

Book reviews

Edited by P. Dann

LIFETIME REPRODUCTION IN BIRDS

edited by Ian Newton

1989. Academic Press; London. Pp. xv + 375, 235 x 153 mm. £42.50.

Variation between individuals in lifetime reproductive success (LRS), which is an estimate of fitness, is a concept basic to the Darwinian theory of evolution. Despite this, it is only during the last decade that measures of LRS, the number of offspring raised by individuals over their lifespans, have become available. The need for such information was highlighted in papers such as that by Clutton-Brock (1983) which pointed out that variation in reproductive success measured over a shorter period, such as a season, did not necessarily reflect the variation between individuals over a full lifespan. Thus, selective pressures on individuals cannot be reliably determined from short term studies.

As is generally true of behavioural ecology, studies of birds have been foremost in providing data and Ian Newton has collected 23 chapters dealing with a wide range of avian species. Some well-known research subjects are included, such as the Great Tit *Parus major* of Wytham woods in a chapter by McCleery and Perrins and the Florida Scrub Jay *Aphelocoma c. coerulescens* studied by Fitzpatrick and Woolfenden, but others were not, notably the Kittiwake *Rissa tridactyla* studied for many years by J.C. Coulson. Fifteen of the chapters present previously unpublished results. Two final chapters, by Linda Partridge and Ian Newton, respectively, synthesise the findings in relation to life history theory and population ecology.

The species are grouped according to life history types into short-lived hole nesters, short-lived open nesters, cooperative breeders, birds of prey and long-lived waterfowl and seabirds. The authors were asked to provide information on annual breeding success, survival and longevity, changes in survival and breeding success associated with age and lifetime reproductive success, for a representative sample of individuals. Also, where possible, they were to describe the effects of individual life history, environment and phenotype on lifetime success. The emphasis on population and life history issues in this book differs from that of individual selection and adaptation in Clutton-Brock's recent book on a similar theme (Clutton-Brock 1988). In fact, while Clutton-Brock's book covered a wider range of taxa, six species are covered in both books, five of them by the same authors. The different emphases of the two books mean that these chapters complement

each other although they are somewhat repetitive. Readers' preferences for the different approaches will depend on personal interests. With my interest in mating systems and the comparison of the sexes, I found the extra detail in Clutton-Brock's book rewarding.

Perhaps the outstanding result from these studies of factors affecting LRS is the great proportion of the variation which is due to chance. For instance McCleery and Perrin found that the weather conditions in the year in which an individual Great Tit was born had by far the greatest effect on its LRS. Also, is it not surprising to find that where individual differences lead to variation in LRS, the heritability of that particular attribute is inevitably low. An example is body size, where a large male may be more successful than a small male in obtaining resources, but his size is a phenotypic character and is not passed on to his offspring. Thus, although all species showed large variations in reproductive success between individuals, and although components of LRS such as clutch size may show high heritability, the selective effects of this variation in a stable population appear very low.

As Ian Newton discusses briefly in the final chapter when analysing the value of lifetime reproductive performance as an estimate of fitness, a number of errors inevitably creep into observational measurements of LRS, which is usually taken as the number of young surviving to fledging or recruitment. Errors may arise from extra-pair copulations, egg-dumping, exclusion of non-breeding or unsuccessful birds from the dataset, emigration of individuals from the population and variation in post-fledging survival of offspring. The effect of these errors is generally assumed to be small, or at least not biased in any particular direction, but the data available to support this contention are limited.

The book is well-presented and a pleasure to read. It provides a very useful collection of data on a wide range of bird species for researchers and students of behavioural ecology. The one Australian species included is the Splendid Fairy-wren *Malurus splendens*, in a chapter by Ian Rowley and Eleanor Russell. Although many years of work are compressed into relatively short chapters, data are presented and analysed in detail, allowing readers the opportunity to consider their interpretation. With the many references, often to earlier works on the same species, this book provides a very thorough summary of the state of knowledge of demographic and environmental effects on lifetime reproductive success of birds. It complements Clutton-Brock's

earlier *Reproductive Success* very well and the comparison between their approaches is very instructive.

