REVIEWS

Edited by J. M. PENHALLURICK

BOOKS

Animal migration, navigation and homing Symposium held at the University of Tubingen, 17-20 August 1977. Edited by K. Schmidt-Koenig and W. T. Keeton, 1978. Berlin, Heidelberg and New York: Springer-Verlag. Pp x + 462, figs 237. 250 x 170 mm. $A31.20.

For many years, the question of how animals navigate has puzzled naturalists. Though the question has generally been raised in relation to migratory birds, it applies to many other animals that can navigate with considerable accuracy, including foraging ants and bees, migrating insects and some fish and mammals.

One of the most often quoted examples of navigation by an Australian bird is that of the Short-tailed Shearwater *Puffinus tenuirostris*. It breeds in south-eastern Australia and winters in the northern Pacific (occasionally as far north as the Arctic Ocean). In spring, after travelling 20,000 kilometres, the adults return, not just to the islands that they left five months earlier but often to the same burrows. This in itself is remarkable but it is coupled with the ability to return on the same day, or almost so, each year and achieved without the aid of maps, calendars, chronometers etc. that modern man would require to navigate so accurately.

How do animals accomplish such feats? Despite years of study by many researchers, we still do not know. However, we have learned enough to be sure that the answer will be complex. Just how complex is demonstrated by this book, which is a collection of forty-five papers read at a symposium held in Tubingen from 17 to 20 August 1977. The sixty-three authors include some well-known names such as D. R. Griffin, W. T. Keeton, F. Papi, K. Schmidt-Koenig and R. and W. Wiltschko.

Twenty-nine papers are concerned with birds, four with fish two each with amphibians, marine invertebrates and turtles, one each with seals, rodents and bacteria, and the other three deal with hypotheses and methods of studying migration, navigation and homing. Of the twenty-nine dealing with birds, seventeen concern the Feral (Domestic) Pigeon *Columba livia*, which has become the guinea-pig of navigational and homing experiments.

The search for the sensory mechanism and cues that animals use to navigate has been wide, as is shown by the scope of the papers. Various authors deal with the detection and navigational use, by animals, of the sun, stars, moon, topographical features, weather, the earth's magnetic field, polarized light, ultraviolet light, atmospheric infrasounds, echo-location, gravity, barometric pressure, water pressure and smell. None of the authors professes to have found the answer. The matter is summed up in a paper by M. L. Kreithen of Cornell University (*Sensory mechanisms for animal orientation—can new ones be discovered?*); he suggests that, 'if we are going to understand animal navigation we *must* discover a new sensory channel. The ones we now have are not sufficient to explain the animal's behaviour. Since we must discover a new cue, we can proceed to search with the optimism that it exists and that it is our job to find it. We must beware of our own limitations and try to overcome mental barriers about what can and what cannot be accomplished.'

The book cannot be recommended to one who simply wants an elementary knowledge of the subject. Most papers are highly technical and would be understood fully only by specialists. However, the book provides an up-to-date view of the rapid increase of data, evidence, ideas and methods in the subject. As such, it ought to be in the library of any institution that is interested in its study. It is well bound and is in typewritten offset printing on high-quality paper. Some minor typing errors have escaped the proof-readers. It has an adequate index.

David Purchase

Recognition of Aerodrome Bird Hazards by G. F. van Tets, W. J. M. Vestjens, A. H. D'Andria and R. Barker, 1977. Canberra: Govt Publ. Serv. Pp vii + 89, 16 line drawings. 175 x 250 mm. $A4.25.

This book is intended as a guide for non-ornithologists. It tells them how birds react to the range of environmental factors that occur permanently, seasonally or erratically round Australian airports. As such, it is aimed at a special readership, which will usually assign a low priority to the subject covered by the book. However its message is important and the small number of readers will occasionally be in urgent need of the advice it contains. Furthermore, it must have sections applicable to all parts of Australia, so that it is as helpful at Devonport as it is at Derby. The authors have achieved considerable success in meeting these unusual specifications, partly by redundancy and partly by the lavish use of illustrations and tabular material, so that the book should both awaken the interest of airport managers and act as a reference work in moments of need. Only experience will provide a measure of its real success.

Although I find myself infuriated by the waste of space involved in the recent fashion of covering only minute fractions of some pages with print, I suppose that it may be justified on the grounds of impact and emphasis. This publication is particularly fashion-conscious with its ample use of empty space, contrasting unfavourably with the telegraphic abbreviation of information in the tabulation. The cover, which is said to illustrate an airport food-chain, has been abbreviated to the point of complete obscurity and one suspects something is missing. On an ornithological note, the only point I could query is Map XX which records *Artamus cinereus* at Perth Airport. Although this is a possible record, *Artamus cyanopterus* is more likely.

