

but can be divided into moral and hedonic dilemmas and the behaviour resulting can then be explained in non-dissonance terms. Janis and Mann suggest that we strike balances (echoes of exchange theory again!) of arguments pro and con and that, in spite of dissonance theory's opposite contention, conflict exists before any commitment is made. Personally, I see this work fitting into a very slightly modified dissonance model which assumes that any kind of cognitive work implies commitment.

On the whole the book is well worth reading. Its main function must be the equivalent of a set of reprints of journal articles rather than that of a text for a teaching course. But at least they are interesting and, I would guess, important articles.

KEITH GIBBINS

DISCOVERING ECOLOGY

Perspectives in Ecological Theory

By Ramón Margalef. (The Chicago Series in Biology, Vol. 1.) Pp. viii+111. (University of Chicago Press: Chicago and London, February 1969.) 40s.

SZENT-GYÖRGYI defined discovery as "seeing what everyone has seen and thinking what nobody has thought". Margalef's book not only discovers basic principles of ecology but makes the reader think in such a way that it allows him to discover.

The author analyses the control of succession, and in so doing throws new light on the process. It seems somewhat of a paradox that a new insight into succession should come from the study of planktonic ecosystems in which succession *sensu stricto* seems impossible. This is, however, the keynote of the book, "get out of the rut of conventional thinking and discovery must follow".

The concept of climax which has for too long simmered in the ecological melting pot is replaced by the concept of maturity refocusing on the organismal approach to the ecosystem. The intimate relationship between organism and ecosystem is explored through the relationship of evolution and succession. The maturing ecosystem creating within itself abiotic stability assures safe sites for the complex of biota, which can only coexist as part of the system. Destruction of the system means loss of the biota but allows species which can cash in on the catastrophe to form less mature, ephemeral systems with an existence time biotically controlled by succession. The question, does biological success lie in "assurance" or "insurance", is thus posed but is not answered.

Similarly, the idea of the importance of the function of the components of ecosystems is stressed, yet the author flatly denies that an understanding of the behaviour of different species falls within the scope of ecology.

The book is full of stimulating hypotheses and tantalizing unanswered questions. It lives up to its title, looking towards the horizons of ecological theory, yet it leaves much of the foreground out of focus. Perhaps this is why it is so successful, for it is within this hyperspace that the reader can himself experience the satisfaction of discovery.

DAVID BELLAMY

ROCK BEHAVIOUR

Fundamentals of Rock Mechanics

By J. C. Jaeger and N. G. W. Cook. Pp. xiv+513. (Methuen: London, February 1969.) 120s.

THE construction of larger dams, higher buildings, the development of deep open-pits and mining at great depths have made it progressively more important for the civil and mining engineer to possess more than an intuitive grasp of rock behaviour. This subject is poorly represented in the literature, this book being only the second major and comprehensive treatment of rock

mechanics available in the English language. As one would expect from these two authors, the book is well written and clearly presented. The emphasis throughout is upon the mechanical behaviour of rock. Consequently, there is a comprehensive treatment of stress, infinitesimal strain, friction, elasticity theory (the authors emphasize that the theory deals only with linear stress-strain relationships), fluid pressure effects and mechanisms of fracture. All these topics are carefully linked to the actual behaviour of rock. There are also chapters dealing with the specifically practical aspects of rock testing in the laboratory, underground measurements and the application of the various principles propounded in the book to mining and engineering problems. Together, these various chapters provide a fund of theory and fact which will be invaluable to the engineer. There are also brief accounts of the behaviour of ductile materials and time-dependent effects. Because these topics, at present anyway, are of relatively minor importance to the engineer, they occupy a total of only thirty pages. There is also a short chapter on the application of rock mechanic principles and stress analysis to geological problems, in particular the development of faults and intrusions. Included in this chapter is a short treatment of the elements of finite strain theory.

The authors write with such clarity and insight that the reader will often wish that they had treated a particular topic in greater detail. A completely encyclopaedic approach to this subject, however, is not possible in a book of 500 or so pages. Moreover, the authors provide abundant references (over 600 are listed), so enabling the reader to pursue any particular interest.

It is almost inevitable that the reader will wish to compare this book with the small monograph *Elasticity, Fracture and Flow* by the senior author. The *Fundamentals* covers a wider field, especially in the more practical topics. The treatment is also more expansive, with ample explanations in the text and the extra step or two inserted in the mathematical arguments, thereby making this book altogether more readable than the monograph.

Clearly, this excellent book will be an invaluable source book and reference for all engineers concerned with rock behaviour and should also be on the reading list of all geologists interested in engineering and structural problems.

NEVILLE J. PRICE

ENGINEERING CYBERNETICS

Cybernetics Simplified

By Arthur Porter. (New Science Series.) Pp. x+159. (English Universities Press: London, March 1969.) 22s paper; 35s boards.

THE science of cybernetics has borne the label "new" and the concomitant implication "not very respectable" for long enough. A quarter of a century's life-span is short on an arithmetic time scale; but as delimiting an integral under an exponential curve of scientific growth it carries more weight. Professor Porter's authority as a "control" man has itself been spread over most of this period, and his book is lucid and helpful. About twenty years have passed, at any rate, since scientists struggling to understand how control servos really work first adopted this author as a basic reference, and he has not deserted them now.

There are, I think, two criticisms to make, neither of which is more a caveat about the scope of the book rather than a complaint about what is actually in it. One concerns the essentially interdisciplinary nature of the science of control; the other is about the size and complexity of the systems with which cybernetics sets out to deal.

The claim of this science has to be about the generality of control principles, about the abstract qualities of being "in control" or "out of control" for any system at all. It