

Book Reviews

Mammal Ecology

M.J. Delany

Blackie & Son, Glasgow, 1982
162 pp.
Price R103 (paperback R50)

The author intends this book to be used as a complimentary text to accompany university courses in ecology and mammalogy. The text encompasses many case studies, arranged into eight chapters, the first of which includes a list of mammalian families and their common names, which is possibly out of place in a book on mammal ecology. The chapter on geographical distribution deals with Wallace's zoogeographical regions and discusses species distribution, abundance and global movements, followed by a division of the mammals into feeding guilds depending on their degree of dietary specialization.

The section on reproduction and life histories describes the mammalian sexual cycle, the different reproductive strategies employed by mammals and includes concepts such as *r* and *K* selection. The social organization of a number of representative mammalian groups is described and the costs and benefits of sociality are discussed. The chapter on population ecology covers lifetables, age distribution, mortality, natality, population regulation and fluctuations in population numbers. The energetics section deals largely with population energetics (i.e. biomass production, consumption and availability of food).

Species diversity, resource partitioning, interspecific competition and the quantification of the niche concepts are also discussed. The final chapter discusses a number of applied ecological problems, including game cropping, the conservation of whales and otters, the management of African elephants, feral cats, rabies and fox ecology, and rodents as vectors of human disease.

I have some reservations in recommending the book, as the text is short (162 pp), often reading like a catalogue of case histories and in my opinion, seldom reaches the underlying implications of the numerous briefly described studies. Although a wide variety of topics is discussed, very few are covered in sufficient detail. This is exemplified by the chapter entitled 'Niche, species diversity and interaction' which simply does not present a balanced account of contemporary thought on these issues. Since the era of the 'n-dimensional hypervolume' definition of the niche, the importance of the role of resource partitioning, and explanations of species diversity have caused a certain amount of controversy and the proponents of alternative views are not represented. This detracts from any text which is aimed at being a reference work for university students.

Redeeming features are that this book is easy to read and is well illustrated. The wide range of topics discussed and the extensive reference list will be of use to the undergraduate student.

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Social Behaviour in Mammals

Trevor B. Poole

Blackie, Glasgow
248 pp.
Price R80,35

The publishers describe this book as being written for advanced undergraduates and postgraduates in mammalogy, animal behaviour, reproductive biology, ecology, sociobiology and experimental psychology. Chapter 1 devotes eight pages to mammalian classification, social communication, altruism and inclusive fitness, and the determinants of mammalian social organization. Chapter 2 divides communication according to the sensory channel (chemical, acoustic, visual and tactile) along which information flows. Chapter 3 includes both sexual behaviour and adult – young interactions under the heading of 'Reproductive Behaviour'. Chapter 4 is headed 'Competitive and Affiliative Behaviour'; 18 of its 38 pages are devoted to agonistic behaviour, 15 to social play and only three to 'affectional' behaviour. Chapter 5, on socioecology, examines the relationships between environment and social behaviour. The sixth chapter is a summary of what is known of the social behaviour of each of the 20 orders of extant mammals and the seventh identifies gaps in that knowledge as fruitful areas for further research. There are two appendices; one classifies into orders the species mentioned in the text using both English and Linnean names and the other is a glossary of special terms.

There is a need for a book which meets the authors stated objective of examining mammalian social behaviour in terms of modern theory and, although sociobiology has to an extent fulfilled its proponents' early claims as a 'new synthesis' it is useful to have a treatment organized along phylogenetic lines. One benefit of this approach is that some of the examples used to illustrate particular social systems are unfamiliar e.g. territoriality is illustrated by means of the short-tailed shrew. On the other hand it is probably this phylogenetic outlook which has resulted in the book's lack of emphasis of the intra-specific variability which is such an important aspect of mammalian social behaviour.

The book is easy to read, the more so since each chapter except the seventh ends with a summary of its main points. Unfortunately the references to original sources are rather inconsistent e.g. on p. 142 references are given for only two out of the six species used as examples of variability in spatial organization. Two quibbles are that the index contains no Linnean names, only common ones, and that some of the line drawings are not very clear.

