REVIEWS

Edited by J.M. PENHALLURICK

BOOKS

The Herons of the World by James Hancock and Hugh Elliot, 1978. London: London Editions. Pp 304, col. pll 61, b. & w. figs 9, map 6. 240 x 360 mm. £45.00.

This is a coffee-table picture book, with an attractive and reasonably accurate colour plate by Robert Gillmor or Peter Hayman for each species and a few drawings scattered through the book. The artists are similar in style and the makers of the plates have done justice to their work. The accompanying text is a synthesis of published information on each species and for the group as a whole, with a few personal observations by the authors. In handbook style, statements are backed up by references but sometimes rather carelessly.

The classification used is a moderate blend of those by Bock (1956, Am. Mus. Novit. 1779: 1-49), Curry-Lindahl (1971, Ostrich Suppl. 9: 53-70) and Payne and Risley (1976, Univ. Mich. Mus. Zool. Misc. Publ. 150). It differs from Australian usage in: a bitterns-first instead of bitterns-last sequence, because perhaps bitterns are primitive; *Dupetor* being sunk into *Ixobrychus;* the Cattle Egret being again made a monotypic *Bubulcus;* and the Pied Heron being moved to *Egretta* after having been in *Ardea, Tonophoyx, Notophoyx* and *Hydranassa.*

These modifications are relatively minor when compared with those by Payne (*in* Mayr and Cottrell [Eds] 1979, Check-list of Birds of the World, 1. 2nd ed.), which transfer several species between, and add a few species to, *Egretta* and *Ardea,* which are barely separable morphologically, ecologically and behaviourally.

We applaud the retention of the historic Australian name, Nankeen Night-Heron, for *Nycticorax caledonicus.* Rather inappropriate is the name Green Heron for *Butorides striatus,* as a glance at Plate 34 with three examples of this variable species will show. Contrary to what is said on page 240, the White-faced Heron does quite well at Lord Howe Island, which is sub-tropical and should not be considered as similar to the subantarctic Auckland, Campbell and Macquarie Islands. The White-faced Heron is also well established on the Chatham Islands.

G.F. van Tets and P.J. Fullagar

Avian Breeding Cycles by R.K. Murton and N.J. Westwood. 1977. Oxford: Claredon Press. Pp 594, b. & w. figs 175, b. & w. pll 23. 157mm x 245 mm. $A53.00.

The authors state that their aim is to stimulate multidisciplinary research in avian biology. They attempt to integrate endocrinology and ecology. Certainly, I believe that multidisciplinary research must become the norm in ecological studies if ecology as a science is to progress. So I looked forward to reading a book that may provide some of the necessary awareness and needed stimulus to promote multidisciplinary research. My approach was that of an ecologist who has little background in endocrinology.

The book contains sixteen chapters, five appendixes, an extensive bibliography, an index of species, an index of authors and many photographs and diagrams. A particularly useful feature is that each chapter begins with a summary of the chapter's contents.

The first chapter introduces the reader to general aspects of reproductive strategies as elucidated by ecologists. For example, breeding is timed to coincide with good supplies of food and other favourable environmental conditions. Clutch and egg size are mentioned in relation to survival rates of eggs, chicks and adults. Here, the concept of the biological clock is introduced. The remainder of the chapter deals with reproductive strategies in relation to survival rates. Simple mathematical models are presented to illustrate the rationale behind various strategies, ending with a flow chart, which illustrates the connexions between environmental stimuli (internal and external) and reproduction, that summarizes the book.

In contrast, Chapters Two to Six are extremely difficult to read and understand. The authors have presented numerous facts. Results of experiments are given but no general conclusions are drawn. In the preface the authors state that they might have oversimplified the subject had they drawn general conclusions. So they did not. To someone like myself, who is not familiar with endocrine cycles, this approach is utterly confusing. Thus the book is essentially a store of information for people who are familiar with the topic, thereby making it unsuitable as a text for undergraduates, many postgraduates and ornithologists in general.

