GASTRONOMY

The kitchen revolution

Michael Pollan's latest book will be eaten up by the conscious consumers he created, says **Nathan Myhrvold**.

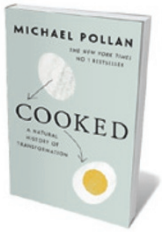
ILLUSTRATION BY ALEX ROBBINS

Michael Pollan is one of the most influential food writers of recent times, and has secured a position as the conscience of a new movement dedicated to local, sustainably produced cuisine. Given this position, it is a surprising admission that until recently he had little interest or skill in the craft of cooking. *Cooked* is the entertaining story of his journey to learn from a series of master cooks, artisan bakers, cheesemakers and brewers.

Pollan is a wonderful writer and his account is told with great wit and humour, which makes for a very entertaining read. The masters he chose are great characters — both in life, and under Pollan's pen.

Other writers have also sought to document their culinary apprenticeships. But *Cooked* has much higher ambitions. "My wager in *Cooked*," Pollan says, "is that the best way to recover the reality of food, to return it to its proper place in our lives, is by attempting to master the physical processes by which it has traditionally been made." This isn't just a well-told tale of how he came to master those processes, it is a book with a mission: to inspire readers to get into the trenches of their kitchens, and to stop letting other people prepare, process and package their meals. It succeeds in making its case, despite occasional lapses.

Many advocacy-oriented books use a direct argument. You should eat this because it is delicious, or because it is fun to make, or because it is healthier. Although each of these is mentioned in *Cooked*, they are sidelines compared with the main purpose: to score intellectual and political points.



Cooked: A Natural History of Transformation
MICHAEL POLLAN
Penguin: 2013. 480 pp. $27.95

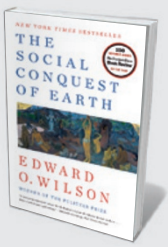
Politically, a strong anti-corporate theme runs through the book, blaming food companies for making us their "prey" with "edible foodlike substances". Much as I agree with Pollan on the sorry state of what is on supermarket shelves, surely we, the eaters, bear at least some responsibility for what we consume.

Intellectually, Pollen grapples, with varying degrees of success, with a fundamental contradiction. On the one hand, he wants to bring food "back to earth" rather than allow it be "abstracted" from the traditional methods and values, the "labor of human hands" or the "natural world of plants and animals". For Pollan, food is meant to be grounded in the context of a traditional kitchen or farmyard; that is how it achieves legitimacy. Yet, on the other hand, he abstracts food by pulling it out of the kitchen and into the salon as a prop in his very philosophical arguments. When he mixes quotes from obscure French philosophers with dialogue from barbecue pitmasters, the result ranges from interesting in some passages to unsuccessful in others. The book's sections mirror the ancient taxonomy of the elements — fire, water, air and earth. But what they are really about is barbecue, bread, beer, pickles and cheese. Put in the patois that his informants might use, if the book is about restoring honesty to food, what's up with the highfalutin words?

In discussing the newfound interest in traditional gastronomy, he asks a rhetorical question: "Can authenticity be aware of itself as such and still be authentic?" It's a very perceptive point in an age in which 'authentic' cuisine — like 'real' southern barbecue or artisanal bread baking — has been seized upon, marketed and branded to a high degree, turning its once humble practitioners into television stars. This is Pollan at his best, honouring tradition while gently calling it into question. In the same

NEW IN PAPERBACK

Highlights of this season's releases



The Social Conquest of Earth
Edward O. Wilson (Liveright, 2013; $17.95)
Distinguished sociobiologist E. O. Wilson asks how social creatures like humans and ants have achieved such evolutionary success. The key, he suggests, is in the way they form communities: with multiple generations, a division of labour and altruistic behaviour. Although Wilson's emphasis on group selection is controversial, this is a masterly amalgam of biology, linguistics, psychology, economics and the arts. (See James H. Fowler's review: *Nature* **484,** 448–449; 2012.)

spirit, I will observe that it is also a question that readers could ask about Pollan's own work, which self-consciously tries to draft on this same authenticity to serve its intellectualism.

Tradition and authenticity are his ideal, but many of his informants aren't as pure as Pollan would like them to be. His barbecue pitmaster uses a proportion of supermarket charcoal, his artisanal baker uses some white flour, his cheesemaking microbiologist nun strikes a nuanced position on raw milk and his pickle guru makes an ersatz kimchi. When this occurs, Pollan wrestles with the issue, sometimes conceding, but often contradicting them or quoting other, more "fundamentalist", sources that call them out for their apostasy.