References

- Clutton-Brock, T.H. (1983). Selection in relation to sex. Pp. 457-481 in *Evolution from Molecules to Men*. Ed. D.S. Bendall. Cambridge University Press, Cambridge.
- Clutton-Brock, T.H. (ed) (1988). *Reproductive Success*. University of Chicago Press, Chicago.

M. Beilharz

PRODIGIOUS BIRDS: MOAS AND MOA-HUNTING IN PREHISTORIC NEW ZEALAND by Atholl Anderson

1989. Cambridge University Press; Cambridge. Pp. xviii + 238, b&w plates 106, 224 x 285 mm. \$85.

Moas — the giant flightless birds of New Zealand — first came to scientific attention in 1839, when Richard Owen studied a bone found on the east coast of the North Island. He deduced that it came from a 'flightless bird' probably extinct, which was heavier than an ostrich. Since then many thousands of moa bones have come to light in excavations of old swamps and sand dunes and in cave deposits. These bones have revealed a remarkable radiation of moas in New Zealand, with species as small as 90 cm high and weighing perhaps 20 kg, and others up to 2.5 m tall and 230 kg in weight.

Atholl Anderson's book is the first comprehensive review for many years of moa palaeontology, ecology, archaeology and ethnography. He provides a strong historical perspective and considers in detail both old and modern ideas about the origins, relationships and demise of the birds.

The book is divided into two sections. The first deals with moa systematics, evolutionary history, morphology and behaviour, and species distribution and

abundance. The second part describes field and other evidence for moa-hunting, the hunting strategies and technologies used by the Maori, and the chronology and reasons for moa extinctions. The book is profusely illustrated in black-and-white, and contains many reproductions of the detailed, delicate drawings published by Owen and other moa anatomists last century.

Moas were a distinctively New Zealand group of ratite birds, whose living relatives include the kiwi, emu, rhea and ostrich. The origins and evolutionary relationships of the moas have excited much speculation. Enthusiastic palaeontologists described up to 28 species of moa but recent careful revisions have reduced this to at most 13 species in six genera. They belong to an ancient lineage whose ancestors inhabited Gondwana before the separation of the continents. Anderson reviews the current evidence and considers that the moas probably descended from flying birds, possibly of different taxa, which reached New Zealand in the Tertiary epoch, well after New Zealand separated from Gondwana and its proto-ratites.

Having reached New Zealand so long ago, why aren't they present now? All the species had died out before the arrival of Europeans. The birds were extensively hunted for food by the Maori, and the moa-hunting evidence is examined in detail by Anderson. Hunting apparently reached a peak about 1350 AD and had ceased by 1500, by which time the birds had mostly become extinct. Anderson considers that the extinctions were due to over-harvesting, especially in the South Island, possibly coupled with massive destruction of their forest and scrub habitats.

Anderson has written a fascinating account of the moas and the development of our knowledge about them. Regrettably, their mummified remains, still found occasionally in dry caves and rock overhangs, are as close as we can ever hope to get now to these amazing birds.

P.J. Moors

Dear Sir,

It has been drawn to my attention that the publication dates printed in the two volumes of *The Food of Australian Birds* by R.D. Barker and W.J.M. Vestjens and published by the CSIRO are not clearly delineated. Volume 1 was published in May 1989 and Volume 2 in September 1990. and should be quoted as follows:

Barker, R.D. & Vestjens, W.J.M. 1989. *The Food of Australian Birds, Vol I, Non-Passerines*. CSIRO, Melbourne.

Barker, R.D. & Vestjens, W.J.M. 1990. *The Food of Australian Birds, Vol II, Passerines*. CSIRO, Melbourne.

Yours faithfully,
Robin Barker, CSIRO