Islands of the Dodo

Studies of Mascarene Island Birds. A. W. DIAMOND, Ed. Cambridge University Press, New York, 1987. vi, 458 pp., illus. $125.

Dodos were not just a figment of Lewis Carroll's imagination. These large, fat, flightless pigeons once thrived on the remote island of Mauritius in the western Indian Ocean. Then, in the 17th century, hungry human visitors proceeded to slaughter and extinguish an extraordinary avifauna, including the dodo. A few survivors of the Mascarene avifauna persist as some of the world's rarest birds: the pink pigeon (*Nesoenas mayeri*), the Mauritius kestrel (*Falco newtoni*), and the echo parakeet (*Psittacula echo*). Saving them has been one of the highest conservation priorities of the International Council for Bird Preservation and the Jersey Wildfowl Preservation Trust.

A sound conservation plan targets key features of an endangered species' natural history—its food and habitat requirements and whatever seems to limit population recovery. Continuing their tradition of ornithological exploration focused on endangered species, the British Ornithologists' Union organized the Mascarene Island Expedition in 1974. The goal was to study the native bird species of Mauritius and of Réunion and Rodrigues, the two other Mascarene islands. *Studies of Mascarene Island Birds* not only details the expedition's results, it is a comprehensive encyclopedia of the ornithology of the Mascarene Islands, past and present.

Two chapters are the centerpieces of the volume. One is the opening chapter on the ecological history of the Mascarene Islands by A. S. Cheke, who reviews in scholarly detail three centuries of savage conflict between human folly and evolutionary paradise. The other is a review by C. G. Jones of the biology and conservation of the three most endangered land birds of Mauritius—the pigeon, the kestrel, and the parakeet. The rest of the chapters concern the known fossil record (Cowles), surviving small land birds (Cheke, Horne), and sea birds (Jouanin). A detailed appendix summarizes measurements and weights of Mascarene endemic birds and their eggs.

The editor and authors of *Studies of Mascarene Island Birds* deserve praise for compiling this scholarly reference volume. The detailed descriptions of each species' natural history fulfill the expedition's conservation goals and should stimulate additional research interest in the birds of the Mascarene Islands. Compiling these accounts was no simple task, given the undigested state of information made available by colleagues. The history of each species also had to be deciphered from the conflicting impressions of a host of casual visitors with varying backgrounds. The results of such research are necessarily of mixed quality, but the authors succeed in developing a coherent and constructive perspective.

This severely overpriced volume is an important contribution to the literature on the natural history of endangered birds and related conservation programs. It reflects some of the guilt that resides in our modern conservation conscience, focused symbolically on one of our most callous mistakes. Just imagine how much richer our natural world would be with dodos as well as pink pigeons in the Mascarene forests.

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Primatology

Primate Societies. BARBARA B. SMUTS, DOROTHY L. CHENEY, ROBERT M. SEYFARTH, RICHARD W. WRANGHAM, and THOMAS T. STRUHSAKER, Eds. University of Chicago Press, Chicago, IL, 1987. xii, 578 pp., illus. $70; paper, $27.50.

Both human and non-human primates have occupied a strange and unique place in scientific investigation. Aside from the excesses sometimes found in grant proposals and sporadic wild leaps made recently into the arena of human sociobiology, most biologists only rarely devote more than lip-service to the idea that humans, too, are animals. The study of human behavior and human biology is almost exclusively the province of those in departments of medicine, psychology, sociology, and anthropology, where the continuity between humans and most other animals is often nearly invisible. Across this gulf that separates research on humans and most other animals stand nonhuman primates, as Jane Goodall aptly put it, "in the shadow of man." Large, socially living, flexible, slow-maturing, long-lived, and with low reproductive rates—these subjects who do not provide large quantities of simple data are discouraging for biologists. Yet the lives and life histories of primates have long intrigued a few biologists, and as our closest relatives primates warrant special attention within medical and social science departments. As a result, the few European and even fewer American biologists who first studied free-living monkeys, apes, and prosimians were joined from the outset by a broad range of social scientists in the task of describing and understanding these complex, highly social animals who are both so much alike and significantly different from humans and from their non-primate mammalian relatives.