The book emphasizes that keeping birds from airports is a long-term management problem, involving the co-ordination of many unexpected and unrelated human activities, often quite unconnected with airports themselves. It should really find a place in the reading list for shire clerks as well as Department of Transport planners and, in the interests of aviation safety, it is to be hoped that it will be widely read by private as well as by commercial pilots.

S. J. J. F. Davies

Breeding Biology of the Egyptian Plover *Pluvianus aegyptius* by Thomas R. Howell, 1979. Univ. Calif. Publ. Zool. 113. Pp 76, col. pl. 1, b. & w. pll 15, figs 6, tables 5. $US10.50

The Egyptian Plover is an unusual tropical wader that no longer occurs in Egypt and has never been a plover at all. The waterside existence of this strange sort of courser is as remarkable as the bird's appearance: what other flying wader shows *white* upperwings with *dark* transverse bars? EPs, as Thomas Howell refers to them, live on the shores of the major rivers in tropical Africa. Their extraordinary breeding behaviour, carried out on sandbars exposed during the hot dry spring, was unravelled by the author during just ten weeks of

fieldwork on the Baro River in Ethiopia. This booklet is really a rather long and loosely constructed paper, which has neither the conciseness of a contribution to a journal nor the additional background information that one expects to see in a narrative. There is much about the behaviour of nesting birds but nowhere is the reader told anything about how the observations (other than telemetric ones) were made.

The conspicuousness of EPs on bare sandbars, together with the very high ground temperatures found on such sites, make any normal sort of incubation impossible. The breeding pair has a dazzling array of adaptive tricks to cope with such an awkward environment for a nest. Like various sandgrouse (Pteroclidae), plovers (Charadriidae) and coursers (Cursoriinae: Glareolidae), which nest in similarly hot surroundings, EPs soak their belly feathers while bathing and carry water to the nest. Here, the eggs are saved from being baked by a scheme of nest maintenance that hinges on keeping the clutch buried in wet sand. When one of the pair incubates in daytime, it actually cools the clutch. Adults evidently test the warmth of the nest surrounds by probing with the bill. Nesting pairs attack all approaching conspecifics, other birds and potential predators. Whenever danger threatens after the chicks have hatched, parents bury them by kicking sand over them. The section of monochrome plates provides vivid illustration of several of these points.

There is a full and useful discussion of the water balance of the developing chick; the author attributes the overlong incubation period (30 days) to a reduction in the rate at which the egg loses water into its environment of wet sand. This is said to enable the embryo to undergo a prolonged period of maturation before it hatches as a precocial chick. An alternative explanation might be that the wet environment of incubation slows gaseous exchange to a point that limits the rate of later development.

In all, this is a good account of a very special wader.

Peter Curry

Population Ecology of Raptors by Ian Newton, 1979. Berkhamsted: T. and A. D. Poyser, Pp 399, b. & w. pll 32, b. & w. figs 50, sketches 31, tables 68. 157 × 241 mm. £Stg10.80.

At the end of a decade that has seen more studies and books devoted to raptors than ever before, Dr Newton has produced a book that is a landmark in its field. The book succeeds in its object of producing a synthesis of current thinking and research on all aspects of the regulation of population in raptors. If there is a theme to this book, it is that raptors lend themselves specially well to studies of the regulation of population and of the influence of food on breeding rates.

At the outset it ought to be said that the title could be misleading, in that only diurnal raptors of the order Falconiformes are discussed. That most data are drawn from studies of raptors in the northern temperate zone results from the fact that there have been few ecological studies of tropical raptors and even fewer from Australia and South America. It is difficult to fault the presentation. The style of writing is lucid and each chapter ends with a convenient summary. The bibliography contains over 800 references.

Newton begins by discussing one of the most intractable subjects of raptor ecology: why most female raptors are larger than males. He proposes a new and convincing theory of sexual dimorphism exhibited by raptors, based on competitive interactions. The discussion progresses logically to sex ratios and mating systems. Most raptors are monogamous but a few species are sometimes polygynous and others polyandrous. I thought that more space could have been devoted to the discussion of the potentially very interesting topic of mating systems.

Dispersion and density are said to be governed by the distribution of nest sites and food. The data used demonstrate that populations of raptors that depend on fairly stable and varied sources of food show fairly stable densities over many years and nest solitarily in contiguous or overlapping home ranges. Conversely, populations that depend on fluctuating sources of food show fluctuating densities in accordance with cycles of their prey and often breed, roost and hunt communally. Although a wealth of data is presented to substantiate his views, Newton is careful to point out that the evidence is largely circumstantial.