Chapters Seven and Eight are concerned with energy budgets and reproduction. They provide a welcome change from the confusion caused by the preceding five chapters. Partitioning of energy to various bodily functions is discussed. This concept is neatly summarized in Figure 7.3 showing the total amount of energy available for use by a bird and the various thresholds at which particular activities such as breeding, moulting and deposition of fat reserves can be performed. One learns that migratory and non-migratory species differ in the temporal phasing of the controlling hormone rhythms but that the hormonal mechanisms are the same. Furthermore, regression of gonads and the onset of moult are not directly related because if the photoperiod is varied they can be temporally dissociated. An example of this is probably the Bridled Terns in the Seychelles, which start to moult when

their eggs hatch (cf. Diamond 1976, Ibis). King's model, which explains the relation between the amount of energy needed to produce eggs and the frequency with which they are laid, and Ricklef's material, which deals with growth and the partitioning of energy between maintenance and growth, were related to the various strategies used by species. This I found very informative. But again these chapters may be less useful to someone not familiar with the topic.

Chapters Nine to Thirteen deal with the role of photoperiodism and the timing of breeding seasons. Circadian cycles and the stimuli that entrain them are discussed. Differences between the timing of breeding cycles in temperate species and tropical ones are related to differences in photoperiods, which in turn entrain circadian rhythms controlling endocrine secretions and thus breeding cycles. The effect of free-running circannial rhythms on the timing of breeding is illustrated by the breeding cycles of tropical seabirds.

Chapter Fourteen is the climax. The preceding thirteen chapters are to prepare the reader for the synthesis. A vast amount of data has been collected on the timing of nesting by Anatidae held at Slimbridge by the Wildfowl Trust. The data show that the dates on which the ducks, geese and swans lay eggs reflect the latitude at which the species occur naturally. This is summarized in Figure 14.4. Each species has a characteristic response to the photoperiod, which determines the earliest or the latest it can lay and presumably successfully rear young. Fortunately, the authors suggest possible mechanisms by which photoperiod influences the onset of breeding. On the basis of this information the authors propose an evolutionary scheme of breeding strategies.

Chapter Fifteen deals with sexual selection and pair bonds. Sexual selection is important in monomorphic species as well as dimorphic ones. The difference is that both male and female exercise choice in monomorphic species whereas only one sex exercises choice of the mate in dimorphic species. Mating systems such as polyandry and polygyny occur when one sex is differentially hampered or favoured during reproduction. A particularly interesting aspect of this chapter is that some polymorphisms are associated with the photoperiod under which breeding is initiated or the length of the breeding season. The remainder of the chapter is devoted to mating systems and how these are related to the ease or difficulty of rearing young. Initially, I was confused by the term sex reversal, which to me means that an individual changes sex and is used this way in marine biology, but the authors use the term to mean the reversal of the sexual roles.

Chapter Sixteen is about population regulation and has not been integrated with the rest of the information presented in the preceding chapters. That task is left to the reader. Most of the chapter uses key factor analysis to detect density-dependent factors operating in populations. Although key factor analysis is one way of looking at the causes of mortality that are correlated with population size, it does not necessarily indicate the operation of density-dependent factors in a population. For a proper discussion of the limitations of such methods to discern the presence of density-dependent factors one should read Reddingius (1971. Acta Biotheoretica Suppl. 20).

The book is amply illustrated with figures and photographs. Some of the figures do not readily convey information because too much information has been crowded into them, e.g. Figures 7.11b, 10.8 and 10.11. Figure 10.8 would have been improved had the volumes of testes and diameters of follicles been given as means and standard deviations. These would have conveyed trend in their growth and the accompanying variation. Some figures are marred by errors and generate some confusion until one realizes the error. Two figures, 8.7 and 8.10, have been given equations that do not match the lines drawn. In Figure 8.7, the equation and the line for 1966 do not match. In Figure 8.10, the equation has a negative slope whereas the line drawn has a positive one. Part of Figure 10.7 is difficult to interpret readily. The information contained in the histograms would have been more readily conveyed had the histograms been drawn side by side rather than being stacked. The direction of the inequality symbols in the algebraic expression on p. 285 should be reversed. The text should read: 'TLL > TDD in noctural animals and TLL < TDD in diurnal animals'. The ordinate in Figure 16.6 was not labelled but that is minor compared to the faults mentioned above. Figure 16.4 confused me until I realized that the line labelled $b_{y.x} = 1.799$, which was lying to the right of the line $b = 1$, was incorrectly labelled. It should be $b_{x.y}$ and not $b_{y.x}$.

In general the photographs of the histological sections are of poor quality (Figures 3.3, 3.5, 3.8, 12.5, 12.8, 14.21 and 16.7). Too much definition has been lost in rephotographing the originals for publication. Thus, one cannot see the structures to which one's attention is drawn by the authors. On a more positive note, the photographs of the birds are good.

