



Michael Mann has been harassed personally and politically over his work on climate change.

CLIMATE SCIENCE

At the storm front

Simon Lewis gets to grips with a climate scientist's account of a conflict that began with a graph.

How would you feel if a powerful politician demanded, with apparent legal authority, that you supply him with every piece of scientific data you had ever collected, every computer program you had written, and every detail that would allow his staff to replicate your work? How would you feel if an envelope of suspicious white powder was posted to you — and the police sealed your office? And if your family was threatened with violence?

Michael Mann knows how he would feel: he experienced all this after publishing a

scientific paper. His *The Hockey Stick and the Climate Wars* tells the story of one of the most harassed scientists in the United States.

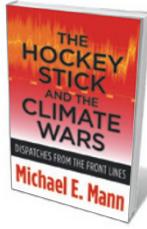
The book begins slowly, moving from happy anecdotes of childhood computer programming to the joys of responsibility-free postdoctoral research. But it becomes riveting when we reach what was in retrospect the turning point in Mann's life: his 1998 paper 'Global-scale temperature patterns and climate forcing over the past six centuries' (M. E. Mann *et al.* *Nature* **392**, 779–787; 1998).

Mann's study used proxy climate records, such as tree-ring growth and the ratios of oxygen isotopes in corals, to make estimates of surface air temperature extending back to AD 1400 — long before direct thermometer measurements were available. The results showed that in the Northern Hemisphere, temperatures were higher in the last years of the twentieth century than at any time in the previous 600 years, and that the suspected dominant cause was anthropogenic carbon dioxide emissions.

Mann's result came to be known as the hockey stick, because the key graph showed a flat 'handle' — the low-level natural oscillations in temperature in the centuries before humans began to create large quantities of greenhouse gases — and a 'blade' representing the sharp uptick in surface air temperature in the twentieth century. The work invoked the ire of lobby groups opposed to political action on climate change, who launched an astonishing decade of attacks on the veracity of the result. The bulk of Mann's book documents this ugly debate.

Mann ably dissects how ideologically driven, industry-funded campaigns attack climate scientists and their work to obstruct the formulation and implementation of policies restricting CO₂ emissions. We learn about Mann's bemusement when he is first assailed, and later his resigned anger. After telling how, in 2006, a US National Academy of Sciences panel found no evidence that Mann's hockey stick was flawed, he notes dryly that one "might think that this would have ended such charges once and for all. One would be wrong."

The influence of lobby groups on public perception of scientific issues is covered in more scholarly detail in the 2010 book *Merchants of Doubt* (Bloomsbury) by historians Naomi Oreskes and Erik Conway. However, Mann's shocking first-hand testimony of the repeated attempts to discredit him and his work gives his book power. Mann reports his 'highs', such as when more than 30 scientific organizations declared their support for him after Senator Joe Barton (Republican, Texas) sent him an aggressive letter demanding, among other things, copies of his records. And we get the 'lows' of what Mann calls the "most malicious of the assaults": the publication in November 2009 of a cache of e-mails, including some from Mann, that had been stolen from the University of East Anglia in Norwich, UK.



The Hockey Stick and the Climate Wars: Dispatches from the Front Lines

MICHAEL E. MANN
Columbia Univ. Press:
2012. 384 pp. \$28.95,
£19.95

Although there is little in the book with which I seriously disagree, it left me uneasy. Many scientists will agree with Mann's three basic points: that climate change is a major societal problem; that there are campaigns to convince the public that this is not the case; and that scientists should engage with society and not allow the public to be "confused and misled by industry-funded propaganda".

However, I am unconvinced that presenting the attacks as a "climate war" waged by a "corporate-funded denial machine" is the best way to help scientists to counter misinformation. It makes good copy, but the war metaphor, with its talk of battle scars and front lines, is unlikely to be an ideal communication strategy: it is, by definition, polarizing. Because denial that climate change poses a problem for society is associated mainly with right-wing political views, science communication needs to transcend ideological divides, not reinforce them.

Last year saw the end of a similarly ugly climate-change spat, following an ideology-transcending innovation that Mann does not mention. After years of bitter dispute about estimates of the warming documented by direct thermometer measurements, the Berkeley Earth Surface Temperature project

in California brought together vocal critics of past analyses and experts who were unconnected with those previous studies. They collated, processed and published raw data, results and associated computer code.

