Animals in Context

The Animal and the Environment. By F. John Vernberg and Winona B. Vernberg. Pp. xv+398. (Holt, Rinehart and Winston: New York and London, 1970.)

SOMETHING outside the normal ecology text, this book focuses attention on the individual animal species and its interaction with the environment. The nature of a community inhabiting a given environment is dependent upon the individual species which comprise that community, and the authors point out that the understanding of the factors determining the distribution of individual species will therefore go a long way towards elucidating that complex entity, the ecosystem. While readers expecting something new on the pressing problem of pollution might well be disappointed, the general zoologist and teachers of university courses in comparative physiology and ecology should find this book of interest.

At a time when ecology tends more and more towards the mathematical and physiology concentrates on the cell, the Vernbergs draw attention to the value of whole animal experimental studies on the adaptations of animals to a particular habitat and niche. This is not to say that the population or cellular levels are ignored; in adopting an autecological approach the authors have merely regarded the animal as the basic unit. The first three chapters of the book serve to outline the approach. The organism is introduced as a dynamic metabolizing entity which has become adapted to continued existence and reproduction in a fluctuating environment, while the second chapter surveys the biosphere with particular attention to abiotic components which necessitate adaptations on the part of animals. Chapter 3 contains a discussion of the effects on animals of temperature, salinity, gases and desiccation, the environmental factors most likely to be lethal, and thus limiting, in animal distribution. The physiological effects of these components are discussed in introducing the concept of a zone of resistance often modifiable by acclimatization. Attention is also drawn to the possibility of different stages in the life cycle having different requirements, thus stressing the need to study the whole of an animal's biology if the factors limiting its distribution are to be determined. The authors are fully aware of the limitations of single factor experimental studies and touch both on the desirability of and the difficulties encountered in carrying out experimental studies on the interaction of multiple environmental factors.

A consideration of respiration and habitat follows in which the effects of environmental variables on the efficacy of respiratory systems and adaptations for survival under particular environmental conditions are discussed. The emphasis is on adaptation to habitat and adaptability to environmental gradients within a habitat. Ion and water balance and the maintenance of a constant internal environment receive a similar treatment. A chapter on perception and the environment leads the account from the influence of abiotic to that of biotic factors. Habitat selection in response to the perception of abiotic environmental components gives way to a consideration of the importance of being able to perceive stimuli relating other organisms in the environment, be they food, predators or conspecifics. From here on, the book follows more or less conventional ecological lines, with chapters on energy relationships, population continuity, population regulation and animal associations. Throughout, however, the emphasis is on the effects of the previously discussed environmental factors.

The final two chapters deal with the complex situations found in ecosystems, bringing in the concepts of succession, trophic levels, productivity, energy flow and chemical cycling, stressing the delicate balance of these systems. The book concludes with a description of the upsetting of this balance by pollution and other means which result in the destruction of habitat.

The Animal and the Environment is well written, in a clear economical style. The examples chosen by the authors to illustrate the various principles are pertinent, graphs and tables of actual experimental results are used to good effect and the chapters follow logically, thus adding up to an eminently readable account. Each chapter is followed by a useful summary and by a comprehensive list of references. A shortcoming of the book might be its restriction of cited examples almost entirely to marine poikilotherms. It must be conceded, however, that in giving greater emphasis to the field in which they are most authoritative, the Vernbergs have been able to draw on firsthand knowledge which has no doubt contributed to the book's readability. In any event, since it sets out to illustrate principles rather than to review, the comparative neglect of other habitats cannot be regarded as serious. The authors are aware of this shortcoming, themselves drawing attention to it in the preface. The reader is guided to literature dealing with aspects not covered in the text.

The value of the Vernbergs' book lies in that it bridges the gap between the physiologist and ecologist. Attending a symposium on terrestrial animal ecology some years back I became acutely aware of this gap; physiological ecologists and population ecologists seemed most often each to be almost completely ignorant of the other's approach. With this in mind, those responsible for university courses in ecology and in comparative animal physiology might profitably make use of this book to place their respective disciplines in perspective. While it cannot at this level replace standard texts in ecology and comparative physiology, it should certainly prove useful as an additional or subsidiary text. In addition, it is of general interest to zoologists, regardless of speciality, in that it places the living animal in its proper context.

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Huxley and Education

T. H. Huxley on Education. (A selection of his writings with an introductory essay and notes by Cyril Bibby.) Pp. xii+228. (Cambridge University: London, November 1971.) £2.80.

DR BIBBY'S fourth book on Huxley, which forms one of the publisher's useful series of texts in the history of education, is dedicated to "all teachers who hate humbug and cant and are therefore also educators". Another scientist-educationalist, Henry Armstrong, who had heard the "bulldog" lecture, maintained that Huxley's educational reputation rested on his writings rather than on his personal teaching ability. Huxley was the acknowledged leader of the Victorian scientific movement, which sought a place for science in schools and a realistic approach to university and technical education, or the abolition of voluntaryism and administrative nihilism, not merely because of the sparkle and thrust of his prose, but also because of his astonishing physical energy in committees, on commissions, and through private lobbying. "Education is the instruction of the intellect in the laws of Nature," he wrote in the superb essay on liberal education in 1868. Science had to become part of every man's education; but the laws of nature he had in mind were not simply those of the new journal *Nature* — laws of "things and their forces" — but also sociology, the laws of "men and their ways". In his Huxley Memorial Lecture in 1933, Armstrong argued that there was still an urgent need to "honour Huxley's will", for only the shadow of Huxley's conception had been executed in the curricula of schools and universities. Perhaps a start on its substance has been made at last in the universities of Edinburgh, Manchester and Sussex where students can gain an awareness of science as a social phenomenon.

Dr Bibby has selected from nearly twenty of Huxley's didactic, but immensely enjoyable, pedagogic essays,