

BOOK REVIEWS

RAYMOND PIEROTTI, EDITOR

VARIABILITY IN THE BEHAVIOR OF DIFFERENT POPULATIONS OF MAGPIES

The Magpies: The Ecology and Behaviour of Black-billed and Yellow-billed Magpies.—Tim Birkhead. 1991. T. & A. D. Poyser, London. 270 p. with illustrations by David Quinn. ISBN 0-85661-067-4. \$39.95.

One of the results of the many recent studies of individually marked birds has been an increasing emphasis on the variability between individuals within a population, as well as differences between populations of the same species. Individual variability has been correlated with factors such as age, experience, and quality of mate and territory, while variability in the behavior of populations has been correlated with habitat and ecology, including vegetation, food, competitors, predators and climate. In *The Magpies*, Tim Birkhead takes advantage of the surprisingly large number of detailed studies from a wide variety of habitats in both North America and Europe to make an in-depth comparison of magpie behavior and ecology. Birkhead uses his and his students' extensive studies of the magpies in the Rivelin Valley, Sheffield (UK), including previously unpublished data, as the foundation for these comparisons, and the result is a fascinating study of variability in magpies.

The Magpies is divided into 12 chapters, including breeding biology, social behavior, territoriality, feeding, population biology and interactions between humans and magpies. The results from over 20 major studies of Black-billed Magpies (*Pica pica*), and three studies of Yellow-billed Magpies (*Pica nuttalli*) are incorporated throughout the text, including figures and tables with the original data. Photographs from many of the study areas make the differences in habitat much easier to grasp. David Quinn's delightful and evocative sketches together with the many photographs of magpies, their young and their nests make the book very enjoyable visually as well as adding to its interest and clarity. Color is necessary to do justice to the magpie's brilliant iridescent plumage, and included in the book is a color illustration by Quinn of the different races of Black-billed Magpies as well as of the Yellow-billed Magpie. Surprisingly, the nominate race *P. p. pica* is not included.

After describing the physical differences among the Yellow-billed Magpie and the one North American and many European and Asian races of the Black-billed Magpie, Birkhead addresses one of the fundamental differences between the different populations that have been studied: the spacing and defense of nests. Nest spacing varies from colonial in some populations of Yellow-billed Magpies, through varying degrees of clumped in North American Black-billed Magpies, to evenly spaced in most European magpie populations. Along with these differences, there is an increasing de-

gree of exclusive use and defense of territories that peaks in the European populations. Not unexpectedly, obtaining territories involves more elaborate maneuvering by magpies in Europe. Birkhead presents a convincing case that territory acquisition is probably the main function of the "ceremonial gatherings" that have long been reported and speculated on in Europe, but which are much rarer in North America. The meaning of another strange behavior reported in magpie literature, that of magpie "funerals," is still not well understood.

The basic social behavior of both breeding and non-breeding birds is dealt with in detail. Dispersal of young, dominance relationships in non-breeding flocks, pair formation and maintenance, mate guarding, extra-pair courtship and copulations are described, along with clear explanations of the evolutionary theory on alternative reproductive strategies. In the chapter on feeding and food hoarding, the opportunistic nature of magpies comes out, and this theme surfaces over and over again throughout the book. Magpies take advantage of whatever suitable food is available locally, from terrestrial insects and human refuse to roosts of sparrows. Food hoarding is discussed in detail, including Birkhead's student Keith Clarkson's fascinating studies of the different spatial distribution of caches made by breeding versus non-breeding birds, and the patterns of cache robbery.

Three chapters are devoted to the breeding behavior of magpies, including timing of breeding, clutch size, inter- and intraspecific nest parasitism, and the care and defense of eggs, nestlings and fledglings. Again, many intriguing differences among the populations that have been studied emerge. For example, European magpies often leave their nests undomed, in spite of serious egg predators, while undomed nests are very rare in North America. North American magpies sometimes respond to possible predators by approaching and babble-singing, a behavior that has not been observed in European magpies.

Populations of magpies in North America seem to be stable, while in Europe they are increasing. Adult survival is estimated to be between 70 and 80%. However, the mortality rates for eggs, nestlings and fledglings during their first few months are high. Half the pairs attempting to breed in any one season fail to produce any young. There is tremendous variability among the different populations, with the percentage of successful pairs varying from 30 to 70% (some of this may be due to different criteria being used in different studies, an unavoidable problem when comparing the research of different individuals). In Europe, re-nesting after a failure is common, and often successful, while in North America it is rare. Data from Sheffield show the high variability in lifetime reproductive success between individuals within the same population. Half of all magpies leave no descendants,

while some individuals fledged more than 14 offspring. When short-lived and long-lived birds were compared, Birkhead found that the long-lived magpies had better territories, larger clutches, and fledged more young. The effect of territory quality on clutch size has been shown in several studies, but in Sheffield, Birkhead found that the quality of the magpies themselves was actually much more important in determining breeding success.