These sociological and intellectual tendencies of science have had a significant impact on primate research over the past 25 years. Not only have scientists from disciplines with widely differing theories, approaches, and assumptions studied primate behavior, they have increasingly influenced each other and enriched our understanding of their complex and intriguing subjects. For a time, the diversity seemed to be a mixed blessing, as much a stumbling block to real progress as a benefit. With the publication of *Primate Societies*, however, Barbara Smuts, her co-editors, and their 46 contributors enthusiastically celebrate the end of the field's awkward adolescence and its entry into adulthood. In almost 600 pages that focus on field studies, the editors have managed to produce an integrated work of considerable scope utilizing a surprisingly successful interweaving of taxonomic and topical themes. Concepts and approaches from cognitive psychology, anthropology, and evolutionary biology, among other fields, inform and shape the wealth of recently acquired data that are presented, some of them for the first time, in this impressive volume.

It is not very long ago that most of the public thought all non-human primates were chimpanzees or gorillas, while many experimental psychologists and biomedical researchers thought they were all rhesus macaques, referred to, even in technical publications, as "the monkey," a nasty beast that spent its life in a cage hardly larger than its own dimensions while providing the data critical to decisions bearing on human behavior and medicine. We have come a long way. No reader of this book can fail to appreciate the diversity of primates or the impact of phylogeny or ecological and social context on the behavior of these complex animals. In a volume that both laboratory researcher and serious non-professional will find accessible, *Primate Societies* conveys the rich and vibrant tapestry, the patterns and the variations within those patterns, that describe the social lives of prosimians, monkeys, and apes—from the 60-gram mouse lemur to the 160-kilogram gorilla, nocturnal primates and diurnal ones, leaf-eaters, frugivores, insectivores, and omnivores, monogamous species, polygamous ones, ones with stable social groups and ones with fluid ones, that majority of species in which males

disperse at maturity while females "stay home" and others with dispersal only by females or dispersal by both sexes—and there is more. It remains the case that we know more about the most accessible and easily observed species, the ones for which the first field data became available, but we do now know at least something about a broad range of species in most geographic regions and habitats. We now have an outline, a sketch, of interspecific diversity where only a few dots existed 25 years ago.

Part 1 of *Primate Societies*, entitled Evolution of Diversity, focuses on the phylogenetic context of social behavior. In it, the authors concentrate on the lesser-known or more recently studied species while surveying the various taxonomic groups. In each of the 14 chapters, the discussion features a particularly interesting characteristic of the group, for example communal care in marmosets and tamarins, sexual dimorphism in the solitary orangutans, and cooperative relationships among bonobos and chimpanzees. The authors thoughtfully bring together, for a large number of species, the results that bear on the featured topic.

As elsewhere in the volume, the text and excellent black-and-white photographs are supplemented with impressive comparative tables that summarize key information that has heretofore been scattered, often heavily imbedded, in the literature or in researchers' unpublished data. In the latter case, field workers responded to structured questionnaires designed to increase comparability of data that were contributed for inclusion in the tables. For any detailed analysis of information presented in the tables, one would still need to consult the original sources to circumvent the inevitable occasional errors and interpretative decisions involved in such an ambitious effort, but I consider these topical cross-species compilations alone worth the modest price of the volume, especially for the seriously interested reader outside primatology. The tables are one of many evidences of the thought and effort that went into the planning and production of this book.

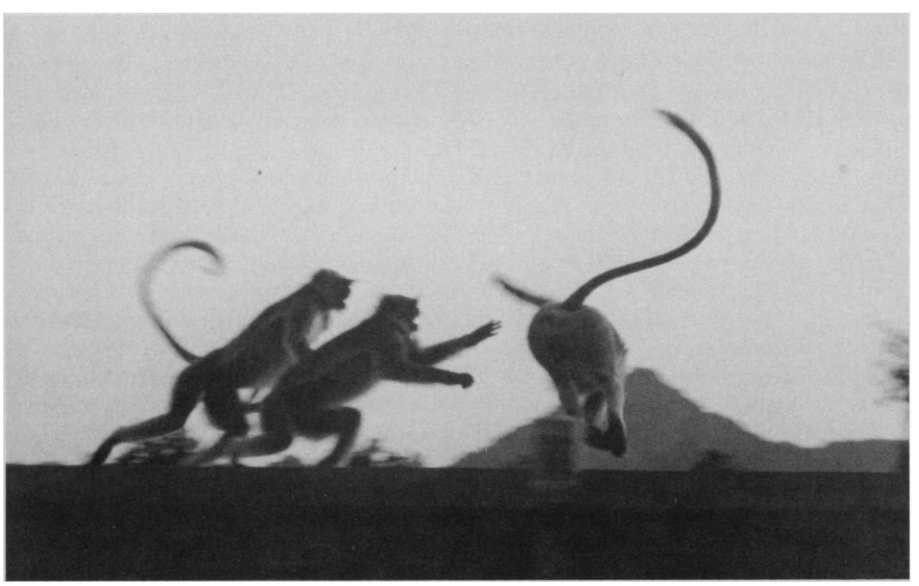
In addition to data on a larger number of species, a totally different kind of information has emerged in the years since the fieldwork of the early '60s, and this body promises to tell us at least as much as that from the addition of species. For a few species, data are now available that provide lifetime information on individually identified animals, data on the same groups over time and changing conditions, and data from a number of different groups and populations. Although these inform and aid immeasurably interpretation of taxonomic material in part 1, it is in part 2, entitled Socioecology, and its successor, Group Life, that these really come to the fore.

