



JOE RAEDLE/GETTY

A DNA-sample library.

## GENETICS

# CRISPR's willing executioners

**Nathaniel Comfort** lauds a sociologist's study of the bias baked into the nature–nurture debate.

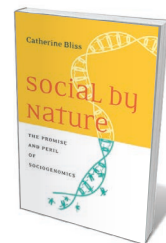
In the beginning, there was nature. Then the statistician Francis Galton — Charles Darwin's half-cousin — set nature (heredity) in opposition to nurture, or environment. Galton treated heredity as a family treasure, tucked away in the gametes, shielded from the buffeting environment and passed down the generations. Applying this idea to what he perceived as the degeneration of English manhood, Galton coined a haunting but familiar term: eugenics.

Thus, the nature–nurture binary has been linked with hereditarianism and eugenics from the start. This trio flares up from time to time, for instance in early-twentieth-century eugenics, 1970s sociobiology and the controversial 1994 book on intelligence by Charles Murray and Richard Herrnstein, *The Bell Curve* (Free Press). History doesn't repeat itself, but it winds.

The latest turn of the helix is 'sociogenomics'. This uses genome-wide

association studies, high-speed sequencing, gene-editing tools such as CRISPR–Cas9 and baroquely calculated risk scores — often combined with social-science methods — to 'understand' the 'roots' of complex behaviour. In *Social by Nature*, sociologist Catherine Bliss anatomizes the field.

Bliss looks at the science, the professional social structures and the social context of these new developments. She seeks social explanations of why the nature–nurture binary persists in the face of DNA-sequence data that once promised to erase it. Sociogenomics has great biomedical potential, she believes; but the path towards that reward runs along a knife edge, with cliffs of eugenic risk on either side. It is a brilliant book — dense at times, but insightful



**Social by Nature: The Promise and Peril of Sociogenomics**  
CATHERINE BLISS  
Stanford University Press: 2018.

and filled with illustrative anecdotes and case studies. It's one you should read if you care about what drives academic research, scientific racism or genetic futurism.

Sociogenomics follows many patterns familiar from previous moments of heightened genetic determinism, such as sociobiology, behavioural psychology or the debate ignited by *The Bell Curve*. But Bliss argues that, this time, it's different. She suggests that genetic methods have never promised so much, while delivering so little. As a historian, I see more consistency in the promises of human genetics over time; nevertheless, Bliss's findings are striking.

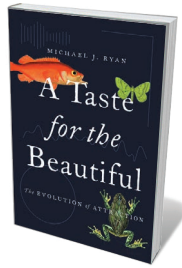
She notes, for example, a special issue of the journal *Biodemography and Social Biology* from 2014 (see [go.nature.com/2qnovjh](http://go.nature.com/2qnovjh)) concerning risk scores. (These are estimates of how much a one-letter change in the DNA code, or SNP, contributes to a particular disease.) In the

**“Sociogenomics has great biomedical potential, but the path towards that reward runs along a knife edge.”**

issue, risk scores of between 0% and 3% were taken as encouraging signs for future research. Bliss found that when risk scores failed to meet standards of statistical significance, some researchers — rather than investigate environmental influences — doggedly bumped up the genetic significance using statistical tricks such as pooling techniques and meta-analyses. And yet the polygenic risk scores so generated still accounted for a mere 0.2% of all variation in a trait. “In other words,” Bliss writes, “a polygenic risk score of nearly 0 percent is justification for further analysis of the genetic determinism of the traits”. If all you have is a sequencer, everything looks like an SNP.

What the historian Andrew Hogan has called the “genomic gaze” isn't the fault of individual bad-guy researchers: it's structural. Bliss is careful to acknowledge the good, even noble intentions of many of the scientists she spoke to (as a sociologist, she keeps the names of her ‘informants’ confidential). But she finds that the funding and publicity mechanisms integral to biology drive it towards genes-first explanations. The stakes are high: finding an SNP associated with a risk increase from 0.01% to 0.03% (a threefold rise) for a disease such as breast cancer could make a career. “While researchers do not intend to lift the focus off of the environment,” Bliss writes, “they are forced to recast social phenomena as ‘evolutionary phenotypes’ so that they can make scientific claims” that sound relevant to biomedical funders. ▶

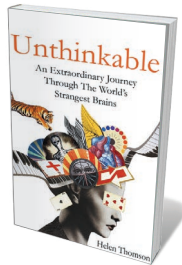
## Books in brief



### A Taste for the Beautiful: The Evolution of Attraction

Michael J. Ryan PRINCETON UNIVERSITY PRESS (2018)

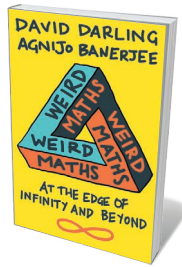
In terms of sexual selection, the iridescent bling of a peacock's tail is just another lure in an array of animal arias, odours and ornaments. And as Michael Ryan argues in this lucid study, such beauties reside “in the brain of the beholder”. Kicking off with his research on the tiny Central American túngara frog (*Engystomops pustulosus*), the males of which emit a complex call, Ryan examines sexual beauty in all its sensory forms, as well as fickleness, hidden preferences and experiments with quail that could shed light on the predilection for pornography.



