

## Book Reviews

avoids the pitfalls of simple, unicausal explanations. She sensibly employs current biomedical knowledge while cautioning of the dangers of applying models built on current third world experience to the evidence from nineteenth-century Britain. Best of all, this book raises many new questions that will influence how the rest of us do our research in the future.

John M. Eyler, University of Minnesota

LEO HOWE and ALAN WAIN (eds), *Predicting the future*, Cambridge University Press, 1993, pp. vi, 195, illus., £18.95, \$29.95 (0-521-41323-0).

Predicting the future is a risky business and few of the authors are prepared to try it. Rather they analyse the past and present. Stephen Hawking does however consider the future of the universe. He would have liked at one stage to write a history of the future about how most predictions turn out to be very wide of the mark. Here he suggests that the behaviour of the universe on a very large scale seems to be rather simple and so one can predict whether it will expand forever or eventually recollapse. He hedges his bets by predicting both ways.

Unlike the large scale behaviour of the universe, tiny changes in the initial conditions of dynamical systems, even like a free-swinging pendulum, can make its behaviour chaotic and hence unpredictable in detail. Ian Stewart looks at how one can analyse the equations that govern such systems and how considerations of symmetry can make sense of the patterns of fluid flow which can suddenly break up into layered vortices. Symmetry and chaos, pattern and disorder, coexist within the same mathematical framework.

Simon Schaffer examines prophecy as a question of trust with an historical analysis of attitudes towards comets. He argues that the culture of the wider public has an affect on the specialist predictions. He sees the common talk of impending disasters like British economic collapse as being sustained by the image of cometary prediction.

Understanding is not the same as predicting as Frank Hahn discusses in relation to economics. One cannot expect predictions from social science but that does not mean there is no understanding. Geologists can understand earthquakes but cannot predict them. Understanding should be seen as placing restrictions on what the world can be like.

Ian Kennedy sees bioethics playing an increasingly important role in medicine. For example, as developments in human genetics advance they may bring with them a "tyranny of knowledge", which forces choices upon people for which they are not yet prepared. There is also the hard question of allocation of resources and the balancing of people's rights and duties.

The last three essays deal with religious aspects of the past and future. Problems arise from God's omniscience and plan for the world, the co-existence of good and evil, and our supposed free will. Averil Cameron examines the efforts made by the church in late antiquity to win adherence to the Christian scheme of providence in the face of both secular and non-secular explanations. In Buddhism, as Richard Gombrich points out, the emphasis is on the individual. It also draws no sharp line between humans and animals, and reincarnation can be into one of many life forms. To attain nirvana is to get rid of all desire and delusion. The future is determined but irrelevant. Finally, the idea of the Last Judgment is discussed by Don Cupitt. The idea that we must, after our death, face a moral tribunal before which we must give an account of our deeds, is found in almost every culture and is first recorded in Egypt some 2500 years ago. But the story that at the end of time everything will make sense does not itself make sense until the end of time. We will never know where it is all going and so our anxieties about the future will persist, forever.

Lewis Wolpert, University College London

HANS-JÖRG RHEINBERGER and MICHAEL HAGNER (eds), *Die Experimentalisierung des Lebens: Experimentalsysteme in den biologischen Wissenschaften, 1850/1950*, Berlin, Akademie Verlag, 1993, pp. 248, illus., DM 78.00 (3-05-002307-4).

Following the historiographical programme instigated by Bruno Latour and Steve Woolgar to study "Laboratory life" and "Science in action", this volume deals with experimentation in the life sciences in the period between the emancipation of experimental physiology from anatomy (around