New in paper back

Was Einstein Right? Putting General Relativity to the Test by Clifford M. Will. Oxford University Press, £8.99. Now in its second edition, this award-winning exposition of how Einstein's theory of general relativity holds up to scientific scrutiny has been updated to cover the most recent experimental findings, including the story of the rise and fall of the 'fifth force'. The author, a professor of physics at Washington University in St Louis, combines the personal with the theoretical. "What I find truly amazing," he writes, "is that this theory of general relativity, invented almost out of pure thought, guided only by the principle of equivalence and by Einstein's imagination, not by a need to account for experimental data, turned out in the end to be so right."

The Undivided Universe: An Ontological Interpretation of Quantum Theory by D. Bohm and B. J. Hilley. Routledge, £12.99. David Bohm, who died in 1992, spent much of his life developing an idiosyncratic interpretation of quantum mechanics. His idea is that the electron is a point particle as in classical mechanics, but that its trajectory is influenced by what he called the "quantum potential", a new type of non-classical physical field derived from the wave-function. The book is intended to bring this idea up to date. Using mathematics, the authors describe how many of the statistically predicted phenomena of quantum mechanics can be explained 'ontologically' in terms of an ensemble of individually well-defined causal motions. For a review, see *Nature* **366**, 420 (1993).

The Essence of Chaos by Edward Lorenz. UCL Press, £10.95. In this introduction to chaos theory, the author gives an insider's view of the formative years of the field, including the true source of the notorious 'butterfly effect'. The idea of a butterfly flapping its wings in Brazil and setting off a tornado in Texas was apparently anticipated in George R. Stewart's novel *Storm*, in which a meteorologist recalls his professor's remark that a man sneezing in China may set people shovelling snow in New York.

Total Eclipses of the Sun by J. B. Zirker. Princeton University Press, $12.95, £10.95. A clearly written, up-to-date guide for the advanced amateur or professional astronomer that explains what causes total eclipses and how they can be used in experiments to examine such phenomena as the dust between the planets and general relativity. This expanded edition includes a chapter on the "great Hawaiian eclipse" of July 1991.

Haldane might have viewed the state of science today. Eugenics also forms the background of Elof Axel Carlson's comparison of the outlooks of Haldane and geneticist H. J. Muller, who were both convinced eugenicists as well as Marxists for most of their lives.

A scholarly chapter by David Weatherall combines a detailed survey of *Daedalus* with a wise and witty consideration of how far medical science has matched it today, and how one might now revise its predictions. Thus, the spartan requirements of preventative medicine would cause transient psychiatric problems that would "gradually pass as generations are born which have never known the pleasures of cream teas, good claret, and a decent cigar". That came from the heart! The penultimate chapter is by Haldane's nephew Avrion Mitchison. Like Perutz's, it has but a tenuous link with *Daedalus*, being an authoritative review of the prospects for human immunology. Although written in an easy style, it assumes a fair amount of background knowledge in the subject. Finally, Dronamraju, in a respectful postscript, comments on Haldane's ambivalent views on religion. A disorganized, repetitious but stimulating compilation of hits and misses — not unlike *Daedalus*, really. □

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The briefest of histories of time

Graham Farmelo

Stephen Hawking for Beginners. By J. P. McEvoy and Oscar Zarate. *Icon: 1995. Pp. 175. £7.99 (pbk)*

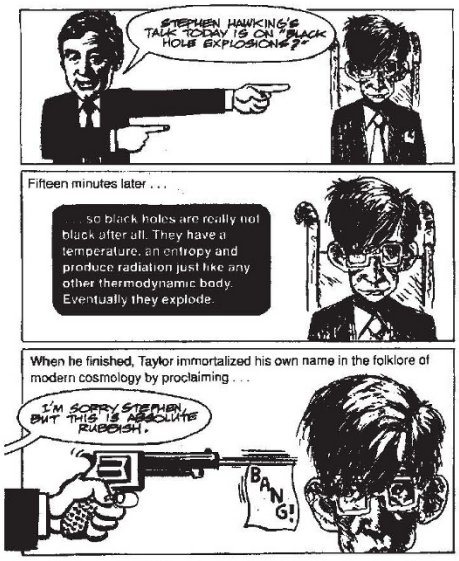
In this age of the potent image and the snappy sound-bite, it is becoming harder by the year to present anything that requires an attention span much longer than a television commercial. In this climate, it was inevitable that someone would have the idea of presenting great contemporary icons, themes and ideas to beginners in the form of 150-page strip cartoons.

Icon Books is among the leaders in this field. Over the past few years it has published dozens of beginners' guides, many of them about science. Their contents are an engaging postmodernist potpourri of line-drawings, photographs and diagrams, annotated with lively and well informed commentaries. Although the guides are not for the straight-faced and intellectually fastidious, they are justly respected for their accuracy and integrity. (One hopes this reputation will survive the forthcoming publication of an introduction to astrology.)

The latest scientist to be Iconized is Stephen Hawking, who we are told cooperated with the guide's author, the science journalist J. P. McEvoy. Many readers who gave up the unequal struggle with *A Brief History of Time* will welcome the fresh approach to that material taken in this accessible, if somewhat hagiographic, guide. Many will obtain their money's worth just from the fine section on black-hole radiation, which is marred only by its spacetime diagrams, which will be comprehensible only to *aficionados*.

There is, however, no excuse for the number of inaccuracies, misstatements and sloppily introduced ideas in the rest of the book, such as an unforgivably confused passage on the units of mass and weight and an introduction to special relativity that does not even allude to inertial frames.) Do we really need five pages on Hawking's audience with the Pope when the wave–particle duality and the anthropic principle are treated with a brevity that defeats the point of their inclusion?

After his somewhat optimistic implication that Cygnus X-1 is a black hole and



From *Stephen Hawking for Beginners*

February 1974 at the Rutherford–Appleton Laboratory, Oxford.

an absurdly overblown account of the 1992 'cosmic ripples' observations, McEvoy struggles to explain why his hero has not been awarded a Nobel prize. There will be also no prizes for this book, I fear, at least not until it has been given an editorial spring-cleaning. □

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