Having dealt with these minor problems I now have to bring up a much more serious one; this book contains a surprising number of factual errors. Some of these could, perhaps, be dismissed as inconsequential, e.g. '... the South African naked mole rat ...' (p. 76), others are more significant; e.g. on p. 12 musk, civet and castoreum are described as 'single chemicals' whereas they are in fact mixtures of dozens of compounds, on p. 32 aardwolves are said to resemble spotted hyaenas when actually they look like brown and striped hyaenas. There are also serious errors which distort the sense of the arguments they are meant to illustrate. For example 'Lionesses nurse cubs other than their own but this may be of benefit in two ways; firstly, *all* females are closely related ...' (p. 60, my italics). The essential point, that

females *within a pride* are closely related (Bertram 1976), has been missed. A similar error appears on p. 164. On p. 209 an evolutionarily stable strategy is defined as 'a strategy which, if adopted by most members of a population, gives higher reproductive fitness than any other strategy' (my italics). This differs from Maynard-Smith's (1976) original definition and once again an essential point is missed; that an ESS is not necessarily optimal (Dawkins 1980). On p. 211 a strategy is defined as 'a course of behaviour which optimizes fitness' (my italics). This would be wrong even if it meant anything.

There are so many of these errors (I spotted 24) that I fear that the book will mislead readers who do not already have substantial background knowledge in its field, consequently I am afraid that it will be of limited value to its intended audience.

References

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PETER APPS

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Social Odours in Mammals. Volume 1

Edited by Richard E. Brown and David W. Macdonald

Oxford University Press, Oxford, 1985
556 pp.
Local price R99,50

This is the multi-authored first volume in a two-volume series which deals with odours and odour-producing glands in mammals. The treatment is arranged taxonomically and is also concerned with the significance of these odours for social behaviour. This first volume covers the monotremes, marsupials, eutherians, bats, primitive ungulates and rodents. Each is dealt with in a single chapter except for the eutherians (2) and rodents (4).

The introduction indicates that each of the chapters will be concerned with summarizing information about scent glands, their products and the behavioural effects of the products. The odours are regarded as having functions in defence, territoriality, mate recognition ('sexual selection') and recognition of strangers. While the significance of these is not developed in the short introduction, there is a discussion of the appropriateness of the term pheromone to studies of mammalian chemical communication. This produces no new insight but does give a comprehensive list of references to previous discussion on the subject.

The only general chapter is the first, which lists and describes all the known potential sources of mammalian

odours. This is then followed by 10 chapters which deal with the groups detailed above. Chapter 5 is unusual, in that it is a case study of a single animal *Tupaia belangeri* (tree shrew) and details the manner in which studies of mammalian chemical communication can be carried out. Each of the other chapters reviews the scent sources, olfactory receptors, functions and chemistry of secretions in each of the groups within the limits of current knowledge. Not surprisingly, 52% of the book (in four chapters) is devoted to a discussion of olfactory communication in rodents, the first chapter of which is a thorough review of the primer effects of odours in these animals. The other three chapters deal with each of the rodent sub-orders.

This book achieves its stated aim of reviewing the current literature — there are no startling revelations about these biological phenomena, but as a convenient reference work it will prove very useful.

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Biology of Communication

D. Brian Lewis and D. Michael Gower

Blackie & Son, Glasgow
239 pp.
Price R53,10

The authors of this book — one a neurobiologist and the other an animal behaviourist — have attempted to synthesize related concepts in neurophysiology and behaviour. The title is somewhat misleading since the underlying theme appears not to be communication *per se*, but rather a study of communication *vis-a-vis* its potential as an approach towards elucidating general principles underlying the neurobiology of behaviour. Communicative behaviour, unlike most other forms of behaviour, is particularly reliable or 'reflex-like' and hence well suited to this purpose.

In the first chapter some aspects relating to the definition of behaviour are discussed. Some functions of communication — both at the intra- and interspecific levels — are briefly considered and illustrated with appropriate examples. This chapter concludes with a brief discussion on the inevitable evolutionary exploitation of existing communication systems. Interspecific examples (e.g. Mullerian and Batesian mimicry) are convincing, but it is difficult to read under the same rubric examples of intraspecific 'deceit'.

Chapter two presents an excellent treatise of sensory systems and their relationship to behaviour in general. The caveat 'reception does not equal perception' is well placed: events at the level of the receptor are only the first stage in a series of integrative steps which determine the image ultimately 'perceived' by the brain. Nonetheless, this first stage — mediated through complement of receptors of an organism, and receptor specificity — plays an important role in defining the subjective world experienced by that organism. The principles underlying such receptor specificity (e.g. receptor sensitivity, bandwidth etc.) are outlined. After a general treatment of principles and evolutionary constraints in sense

organ 'design', a more detailed discussion of coding at the level of receptors ensues. Not all receptors are capable of coding for all stimulus parameters (e.g. intensity, duration, repetition rate, frequency analysis, etc.) and specific receptor systems are discussed in this regard. Finally, as an illustration of the main points discussed, Chapter 2 ends with a detailed look at some particular examples of visual and acoustic communication.