One of the eighteen chapters is devoted to problems concerning nest sites. The chapter is largely descriptive and for this reason I found it one of the least interesting. Problems discussed range from whether a species can build a nest for itself to availability of nest sites, competition with other species, pressures from predators, and local traditions. Newton suggests that the large nests built by eagles may serve as an important signal in advertising the territory to others of their kind. He considers the habit of bringing greenery to nests may further serve to denote an occupied, as opposed to an unoccupied, territory. This view departs from the more traditional idea that greenery serves as an aid to nest sanitation and possibly maintenance of humidity.

'Breeding season' is one of the few topics for which there are enough data on tropical species for comparison with northern temperate species. In both tropical and temperate regions, large raptors begin breeding before small ones. However, the two zones differ in that breeding by tropical raptors is spread more evenly over the year with bigger differences in breeding periods between species and more spread in laying dates within any one species. Unlike temperate regions, the tropics do not experience marked seasonal change in daylength, which might act as a proximate factor to stimulate laying. It is suggested that in the absence of such changes, the most likely proximate breeding factor in tropical raptors is change in rainfall, with a subsequent effect on the availability of food and hence on body condition.

The chapter on breeding strategies is one of the most interesting, although most of the ideas have previously been put forward in Newton's 1978 paper *Breeding strategies in birds of prey* (*Living Bird* 17: 51-82). The author states that the three main trends in the breeding of raptors are related to size of body and associated longevity. The larger the species, the later the age at which breeding begins, the longer each successful attempt takes and the fewer young that are produced with each attempt.

The Falconiformes show greater variation in weight and breeding rate than any other Order. In their population dynamics the small raptors resemble song birds where reproduction is likely to be easy, with many openings for recruitment into breeding populations each year. These conditions ought to favour the evolution of large clutches, high rates of breeding and early maturity ('r-selection' in the sense of MacArthur and Wilson 1967). Conversely, in large raptors selection pressure favours the production of well-nurtured young released from prolonged parental care with the greatest chance of competing successfully with others of their species ('K-selection' in the sense of MacArthur and Wilson 1967). Large raptors resemble certain seabirds with their small clutches, long breeding cycles and deferred maturity.

Tropical species have smaller clutches and slightly longer incubation and nestling periods than their closely related equivalents in temperate zones. Newton believes that this is related to the fact that the supply of food is more stable in tropical than in temperate environments. These conditions lead tropical populations to be more consistently near saturation level, so that recruitment is more difficult and K-selection stronger.

The general reader will find the chapter on behaviour in the breeding season one of the most enjoyable. This is because the background information that the author has to draw on is extensive and we can readily compare our own observations with the general patterns described. Despite the divergent ancestry of different types of raptor, most species that have been studied behave in a remarkably consistent way, presumably through

convergence. With typical thoroughness, the author remembers to include that most neglected fraction of any raptor population, the non-breeders.

In the study of movements by raptors within and between continents, the South American and Australian continents have received scant attention. Most of the diversity in patterns of migration from Europe into Africa and from North America into South America is explained in terms of food. Elements in these patterns are: seasonality of movement, such that raptors are absent from breeding areas when food is scarce there; annual and regional variations in migrations, specially of northern species dependent on cyclic prey; relation between migration and diet, with those species that depend on cold-blooded prey withdrawing earlier and most completely from the temperate zone in winter; and the precise timing of movements in relation to changes in prey numbers.

In the last third of the book, we have a chapter on mortality; three chapters on the bleak history of human persecution, DDT and other organo-chlorines, and pollutants and pesticides such as mercury and organo-phosphorous compounds; and two brighter chapters on conservation and breeding from captive birds.

The study of natural mortality in raptors is much less advanced than the study of breeding. One reason for this is that banding recoveries are inevitably biased towards deaths that occur from human action or round human habitation. Newton makes the point that recovery rates for banded European raptors were higher than for many game-birds and waterfowl regularly hunted. This trend is graphically illustrated in two maps of Britain showing a high negative correlation between the average breeding density of Buzzards and the distribution of gamekeepers. Mention is also made of bounties paid for 147,237 Wedge-tailed Eagles in Western Australia in 1927–68.

Newton has published several papers on organo-chlorine effects on populations of raptors and in this book makes it easy to read this technical topic without oversimplification. The detailed case that organo-chlorines have caused the decline in some populations is extremely compelling. What is alarming is that, although fairly small amounts of organo-chlorines are now used in Europe and North America, their manufacture by American and European factories continues and the main market has shifted southwards. The heaviest use is now in a broad band across central America, northern Africa, the Middle East, India and south-eastern Asia. Newton notes that at the time of writing the use of organo-chlorines worldwide is still increasing, specially in developing nations. The author sees that the immediate lesson from the DDT saga is to avoid the more persistent synthetic pesticides and points to the major need for knowledge of new pesticides and pollutants on which the spotlight has not yet fallen. The biologist cannot make toxicological tests or routine analysis for chemicals he does not know about.

