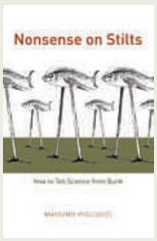
BOOKS IN BRIEF



Why do so many people reject scientific evidence in favour of anecdote? In *Nonsense on Stilts* (Univ. Chicago Press, 2010), Massimo Pigliucci examines controversies from unproven links between childhood vaccinations and autism, to refutations of the theories for evolution and climate change. He asks how superstitions work, what part the media plays and how we value expert opinion. He suggests that science is a human business, sometimes fallible and often misused. The best defence is to stay alert to nonsense, he concludes.

Physicist David Goodstein asks why some scientists are driven to misrepresent results. His book *On Fact and Fraud* (Princeton Univ. Press, 2010) uses well-known cases to look at how science is conducted and to remind us that not all 'fraudulent' scientists are guilty. For example, Robert Millikan's 1910s work on electron charge was criticized unfairly. The high stakes of modern research may have piled on the pressure, notes Goodstein, but not everything that seems too good to be true is fraudulent: some major discoveries, such as high-temperature superconductors, were viewed with suspicion at first.

Fifty years ago, the combined oral contraceptive pill was approved in the United States. In *America and the Pill* (Basic Books, 2010), Elaine Tyler May tells the story of a drug "central to some of the most profound developments in public and private life over the last half century". She charts how it enabled women to take advantage of expanding opportunities for education and employment, and hence how it became a flashpoint for a social transformation.

D. SMITH/ALAMY

Back to basics by way of evolution

The public misunderstands and mistrusts the scientific explanation of evolution more than any other branch of research, particularly in the United States. Molecular biologist John Ellis's student primer, *How Science Works: Evolution*, seeks to teach the nature of science using evolution as an exemplar, in the hope that a public with greater scientific literacy will be able to tackle "looming world problems" more effectively.

Ellis gives a clear description of how science works. Students learn about testing multiple hypotheses, reliance on natural causes, the open-endedness of science, its lack of dogmatism and the function of peer review and replicating results.

He contrasts naturalism — the ideology that only the physical universe exists, operating "according to inbuilt, unvarying regularities" — with supernaturalism, the view that non-physical "active agents" interact with the physical world. Religion, "the belief in some superhuman controlling power or powers", is a subset of the latter, he writes. Ellis distinguishes between the methodological and philosophical aspects of naturalism, but regularly conflates it with science, which is not an ideology.

Turning to evolution, Ellis's treatment is uneven. Those new to the field will be confused by overlapping definitions: evolution is "the change in genetic composition of populations with time"; natural selection is "changes in the genetic composition of a population due to differences in survival and reproduction". Evolution could have been more clearly defined in terms of common ancestry, following Charles Darwin's idea of descent with modification, and natural selection as a process resulting in such change. Both of Ellis's descriptions target modification; descent gets short shrift.

Similarly problematic is Ellis's idiosyncratic treatment of homology. He argues against defining it as traits derived from a common ancestry because that definition is based on a circular argument, but he does not offer a better one. So the reader is left with the wrong impression that homology is merely anatomical similarity. His rudimentary treatment of systematics is pre-cladistic; students seeking to understand how contemporary biologists classify organisms will be none the wiser. Reflecting Ellis's speciality, the discussion of molecular biology is overly detailed. However, other issues are handled clearly, such as the distinction between the probabilistic nature of the origin of genetic variation and the non-random process of natural selection.

How Science Works: Evolution. A Student Primer
by R. John Ellis
Springer: 2010. 100 pp. $39.95, £19.99

It is welcome when scientists explain evolution to the public. But for a better introduction to the topic I would recommend Jerry Coyne's *Why Evolution is True* (Viking, 2009), Richard Dawkins's *The Greatest Show on Earth* (Free Press, 2009), Donald Prothero's *Evolution* (Columbia University Press, 2007) and Neil Shubin's *Your Inner Fish* (Pantheon, 2008). ■

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