Chapter 3 begins with a brief discussion of some early models accounting for the specificity of behavioural response to particular stimulus configurations. The concept of the 'Innate Releasing Mechanism' (IRM) has been of heuristic value, but the authors present both ethological and neurobiological information which warn against a too literal interpretation of this model. Specific behavioural units are not always inexorably linked to particular stimuli, since such factors as 'motivational state' may intervene between stimulus and response. Some of the models proposed to account for such intervening variables are discussed. Those which carry implications about underlying processes or structures at the level of the CNS are generally too mechanistic or too specific in assigning particular functions to discrete motivational 'centres' in the brain. 'Threshold' models — which say nothing about the actual mechanisms gating particular responses while eliciting others — are said to be popular. Some neurophysiological phenomena which may partly account for changing of thresholds of response to particular stimuli are discussed.

It is stressed in this chapter that stimulus filtration and motivation are not physically or functionally discrete aspects of the nervous system. Thus the CNS may influence a receptor in such a way as to bias the input of certain stimuli relative to alternative, competing stimuli, thereby effectively lowering the threshold of response to the former. In this way motivational aspects may distinguish, or 'gate', certain responses — a process referred to by the authors as 'motivational gating'. Examples involving the effects of circulating hormones, and of artificial, selective stimulation of parts of the brain are included.

In Chapter 4 the neurophysiological correlates of the behavioural terms 'stimulus filtration' and 'motivational gating' are considered. The role of the synapse, the axon, and of non-spiking interneurons are investigated. Having laid this theoretical background, the authors proceed to consider some established mechanisms of sensory integration in the CNS. What follows is a consideration of neuronal aspects in the production of signals by the motor system. The complexity of the CNS is again stressed, reiterating that no one area of the brain can be considered to control behavioural output.

The fifth chapter deals with the evolution of signals used in communication. Much emphasis is placed on the model of 'stable conflict' as an origin of signal behaviour, and several points of evidence in favour of this model are presented. Possible origins of particular stereotyped behaviour patterns (e.g. 'intention movements', 'displacement activities', etc.) are then evaluated in the light of this model. Despite the strong supportive evidence in favour of the 'stable conflict' model, the authors are pleasantly non-dogmatic and conclude that '... the sensible approach, at present, is to accept that signals can derive from a variety of sources ...'.

Having dealt with possible origins of signals, the authors proceed with a discussion on their evolutionary elaboration. Chapter 5 closes with a brief discussion on the ostensibly small and constant number of displays in the repertoire of a wide range of animals.

While Chapter 5 considered signals as isolated units, chapter six deals with sequences, or 'reaction chains' of signals. Courtship sequences of butterflies, fish, newts and birds are described. Such behavioural sequences are stated to evolve when there is some barrier to immediate mating, and an illustrative discussion on what may constitute such barriers is presented.

In the final chapter some statistical techniques used in analysing sequences of behaviour are outlined. This could equally have been included as an appendix to the book.

In this generally well-laid out and lucidly written text the authors have made an important contribution to the teaching of both ethology and neurobiology. What accrues from their holistic approach is an introduction, at the undergraduate level, to the newly emerging science of neuroethology. It is only through dispelling of conventional boundaries that we can hope to understand the underlying causes of behaviour. Hopefully others will follow this synthetic approach, drawing on available information from traditionally discreet sub-disciplines of science to enhance our ultimate understanding of natural phenomena.

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Animal Osmoregulation

J. Clifford Rankin and John A. Davenport

Blackie & Son

202 pp.

Price R108,30; paperback R58,20

Although slightly biased towards students with a knowledge of the various 'pods', this book is an excellent introduction for undergraduates or post-graduates from diverse scientific backgrounds who require a comprehensive understanding of osmoregulatory mechanisms throughout the animal kingdom.

Beginning with the concept that animals originated as solutions of various solutes in water, the authors set out to describe concisely and interestingly the evolution of organs and strategies that enable animals to regulate their internal osmotic environment, regardless of their external one. After an introduction to the basic principles of salt and water movement within and between animal cells, the specific problems associated with life under various aquatic conditions are dealt with. In these chapters numerous examples are cited to highlight how organisms cope with too much or too little salt in their surrounding water. How some are so efficient they can migrate between salt-rich and salt-deficient habitats.