A scientific perspective on food makes a token appearance, and includes footnotes to papers in scientific journals (including *Nature*). But this is mostly for show; like most books based on traditional cooking, its explanations deviate from scientific accuracy. This book is, at its heart, about what people feel about food, rather than what science has shown to be true.

Pollan's proselytizing that we all ought to cook more can seem a bit strident given that we are living in the golden age of organic, sustainable artisanal local food. Interest in cooking has never been higher (even if many people still don't do it); indeed, that is why Pollan's previous books have been best sellers, as this one is also likely to be. In one passage he marvels that an artisanal baker sells his loaves for only 41 cents more than the giant Hostess Brands sells its Wonder Bread. The unspoken irony is that Hostess itself recently went bankrupt. Times have changed, and many parts of *Cooked* read like a call-to-arms for a revolution that is already well under way, thanks in part to Pollan's previous books. *Cooked* will add to that legacy. ■

Nathan Myhrvold *is chief executive and founder of Intellectual Ventures. He is also the creator and co-author of the award-winning books* Modernist Cuisine *and* Modernist Cuisine at Home.

BIOLOGY

Vive la différence

Suzanne Alonzo relishes a synthesis of the extraordinary variations among males and females of the same species.

Forget men and women being from different planets. In *Odd Couples*, Daphne Fairbairn shows that males and females of many species look almost as if they hail from different galaxies. What is a little friction over whether the toilet seat should be left up or down? You could be a female giant seadevil with a parasitic mate one-fiftieth of your size stuck to you for his entire adult life — or a male garden spider, eaten by your mate after you have broken off your genitals to ensure her fidelity.

Fairbairn, an evolutionary biologist, demonstrates that such differences between the sexes are a fundamental component of biological diversity, affecting everything from an animal's behaviour and appearance to its life expectancy and nervous system. After a general introduction to how this works, Fairbairn spends the bulk of the book on a guided tour of sexual dimorphism in eight carefully selected and researched species, covering two fishes, a bird, a mammal and four diverse invertebrates.

As Fairbairn lucidly explains, the defining distinction between the sexes is that females make eggs and males make sperm. What is harder to understand is how that — along with a species' basic biology and habitat — can drive a cascade of differences in almost every aspect of male and female biology. Whether an organism makes eggs or sperm can affect, for example, the energy it takes to reproduce. This, in turn, affects how much energy each sex has left for growth and survival. Disparities in these, in their turn, alter the body size, habitat use, metabolic rate and reproductive behaviour favoured by Darwinian selection in males versus females. Over time, these effects lead to striking differences in body mass, colour and much more between males and females of the same species. It remains a challenge to understand how these myriad factors interact to shape the striking differences in what it means, across species, to be male or female.

Fairbairn's tour elucidates these points as it entertains. After first exploring the perhaps more familiar patterns found in mammals and birds (elephant seals and the great bustard, species in which males vastly outweigh, and compete for, females), we encounter much stranger creatures. Take the bone-eating tubeworm: deep below the ocean's surface, harems of dwarf males live within the tube-like home of a single, much larger, female. Even more bizarre are the shell-burrowing barnacles, whose long-lived females weigh 500 times as much as the short-lived males. The males never eat, developing into little more than sperm production and delivery machines on finding a female.

A key message here is that the large, flashy males who fight one another for access to numerous small, coy females — as seen in birds and mammals — are not representative of the predominant pattern. Females are larger in 86% of animal classes with sexual size dimorphism, Fairbairn tells us, and in many species the main challenge males face is finding a female. Moreover, Fairbairn emphasizes that selection on males and females differs in a multitude of ways, rather than being primarily due to sexual selection on males (namely, competition among males for access to mates or to fertilize eggs). For example, male shell-carrying cichlid fish are much larger than females of the same species not only ▶

Odd Couples: Extraordinary Differences Between the Sexes in the Animal Kingdom
DAPHNE J. FAIRBAIRN
Princeton University Press: 2013. 312 pp. $27.95, £19.95

Darwin's Ghosts: In Search of the First Evolutionists
Rebecca Stott (Bloomsbury, 2013; £8.99)
Science historian Rebecca Stott probes the intellectual origins of the theory of natural selection, showing that Charles Darwin stood on the shoulders of giants, from Aristotle to Jean-Baptiste Lamarck. (See Andrew Berry's review: *Nature* **485,** 171–172; 2012.)

The Spark of Life: Electricity in the Human Body
Frances Ashcroft (Penguin, 2013; £9.99)
As you read this, ion channels regulate the electrical activity in your neurons and muscle cells. Physiologist Frances Ashcroft offers a brilliant treatment of the 'body electric', mixing research, science history and personal stories.

because reproductive competition among males for territories favours size — but also because selection favours females small enough to fit inside a shell to care for their young.