Birkhead includes an interesting chapter on the history of interactions between humans and magpies. Magpies take advantage of any reasonable nesting site and any good source of food. Depending on the local level of persecution, their personality changes from confident and friendly to very secretive and hard to watch. Most evidence suggests that magpies actually do little damage to other species of birds, or to cattle and sheep, and that their consumption of insect pests and carrion should qualify them for higher tolerance from humans.

The Magpies ends with a chapter summarizing the differences between the European magpie, the North American Black-billed Magpie, and the North American Yellow-billed Magpie. As other researchers have noted, the North American and European *P. pica* are at least as different from each other as they are from the very restricted population of *P. nuttalli*. Birkhead suggests several areas in which more information is needed to solve this problem, such as comparative studies of the vocalizations and of the DNA of the three types of magpies. In addition, information is needed on the behavior of some of the Asiatic races about which so little is known, and which might be more closely related to the North American magpies.

In conclusion, Birkhead has put together a thoroughly enjoyable book about magpies. *The Magpies* is very readable, with lucid treatments of relevant evolutionary theory that are suitable for the layman as well as magpie biologists. Enough of the actual data from many of the studies is included to make this book very valuable to scientists, without overwhelming the reader. This book is an excellent example of the value of good comparative studies of different populations of a species, and perhaps will inspire future magpie enthusiasts to fill in some of the gaps in knowledge Birkhead underscores.—DEBORAH BUITRON, Department of Zoology, North Dakota State University, Fargo, ND 58105.

BIOLOGICAL SPECIES, HYBRIDIZATION AND CAPTIVE BREEDING

Meant to be Wild: The Struggle to Save Endangered Species through Captive Breeding.—Jan DeBlieu. 1991. Fulcrum Publishing, Golden, CO. \$24.95. ISBN 1-55591-074-2.

Wherever Europeans have gone they have taken the attitude that indigenous flora and fauna (including indigenous peoples) were primarily obstructions in the way of economic development. The general consequence of this is major habitat destruction, which leaves the continued existence of many species of plants and animals tenuous.

Some of these persecuted species have been deemed

worthy of protection under the "endangered species act," but a problem remains about exactly what form of protection "endangered" species should receive, as in the current controversy over Spotted Owls. This problem becomes particularly pressing with species whose numbers have fallen to a point where they may no longer have viable populations in the wild. Jan DeBlieu's *Meant to be Wild* deals with the questions of when and why is it worthwhile to attempt to remove individuals from threatened wild populations and attempt to restore these species through captive breeding. DeBlieu also addresses the ramifications of such programs for conservation policy in general.

DeBlieu is a freelance journalist and writer rather than a scientist, and has no obvious axes to grind. As a result *Meant to be Wild* is a carefully documented and unbiased account of the pros and cons of captive breeding. There is no issue or point of view that is not represented fairly in the book, and I think this book should be read by all ecologists, conservation biologists, wildlife managers, and others who are concerned about endangered species.

DeBlieu begins with a detailed case study of a single captive breeding project, and then uses other programs to explore issues that are specifically related to the case in point. In between, she mixes essays that deal with general issues and links themes and sections. The overall result is a book that reads well, and presents considerable amounts of discussion and information about captive breeding and release programs.

From a taxonomic viewpoint, *Meant to be Wild* deals exclusively with mammals and birds, with an even balance between the two groups. The first section deals with the history of the red wolf captive breeding program up to recent reintroductions into the Smoky Mountains. This section is particularly poignant in that it documents the dedication, despite numerous setbacks, of the biologists involved in this project. In general, these individuals deserve immense respect for their efforts. There are, however, two issues that I would have liked to see discussed in more detail with regard to this program. First, numerous animals were removed from the wild, but only individuals meeting a narrowly defined set of mensural characteristics were admitted into the program. Individuals not meeting these criteria, including offspring of wolves admitted into the program, were presumed to be hybrids and euthanized. In a book that stresses the serious consequences of small population sizes, the potential loss of genetic diversity resulting from this policy of euthanizing putative hybrids is never addressed.