The three main aspects of conservation discussed are concerned with halting the restriction and degradation of habitat, persecution by man and contamination by toxic chemicals. The author believes that the controversial programs of captive breeding and release offer the best chance of restoring some endangered populations, provided of course that the environment into which they will be released is suitable.

Questions that rely on personal opinion and sentiment for their replies are left unanswered. For example, how many raptors do we want? Where should they be? However, questions of a scientific nature are confronted in a manner that will satisfy the professional research worker without losing touch with the general reader. I believe that if there is but one book on raptor ecology on your shelf, this should be it.

D. J. Baker-Gabb

The Birds of South-east Queensland by Gregory J. Roberts, 1979. Brisbane: Qld Conserv. Counc. Pp 50, b. & w. figs 2, maps 2. 145×210 mm. $A1.80+$0.35 postage (from QCC, PO Box 238, North Quay, Q 4000).

The production of this booklet by the Queensland Conservation Council illustrates a growing trend. Conservation groups are becoming more involved in the publication of literature that takes esoteric information from natural history groups and makes it more readily available to nonspecialists.

It is over ten years since Elks's *Field List of Birds of Queensland's South-east Corner* was published. Whereas Elks's list gave information only on status and habitats, Roberts's annotations contain additional data on localities, seasonality and literature. He lists 427 birds compared to Elks's 379. In general, this booklet is similar to G. M. Storr's *List of Queensland Birds* in style and outlook. Order and nomenclature follow the recent RAOU list of recommended names but more familiar versions of the English names are often given, in brackets. The gazetteer in the back is very useful for those who want to know where to go to find particular species.

I think Roberts achieves his stated aim of providing an up-to-date annotated list on the status and distribution of birds in south-eastern Queensland. This is particularly noticeable with seabirds and waders where much of the information given has spread widely by word of mouth but is otherwise unavailable. My only criticism, beside the variation in the quality of the printing and several spelling errors, is the lack of an index.

In summary, *The Birds of South-east Queensland* is a handy little book if you are interested in Queensland birds.

Glen Ingram

SOUND RECORDINGS

Menura the Lyrebird. 23 pp, 14 col. pll+7″ EP Record MX24394.
Voices of the Australian Bush. 28 pp, 31 col. pll+7″ EP Record Z4KB0292.
Bird and Mammal Calls of Australia. 24 pp, 27 col. pll+7″ EP Record MX27400.
Wonder Birds of Australia and their Calls. 36 pp, 35 col. pll+7″ EP Record JNS 5038.
All by Harold J. Pollock, 1979. Brisbane: The Jacaranda Press. $A6.95 each.

With the publication of Harold Pollock's most recent title, *Wonder Birds of Australia and their Calls*, the Jacaranda Press has taken the opportunity to reprint the three previous titles in this series so as to issue all four in a standard format. First published in 1967, *Menura the Lyrebird* still stands out above the others, reflecting the author's deep involvement with that species when he made also a well-known movie film. Dealing mainly with a single species, *Menura the Lyrebird* treats the subject in greater depth, both in the book and on the recording, than do the other three titles, which cover a number of subjects. *Bird and Mammal Calls of Australia* covers twenty-five species and the other two titles, thirty each. Thus, there is not an inch of wasted track on the recordings but the brevity of some may leave the listener with a desire to hear more. Unfortunately, to replay a given section on this type of recording requires some patience because the subjects are not separated into different bands, so as to conserve space.

There is considerable overlap of subject matter in the last three titles, no doubt largely brought about by the publisher's

reprinting of works ten or so years old. It is a pity that the opportunity was not taken when reprinting to correct a few small errors in *Voices of the Australian Bush,* which attributes the range of the Brown Cuckoo-Dove to the NT, a clutch size of three or four to the Yellow-tailed Black-Cockatoo and as many as nine eggs to the Eastern Rosella. The Black-winged (Pied) Stilt in the text is announced by the older vernacular of White-headed Stilt on the record. However, such minor errors do not detract from the general attractiveness of the publications. They have been produced primarily to provide enjoyment to the listener or reader and they do this well. Harold Pollock's narrative is written in a light informal style, which amply complements the recordings, which are mainly animal or bird calls together with the briefest of announcements for each subject. Useful notes on his methods of recording are appended to the last three titles.

Graeme Chapman

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