Finally, although the possible biological origins of human sex differences continue to fascinate, human sexual dimorphism is really not that striking. Men and women are boringly similar in size compared with other primates, and obviously outclassed in the oddity stakes by the other species highlighted here.

Fairbairn has simplified some material and left certain complexities out. For instance, there is nothing on the recent research documenting striking differences between the sexes in gene expression, affecting everything from early development to social behaviour, and little on the fact that we have only just begun to understand how a single genome can produce such diverse forms. But *Odd Couples* is a pleasure to read. There is humour (including an eye-rolling joke or two), but no reliance on the anthropomorphic cuteness so common in popular books on animal behaviour — especially sexual behaviour. There are certainly moments where the author 'geeks out' on the details, and this is part of the appeal. You walk away from this book with a deeper understanding of both these creatures and a biologist's mind.

I am inevitably biased in favour of Fairbairn's theme, having spent my working life trying to understand the amazing diversity of reproductive behaviours. Even so, I found reading the book like taking a holiday in a foreign land with an enthusiastic and expert guide. You will come back with good stories, and a new appreciation of the amazing diversity of life on Earth and the forces shaping it. You may even find your perspective on bigger questions shifting.

As Fairbairn concludes: "The enduring message from all of this is that there is clearly no one way of being a male or a female." When it comes to sex roles, all bets are off in the animal kingdom. ■

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THOMAS JACKSON/STONE/GETTY

GEOLOGY

Written in stone

Ted Nield relishes a deft tracing of the relationship between the rise of geology and the novel in the turbulent nineteenth century.

When we imaginatively recreate the past, we enter a dangerous landscape: we may find ourselves needing a philosophical map. Things become even more treacherous when trying to recreate the ways our ancestors looked back at history. This entails deciphering a palimpsest. Its cartographic vagaries may further distort our hindsight. Adelene Buckland attempts just such a recreation in her book *Novel Science*.

Buckland tries to get inside the heads of the Britons who were writing into existence a scientific geology while developing a great literary form: the nineteenth-century novel. She succeeds triumphantly.

Like their descendants today, the groups driving these two grand projects were not much separated from each other in the late eighteenth and early nineteenth centuries. Victorian geologists, and Charles Lyell in particular, were deeply concerned with evolving appropriate literary and visual forms that would convey their geological discoveries. The creative

NATURE.COM
For more on Charles Dickens and science, see.
go.nature.com/79ckns

Ocean of Life: How Our Seas Are Changing
Callum Roberts (Penguin, 2013; £10.99)
Overfishing, acidification, plastic pollution, biogeographical shifts: marine conservation biologist Callum Roberts lucidly lays out the range of issues affecting the world's oceans. A sobering look at Earth's biggest biosphere. (See Stephen R. Palumbi's review: *Nature* **484,** 445–446; 2012.)

Antarctica: An Intimate Portrait of the World's Most Mysterious Continent
Gabrielle Walker (Bloomsbury, 2013; £8.99)
Science writer Gabrielle Walker unveils Earth's southernmost 'wild lab' in this vivid and accessible mix of researchers' stories and environmental writing. (See Francis Halzen's review: *Nature* **483,** 272–273; 2012.)

act of writing was, for them, as essential a part of scientific practice as any other, and they looked to contemporary writers of fiction for models. Meanwhile, those novelists — beginning with Walter Scott, and later including the likes of George Eliot, Charles Kingsley and even Charles Dickens — drew from the new science of geology and the awareness of deep time that it brought into popular consciousness. They found a new profundity with which to disturb and enrich their narratives.

The evolution of these two fields, geology and literature, mirrored and drove each other. The scientists sought to develop rigour, the novelists to achieve seriousness. 'Romance', in both cases and senses, was the enemy.

Buckland begins by taking us through the emergence of geology from its highly speculative, theoretical roots. In the early to mid-eighteenth century, speculation about Earth's structure and history was the preserve of *Weltall* theorists — system-builders who focused on how the cosmos began. They devised all-encompassing cosmogonies, then cherry-picked their evidence to suit. Even the Scottish geologist James Hutton, whose *Theory of the Earth* (first made public in 1785) ushered in a properly constrained, scientific approach to the rock record, sat within this tradition. But Hutton introduced — and Lyell firmly established — a key principle that University of Cambridge don William Whewell termed 'uniformitarianism' in the 1830s. This doctrine, which holds that all interpretation of the past must refer to processes that can be seen operating on Earth today, remains the central concept that makes geology 'scientific'.