After describing comprehensively how osmoregulation is accomplished in representative aquatic species, the book goes on to deal with the requirements associated with the emergence of animals from water onto land. Terrestrial animals have developed methods of dealing with water shortage that include minimizing water loss together with stimulation of water intake. Similarly salt regulation in conditions of shortage and excess is also admirably dealt with. Naturally the importance of the kidney has been emphasized by the inclusion of a chapter on the mammalian kidney. As the authors point out,

the vast amount of work in this field makes it impossible for textbooks to keep up to date, especially as the more we learn, the less we know about renal function. Nevertheless, they have put together a chapter that explains in an understandable way the many complexities of renal physiology, not least the essential concentrating mechanism and its hormonal control.

To conclude this fine survey of animal osmoregulation the book has chapters that discuss specialized osmotic problems, such as life at very low temperatures as well as some of the techniques used in osmoregulatory research that give an impression of the ways in which physiologists work.

Throughout this volume the authors flavour their offering with small pieces of useful information. Information such as why man cannot survive drinking only sea water or that the humming bird is capable of ectothermy, simply adds to the content of the book.

Concerned with the interaction between osmotic control mechanisms and the osmotic stresses imposed upon animals by their environments, this book tends to stress the similarities between species rather than their more commonly expressed variations. The authors bring together a rich mixture of animal types and situations although the main ingredients are aquatic. In addition to the basic concepts of osmoregulation they deal with current theories as to how it is achieved with its complex neural and hormonal components. This book is a worthwhile investment in both time and money for those who want to learn more about animal osmoregulation.

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Physiological Strategies in Avian Biology

J.G. Phillips, P.J. Butler and P.J. Sharp

Blackie Publishing Corporation, Glasgow, 1985

218 pp.

Price R108,30 (Hardcover), R53,10 (Softcover)

Morphological, physiological and behavioural adaptations have evolved in birds allowing them to exploit successfully a wide range of ecological niches. These adaptations, and in particular the physiological mechanisms that allow birds to maintain homeostasis in conditions as widely different as those encountered in the Antarctic, the tropics, the desert and the marine environment, form the overall theme of this book.

Following the introduction, the first chapter investigates the morphological systems involved in locomotion, energy costs associated with flying, running, swimming and diving as well as the physiological adjustments during these locomotory activities. A rather short, descriptive chapter on migration and navigation is followed by discussions on thermoregulatory adjustments in birds exposed to cold and heat stress. Osmoregulatory adaptations for maintaining water and salt balance, with some emphasis on the structure and functioning of salt glands, receive careful attention. A detailed description of the reproductive system and its functions leads up to a chapter

on breeding patterns and the role of environmental stimuli in initiating and mediating the morphological and physiological changes which occur in birds during the breeding cycle. The role of hormones in the reproductive physiology of birds receives considerable emphasis, reflecting the interest of the authors in this subject.

An unusual inclusion in the book is the final chapter on the applied aspects of physiological studies, in which the authors discuss how understanding of the physiology of reproduction has allowed the artificial modification of environmental conditions to maximize egg production and body weight in poultry. Whilst of interest, I think this should have taken second place to the section on the effects of environmental pollution on the thermoregulatory, osmoregulatory and reproductive physiology of birds which concludes the book.

Throughout the book the authors cite numerous studies which not only emphasize basic physiological principles, but which illustrate the diverse adaptations which have evolved in birds occupying both similar and widely different niches. What is good for the goose, it appears, is seldom good for the white-crowned sparrow.

I found the format of the book particularly pleasing. Each chapter is divided into numerous sub-sections which are listed in the detailed table of contents. This allows one to rapidly locate topics of specific interest and in several cases I found it more useful than the index. Figures and plates in the text are clear and well produced. Editorial and typographical errors, which I find particularly irritating, were pleasantly few. The most serious of these were the omission of Stroke Volume (S.V.) from the equation for oxygen consumption and a transcription error in a figure caption which endowed canaries with precocial young and turkeys with altricial.

The book contains a comprehensive list of some 247 references but I was disappointed to note that several interesting observations in the text were not referenced. It was also disappointing to note that the authors persist in using the term 'strategy', even in the title. Not only is this semantically incorrect but it is philosophically misleading.

