

## Book Reviews

AMONG ORANGUTANS: RED APES AND THE RISE OF HUMAN CULTURE. By Carel van Schaik. Cambridge, MA: Harvard University Press. 2004. 244 pp. ISBN 0-674-01577-0. \$29.95 (cloth).

The orangutan has been referred to as the neglected ape. Studies of orangutan behavior in the wild or in captivity are far fewer than those of chimpanzees and gorillas, and while all the other great apes have been the subject of countless nature documentaries or popular science books, orangutans rarely capture the spotlight. Much behavioral research with great apes is driven by the notion that they can tell us something important about human social or cognitive evolution. Until recently, however, it seemed that orangutans did not have anything interesting to say on the subject. Many theories of cognitive evolution that became popular in the 1980s and 1990s identified the selective pressures for the evolution of large primate brains with sophisticated foraging and feeding skills, complex social environments, or tools use. As the great ape with a big brain but a boring diet, little social life, and no interest in using tools in the wild, orangutans were typically the outliers in any regression analysis that showed a significant association between brain size and ecological or social variables across Primates. The neglected ape was also the embarrassing ape.

All of that has changed in the last few years. Exciting new discoveries have been made about the life-history, growth and reproduction, social system, sexual behavior and mating strategies, and tool-making and tool-using skills of orangutans. The red ape is now hot. Orangutans are no longer the embarrassing exception but the inspiration for new theories of primate cognitive evolution. Carel van Schaik deserves much credit for this change. After many years of fieldwork at the Ketambe Research Station in the Gunung Leuser National Park in Sumatra, Indonesia, van Schaik in 1993 began a long-term study of orangutans in Suaq, a swampy area south of Ketambe. Suaq turned out to be an area with an exceptionally high density of orangutans, where they were for the first time observed to make and to use tools in a way similar to some communities of chimpanzees. That study provided new insights about orangutan life history, social organization, and behavioral complexity. In *Among Orangutans*, van Schaik describes the research conducted at Suaq and presents a comprehensive and updated view of the behavior and ecology of orangutans. The book is illustrated by splendid color photographs of orangutans in their natural environment taken by Dutch naturalist photographer Perry van Duijnhoven, who accompanied van Schaik during much of his research at Suaq. *Among Orangutans* has the deceiving look of a coffee-table book, but it is pure science at its best. It is packed with information and ideas, but the clear and engaging prose makes it accessible to everyone.

*Among Orangutans* begins with the presentation of the orangutan paradox: observations of these apes in captivity suggested that they are socially astute and intelligent, and when given the opportunity, also adept toolmakers and users. In the wild, however, they were known as solitary animals with poor social and manipulative skills. Solving the paradox was one of the main goals of van Schaik's

research project, and is also one of the many accomplishments of his book. After a brief discussion of the study of orangutans and human evolution from a historical perspective, there are several chapters about the current geographic distribution of orangutans and their natural history, including habitat characteristics, ranging behavior and feeding ecology, social interactions and development, and sexual behavior and reproductive strategies. The strength of van Schaik's approach is in his use of life-history theory as a framework for understanding the ecological and behavioral characteristics of orangutans. Many of these characteristics, which might otherwise appear puzzling, make perfect sense when viewed in light of orangutans' extremely slow patterns of growth and reproduction. With Chapters 8 and 9, van Schaik shifts gears and reviews the most novel and exciting aspect of his research: the demonstration that the Suaq orangutans use tools, and that there is cultural variation in behavior among different populations of orangutans, similar to what has been described for African chimpanzees. The orangutan paradox is therefore solved: orangutans have a great potential for social learning and, given the appropriate ecological and social conditions, innovative patterns of behavior can emerge and be socially transmitted across individuals and generations. Building upon the notion that potential for social learning is associated with long life-spans with an extended period of slow development and maturation, van Schaik argues that culture is the inevitable outcome of particular life-history traits, reliance on social learning during development, and high intelligence and sociability, and that these characteristics are typical of the great apes. In Chapter 10, van Schaik uses these generalizations from the extant great apes to lay out the foundations of a new theory of human cognitive evolution. This chapter is one of the longest and most conceptually dense, but is just as clear and engaging as the rest of the book. It is probably a good representation of where most of van Schaik's thoughts are these days. The book's epilogue chronicles the end of the orangutan research at Suaq due to the civil war that broke out in the Aceh province. The civil war cost the life of one of van Schaik's long-term field assistants and the destruction of massive areas of orangutan habitat, making the future of Sumatran orangutans very uncertain.