Novel Science: Fiction and the Invention of Nineteenth-Century Geology
ADELENE BUCKLAND
University of Chicago Press: 2013. 384 pp. £29, $45

Within uniformity, however, questions remained — even into our own times. Did today's processes always operate at today's rates? Is the tiny snapshot of human experience an adequate sample of Earth history? And does the occasional rare event leave more of a trace in the record than the long ages that pass in between?

Lyell adhered to an overly strict constancy of rate for Earth processes — perhaps because, as Buckland reminds us, he trained as a lawyer. Using his chief skill of rhetoric, he sought to establish that, on an Earth of extreme age, everyday processes would efface any occasional catastrophe. For Lyell, gradualism was all. Another crucial turning point on the road to rigour and respectability was the foundation of The Geological Society of London in 1807, in whose hallowed halls I work. The society set itself against all theorizing in favour of information-gathering.

> THE DOCTRINE THAT ALL INTERPRETATION OF **THE PAST** MUST REFER TO PROCESSES THAT CAN BE SEEN OPERATING ON EARTH **TODAY** MAKES GEOLOGY 'SCIENTIFIC'.

But the society's literate builders of geology, such as Lyell, William Buckland and William Conybeare, fretted that their science might be embodied in or even traduced by literary forms that militated against the quest for academic dignity. Their loathing of 'theory' led them to suspect any reliance on its narrative analogue, 'plot' — with its emphasis on causality and motive. They reviled popularizers such as Robert Chambers — revealed as the author of the scandalous 1844 book *Vestiges of the Natural History of Creation* only after his death — who succumbed to such literary devices. (Some things don't change much.)

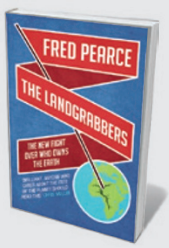
Wishing to purge their science of romance, they sought a drier narrative approach. This could have endangered their mass appeal. Happily, it didn't. Lyell and his peers each assumed the role of the wandering romantic, allowing a public fascinated by their discoveries to picture the heroic geologist — such as the weatherbeaten Adam Sedgwick pausing atop Glyder Fawr, one of Wales's highest mountains, like some human embodiment of painter Edwin Landseer's *The Stag at Bay*.

Meanwhile, contemporary novelists were inserting discursive philosophical elements into their writing. As Buckland argues, Scott did the most to reinvent the novel for his contemporaries as a credible literary form fit for gentlemen to read, as well as ladies. Scott, followed by Elizabeth Gaskell, Eliot, Kingsley and others, distanced their art from the yarn-spinning romancers of yore, such as Laurence Sterne, who cleaved more to the ancient traditions of Miguel de Cervantes and François Rabelais.

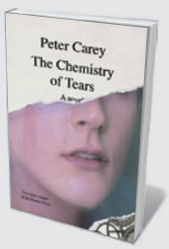
As both groups strove for realism, geologists discovered Scott, and he them. Buckland's book is the story of how they, and successive generations of geologists and novelists, helped one another to write the past into existence. It culminates, for me, in the work of geologist-novelist Kingsley, who even seems to have striven for the fusion of story-line and stratigraphy. Buckland will send you scouring the second-hand bookshops for long-forgotten works.

The relationship between science and literature has proved to be a rich seam of inquiry since 1983, when Gillian Beer produced her seminal book *Darwin's Plots* (Cambridge University Press). In the intervening decades, Earth scientists, with their strong historical bent, have worked with science historians and literary critics to create today's vibrant, culturally integrated field. A few inconsequential slips apart (neither William Buckland nor Conybeare were among the 13 founders of the Geological Society of London), Buckland meets this multidisciplinary challenge well in *Novel Science*. ■

Ted Nield *is editor of* Geoscientist, *the Geological Society of London's monthly fellowship magazine. His next book,* The Forgotten Land, *is expected early next year. e-mail: ted.nield@geolsoc.org.uk*



The Landgrabbers: The New Fight Over Who Owns the Earth
Fred Pearce (Eden Project Books, 2013; £9.99)
Delving into the recent 'land grabs' in developing countries, science journalist Fred Pearce mulls over solutions, such as including African smallholders in the global agricultural economy. (See Wendy Wolford's review: *Nature* **485,** 442–443; 2012.)



The Chemistry of Tears: A Novel
Peter Carey (Vintage, 2013; $15)
The history of science and engineering flavours this moving novel centring on a nineteenth-century automaton. Peter Carey's meditation on time and early 'artificial life' raises questions about what it means to be human. (See Minsoo Kang's review: *Nature* **484,** 451–452; 2012.)

PHYSICS

Clockwork cosmos

Pedro Ferreira ponders a vision of the Universe in which time is paramount.

