

Playing for high stakes

Theoretical biology, the science of applying mathematics and computers to models in biology, has had a rough time of it over the years. Analysts of the biological ilk cast longing eyes at theoretical physics, with its elegant models that not only explain but predict as well the behaviour of everything from atoms to galaxies. They may well ask when it is the turn of biology to be graced with theories of such beauty and power that they can rival quantum mechanics and general relativity.

True, biologists have Charles Darwin's theory of evolution which could lay claim to being the most controversial scientific theory of all time. Although evolution is no longer seriously questioned by most practising biologists, Darwin's theory has never been put on the firm mathematical ground that is expected of a theory in physics.

Progress, however, has been

BY GLENN ROWE

GAMES OF LIFE: EXPLORATIONS IN ECOLOGY, EVOLUTION, AND BEHAVIOUR

BY KARL SIGMUND
Oxford University Press
244pp, £9.95
ISBN 0 19 854783 8
published September 1993

made. Karl Sigmund's *Games of Life* is a beautifully written and, considering its relative brevity, amazingly comprehensive survey of past and current thinking in "mathematical" evolution.

Sigmund treats evolution in all its manifestations as a collection of games: predator against prey, rivals in the game of sex, even games on the molecular level as genes square off to get a better chance at being passed on to the next generation. Just as games (at least, the human variety) are sup-

posed to be fun, so too is *Games of Life* — the witty section headings, the relaxed style and the clarity of the explanations make the book as enjoyable to read as a Marx Brothers film (to which there is a reference in the book) is to watch.

Beginning with a description of John H. Conway's computer game of Life, in which coloured squares on a computer screen give rise to some eerily lifelike behaviour, Sigmund proceeds to describe how the predator-prey game can lead to chaotic fluctuations in population sizes. The roles of chance and necessity are introduced as a prelude to a tour of population genetics, in which hereditary traits compete with each other for prominence from one generation to the next.

The complications (both microscopic and macroscopic) arising from sex lead into a discussion of the mathematical theory of games, and its application to the area of conflict resolution. Ani-

mals, including humans, unwittingly play games that affect behavioural traits in future generations. Sigmund argues that game theory, in which the best strategy to use in a game can be mathematically derived, can be used to explain why animals and humans behave the way they do.

All of these topics are presented with wit and skill, but on reflection, the reader may begin to wonder if Sigmund has written the book a bit too well. Like a good salesman, he sometimes overwhelms you with his oratory, so that you can find yourself believing things that, after a bit of thought, do not seem so obvious. Some of the models presented in the book (such as Conway's game of Life) actually have very little to do with "real" biology, and their inclusion as milestones in the discussion, although entertaining, does not boost the reader's faith that theoretical biology can solve the problems found in a real ecosystem.

The emphasis on the application of game theory to animal conflicts is somewhat out of proportion to its importance in current thinking in evolutionary biology. Two chapters out of the seven that form the core of the book are devoted to game theory, including a chapter entirely devoted to the "Prisoner's Dilemma" game. Some serious flaws and contradictions (such as "stable strategies" for playing a game that are actually unattainable; that is, unstable) are presented as strange-but-true stories, rather than interpreted as evidence that perhaps something is wrong with the theory.

However, there is very little in the theory of evolution that is uncontroversial, so one cannot fault Sigmund too much for what is his personal view of the subject. Other popular writers on evolution, such as Stephen Jay Gould and Richard Dawkins, have all had their turn at raising the hackles of biologists and reviewers alike. *Games of Life* is less likely to cause a brawl at a biologists' convention than the writings of Gould or Dawkins, but is no less enjoyable for all that.

Glenn Rowe is a lecturer in computer science and mathematical biology, University of Dundee.

Dilemmas

Ethics and Biotechnology

Anthony Dyson and John Harris, both at the University of Manchester

A penetrating survey of the moral dilemmas posed by biotechnology, from the smallest cells through animals to the engineering of human beings. The book reflects an international and multidisciplinary approach, with contributions from outstanding scholars in fields as diverse as agricultural economics, medicine, cell biology and theology.

December 1993: 288pp Hb: 0-415-09140-3: £40.00

Death Rites

Law and Ethics at the End of Life

Edited by Robert Lee, *Wilde Sapte Solicitors*, London and Derek Morgan, *University College Swansea*

Following the success of Morgan's earlier book *Birthrights*, this unique collection focuses on the legal and ethical issues surrounding the medico-legal management of death and dying. The book charts its way through a moral minefield, with essays that are wide-ranging, provocative and timely.

December 1993: 328pp Hb: 0-415-06260-8: £40.00



Available through booksellers.
For more information or a subject catalogue contact Sam Boyce,
Routledge, 11 New Fetter Lane,
London EC4P 4EE.
Tel: 071 583 9855

The Elimination of Morality

Reflections on Utilitarianism and Bioethics

Anne Maclean

Anne Maclean's new book addresses the fundamental question of the kind of contribution philosophers can make to the discussion of medico-moral issues and the work of health care professionals, arguing that the whole bioethical enterprise is philosophically misguided.

September 1993: 232pp

Hb: 0-415-01081-0: £35.00 Pb: 0-415-09538-7: £10.99

Creative Morality

Don MacNiven, *York University*

Medical confidentiality, experiments with human subjects, euthanasia and environmental issues are among the topics dealt with in this philosophical study of moral dilemmas. Professor MacNiven analyses the ethical systems on which our moral decisions are based and suggests a comprehensive ethical theory for the interpretation of contemporary moral problems.

September 1993: 256pp Pb: 0-415-00030-0: £11.99

New in Paperback

Against Liberation

Putting Animals in Perspective

Michael P.T. Leahy, *University of Kent*

A radical, philosophical questioning of prevailing views on animal rights, that credit animals with human-like self consciousness.

'... a useful addition to any collection on the ethics of animal use.' — *Laboratory Animals*

November 1993: 304pp Pb: 0-415-10316-9: £12.99