In conclusion, I think that the book is a splendid source of information and therefore extremely useful as a reference but is hardly suitable as a text. It may create an awareness among ecologists and ornithologists of the importance of the physiological basis of behaviour and so stimulate multidisciplinary research. But I felt that the authors would have achieved greater success had they drawn conclusions to help the reader put the significance of the material into perspective. Had they done this, the book would have been assured of a wider reading than it will receive.

Kees Hulsman

Nomina Anatomica Avium. An Annotated Anatomical Dictionary of Birds. Edited by J. J. Baumel, A. S. King, A.M. Lucas, J.E. Breazile and H.E. Evans. Consultant for Taxonomy, R.L. Zusi; Consultant for Classical Languages, L. Malinovsky, 1979. London: Academic Press. Pp. xxv + 636, numerous b. & w. figs. $US86.10.

Nomina Anatomica Avium will be immensely useful to any avian anatomist and is a welcome edition to the vast literature on birds. It provides a long-desired standardized terminology for external anatomy and integument, osteology, anthrology, myology, serosal membrances and celomic cavities; the respiratory, digestive, urogenital, endocrine, cardiovascular, lymphatic and nervous systems; and sensory organs. The ter-

minology is tabulated according to anatomical position, well illustrated and carefully indexed for ready reference. An extensive, not exhaustive, bibliography gives an excellent lead into current and classical literature on avian anatomy.

The book, supervised by J.J. Baumel, is the result of years of work by members of the International Committee for Avian Nomenclature (ICAAN). Its broad objectives are well expressed in the Introduction (p. x):

'(1) As few changes as possible should be made in well-established terms;

(2) with a few exceptions, each structure should be named by only one term;

(3) each term should be in Latin;

(4) each term should be easy to remember and should, above all, be informative;

(6) structures which are closely related topographically should have similar names;

(7) contrasting adjectives should generally be opposites, such as major and minor;

(8) eponyms should not be used; and

(9) no attempt should be made to name every minor structure ever discovered.'

These aims have largely been realized.

Terminology is expressed in Latin. Each term is described by a short paragraph and most terms are illustrated by black-and-white line drawings. Terms are also listed at the beginning of each section in groups related to position in the body from the cranial end to the caudal. Orientation of elements or muscle masses within the bird are clearly indicated in a standing individual with wings outstretched. Terms for macro- and mesoscopic work are included but there is no attempt to include microscopic terminology except where the mesoscopic and microscopic features imperceptibly grade into one another.

As an avian palaeontologist I think that some real improvements have been made, such as the terminology relating to the orientation of elements of the wing. The use of *condylus ventralis* and *condylus dorsalis* and caudal view v. cranial view on the humerus is much clearer than in many past usages. The use of *Os metacarpale alulare, Os metacarpale majus* and *Os metacarpale minus* instead of numbers points out the real controversy regarding the homology of these bones and does not perpetuate either theory of origin. I suspect that many anatomists, particularly in the texts of papers, may prefer to use the English version of the Latin names but an available widely distributed reference may eventually result in more extensive use of the Latin names.

The book could have been improved if lists of synonyms that are being superseded but are not always obvious from the new terms could have been included and the bibliography expanded. Some terms that occur in current references, as in Howard (1929), find no equivalent in *Nomina Anatomica Avium*. For example, terms are lacking for places of attachment of muscle masses, so that references must be sought elsewhere. A chapter showing where muscles are attached to major bones (without illustrating the muscles themselves) could remedy this.

To sum up, *Nomina Anatomica Avium* is a real step forward in the standardization of avian terminology and its use will improve communication between avian anatomists. Still there will be problems; if individuals can correspond with members of the ICAAN Committee (whose names and addresses are listed at the beginning of the text), future revisions could clarify such problems. A quote from this book (p. vi) seems most appropriate: 'The analysis of anatomical nomenclature has always been contentious; surprisingly passionate emotions can be generated over the names of quite insignificant structures.' It is hoped that equally passionate emotions can be directed at agreeing on the standardization of this terminology, particularly in the application of these terms to current research; and also that a sympathetic revision of some terms can be made.

P.V. Rich

The Birds of The Gambia by J. V. Jensen and J. Kirkeby, 1980. Nostrup Film-Grafik, Århus, Denmark. Pp 284, b. & w. pll 110, figs 10, numerous maps. 210 x 145 mm. £11.80.