At the beginning of this 600-page volume, the editors alert us to a policy decision based on space limitations: the book will focus on social behavior to the relative exclusion of behavioral ecology. However, one of the major lessons of the past 30 years has been the importance of context for behavior, the recognition that differing quantities and distributions of food, family or group structure, predation pressures, and life history patterns provide constraints and opportunities for social behavior just as phylogeny does. In part 2, which focuses on the ecological and demographic contexts of social behavior, the editors made what I think is a wise compromise. They included eight topical chapters that provide an overview of major subjects without pursuing any in great detail for any species. The three chapters on food distribution and foraging behavior, interspecies interactions, and predation evaluate key aspects of environmental influence.

The other five chapters in part 2 focus on life history and evolutionary patterns. The authors describe and evaluate the consequences of similarities and differences in features such as body size, reproductive rates, and dispersal patterns, many of which are critical in determining potential social partners. Will an animal have many siblings available for interaction, only female kin, primarily unrelated individuals, playmates of both sexes and mixed ages to choose among? The variants that are available, and the degree to which they can be predicted, result from patterns of natality, mortality, maturation, and dispersal.

Despite the potency of life history variables in determining the context for social behavior and its evolution, we have the relevant data for only a few species and from only a handful of long-term field sites around the world. Obtaining these data requires 20 or more years for slowly maturing, long-lived, and slowly reproducing species such as primates. For most species, we will never have more than fragmentary information; for these, we shall be dependent for interpretation and extrapolation on the trends and principles and insights we gain from the more intensively studied species. But even for these latter studies, the prospects are not encouraging, as political, conservation, and financial problems constantly threaten the prospect of longitudinal studies. When such studies are interrupted, even for relatively short periods of time, the loss of data is enormous; and we cannot, as we could with humans, ask our animals to fill us in on the gaps.

With the stage set in previous sections, for part 3, entitled Group Life, the editors solicited 11 chapters that present in some detail concepts and data bearing on various features of social behavior. One highlights evolutionary aspects of social behavior and one focuses on social behavior at a critical life stage, the transition to adulthood. Several chapters examine particular types of social behavior, such as conflict and cooperation, others analyze social relationships more generally or particular social relationships such as those between infants and adults. A very different chapter asks the question whether non-human primates can help us understand humans. It is in this chapter and in part 4, Communication and Intelligence, that we are reminded most explicitly of our taxonomic proximity to non-human primates



Two female langurs chase a male to retrieve an infant he has snatched and wounded. [From *Primate Societies*; Sarah Blaffer Hrdy/Anthrophoto]

and the influence of this proximity and of the social sciences on the questions being investigated. These thoughtful chapters deal with topics that have been of considerable interest in experimental studies conducted in captivity, and the restriction of the volume to field studies was wisely relaxed somewhat more in this section than in the previous ones. Still, coverage of work done with captive rather than free-living primates is less complete. That truncation is unfortunate but understandable. We will be blessed if in the near future another volume of equal quality and scope brings us a different balance from this one's.

Part 5, the final one, is entitled The Future, and the first chapter deals briefly with the critical state of tropical conservation; on the outcome of this complex story hinge our hopes for the very survival of most primate species as well as any possibility of gaining a deeper understanding of their lives. Even species that do not disappear entirely may soon live only in small isolated populations or inhabit greatly altered environments in which their futures are tenuous and their behavior is greatly compromised. In recognition of the centrality of conservation concerns, the editors and authors of this volume are contributing their royalties to a conservation fund, and an increasing number of researchers are involved in facilitating educational opportunities for those in tropical countries who will ultimately be the ones to resolve the complex issues.