Theoretical physicist Lee Smolin's recent books have been about crises in physics so catastrophic that physicists need to completely rethink their methods. In his 2006 book, *The Trouble with Physics* (Houghton Mifflin), he stated controversially that a cabal of researchers working on what he thought was a moribund theory of fundamental physics — string theory — was preventing a new generation of clever young thinkers from working on other, rival theories. Through his brilliant writing and articulate arguments, readers took him seriously. One string theorist told me that he struggled to convince non-physicists that he wasn't a charlatan after the publication of Smolin's book.

Now, in *Time Reborn*, Smolin attempts to chip away at basic theories of modern physics. He makes the case that by doing away with time, existing theories are missing a trick. He uses the orbits of planets in the Solar System as an example: each orbit is an ellipse existing in three dimensions. A planet will lie, at some moment, on a point along that track. But its motion can be described without knowing what happens at that particular moment, or at any other. Newtonian physics is essentially timeless.

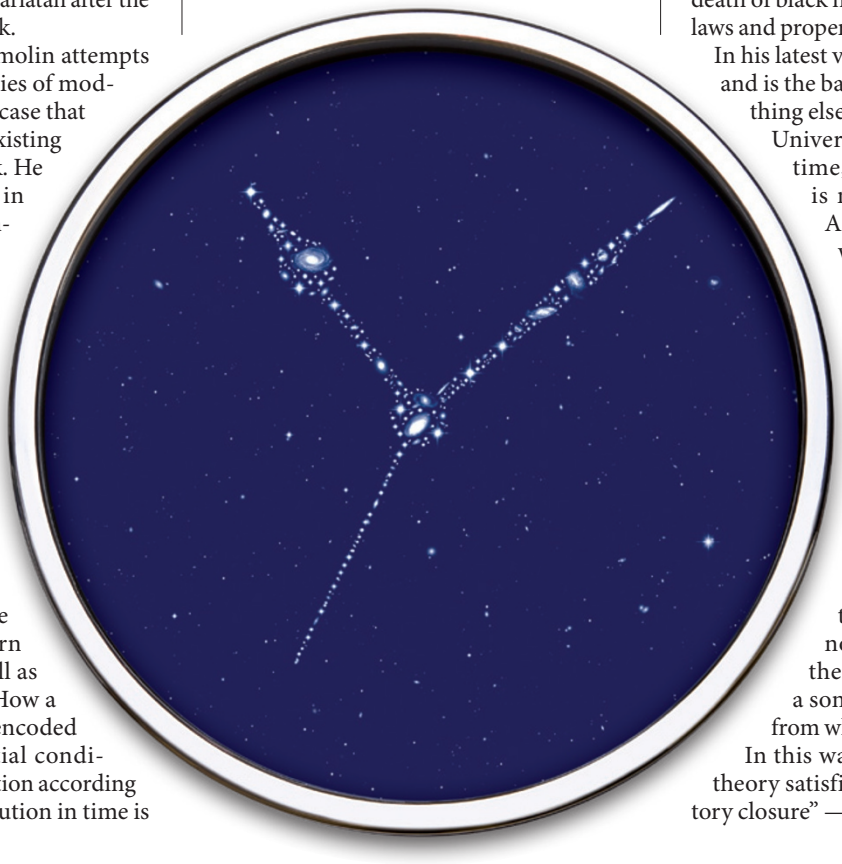
According to Smolin, our picture of a timeless Universe stems from the assumption that all modern physics — quantum as well as classical — is predictive. How a system evolves is entirely encoded in the starting set of 'initial conditions' and their transformation according to the laws of physics. Evolution in time is

Time Reborn: From the Crisis in Physics to the Future of the Universe
LEE SMOLIN
Houghton Mifflin Harcourt: 2013. 352 pp. $28, £20

secondary, a by-product of the theory. This bothers Smolin. A timeless view of reality is, he says repeatedly, incomplete (where do the initial conditions or laws come from?) and, simply, "wrong". He believes that a better description of time lies at the heart of some of the big questions, such as the marriage of quantum physics and general relativity.

Smolin sketches an alternative path for modern physics. Inspired by the ideas of Brazilian philosopher and political theorist, Roberto Mangabeira Unger, who argues that social structures emerge without an underlying natural order or guiding principle, Smolin develops some of the ideas behind his first book, *The Life of the Cosmos* (Oxford University Press, 1997). In it, he argued that the Universe evolved through natural selection, mediated by the birth and death of black holes, to give us the physical laws and properties we measure today.