This point leads directly to the other issue not addressed, i.e., the possible role of hybridization in the origin of this species or in the survival of other species. Red wolves may have arisen through hybridization (Wayne and Jenks 1991), typically breed true at the phenotypic level, and have been accorded distinct taxonomic status. If evolution as a continuing and dynamic process means anything, this makes red wolves a species of particular interest because they may be one of only a few animal species that have arisen through hybridization. As a consequence, the euthanization of alleged hybrids according to a narrow morphometric definition generated strong directional selection on the lineage.

Hybrid speciation is well-known in plants and insects (Grant and Grant 1992), and has been invoked in a few vertebrates, e.g., some desert pupfish and the Italian House Sparrow, *Passer italiae* (Johnston 1969). The potential significance of speciation through hybridization is generally ignored or downplayed by zoologists because of excessive reliance on the "Biological Species Concept" (e.g., O'Brien and Mayr 1991). It should also be recognized that interspecific hybridization is one means by which genetic diversity can be restored in lineages that have undergone severe population bottlenecks, as demonstrated in the *Geospiza fortis* complex by Rosemary and Peter Grant (1989, 1992).

In general, most of the biologists discussed in *Meant to be Wild* appear to regard hybridization as a serious problem, as shown in the efforts to exterminate "hybrid" wolves or to release only sterile analogues for species removed from nature. Examples are Andean Condors, Siberian Polecats, and perhaps most unusually, cougars from the western United States in Florida. It might represent a considerable advancement in conservation philosophy if biologists, especially vertebrate zoologists, could overcome their aversion to hybridization and recognize interbreeding as a natural response on the part of animals endeavoring to minimize the possibility of extinction of their genetic lineage. After all, a member of a species that is declining in numbers in a severely disturbed habitat does not care if the Biological or Phylogenetic Species Concept best represents the major unit of evolution. It is under selection to reproduce and leave as many offspring as possible, even if the best available mate is a heterospecific (or in the case of the Florida Panther, a heterosubspecific).

One strength of the book is the insight that it yields into our colleagues that work in this controversial and generally frustrating field. I found myself with new insights into the personalities of the ornithologists involved. In particular, the chapters on Puerto Rican Parrots and California Condors will both move and inform readers who thought themselves familiar with these species.

Another strength of *Meant to be Wild* is its discussion in a number of contexts of whether captive breeding and rearing generate animals different from the "wild form" of the species. This is perhaps the most difficult question to address with regard to captive breeding. This became an issue of major debate during the California Condor project and resurfaces each time the issue of removing animals from the wild for breeding in captivity arises. Ironically, naturally occurring hybrids, e.g., between red wolves and coyotes, may be much more effective wild animals than captive reared "pure" animals, yet hybridization is regarded as a threat to endangered species and captive breeding is regarded as a form of salvation.

One of the most important sections of the book is Chapter IX, on "The essence of wildness," which deals thoughtfully with the question raised in the previous paragraph. A major theme discussed here, and raised in other sections of the book, is whether behavior patterns are fixed, or can change in only a few generations in captivity. Proponents of the former view appear to ignore the plasticity inherent in the nature of social

bonds, prey preferences, and mate choice. Scott Derrickson's views, based on hand-raised Whooping Cranes, are insightful. Derrickson argues that some aspects of behavior, such as courtship patterns are "hard-wired," but others such as foraging patterns or parental care, seem to much more labile. Too many scientists treat behavior as if it were composed of single traits, rather than as a hierarchical structure ranging from simple motor patterns (e.g., preening) through complex patterns of interaction with the environment (e.g., habitat or mate choice, parental care). These complex patterns are probably the aspects of behavior most altered by captivity.

Another issue raised in *Meant to be Wild* is which species are most likely to become endangered. DeBlieu argues that "K-selected" species are more prone to extinction, whereas "r-selected" species are more opportunistic and adaptable. This is both correct and incorrect. It is unlikely that such simple concepts as "r- and K-selection" have any meaning. As originally described by Robert MacArthur, "r- and K-selection" were intended to describe traits favored within a single species at different stages during the population trajectory from rare to common after an invasion event (MacArthur 1972, Boyce 1984). More likely is that specialized species, or top predators, are prone to extinction. The former because they are especially affected by habitat destruction or perturbation and the latter because of persecution. In contrast, generalists tend to be more adaptable, regardless of fecundity or age of first reproduction. For example, neotropical migrants are threatened because they are specialized for habitats that are being destroyed, and wolves are endangered because of heavy persecution, regardless of their high potential fecundity. In contrast, low fecundity generalist species (e.g., gulls, black bears) are doing well because of their adaptability.