Primate Societies is not free from the unevenness of style and quality that is virtually inevitable in a multi-authored volume, but these are balanced or muted by the differing strengths of the many authors and the benefits provided by the editors, who possessed a clear vision of the whole. In addition to the roughness, there are gaps in information and in satisfactory explanations and insights. To some extent the level of conceptual insight and synthesis reflects the cost of having a tightly edited multi-authored volume with ambitious goals for conveying the large, scattered body of recent data, but what we miss in the book also reflects the state of the field. Throughout the book, and in the final chapter, the editors and authors explicitly point out what we don't know, and in doing so they communicate the searching, alive, active state of field, the opportunities and possibilities, the studies that still need to be done.

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Dreams as Behavior

The Dreaming Brain. J. ALLAN HOBSON. Basic Books, New York, 1988. xvi, 319 pp., illus. $22.95.

Sleep is, arguably, the most consistent feature of animal and human behavior in that both its timing and the structure of the behavior are relatively stereotyped. Nonetheless, the major biological questions concerning sleep, its adaptive significance and the mechanisms by which it is produced, remain largely unanswered. In this book, Hobson analyzes that component of sleep behavior that is the least stereotyped and the most challenging and intriguing, dreaming. His thesis, simply stated, is that dreams are what they seem to be, fragments of mental activity that occur during sleep. Mental activity, in Hobson's view, is equivalent to the physiological activity of the nervous system. To make this clear, he states, "I use the hybrid term *brain-mind* to signal my conviction that a complete description of either (brain or mind) will be a complete description of the other (mind or brain)." Thus the proper path to analyzing and understanding dreaming as a behavior lies in identifying and characterizing the neural mechanisms associated with it. Obviously this is an enormously difficult task; the substantial progress that has been made is recounted in the book. Hobson's approach is historical, and this is both effective and engaging. Early attempts at a scientific analysis of dreaming were undertaken in the 19th century by a number of investigators, including Helmholtz and Wundt, and were driven by the view that dreams should be analyzed as brain functions. The work was primitive, however, and, as is the case inevitably in science, progress awaited the development of appropriate methodology. This began to appear over the early decades of this century, but as these developments emerged, a powerful voice arose that carried dream analysis in another direction for many years.

Sigmund Freud, a Viennese neurologist who developed an interest in hypnosis and psychopathology, concluded that the content of dreams provided a rich insight into understanding human behavior and, in particular, pathological behavior. Hobson correctly concludes that the consequence of Freud's development of psychoanalysis was to abort the emerging experimental tradition in sleep research. He spends some time in debunking the psychoanalytic approach, but his criticism of this and other early behavioral approaches to the analysis of dreams is reasoned and dispassionate. Dispassion is appropriate, as psychoanalysis, at least in the strict interpretation of that term, has largely disappeared from American psychiatry, and we are in a period in which the biological analysis of behavior and its disorders is in ascendance.

The chronology continues with a review of the development of modern neurobiology, from the neuron doctrine to early neurophysiology. The development of technology to record the electrical activity of the nervous system led to the discovery of what remains the principal tool in the study of sleep and dreaming, the electroencephalogram. The EEG records activity only from the surface of the brain, essentially from superficial cerebral cortex, but it is a reliable indicator of behavioral state, clearly distinguishing sleep and waking. As this distinction became evident, a series of other observations contributed immensely to our understanding of the localization of brain structures critical to the generation of sleep and wakefulness. The crucial observation was that of Moruzzi and Magoun, who demonstrated that the integrity of the upper brainstem reticular formation is essential to the maintenance of wakefulness. At almost the same time, Kleitman and his associates demonstrated that the sleeping EEG has two distinctive components. One is characterized by relatively slow, high-voltage activity and is designated slow-wave sleep. The other is characterized by more rapid, low-voltage activity similar to waking, with associated changes in muscle tone and very dramatic rapid eye movements, which led to its designation as REM sleep. Subsequently, Kleitman and Dement demonstrated that nearly all dreaming is associated with REM sleep.

From this background, Hobson and his associates, and other workers, have carried on an extensive investigation of the neurophysiology of REM sleep. This has led Hobson to advance what is termed the "activation-synthesis hypothesis." In this formulation, structures in the reticular formation of the brainstem interact so that the forebrain is intermittently activated into a state similar to waking but receives no sensory input and has no motor output. The forebrain, thus activated, synthesizes its ongoing activity to produce a dream. The nature of the dream will reflect the physiological processes activated. Although the formulation is complex and difficult, the hypothesis permits Hobson to begin to ac-