In his latest vision, time reigns supreme and is the backbone from which everything else emerges. Each state of the Universe pops up somewhere in time, from what the Universe is made of to what it does. A prime example is space, which — echoing some of the ideas put forward by different schools of quantum gravity — emerges not as a fundamental entity, but as a tapestry of connections between events happening over time. More importantly for Smolin, none of the laws or principles that we have discovered over the centuries constitute the bedrock of physics, nor are any perennial. On the contrary, they emerge in a somewhat unpredictable way from what is going on at each time. In this way, he says, his embryonic theory satisfies a "principle of explanatory closure" — there is no need to invoke



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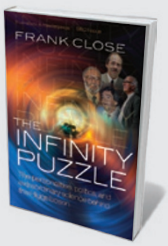
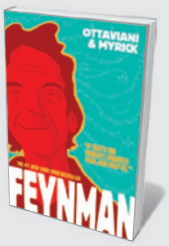


The Infinity Puzzle: The Personalities, Politics, and Extraordinary Science Behind the Higgs Boson
Frank Close (Oxford Univ. Press, 2013; £10.99)
Particle physicist Frank Close pins down the elusive Higgs boson in this account of the search that led up to its 2012 discovery. With a Nobel prize in the offing, the vexed question of credit adds edge. (See Edwin Cartlidge's review: *Nature* **478,** 315–316; 2011.)



Feynman
Jim Ottaviani and Leland Myrick (First Second, 2013; $19.99)
The playful creativity and genius of theoretical physicist Richard Feynman are brilliantly brought to life in Jim Ottaviani's graphic biography, illustrated by Leland Myrick. (See Marc Weidenbaum's Q&A: *Nature* **477,** 32; 2011.)

any external laws or initial conditions.

It is a tall order, and if Smolin's theory is to work, then all the great experimental discoveries in physics — from elliptical planetary orbits to the Higgs boson — need to be incorporated. Hallowed theories such as quantum physics and relativity must be dismantled and some radically new way of explaining how the Universe evolves must come into play. Smolin shies away from actually telling us what that new way is, because he doesn't seem to know himself. All he can do is to explain how different his theory must be from everything we have done before.

To explain why anything can be predicted at all in such a lawless Universe, Smolin invokes reproducibility: if a physical process has happened in a certain way before, it will happen in the same way again. We can predict what will happen if we have some familiarity. But, Smolin notes, there will be situations that we have never seen before, in which it will be impossible to predict the outcome.

Writing a book is a well-worn way of presenting a provocative theory that is still in its infancy. Smolin, a respected physicist with a track record of best-sellers, has a privileged platform for promoting his ideas, similar to Arthur Eddington, Erwin Schrödinger or Fred Hoyle before him. Books can, however, feel reckless without the filter of the (albeit flawed) peer-review process.

Yet I enjoyed *Time Reborn*. Smolin is an excellent writer, a creative thinker and is ecumenical in the way he covers so many different branches of thought. Even as I mentally argued with this book, I kept on ploughing through to see how Smolin dealt with the objections. I would love to sit down with him over a drink and debate the ins and outs of his theory. And that is how this book should be read: as an account that makes you ask questions. ■

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ILLUSTRATION BY ALEX ROBBINS

NEUROSCIENCE

Drugs to build a better brain

Anjan Chatterjee probes a cognitive-enhancement primer.

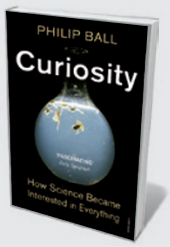
Decisions can be as trivial as which coffee to order or which wine to buy, or as consequential as who to marry or which job to accept. Yet even the most profound choices are rarely made on strictly logical grounds. We don't weigh up pros and cons and dispassionately pick the best course of action. Our emotions and attitude to risk, how a situation is framed and the time available all influence our final choices.

In *Bad Moves*, Barbara J. Sahakian and Jamie Nicole Labuzetta lay out the neuroscience of how people make decisions and the ethical quandaries that accompany the use of drugs to enhance cognition. Their slim book is admirable in reviewing these important topics, but it does little to explore the wider view of how emotions can be regulated by drugs.

Sahakian, well known for her research on the neuropsychology of affective and cognitive systems, and neurologist Labuzetta use people with dementia, depression, mania and phobias, who tend to make poor decisions, as exaggerated examples of how we can all err. Abnormal functioning of the frontal lobes and deep limbic structures in the brains of people with these disorders disrupts their emotional control and thus decision-making ability.

Bad Moves: How Decision Making goes Wrong, and the Ethics of Smart Drugs
BARBARA J. SAHAKIAN AND JAMIE NICOLE LABUZETTA
Oxford University Press: 2013. 192 pp. £14.99

After discussing decision-making processes in the brain, Sahakian and Labuzetta explore cognitive enhancers. They focus on cholinesterase inhibitors and stimulant medications that can improve memory, sharpen attention and boost concentration. Such 'smart drugs' raise an ethical question: if drugs developed to treat people with ▶



Curiosity: How Science Became Interested in Everything
Philip Ball (Vintage, 2013; £9.99)
Humanity's burning urge for knowledge drives science. Philip Ball's scintillating history of curiosity brims with treats — such as seventeenth-century philosopher Francis Bacon's use of a Pan myth as an allegory for the quest to learn from nature.