The Gambia, the smallest African country, is situated along the lower River Gambia between 13°N and 14°N, on the extreme western coast. It lies mainly in the Guinea–Sudan Savanna zones, though the western tip is Forest–Savanna Mosaic. The climate is divided between a short wet season from June to October and a long dry season.

The first two chapters, comprising fifty-nine pages, also deal with the topography and definitions used in the text and list thirty-seven outstanding localities where species are likely to be seen. There are locality maps and photographs of various habitats.

The systematic list of 200 pages covers 489 accepted species, of which some twenty-five per cent are Holarctic migrants mainly from the Palaearctic area. This is an impressive list for an area of little more than 10,000 squares kilometres, which is a minute slice of West Africa, where 1,097 species have been recorded (Serle and Morel's *A Field Guide to the Birds of West Africa*). The list follows the nomenclature of Voous's list for Holarctic species. Ethiopian species are listed as in Serle and Morel's Field Guide and Mackworth-Praed and Grant's *Birds of West Central and West Africa*.

Each species has comments on status, habitat, breeding (where applicable) and range, and the notes on 385 species are accompanied by maps showing distribution during the dry season. One hundred and twenty-four references are listed and the indexes show scientific and English vernacular names.

Several species are illustrated by photographs, a few of which detract from the general presentation by lacking clarity or colour. For instance, photographs of the Rey-eyed and Vinaceous Doves, Red-throated Bee-eater, Long-tailed Nightjar (the long tail is not shown) and Red-billed Firefinch do not really illustrate anything. On the other hand, most photographs add interest and some offer aid for the identification of species like birds of prey and vultures in flight.

However, this book is not intended as a field guide but is precisely what it says on the cover, an annotated check-list and guide to localities. Ornithologists visiting The Gambia would find it useful, mainly as an aid to locating places where birds may be found.

V.W. Smith

DEBATE ON THE SULIDAE

[A recent review (Emu 80: 45-46) produced some comments from the author, Dr J.B. Nelson. In the hope that they may lead to more work and clarification, we publish them with replies by the reviewer. Ed.]

JBN. In his review of my book *The Sulidae: Gannets and Boobies* (1978) Dorward, whose own work on the White (Masked) Boobies of Ascension is well known, makes a number of points that merit response.

The adaptive significance of 'sibling murder' (brood reduction from two to one by eviction of the younger chick) in the White Booby is important because it has been used to buttress two incompatible theories of population control. It is evidently a mechanism to maximize reproduction rather than to regulate it. My suggestion is that the five-day gap between the laying (and thus hatching) dates of the first and second egg gives the parents a second chance to rear a chick, should the first-hatched die of starvation. Incidentally, the fact that White Boobies interpose five days between eggs is itself of adaptive significance, because there is no reason why five days ought to be needed to form the second egg. Newly hatched nidicolous chicks are vulnerable to starvation and (as I saw in the Galápagos) shortages of food begin and end sharply; five days can make the difference between life and death. Nor does there need to be a major shortage of food for this mechanism to operate. Because the White Booby's food is patchy and unpredictable, it may be forced to spend several days away from the colony. If the first chick hatches during such an absence, it may not survive. Usually this does not happen and, when the second chick hatches, the first is strong enough to evict it. Sometimes, the second egg gives rise to a successful fledgeling but instead of, not in addition to, the first. So, the important points are: when does the shortage of food end (if it has been prolonged) and what is the probability that the foraging parents will be away for long enough about the critical time to endanger the first chick's survival? How does the second egg provide the eventual fledgeling, as it often does? Starvation of the first chick during its first five days is by far the likeliest explanation and has been recorded.

DFD. I did not find in the book documented instances where the first chick died from starvation before the second hatched. The point is, of course, important.

JBN. I have been taken to task about the function of dark plumage in the juvenile Atlantic Gannet also by K.E.L. Simmons. He says that I neglected the possibility that it is adaptive as 'hunting camouflage', by asserting that it serves to reduce the probability of the returning male attacking his offspring (as he attacks his mate) and perhaps pushing it off the nesting ledge with fatal results. Dorward apparently favours heat-regulation as another explanation. The fact, mentioned by Dorward, that, when younger, the chick is white is irrelevant because at that stage it differs from the adult in size, shape, stance and texture (down instead of feathers) and so does not provide the releasers for attack. Even if heat-gain were an important function of dark plumage, a dark dorsal surface would be almost as effective as the all-dark plumage, because incident heat would come mostly from above. Finally, and most concretely, there is experimental evidence that dark plumage is less effective than white in retaining body-heat. As cited on page 307, Probine and Wodzicki (1955) placed a copper shell inside a Gannet's skin, heated it and measured the energy necessary to keep the skin at the temperature of life. More heat was lost through a juvenile's dark plumage than through an adult's white one. They concluded that the juvenile's dark feathers provided poorer insulation than the adult's white ones. So, an explanation in terms of energy is not, as Dorward claims, 'at least as plausible as a behavioural one'.