Overall, I strongly recommend *Meant to be Wild*. There is much in this book for both the specialist in conservation and endangered species, the concerned ecologist or ornithologist, and the interested layperson. The discussions of issues are complex and informative, while the text is as readable and the portrayals of many characters are as unforgettable as that of many best-selling novels.—RAYMOND PIEROTTI, Department of Biological Sciences, University of Arkansas, Fayetteville, AR 72701.

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QUANTITATIVE METHODS FOR COMPARATIVE BIOLOGY

Phylogeny, Ecology, and Behavior.—D. R. Brooks and D. A. McLennan. 1991. Univ. Chicago Press, Chicago, IL. 434 p.

The Comparative Method in Evolutionary Biology.—P. H. Harvey and M. D. Pagel. 1991. Oxford Univ. Press, Oxford, UK. 239 p.

Since Buffon and Cuvier, and even earlier, the objective of comparative biology has been to identify the patterns of nature, and thence the explanations of the processes responsible. Until quite recently, pattern recognition was a chancy business due to the intrinsic weakness of methods used to determine homology and to order the subjects of comparisons. These shortcomings are further exacerbated when the goal is broadened to include an evolutionary perspective. The scientific literature is clogged with teleological research wherein the evolutionary patterns (of morphology, of behavior, of ecology, whatever) derive from taxonomies based in large part on the phenomena being studied. Assessments of relationship, the central structure for all comparative studies, previously had to be made using ad hoc formulations of similarity, ontogeny, and other characteristics, or be made by intuition. With the rise of quantitative methods of study in ecology, behavior, and morphology, the limitations of the comparative method became more evident, and interest in broad-scale studies waned. Comparative studies continued, of course, but at a level where intuition was unlikely to fail (i.e., “closely-related species”).

The advent of modern systematics offered robust means to evaluate homology, to assess relationship and, most significantly, reconstruct phylogenies. After a decade of intense development, systematic biology is still in the midst of great intellectual ferment directed towards methodologies and philosophies, even the algorithms and terms to be used, and so it is not surprising that there has been less attention directed towards understanding the utilization of the end products—the phylogeny. Two new publications in 1991 addressed this need and, together, help to indicate the future direction of comparative studies.

Brooks and McLennan's book, the first to appear, is a fairly complete treatise on how to do comparative biology. The first part of their book is devoted to a historical survey of the rise, fall, and rise of comparative studies and a truncate overview on the methods of phylogenetic systematics. The neophyte will have a difficult time with the chapter on methods, but it does serve to introduce the basic notions and even perhaps suggest the robust nature of modern systematics. I particularly liked the section on “Answers to Some Common Questions and Misconceptions,” which was in the format of a Socratic dialogue between the authors and the reader. The second part is the conceptual core of the book and contrasts the processes of speciation

and adaptation from a phylogenetic point of view. The preamble to this section is a manifesto describing the aims of phylogenetically based comparisons; those readers previously unaware of how modern systematic thought has eclipsed the traditional philosophies will find the chapters on speciation and adaptation to be provocatively novel. The third part deals with ecological associations, specifically the phenomena of coadaptation and cospeciation. Many examples from the literature are presented, most of them are reanalyzed by the authors using methodology (BPA) developed earlier by Brooks. Finally comes a chapter on Historical Ecology, which covers a broad range of topics, all centered on the application of a historical perspective to ecological studies.

Harvey and Pagel's book aims for the same goal but with a narrower, possibly more focused, point of view. The first two chapters summarize the past history of comparative biology and espouse the phylogeny as the conceptual basis for study. Here the problems of confounding covariation, nonindependence of study subjects, and phylogenetic “effects” on species comparisons are discussed, and the authors introduce some of the rigor they bring to bear on their solutions. The conceptual center of their book lies in chapters 4 and 5, where, relying heavily on the work of Felsenstein, Cheverud, and others, they present a general statistical model to quantify comparison. Their method requires information on transition probabilities of character state change and branch lengths, in addition to a branching diagram of phylogenetic relationships, and they present many useful formulas and algorithms for estimating these needed quantities. They discuss the difficulties in the use of continuous characters for reconstruction of phylogenies and review nine methods which might be used to estimate the association between traits with phylogenetic influence removed. The ensuing discussion is rooted in a deep understanding of ANOVA and ANCOVA models, which may leave the uninitiated bewildered. After all this, the authors seem to revert to the use of pairwise comparisons as the method of choice, but it was not clear on a purely quantitative basis which was best for which circumstance nor what method might prevail given a data set of a particular form. Harvey and Pagel review the results of their previous studies on the functional patterns of allometry in an evolutionary (phylogenetic) context and demonstrate, I think, the superiority of this method of comparative biology over attempts done previously.