Genentech: The Beginnings of Biotech
Sally Smith Hughes (Univ. Chicago Press, 2013; $16)
The history of Genentech, the company that kick-started the biotech industry, is compellingly told by Sally Smith Hughes. Studded with in-depth portraits of its pioneers. (See Linnaea Ostroff's review: *Nature* **478,** 456; 2011.)

cognitive disorders can also make people with healthy brains smarter, should we use them?

There is no simple answer. Smart drugs can make us more efficient and productive, which may be a good thing for society. But there are many reasons to be cautious. The long-term safety of ingesting these drugs is not fully known, although stimulants can be addictive. Easy rewards from these medications undermine the value of hard work and threaten our ideas of authenticity. And the availability of such drugs could compromise our liberties.

We could feel compelled to use drugs of this kind if all those around us are taking them and appear more productive. We might even insist that some people, such as commercial pilots and medical residents, take cognitive enhancers. And variations in access to smart drugs could raise concerns of fairness and justice, particularly if the advantages they confer are available disproportionately to the rich.

Although the book's themes are timely, the link between them is not transparent. After the authors make the convincing case that emotional dysregulation can cause us to choose badly, I expected a discussion about our ability to regulate emotions chemically. Surprisingly, the authors make no mention of antidepressants, anxiolytics and mood stabilizers, and the ethics of their use in healthy people. As a result, Sahakian and Labuzetta's diagnosis of the emotional source of bad decisions is disconnected from potential interventions.

Nonetheless, *Bad Moves* offers a good introduction to issues that affect us all. As the authors astutely point out, academics are not the final arbiters of the ethics of cognitive enhancement — these are societal concerns. With this accessible primer, full of medical anecdotes and clear explanations, Sahakian and Labuzetta prepare the public for an informed discussion about the role of drugs in our society. ■

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ILLUSTRATION BY ALEX ROBBINS

CULTURE

Of Genesis and genetics

Tim Radford revels in a masterly take on science invoked by the Bible.

The Serpent's Promise is a believer's book. It expresses belief in the power of language, imagination, scholarship, high art, enduring myth, tribal tradition, unforgettable poetry, irrational vision and inspired insight. If you wanted to find all of these things between just one set of covers, you might pick up the Authorized Version of the Bible; but this is a not a book by somebody who believes in God. It is a book by the distinguished geneticist, broadcaster, lecturer, writer and Welshman Steve Jones, who has a sharp awareness of moral imperative and a warm feeling for those Joneses before him who invoked the bread of heaven and yearned to be safe on Canaan's side. It is the ambivalence at the heart of this book which makes it so hugely enjoyable and, perhaps, so important.

Jones' story is not of the science of the Bible, but of the science invoked by the Bible. The Good Book (his words, his capitals), he says, was always more of a guide

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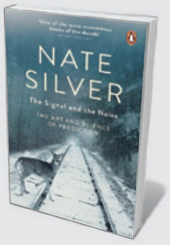
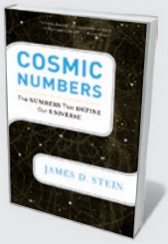
For Mark Pagel on Steve Jones's *Almost Like a Whale* see:
go.nature.com/ca6kzj



The Signal and the Noise: The Art and Science of Prediction
Nate Silver (Penguin, 2013; £8.99)
Statistician Nate Silver reveals how 'noise', a random component of data, often clogs up the complex process of forecasting. Silver makes a convincing case for a Bayesian approach (See Paul Ormerod's review: *Nature* **489,** 501; 2012.)



Cosmic Numbers: The Numbers that Define Our Universe
James D. Stein (Basic Books, 2013, $15.99)
Key numbers in physics, chemistry and astronomy star in this mathematical history. James D. Stein captures ideas from luminaries such as Isaac Newton and Johannes Kepler to characterize these 'universal' measurements.

book, "a handbook to comprehend the world … it sits firmly in the genealogy of ideas. Science is its direct descendant." In each chapter he takes a text — from Genesis or the Gospel of John, from Ecclesiastes or Matthew, from Exodus, Leviticus, Job and so on — as the starting point for a rationalist sermon on a biblical theme. So Jones uses Genesis 6:4 ("There were giants in the earth in those days") as a springboard less for talking about Goliath than for using "the power of science to illuminate myth" and for discussing the growth-hormone disorder acromegaly, linked to tumours of the pituitary gland. The long life described in Ecclesiastes 11:8 prompts reflections on insulin, the French paradox (high consumption of saturated fats coupled with low rates of coronary heart disease), the joys of red wine, the connections between sex and death and the enhanced lifespans of castrati.

