Personal approaches

Peter J. Bowler

Scientific Genius and Creativity: Readings from Scientific American. Introduction by Owen Gingerich. *W.H. Freeman: 1987. Pp.110. Hbk £21.95, $21.95; pbk £9.95, $9.95.*

Man Masters Nature: 25 Centuries of Science. Edited by Roy Porter. *BBC Books: 1987. Pp.224. Pbk £4.95.*

BOTH of these books use biographical sketches of famous scientists as a means of informing the general public about the nature and development of science as a whole. Their purpose, format and range of coverage are, however, quite different.

The *Scientific American* reader has the usual large format with plenty of diagrams and illustrations. Its purpose is to throw light on the process of scientific creativity by offering case-studies of great discoveries. To set the scene we have Jacob Bronowski's comparison of scientific and artistic creativity, while a postscript by Gunther Stent explores the meaning of the term 'premature discovery'. The editor's choice of biographical studies was obviously limited by what has already appeared in the pages of *Scientific American*, and although the range extends from Newton to Einstein there is no pretence of offering a complete survey of the history of science.

The real problem for the editor, however, is that he has had to reprint essays which may be up to 30 years old, with only a brief bibliographical note in which to mention more up-to-date studies. I. Bernard Cohen's 1981 account of Newton's work on gravity is still useful, but Loren Eiseley's 1956 mini-biography of Darwin contains only a limited and very outdated outline of the discovery of natural selection. Considering the detailed studies of Darwin's notebooks by a host of scholars in the past couple of decades, it is difficult to see how this piece can be expected to illuminate what we now know to have been an immensely complex act of creative thinking.

The BBC book, by contrast, includes a series of biographies written by specialists well aware of current developments in their fields. The purpose here is to use the biographies as a means of showing how Western science has become so successful — creativity is only one part of the story, along with methodology and the social environment in which the scientist works. There are 17 articles ranging from Aristotle to Watson and Crick, with a fairly balanced coverage of the physical and biological sciences. The problem is that with an average of only a dozen pages each, the authors have to work very hard to give the non-specialist reader an impression of what their chosen subject achieved and how he did it. Individually the results are surprisingly good, but I am not sure that the man or woman in the street will be able to extract a general message about the nature of modern science from so diverse a collection.

Biography is an obvious vehicle for studying creative thinking, and the *Scientific American* project would have benefited from the BBC's approach of commissioning newly written articles. But I am not persuaded that biography is a suitable format through which to inform the lay public about the general factors responsible for the rise of modern science. A series of biographical studies may have offered a convenient format for the radio programmes upon which the BBC book is based — but is it the format the authors would have chosen to present their ideas to a general audience? Roy Porter's introduction directs his readers to the broad themes explored in the individual articles, but how many of them will realize that the true purpose of the book is to show that science is something more than a series of great discoveries?

Most historians of science now believe that the traditional emphasis on the 'heroes of discovery' has obscured the complexity of the process by which new theories are created and promoted in the scientific community. However hard one tries to dispel the almost myth-like stories surrounding these discoveries, to do so within a biographical format may be to invite misunderstanding. □

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More 'heroes of discovery' — the picture (of Michael Faraday expressing distaste at the polluted state of the Thames) is taken from The History of Scientific Discovery *edited by Jack Meadows, a similar book to those reviewed here. Publisher is Phaidon, Oxford. In the United States the book is published by Oxford University Press under the title* The Great Scientists. *Price is £19.95, $35.*

Mutual aid society

Gordon H. Orians

Helping and Communal Breeding in Birds: Ecology and Evolution. By Jerram L. Brown. *Princeton University Press: 1987. Pp.354. Hbk $45, £28.20; pbk $16.50, £10.40.*

RECENTLY, there has been increasing recognition that genetic contributions to future generations by means of assistance to non-descendant relatives have strongly influenced the evolution of animal societies. The study of social insects provided the impetus for both theoretical and empirical analyses of inclusive fitness, but during the past two decades research on communally breeding birds, based on long-term studies with uniquely marked individuals, has added substantially to our understanding of the evolution of sociality.

This extensive and rapidly growing literature is critically reviewed by Jerram Brown, one of the principal contributors to both theory and field studies. The book is comprehensive in scope. It presents an evaluation of the use of terms (supplemented by an extensive annotated glossary). There are surveys of the geographical and taxonomic distribution of helping and communal breeding, a discussion of theories of inclusive fitness, and detailed treatments of the diverse forms of communal breeding among birds and their theoretical implications.

The book is a storehouse of information, interpretation and clear, if controversial, exposition of complex ideas. Brown makes effective use of a mixture of mathematical formalisms and intuitive arguments, and uses his models to highlight the key inequalities that must obtain if specific types of behaviour are to be favoured by natural selection. Early in the book he establishes the need to separate delayed dispersal, delayed breeding and helping, pointing out that all combinations of these variables exist among birds. He uses this distinction throughout the text to clarify arguments and interpret patterns in areas where failure to keep them apart has caused confusion.

A major contribution of the book is its emphasis on the importance of ecology in the study of evolution of helping and communal breeding. Most sociobiological theories are at least implicitly ecological, but ecological factors are often passed over rather lightly, in part because of a widespread belief that the most important need is to incorporate genetics into sociobiological models. Brown demonstrates that the key to understanding the evolution of communal breeding in many species lies in a better appreciation of how the birds live and how they exploit their environments.

Brown jumps squarely into the middle