functioning of sight, and in a manuscript largely devoted to the optics of the eye, written around 1507, he turned his attention to the issue of focus — what a photographer would call depth of field. He realized that something too close to the eye is not seen clearly, although he did not have any conception that this resulted from the focal range of the lens. He also stressed the loss of clarity when something became more distant. As he argued that images were received in the eye across a receptive surface, not at a single point, he maintained that the eye does not perfectly "know the edge of any body".

In *Salvator Mundi* he plays with these depth-of-field problems. None of the contours is absolutely sharp, but the blessing hand and the tips of the fingers cradling the orb are discernibly clearer that the features of Christ's face. The rapid loss of clarity in depth serves to give space to what would otherwise be quite a flat image.

The other optical effect is unique to this painting, both in Leonardo's work and in the Renaissance more generally. The orb is not the standard globe of the world. It is translucent and glistens internally with little points of light. These are not the spherical bubbles found in glass, but are the kind of cavity inclusions (small gaps) that appear in some specimens of rock crystal and calcite. Leonardo, we know, was considered an expert in such semiprecious materials. It seems that he observed the double refraction produced by calcite. The heel of Christ's hand exhibits two distinct contours, not in this case due to a change of mind.

The crystal orb is not simply a visual tour de force. It reworks the meaning of the painting. In Ptolemaic cosmology, the stars were embedded in the fixed crystalline sphere of the heavens. The saviour of the world is also the saviour of the cosmos. Leonardo characterized God, who created the whole system, as the 'Prime Mover', who stands outside the sphere of the fixed stars and who set everything in motion at the moment of creation.

Leonardo has taken a stock subject and recast it. The soft, out-of-focus effects for Christ's head, endowing him with an ambiguous expression, invite the viewer to speculate on the supreme mystery of his flesh-and-blood presence on Earth. Leonardo also signals, through the crystalline sphere, that the domain of Christ's Father extends to the whole of the cosmos.

However skilled Leonardo's followers and imitators might have been, none of them reached out into such realms of "philosophical and subtle speculation". We cannot reasonably doubt that here, we are in the presence of the painter from Vinci. ∎

Martin Kemp *is emeritus professor of art history at the University of Oxford, UK.* Salvator Mundi *features in his books* Christ to Coke *(2011) and* Leonardo *(2004).*

Books in brief

The Quantum Universe: Everything That Can Happen Does Happen
Brian Cox and Jeff Forshaw ALLEN LANE *272 pp. £20 (2011)*
If quantum entanglement leaves you tongue-tied or you burn to know what fills 'empty' space, this offering from Brian Cox and Jeff Forshaw is a solid introduction to the "inescapable strangeness" of the subatomic world. Particle physicist and presenter Cox and theoretical physicist Forshaw nip through the territory with brio, unveiling the quantum cornucopia with clarity and concision — from the double-slit experiment, the wave–particle phenomenon and the key principles and constants, to the illusion of movement, the uneven spin of electrons and the death of stars.

Baby-Making: What the New Reproductive Treatments Mean for Families and Society
Bart Fauser and Paul Devroey OXFORD UNIVERSITY PRESS *289 pp. £16.99 (2011)*
One in 25 European infants now gets its start in the test tube. But taking the sex out of conception has spawned vast scientific, ethical and social complexities. In this succinct overview, fertility experts Bart Fauser and Paul Devroey cover techniques from cryopreservation of embryos to egg donation. They explore baby 'design', parental demands, infertility, genetic issues and the social, ethical and scientific limits of assisted reproduction.

Eradication: Ridding the World of Diseases Forever?
Nancy Leys Stepan REAKTION BOOKS *312 pp. £25 (2011)*
The idea of vanquishing diseases globally, one by one, has been contested ever since it emerged in the twentieth century. Historian Nancy Leys Stepan's book ranges from imperialist politics to medical technology. She probes the role of the World Health Organization and the Rockefeller Foundation, the efforts of "arch-eradicationist" Fred Lowe Soper to wipe out malaria, and other campaigns such as that against Guinea worm disease. Success, she shows, is rarely absolute: the 1980 eradication of smallpox was a triumph that now, with the threat of bioterrorism, teeters into uncertainty.
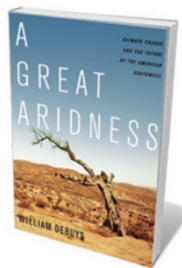
A Great Aridness: Climate Change and the Future of the American Southwest
William deBuys OXFORD UNIVERSITY PRESS *384 pp. $27.95 (2011)*
The bone-dry American Southwest is a trainwreck waiting to happen, says writer William deBuys. A swelling population with water-guzzling habits, combined with the impacts of climate change, threaten the balance of the region's vast interlocking ecosystems. Drawing on the work of climatologists and other scientists, deBuys's analysis of the eco-crisis — rising temperatures, wildfires, water shortages, disappearing wildlife — is a reasoned warning to heavily populated arid regions round the world.

Relics: Travels in Nature's Time Machine
Piotr Naskrecki UNIVERSITY OF CHICAGO PRESS *384 pp. £26 (2011)*
Conservation biologist and photographer Piotr Naskrecki delves into 'deep time' in this gorgeously illustrated paean to flora and fauna that have changed little from their fossil forebears. Through his lens, we get a hint of prehistoric times from ecosystems such as the Papuan highlands or New Zealand's fern forests. His photos of ancient subjects — including Indonesian forest dragons (*Hypsilurus dilophus*) and the sagebrush cricket (*Cyphoderris strepitans*) of Wyoming — are a call to conserve these venerable survivors.