Unsurprisingly, the results confirmed previous analyses. This reminded the public of an important result, provided a well-publicized vindication of it and, by involving key critics, dealt deftly with those who choose to confuse the public. A comparable effort to estimate the past millennium's surface air temperature could be similarly decisive.

An influential Editorial in *Nature*, cited by Mann, noted that climate scientists are in a "street fight" (*Nature* 464, 141; 2010) — imagery that I think is more apt than that of war. Street fighting is not about taking sides, and the metaphor describes well the 'anything goes' attacks that scientists can face when publishing or speaking about climate change.

Mann's story is important. However, it is also important to step back from the conflict. Emphasizing a binary war might not be the best way to end it. ■

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Books in brief



Opium: Reality's Dark Dream

Thomas Dormandy YALE UNIVERSITY PRESS 376 pp. \$40 (2012)

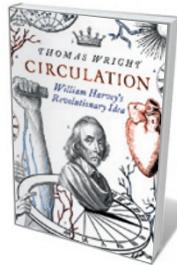
'Poppy tears' — the sap of the opium poppy — are aptly named: the drug has enslaved multitudes and sparked violence for 6,000 years. Yet opium and derivatives such as morphine and heroin have been stars of medicine and inspired greats such as the Romantic poet Samuel Taylor Coleridge and, more arguably, surgeon William Stewart Halsted. Those stories are threaded through medical historian Thomas Dormandy's engrossing chronicle, but we're never far from the shadows — the dosing of infants in Victorian England, the torments of addiction, and wars in Afghanistan and China.



Megachange: The World in 2050

Edited by Daniel Franklin and John Andrews PROFILE/WILEY 320 pp. £15/\$34.95 (2012)

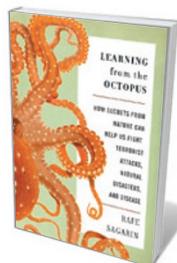
The Economist editors Daniel Franklin and John Andrews give the "helicopter view" of where the world will be by mid-century. Aiming to pin down the trends forcing "megachange", they offer 20 chapters that make predictions in everything from public health and women's welfare to social networking, climate change and, inevitably, economics. This succinct, pithy resource has surprises: by 2050, China's gross domestic product will be 80% more than the United States's, for instance; and the world's total fertility rate could stabilize.



Circulation: William Harvey's Revolutionary Idea

Thomas Wright CHATTO & WINDUS 272 pp. £16.99 (2012)

It is easy to forget that William Harvey's great theory on the circulation of blood was as groundbreaking as Copernicus's on the Solar System. Working mainly from dissections and vivisections, Harvey also drew insight from his observations of networks and systems in transport and technology. Author Thomas Wright's account has a brilliant cast — including John Donne, the great metaphysical poet and dean of St Paul's Cathedral, London, whose interest in anatomy and the human heart drew him to Harvey's work. A classic example of how great science affects culture, language and politics.



Learning from the Octopus: How Secrets from Nature Can Help Us Fight Terrorist Attacks, Natural Disasters, and Disease

Rafe Sagarin BASIC BOOKS 320 pp. \$26.99 (2012)

How are tide pools linked to national security? Ecologist Rafe Sagarin says that adaptability in nature — particularly in the octopus — exemplifies key defence principles. For example, the cephalopod has both attack and defence capabilities, with a powerful bite and inky camouflage, and its flair for escapology in the lab shows that it can handle a change in environment. Drawing on life science and evidence from the military and emergency services, Sagarin defines adaptability as the "sweet spot" between reaction and prediction.



Clouds That Look Like Things: From the Cloud Appreciation Society

Gavin Pretor-Pinney SCEPTRE 112 pp. £12.99 (2012)

Anyone who has spent long minutes staring idly into the blue will relish these bingo moments gathered by Gavin Pretor-Pinney, author of *The Cloudspotter's Guide* and *The Wavewatcher's Companion*, which won the 2011 Royal Society Winton prize for Science Books. From Alfred Hitchcock to flying saucers and a menagerie of beasts, Pretor-Pinney's gallery of evanescence is a reminder of the simple joy of perception.