

man invited his father's brother-in-law, his brother's father-in-law, his father-in-law's brother, and his brother-in-law's father. Others were in the form of fallacies to debunk. Dodgson once asked a 14-year-old boy to find the flaw in his proof that $2 + 2 = 5$, which Wilson reveals to be a stealthy division by zero. A few problems hinged simply on a pun.

Later in life, Dodgson taught symbolic logic with a board game that used red and grey counters on a set of nested squares, which he believed superseded the overlapping circles championed by British logician John

symmetrical poem that can be read vertically and horizontally.

Lewis Carroll in Numberland is not a conventional biography. Robin Wilson has winnowed Dodgson's prodigious output into a first-rate scrapbook of proofs and puzzles. Sadly, his tone is often fawning and flat — not up to the standard of mathematical storytelling he set in his previous book, *Four Colours Suffice* (Allen Lane, 2002), on the history of the conjecture that four colours can fill any map without any bordering countries sharing a colour. By immersing us in Dodgson's correspondence, however, Wilson conjures the spirit of a man who delighted in paradox yet insisted on precision, who held fiercely to the ancients while straining to understand the world around him, and who wanted most of all to stump everyone he knew. Writing for work or pleasure, for children or adults, Wilson shows that Dodgson turned the most sober of problems into child's play.

"Some perhaps may blame me for mixing together things grave and gay," he wrote as Lewis Carroll in an insert to his nonsense poem *The Hunting of the Snark*. But, he continued, "I do not believe God means us thus to divide life into two halves."

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an algorithm that could give the date of every Easter Sunday until 2499.

Sooner or later every child who knew Dodgson would receive a brain teaser. Published in collections with titles such as *A Tangled Tale* and *Pillow Problems Thought Out During Sleepless Nights*, many of these word problems required the dutiful application of algebra, trigonometry or geometry. Some needed mere patience and common sense. One devious puzzle asked how many guests would come to a dinner party if a

Venn. In Dodgson's *Game of Logic*, published under his pen name to gain a wider audience, one can see some of the punctilious lunacy of the Mad Hatter. Following chains of inference he called 'sillygisms', he led readers from reasonable premises to conclusions such as "Babies cannot manage crocodiles", "No banker fails to shun hyaenas" and "No bird in this aviary lives on mince-pies". These examples are perhaps less interesting as logic than as the stirrings of a systematic kind of literature, also apparent in his

The creationist controversy

Only a Theory: Evolution and the Battle for America's Soul

by Kenneth R. Miller
 Viking: 2008. 256 pp. \$25.95

The United States has a big problem: although we maintain a strong scientific establishment, competitive with the rest of the world in many fields, we also have some of the most backwards proponents of superstitious nonsense in both our electorate and at the highest levels of politics. It is an embarrassment to host laboratories that are at the forefront of scientific research in the same country where presidential

candidates are discussing whether Earth is really 6,000 years old as some Bible scholars say, or whether they believe in evolution.

Science and evolution have an advocate in Kenneth Miller, one of North America's eminent knights-errant, a scientist who is active in defending evolutionary theory in the conflict between evolution and creationism. He has been at the centre of many recent debates about science education, most prominently testifying against intelligent design creationism in Pennsylvania's Dover trial, which decided that intelligent design was a religious concept that should not be taught in public

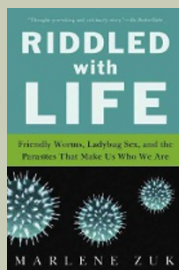
schools. He is also a popular speaker, offering the public a grass-roots defence of good science education. Miller's new book *Only a Theory* is a tour of creationist misconceptions about evolution, such as the one referred to in the book's subtitle — a creationist predicted an inevitable victory in the Dover trial because evolution is "only a theory". The book is also a celebration of the power of evolutionary theory to explain our existence.

Miller is a fine writer who sharply addresses the details of the arguments about intelligent design creationism. When tackling old chestnuts such as the "only a theory" complaint, or Michael Behe's argument for a maximum limit for the number of genetic mutations, or William Dembski's rehash of William Paley's

Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites That Make Us Who We Are

by Marlene Zuk
 (Harvest, \$14, £8.99)

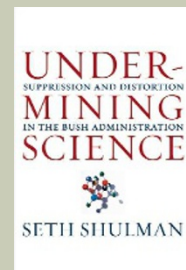
An evolutionary biologist enthusiastically argues that parasites are a driving force behind evolution and that their effects still mould us today. Parasites have shaped us physically and culturally, and affect our minds on a daily basis.



Undermining Science: Suppression and Distortion in the Bush Administration

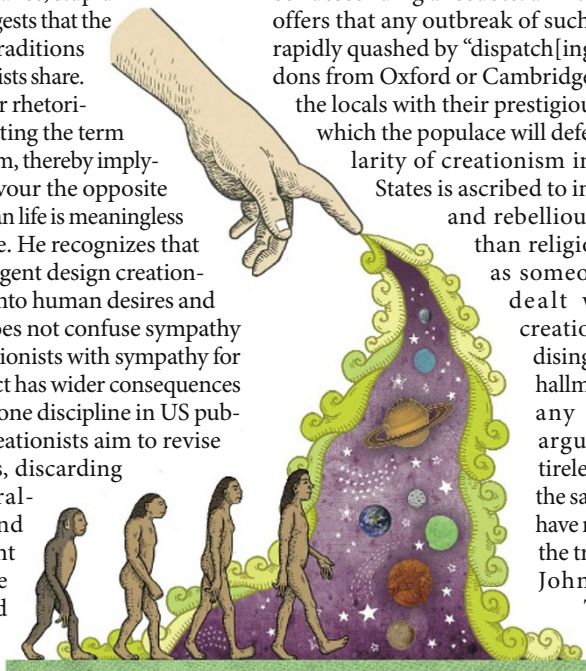
by Seth Shulman
 (Univ. California Press, \$16.95, £9.95)

Shulman explores how US politicians and scientists have misrepresented science to push their own agendas. "A concise, straightforward case history of the politicization of science, ideal for courses on the history, philosophy, sociology and ethics of science," wrote John Horgan (*Nature* 445, 365-366, 2007).



watchmaker argument for complexity, Miller discusses the contemporary biological explanations while refuting the errors.