His choice of stories from the Bible (Noah's Ark and the flood, Joseph in Egypt and the years of plenty and famine, among others) are no surprise. The delight is in the delivery — often witty and laconic, always generous. He does not waste much energy on the three great mysteries resolved with such confidence in Genesis ("the world's first biology textbook"): science may never be able to explain why the Universe happened at all, precisely how life began or what exactly turned an omnivorous foraging African bipedal primate into a creature with a taste for abstract speculation. The reward arrives with all those other Biblical preoccupations — Eden, a homeland, long-lived Methuselah, dietary rules that distinguish one group from another, the treatment of leprosy, the emerods or swellings with which God smote the Philistines, and ancient and modern insurance policies. ("Noah, unlike his feckless fellows," writes Jones with a characteristic flourish "was seen as a good bet in the eyes of the Lord and quite soon, his policy paid off.")

The Serpent's Promise: The Bible Retold As Science
STEVE JONES
Little, Brown: 2013. 448 pp. £25

He is, of course, terrific on genetics. Jewishness is historically defined by descent, and the Bible is big on begetting. The stories told in human DNA sometimes square with tradition, and sometimes do not. Yes, the human race was all but extinguished — but perhaps more than once. Yes, the mutations in the male Y chromosome point back to a single progenitor in Africa 100,000 years ago. But the mother of all humans — the only one whose daughters all had daughters — lived in Africa 200,000 years ago. Adam and Eve can never have met, "let alone have committed the first and perhaps least original of all sins".

About half of all the Ashkenazim, the biggest group of Jews, share descent from just four women (the number of women who survived on the Ark, Jones teasingly reminds us). Half of all Russian males have a Y chromosome linked to the historical Arya people of Iran. But this is not the case in Germany — Teutonic purists of the early twentieth century who claimed Aryan supremacy in fact shared their chromosomes with people in the Middle East. They had on average a closer tie with the Jewish men they despised than with the Arya. Almost all native Britons can trace descent from a single anonymous individual who lived around the thirteenth century. The most recent universal common ancestor for the entire planet dwelt about 100 generations ago in the Bronze Age, perhaps around the time of the destruction of Solomon's Temple in Jerusalem in 600 BC. As we count back through the generations, our ancestors multiply. But populations were smaller, so we begin to share forebears. We have roots in common, says Jones: "Ancestry is a forest not of pines but of mangroves."

THAT IS THE PROBLEM WITH HUMANS. THEY CAN INTELLECTUALLY ENDORSE ONE THING AND STUBBORNLY LOVE ANOTHER.

In 1999, in *Almost Like a Whale* (Doubleday), Jones updated Darwin, starting each chapter with Darwin's own words: hardly an impertinence, given that every evolutionary biologist updates Darwin. *The Serpent's Promise* cannot advance divine revelation, but it offers a new context for old myths. It is of course superbly written by someone who quotes historian Edward Gibbon, Marxes Karl and Groucho, Mark Twain, James Boswell and Giovanni Boccaccio, and gourmet Jean Anthelme Brillat-Savarin with the casual ease of an omnivorous reader. This book is not an overt condemnation of religious belief: skilfully, it selects stories that have informed Western culture for 2,000 years to illuminate modern research, and Jones ends with an envoi on behalf of a future enriched by "an objective and unambiguous culture whose logic, language and practices are permanent and universal. It is called science."

I don't think even Jones believes that things are going to work out that way, if only because he also begins each chapter, and the book, with illustrations by William Blake, "who demonstrates, better than almost anyone else, the power of sacred imagery to move even those who do not share his convictions". That is the problem with humans. They can intellectually endorse one thing and stubbornly love another, which is why *The Serpent's Promise* is more than just another science book, and all the more humane for its wider dimension. ■

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Wired for Culture: The Natural History of Human Cooperation
Mark Pagel (Penguin, 2013; £9.99)
Culture has shaped us, besting even genes, says evolutionary biologist Mark Pagel. Full of gems, such as the similarities between 'tree' diagrams for languages and for related species. (See Peter Richerson's review: *Nature* **482,** 304–305; 2012.)

Breasts: A Natural and Unnatural History
Florence Williams (W. W. Norton, 2013; $15.95)
In this meticulously researched environmental history, Florence Williams covers the human breast from puberty to menopause and beyond. Fascinating, from its unique development to the toxins lurking in breast milk. (See Josie Glausiusz's review: *Nature* **485,** 306–307; 2012.)