

# reviews

## Animal signal characteristics

P. J. B. Slater

*Optical Signals: Animal Communication and Light.* By Jack P. Hailman. Pp. xix + 362 (Indiana University: Bloomington, Indiana and London, 1977.) £11.25. *Animal Communication.* Second edition. By Hubert and Mable Frings. Pp. ix + 207. (University of Oklahoma: Norman, Oklahoma, 1977.) Hardback \$9.95; paperback \$4.95.

THE striking and often stereotyped displays with which animals communicate have always fascinated ethologists. The similarity of signals within a species, and the differences between species, make them well suited to the study of behavioural evolution. By examining the contexts in which signals occur, some progress has also been made towards understanding the motivational systems underlying them and thus the messages which they convey. On the other hand, the selective forces which have led them to be as they are have received less attention.

It is on this last area, the ways in which signals are adapted to the environments in which they occur and to the functions which they have, that Hailman hopes to shed some light. He was originally asked to write a chapter on visual signals for a book to be edited by Sebeok but, having over-run his word limit, he decided to use the additional material for a book of his own. His aim in this is a limited one: "to specify optical principles, search for ecologically relevant situations, and then predict animal signal characteristics". As this is a largely unexplored area, the range of topics covered is unconventional for a book on animal communication.

The first two chapters outline the author's approach to the problem, dealing in particular with scientific philosophy and information theory. The following three are concerned with the properties of the channel, the sender and the receiver: in effect, optics, the basis of animal colours and movements, and visual sensation and perception. These chapters provide a wealth of background material covering every physical and physiological process which might conceivably be relevant to the form of animal signals. The rest of the book gets down to examining the sorts of signals which

should emerge, given these constraints. A chapter on deception, dealing largely with crypsis and mimicry, is followed by one on noise, in which the ways in which animals may achieve conspicuousness in various situations are explored. A further chapter deals with the sorts of signals which might carry different types of information.

The book is a bold attempt to take a novel approach to visual communication, but in many ways it is hindered by the very novelty of that approach. Although the background information in the earlier chapters is solid and well-established, the later ones sink into the haze which often surrounds functional questions. To approach such problems as "Why is the cardinal red?" one can only resort to correlational methods with all their attendant difficulties, looking across species to see if red colouration occurs in some situations more than in others. The correlations the author uses are neither extensive nor formal, so that many of his suggested explanations rest on speculations from selected data. He has, however, done a service by pointing to an inter-

esting and neglected area. If he has been unable to pull all the strings together himself, he has at least provided a basis on which research towards doing so may be founded.

Hailman's book is tough reading: it is tersely written and contains few detailed examples; the author has a liking for classifying things with the aid of a confusing variety of polysyllabic labels; the text is in typescript form and contains many misprints. Although also poorly produced (two pages are even printed in the wrong order), the book by Frings and Frings is something of a contrast, as it was written as a brief introduction for laymen, and contains many examples and little theory. Such theory as it does include is, however, seriously out of date, for it was originally published in 1964 and the new edition has been simply updated by adding a chapter on recent advances. This is an unhappy compromise which can hardly do justice to what has happened since then. □

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## Lunar studies

*The Moon: A New Appraisal from Space Missions and Laboratory Analyses.* Edited by G. M. Brown, G. Eglinton, S. K. Runcorn and H. C. Urey. Pp. vi + 606 + 15 plates. (Royal Society: London, 1977.) £38 in the UK; £38.95 overseas.

THIS book is a collection of papers given at a Royal Society symposium in 1975. Many, perhaps most, of the leading research groups in lunar science are represented. It represents well the state of the subject at the time of presentation.

The climactic period of lunar studies began with the Apollo missions in 1969–72, but it did not end there. The rich collection of lunar samples returned by US and Soviet missions, the experiments left on the moon, and the data tapes obtained during the missions, have provided the basis for a vigorous and even an expanding science. Although the work has been published in all the appropriate journals (including *Nature*), it has a special point of concentration in the Proceedings of the Lunar Science Conferences held each year in Houston. The worker seeking direct access to some

aspect of lunar research should begin there.

What then is the role of the present volume? The editors have made a deliberate, and quite successful, effort to make the work accessible to a wider scientific public. Authors have been encouraged to begin at the beginning, and to set their work in context. As a result, some of the papers are admirable introductions to important and difficult subjects. Others are broad-brush extended abstracts, which can at least alert the reader to the significance of an area, or the point of view of one group. Narrower, more technical papers have not been eliminated, but they do not dominate the whole.

The first section, on the accumulation and bulk composition of the moon, is especially good. The evidence, mainly isotopic and chemical, is presented with care by Wasserburg, Anders, Wänke, and Lal *et al.* I know of no more accessible current summaries of the beautiful development of early lunar chronology, or of the striking patterns of trace element abundances.