Miller is sympathetic to the creationists' perspective but opposes them uncompromisingly. The book does not try to place the blame for creationism on ignorance, stupidity or malice, but suggests that the ideas are rooted in traditions and values that biologists share. He admires the clever rhetorical trick of appropriating the term 'design' for creationism, thereby implying that scientists favour the opposite and believe that human life is meaningless and without purpose. He recognizes that the concept of intelligent design creationism taps effectively into human desires and prejudices. Miller does not confuse sympathy for the intent of creationists with sympathy for its effects. The conflict has wider consequences than the teaching of one discipline in US public schools — the creationists aim to revise what science means, discarding rationalism, naturalism, materialism and other Enlightenment values to incorporate the supernatural and loosen the rigour of all sciences.



Only a Theory deals poorly with one central aspect of this battle: why this problem is so much greater in the United States than elsewhere. Miller's rationalizations are sometimes painful to read. Europe's relative freedom from the scourge of creationism is explained with a condescending anecdote: a British colleague offers that any outbreak of such nonsense is rapidly quashed by "dispatch[ing] a couple of dons from Oxford or Cambridge" to overawe the locals with their prestigious degrees, to which the populace will defer. The popularity of creationism in the United States is ascribed to independence and rebelliousness rather than religiosity, which, as someone who has dealt with many creationists, I find disingenuous. The hallmark of almost any creationist argument is the tireless bleating of the same points we have rebutted since the trial of teacher John Scopes in Tennessee in 1925, which tested the

law on teaching Darwinian evolutionary theory; the only twists come from new creationist authorities that enter the fray. An equivalent US variant of Miller's British anecdote is that the enemies of science need only dispatch Dembski or Behe from the Discovery Institute in Seattle, Washington, to stir up more doctrinaire creationism among school boards and in elections and churches. To call US citizens more independent-minded than European citizens flatters the creationists too much and demeans Europeans.

If Miller is on shaky ground in his explanations of the origins of creationism, he is rock-solid on where the creationists want to take us: "To the intelligent design movement, the rationalism of the Age of Enlightenment, which gave rise to science as we know it, is the true enemy ... science will be first redefined, and then the 'bankrupt ideologies' of scientific rationalism can be overthrown once and for all." Although his own religious leanings blind him to conflict between faith and science, they also give him insight into both sides of the struggle. *Only a Theory* is a useful overview of a perilous political attack on the nature of science. ■

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Fictional quantum conspiracy

Final Theory: A Novel

by Mark Alpert

Simon & Schuster: 2008. 368 pp.

£12.99, \$24

Most conspiracy theorists focus on political cover-ups. But science is an excellent catalyst for this sort of paranoia too: so entrenched is the stereotype of the mad researcher that it is not surprising people might suspect that someone, somewhere, is hiding something for nefarious gain. Physics in particular lends itself to these

sorts of fears. Whereas most people can conceptualize tangible sciences such as biology, the quantum world is, by its very nature, largely ungraspable and seems to simmer with deadlier force. The Manhattan Project, which still casts a long and sinister shadow in the popular imagination, certainly didn't improve its reputation.

Mark Alpert's debut novel *Final Theory* is classic conspiracy fodder. It posits that Albert Einstein, who in real life spent his last decades failing to unify quantum mechanics with relativity, instead succeeded. Realizing the military

implications, yet incapable of destroying the beautiful mathematical proofs outright, Alpert's fictionalized Einstein decides to bury the information until mankind has outgrown its warlike ways. He duly entrusts various pieces of the puzzle to a select group of young protégés. Many years later word leaks out, and soon the US government and a rogue terrorist are hot on the trail. One by one, the protégés — now old men — are tortured and killed.

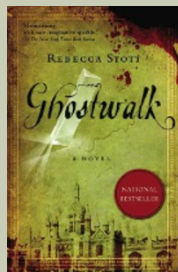
David Swift, the protagonist, is a failed physicist-turned-science historian who witnesses the dying words of one of these men, his former PhD supervisor. Before long, Swift has been taken prisoner by the FBI and, after escaping,

Ghostwalk: A Novel

by Rebecca Stott

(Spiegel & Grau/Phoenix, \$14.95/£7.99)

Seventeenth-century murder and present-day mysteries become entangled in Stott's *Ghostwalk*. Fine historical research is combined with a modern literary thriller when Lydia Brooke is asked by a former lover to complete his late mother's great work — a history of Isaac Newton's involvement in alchemy.



The World Without Us

by Alan Weisman (Virgin, £8.99)

If humans disappeared, what would the world look like? Using evidence from places where war or disaster have created no-go zones for humanity, Weisman describes what would happen in our absence and what would be left behind. Stuart Pimm wrote: "There is no guarantee that even with all the pieces, we would be able to put nature back together again," (*Nature* **448**, 135-136; 2007).