DFD. *Pace* Probine and Wodzicki (1955, NZ J. Sci. Tech. 37: 158-159), the experimental evidence more recently is that, though light- and dark-plumaged birds lose radiant heat similarly, absorption of incident heat (directly and reflected from below) results in metabolic economy about twenty per cent greater in dark birds than in light (Heppner 1970, *The metabolic significance of differential absorption of radiant energy by black and white birds*, Condor 72: 50-59). This and other evidence (reviewed by Calder and King 1974 in *Avian Biology* by Farner and King, Vol. 4: 259) suggest that selection pressures of a thermoregulatory sort cannot be ruled out as factors in the evolution of the juvenile Gannet's dark plumage.

JBN. Regarding the growth of culmen and wing in the White Booby (incidentally, reference is page 364 not 164), the differences are so large that the size of the sample seems unlikely to invalidate the conclusion.

DFD. My point about differences between growth of the culmen on Kure and Ascension was that the data did not reveal possible variation between seasons, as there was on Ascension. Nelson's conclusion may be true but may not always be; one cannot tell from his Figures 163 and 164.

JBN. In relating synchronization and social stimulation, I cited two sets of data. One set (to which Dorward refers as p. 123, line 4) is intended to show that two groups of twenty nests from the centre of a large mass each had an earlier onset and a greater synchronization of laying than did a group of twenty that was more isolated. I do not think that Dorward questions these data. The other set, much less satisfactory, is intended to support the same claim, that laying appears to be more highly synchronized in large than in small groups. These data were obtained simply by noting the distribution of laying in groups of different sizes, admittedly poorly demarcated. The relation between size of group and spread of laying was as follows (p. 122): 20 nests, 41 days spread; 47 nests, 46 days; 78 nests, 46 days; 53 nests, 58 days; 113 nests, 62 days; 136 nests, 59 days. Dorward claims that these data were not evidence of synchronization but show the reverse; this is not so. I accept that it may not add support to the case for synchronization but it does not detract from it.

DFD. What I said was that there was a positive, not a negative, relation between size of group and spread of laying, i.e. that as the group increased in size so did spread of laying. These data do not show that larger groups are more synchronized. I am indebted to J.M. Cullen for further verifying this by computation: if the data (number of eggs laid) are normally distributed, then the spreads of laying will increase as the sample increases in size in precisely the way indicated by Nelson's data, i.e. with no change in standard deviation. If the data are not normally distributed, then a conclusion cannot be drawn anyway.

Unfortunately 'spread of laying' is an inappropriate statistic and what is needed is a mean date of laying for the different groups, with standard deviations therefrom.

Hence, Nelson's view about synchronization may be correct but it cannot be based on the data cited.

JBN. Heat regulation does receive more space than Dorward implies; for, beside the species' accounts, it is given some forty-five lines (pp 948-9) in the comparative section. 'Clubs' are not left 'unexplained' but are defined and discussed on pp 918-20.

Finally, on the many omissions, particularly in physiology and methods, I must point to the excessive length of the book, for which I have been duly slated, and remind Dorward that the salt-gland, and handling and marking techniques are not solely or primarily sulid matters. If one widens one's net, where would one end? But I was remiss in omitting full treatment of respiratory modifications; so, he has the last word!

DFD. My curiosity over the brevity about heat regulation in the chapter on the White Booby ought to have sent me to the index, where I should indeed have found my way to a more extensive treatment in the comparative section. Full cross-referencing on that and other points, I concede, would have been difficult in such a large book.

My main argument in singling out some specific points was that the distinction between fact and opinion ought always to be made clear. In many cases it was.

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INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

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1168 (p. 69) *Cacatua ducorpsii* Pucheran, 1853 (Aves): conserved.

The Commission regrets that it cannot supply separates of Opinions.

R.V. MELVILLE,
Secretary.