These two books complement each other; however, outside of a common theme and essentially a common conclusion, there is little overlap between them. Their joint bibliography of about 1,000 references share only 30 or so citations between them, and surprisingly, few of these 30 were general subject or review papers. Part of this is due to the distinctly different approaches taken by each pair of authors and part is due to the weak treatment of systematic methods in Harvey and Pagel's book. Brooks and McLennan stress what can be done using data sets, phylogenies, and methods now available, and show what new interpretations and what new insights can be obtained within a phylogenetic framework. By contrast, the statistical methodology presented by Harvey and Pagel demands a much greater set of assumptions, and which are met only infrequent-

ly with present sets of systematic data. Much effort is being brought to bear on utilization of continuous data for phylogenetic reconstruction, and as the methods are further refined, the application of their approach will become more commonplace.

The experienced systematist interested in comparative studies would do well to read both books, Brooks and McLennan first. Ecologists will find the statistical approach used by Harvey and Pagel familiar and I hope become convinced that history, as in phylogenetic

relationships, is the necessary criterion to evaluate comparison. I suggest that the budding comparative biologist should learn systematics by any of the other excellent texts now available, or better yet, hire a systematist and begin an exciting collaboration in comparative studies.—DOUGLAS SIEGEL-CAUSEY, Museum of Natural History and Department of Systematics and Ecology, University of Kansas, Lawrence, KS 66045-2454.

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NEWS AND NOTES

MEWALDT-KING STUDENT RESEARCH AWARD

The first Mewaldt-King Student Research Award will be presented at the 1993 (Centennial) meeting of the Cooper Ornithological Society. The \$1,000 award is designated, in honor of L. Richard Mewaldt and James R. King, to support research that relates to the conservation of birds. Research may be in any area of ornithology (e.g., ecophysiology, population genetics, behavior, and ecology); studies that involve demographics, breeding biology, or dispersal biology may be particularly relevant, especially if the species is endangered, threatened, or otherwise "sensitive."

Proposals must be received by the Mewaldt-King Award Fund Committee on or before 15 January 1993. Only graduate students accepted to or enrolled in a Master's or Doctoral program are eligible for the award. Proposal format is as follows: (1) abstract, (2) introduction, including a) relevant background, b) specific hypotheses to be tested or questions asked, c) relevance of proposed research to conservation biology; (3) proposed methods, analyses, and timetable; (4) general categories of expenditures; and (5) literature cited. The proposal text, not including literature cited, plus abstract should not be longer than six single-spaced pages. Applications must also include a curriculum vita and letter of support from a faculty advisor. Please send three copies of the entire application to Diana F. Tomback, Mewaldt-King Award Fund Committee, Department of Biology, Campus Box 171, University of Colorado at Denver, P.O. Box 173364, Denver, CO 80217-3364.

NEW EDITOR NEEDED FOR STUDIES IN AVIAN BIOLOGY

The Cooper Ornithological Society is seeking a new editor for its monograph series, *Studies in Avian Bi-*

ology (SAB). The new editor will be given considerable freedom to influence the nature of this series. Possibilities range from continuing it in its current traditional monograph format to major changes involving a shift to publication via electronic media. Interested applicants should send a letter of interest, a vita, and any ideas they have on future directions for SAB to the Chair of the Publications Committee, S. I. Rothstein, Dept. of Biological Sciences, University of California, Santa Barbara, CA 93106.

NORTH AMERICAN BLUEBIRD SOCIETY RESEARCH GRANTS—1993

The North American Bluebird Society announces the tenth annual grants in aid for ornithological research directed toward cavity nesting species of North America with emphasis on the genus *Sialia*. Presently three grants of single or multiple awards are awarded and include:

Bluebird Research Grant. Available to student, professional or individual researcher for a research project focused on any of the three species of bluebird in the genus *Sialia*.

General Research Grant. Available to student, professional or individual researcher for a research project focused on any North American cavity nesting species.

Student Research Grant. Available to full-time college or university students for a research project focused on any North American cavity nesting species.

Completed applications must be received by 1 December 1992; funding decisions will be announced by 15 January 1993. Further guidelines and application materials are available upon request from: Kevin L. Berner, Research Committee Chairman, College of Agriculture and Technology, State University of New York, Cobleskill, NY 12043.