The book is aimed at undergraduate and postgraduate students as well as amateur ornithologists and I feel it is well suited to this level of reader. The authors have achieved a good balance between comprehensiveness and readability without overwhelming detail and the book will make a useful addition to the shelves of anyone with more than a passing interest in birds.

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Vocal Communication in Birds

Studies in Biology no. 115

Clive K. Catchpole

Edward Arnold (Publishers), London, 1979
68 pp. & 38 diagrams
Local price R25

The Studies in Biology series is primarily aimed at giving an up to date introduction to a field of biology and to stimulate interest in that field. This slim book is a great success towards these aims. Clive Catchpole gives an easily readable and interesting account of the present state-of-play of some aspects of bird song being studied today.

There are six chapters in the book. The first two deal with the communication system and methods and techniques of how bird songs should be recorded and analysed. In the chapter on calls and communication it is clearly shown that every simple bird call has a function and a *flying predator call* for instance can convey the intensity of the situation to conspecifics but still give minimum directional information to the predator. Song and communication are discussed in Chapter 4. After reading through this chapter one is left with the feeling that bird communication systems are very complex and by studying the song of each new species a new dimension will be added to our understanding of vocal communication systems.

In the last two chapters the development of song and song and evolution are discussed. Various thought-provoking experiments are discussed and stimulating results given. The complex nature of the songs of the *Acrocephalus* warblers discussed in the last chapter makes one think about several of the issues of the evolution of song such as the advantages of mimicking other species' calls.

Clive Catchpole is to be congratulated on producing such an easily readable introduction to vocal communication in birds. The subject is well introduced, the examples well chosen and the way in which the subject is presented will be appreciated by biologists in this field.

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An introduction to coastal ecology

P.J.S. Boaden and R. Seed

Blackie and Son (Ltd)
218 pp.
R50 (Soft cover)

This book is intended to provide a concise account of coastal ecology for advanced undergraduates and immediate post-graduates and adopts a 'habit organismal' approach. It reads easily and has a good overall coverage of coastal marine environments, although there is some slight bias towards

European shores and towards micro-components of the biota. Despite the claim of the authors, it is not suitable, however, for post-graduate use as the field is so broad that coverage is of necessity extremely superficial. It would, however, make a good undergraduate text, introducing the student to coastal environments and their fauna and flora.

There are eleven chapters, each dealing with a particular type of habitat or topic. The chapters average about 20 pages in length and most chapters end with an account of primary production and trophic relations in a particular environment. The first chapter deals with coastal environments, covering types of shores, water movement, waves, tides, temperature and other climatic factors. Chapter 2 covers the neritic provinces and includes sections on coastal plankton adaptations, distribution and productivity. The third chapter deals with rocky shores, covering adaptations, zonation, distribution, patchiness, predation and trophic relationships and forms a generally good synopsis.

The fourth chapter on sediments is poor. It covers physical processes very superficially as well as microbes, chemistry, protozoans, macrophytes and bottom communities. Little mention is made of major habitat types. The fifth chapter, on brackish waters, covers some aspects of estuarine environments, but is only 12 pages long. Chapter 6, on coral reefs gives a reasonable general coverage and the longer Chapter 7 (23 pages), on marshes and mangroves, is quite good.

Chapter 8 briefly mentions a series of other habitats including dunes, desert coasts, shingle beaches, grassland and heath, woodlands, cliffs, swamps and ice coasts. Chapter 9, on the 'Inshore Harvest', deals with fisheries, marine culture and seaweed resources and also includes a section on marine tetrapod vertebrates. Chapter 10, on coastal birds, is an interesting aspect not usually covered in books of this sort, but there is too much emphasis on oceanic birds and too little on coastal birds such as waders. Chapter 11, on management, covers the use of resources, conservation, management and modelling.

The authors have perhaps been too ambitious in attempting to cover the whole spectrum of coastal ecology in a book as condensed as this. While its concise nature does make it useful as a basic undergraduate text, limiting the coverage of complex environments to 20 pages has resulted in very superficial synopses. Another criticism is that, because of the way the book is structured, some environments are split over several chapters, e.g., estuaries are covered in Chapters 4, 5 and 7 and one really needs to consult all three chapters to get a good coverage of the estuarine environment. Open sandy beaches and upwelling zones are hardly mentioned.