### Unthinkable

Helen Thomson JOHN MURRAY (2018)

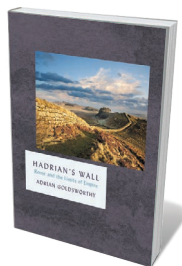
Botched surgery, accidents, mutations and disease: as Helen Thomson reminds us in this exploration of rare neurological conditions, trauma has told us much about the brain. She neatly integrates sensitive interviews with patients into current research on their conditions and historical case studies. We meet, for instance, Sharon, who cannot generate mental maps and feels permanently ‘lost’; and Graham, who believed he was dead (Cotard's syndrome) for three years. The result is a stirring scientific journey, a celebration of human diversity and a call to rethink the ‘unthinkable’.



### Weird Maths

David Darling and Agnijo Banerjee ONEWORLD (2018)

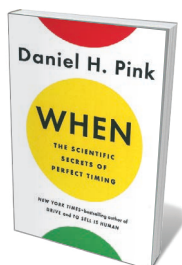
This frolic on the wilder shores of mathematics, by astronomer David Darling and maths prodigy Agnijo Banerjee, aims to bolt the way-out to the day-to-day. It succeeds. After playing with the question of whether the cosmos is innately mathematical, or just looks that way, Darling and Banerjee plunge into the deep. Here, they surf the big waves: invigorating concepts such as how to see in four dimensions, the inner structure of the Mandelbrot set of fractals, the musical scales of alien cultures, Georg Cantor's work on hierarchies of infinity and the uncomputably huge Rayo's number.



### Hadrian's Wall

Adrian Goldsworthy HEAD OF ZEUS (2018)

Stretching just over 100 kilometres coast to coast across the north of England, Hadrian's wall is a pipsqueak compared to the Great Wall of China. Yet the barrier, begun in AD 122, is a stunning testament to Roman engineering in a far-flung corner of the empire. As historian Adrian Goldsworthy explains in this succinct study, its real purpose (protection from Picts, or display of power?) remains enigmatic, but much else is known. He follows the emperors who put their stamp on ‘Britannia’, and explores the wall and its garrisons up to the fifth century, when Germanic tribes fatally disrupted Roman rule.



### When

Daniel H. Pink RIVERHEAD (2018)

When is the best time to start a relationship, change career or eat dinner? Daniel Pink analysed 700 studies in anthropology, endocrinology, social psychology and beyond to probe the science of timing. He unpicks compelling patterns: why medical malpractice and harsher judicial rulings cluster in the afternoon; how we pay too much attention to endings; which circumstances favour synchronization in teams. And he includes handy ‘time-hacking’ advice on how to put the insights divulged into practice. *Barbara Kiser*



ROBERT FRANKLIN/SOUTH BEND TRIBUNE VIA AP

Students at the University of Notre Dame in Indiana protest outside an event featuring the author of a controversial book on intelligence.

► This tendency has social implications. ‘Just-so stories’ abound, reinforcing toxic stereotypes. For example, Bliss cites peer-reviewed work speculating that violence might get men more sex. And prevention can grade into genetic surveillance: after the 2012 mass shooting at Sandy Hook Elementary School in Newtown, Connecticut, the state asked a geneticist to examine gunman Adam Lanza’s genome for markers that might have predisposed him to violence.

Bliss handles sensitive categories such as race, gender and sexuality with subtlety, examining the interplay of peer-reviewed articles and their media coverage. For example, she notes that most social-genomics papers “make rote references to racial differences without defining what they mean”. She observes that mass-culture gender norms, by contrast, inflect peer-reviewed articles, demonstrating that culture shapes science as well as the reverse.

Some of Bliss’s informants even contemplate the creation of DNA-based social strata. “You know,” one reports a colleague saying, “it’ll be great when we can have the janitors just be janitors.” Shades of Aldous

Huxley’s *Brave New World*: I’m so glad I’m a Beta.

Genetic determinism, then, isn’t just spread over genomics like poisoned icing. It’s baked into how we fund, conduct and disseminate research. Unlike the optimists who claim that individualism and the free market immunize us against eugenic evils, Bliss sees both as rife with eugenic risk. The medical marketplace helps to reify the idea that your genome is

your true identity. It lends scientific authority to efforts to find ‘objective’ answers to impossible, hopelessly social questions about, say, IQ. Direct-to-consumer advertisements often target children or parents. The Children’s Palace in Chongqing, China, for instance, hosts a “genetics summer camp” for children aged 3–12 that claims to identify and then to develop ‘traits’ such as sporting and musical ability.

I’m less convinced than Bliss that this genocentrism is new to the genomic age.

I readily concede that genomics gives new power to hereditarian explanations of human behaviour, and that our culture is newly conducive to ‘gene-for’ research. But much of what she describes sounds to me like determinism in a new context.

What Bliss does brilliantly is analyse the mechanisms by which genetic determinism is an outcome of the research endeavour itself. Her most searing conclusion is that scientists and journalists can understand that nature and nurture are not zero-sum, can even strive to strike essentialist language from their work, and yet can still serve the god of genetic determinism. Driven by capital, individualism and the lure of interdisciplinarity, we may be opposed to the ideology and yet willingly participate in its prosecution. In historical context, that is a haunting thought. ■

**Nathaniel Comfort** is professor of the history of medicine at Johns Hopkins University in Baltimore, Maryland, and is the author, most recently, of *The Science of Human Perfection*. He is working on a biography of DNA.  
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