While the book is very readable and does provide a good general introduction to coastal environments for the undergraduate student, I think it is unlikely to be prescribed at South African universities as much of our major coastline types receive very little treatment.

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Biology of Reptiles: An Ecological Approach

Ian F. Spellerberg

Blackie & Son Ltd., Glasgow & London, 1982
158 pp.
Price R53,10

This book was originally published in Britain as part of the Tertiary Level Biology series. The titles in this series include selected topics in biological science and are intended mainly for advanced undergraduates, but also for specialists and research workers in other fields, not familiar with the subject.

In the preface the author states that his aim was to adopt a more ecological approach providing functional interpretations in order to stimulate the reader to further study. The author contrasts his approach to previous herpetological texts.

The book contains eight chapters, commencing, as is usually the case in other herpetological texts, with a chapter concerning the origin and evolution of reptiles. It does not take much reading to realize that this chapter is a collection of facts taken from other texts. Numerous statements are made without any explanation of what is meant, which to say the least, will only confuse the reader. For some reason dinosaurs receive most of the limelight. Many theories have been put forward concerning the extinction of dinosaurs, however, the author chooses to discuss only one rather unknown theory in detail. Swain (1976) suggested that herbivorous reptiles poisoned themselves on toxic alkaloids of the newly evolved angiosperms. Compared to the theories available for discussion this one seems one of the least important scientifically.

Currently five suborders of mammal-like reptiles are recognized compared to the three he mentions. He also mentions *Tyrannosaurus* as a Jurassic contemporary of *Allosaurus*, rather than a specialized Cretaceous carnivore. Modern day taxonomy and classification of living reptiles are allocated disappointingly little writing space when compared to their palaeontological grandfathers. In conclusion I feel that the composition of this chapter may confuse and bore any undergraduate reader.

The second chapter is concerned with the functional anatomy of reptiles and is composed in much the same way as Chapter 1. Technical terms are frequently used without any explanation (e.g. pseudoheterodonty) and very little functional interpretation is given. I find this chapter a potboiler of facts, carelessly collected and assembled. I know of several general vertebrate biology texts that give more functional morphology in a much clearer way.

In Chapter 3 the author gives an overview concerning the worldwide patterns of distribution of reptiles, combining past

and present distribution. Species abundance, mostly using American and Australian examples, is also discussed briefly. Also included in this chapter is a rather lengthy discussion concerning the distribution and species richness on islands, in particular the British Isles, West India and Greater Antilles.

Chapter 4 starts off with the basics of reproduction, giving the reader some idea of the complexities of the different modes of reproduction encountered in reptiles. Lacking is the physiological basics of the different modes of reproduction. Most of the discussion concerns the post-ovulatory stages of the reproductive cycle. In the section on reproductive effort and the different reproductive strategies, the author, for the first time, lives up to his goal in providing stimulating functional discussion.

Chapters 5 and 6 are devoted to Ecology (the physical and biotic environments respectively). The title 'Physical Environment' seems to be rather misleading since the whole of Chapter 5 is devoted to a discussion concerning the water balance and temperature ecology in reptiles. It is a pity that the author did not include the topic of behavioural thermoregulation in this chapter. Also lacking in this chapter is the new biophysical approach to the understanding of the interaction of a reptile with its physical environment. Figure 7.2, p. 133, is an example of such an approach, although discussed under the topic of behaviour.

Basic ecological concepts, mainly concerning population dynamics are discussed in Chapter 6. This chapter is flawed by errors in an equation to estimate the abundance and density of reptiles. Although Bailey (1952) is the original source, Turner (1977) receives the credit for the equation. Moreover, according to Bailey (1952) both Turner (1977) and Spellerberg presented this equation in an unusable form. Other typographic errors spotted, include the expression of areas in the units m^{-2} instead of m^2 .

The chapter on Behaviour is, like earlier chapters, assembled with insufficient clarification. The reason for this may be the fact that the behaviour of reptiles has not been extensively studied in the field. At last someone points out that the conservation of certain reptiles deserves similar treatment to taxa such as birds and mammals. The last chapter, on conservation, underlines the importance of habitat conservation as a conservation strategy for reptiles.

References are collated at the end of the book according to chapter. It is clear that the author included more recent literature. The book ends with a general index, also including generic names. The last error occurs on the back cover where the author defines Herpetology as the study of reptiles only!

Although the author selected an interesting set of topics, he frequently failed to live up to his goal noted in the preface, of providing an ecological and functional approach.

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