Overall, *Among Orangutans* is an outstanding book that can generate as much interest and enthusiasm among high school students as among experienced primatologists and anthropologists. If van Schaik had the brilliant idea, like the Kramer character in the popular TV series *Seinfeld*, of writing a coffee-table book about coffee tables, I am confident that we would learn a great deal about the hidden sociality, unique life-history traits, and complex behavioral evolution of these neglected organisms.

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**SURVIVAL BY HUNTING: PREHISTORIC HUMAN PREDATION AND ANIMAL PREY.** By George C. Frison. Berkeley: University of California Press. 2004. 226 pp. ISBN 0-520-23190-2. \$34.95 (cloth).

A hunter must make split-second decisions based on an animal's most likely behavior in a specific environmental context. This ability to anticipate, and thereby exploit, animal behavior is fundamental to hunting success, and is acquired through practice, often from childhood and in the company of more experienced hunters. In this book, George Frison demonstrates that hunting skills and knowledge of animal behavior are equally valuable to those using the archaeological record to infer the complex set of human activities involved in animal procurement in the past. An opportunity to understand human behavior more fully is lost, he argues, when an investigator naively reduces hunting to "leaving camp and killing an animal" (p.228).

*Survival by Hunting* opens with a brief overview of the physiography, fauna, and culture chronology of the regions that are the focus of the book (the Great Plains, Rocky Mountains, Great Basin, and Columbia and Colorado Plateaus) and of the Frison family's history in the area. Frison's education as a hunter, and later as an archaeologist, provides the framework of Chapter 2. Writing in a conversational style, he describes his childhood introduction to hunting and trapping in a ranching community in north-central Wyoming. Although this was an ideal environment for someone with a developing interest in paleontology and archaeology, ranch life in the 1930s wasn't easy. Food could be scarce in winter, and livestock were frequently threatened by predators. Hunting and trapping were necessary skills for feeding families and for predator control, and the sale of pelts was a source of extra income, especially for boys. These skills went beyond the ability to shoot straight and set a trap: also required were a familiarity with animal behavior and with the ethics of hunting and trapping. Frison first gives the reader a whirlwind hunting lesson, interweaving observations on the relationship between procurement strategies and animal behavior with richly detailed accounts of his early hunting experiences. He also reports the impact of the shift toward trophy hunting on life in the plains and mountains after World War II. Frison then describes how his interests in hunting and prehistory dovetailed, leading him to formalize his anthropology education in the early 1960s. At that point, he had been an avocational archaeologist for many years. Frison quickly established himself as one of several investigators in the region whose goal was to increase understanding of prehistoric cultural practices and of faunal taxonomy and biology through improved methods of collection, analysis, and interpretation of data from animal procurement sites.

Like many examinations of prehistoric hunting in the plains/mountains regions of western North America, this book is centered on large mammals, although small mammals and birds are also briefly discussed. Chapter 3 focuses on the relationship between Paleoindian (Clovis) groups and late Pleistocene and early Holocene mammals, particularly mammoths and extinct forms of North American bison, horse, and camel. Relevant sites are described (and, helpfully, shown on a map), but the chapter is not a laundry list of dates, place names, and important finds. Instead, the text combines paleontological and archaeo-

logical information with Frison's comments on procurement strategies, weaponry, animal behavior, site formation, and the potential influence of human hunting on megafaunal extinctions. The behavior of an extinct species obviously cannot be observed directly. To the extent that this behavior resembles that of a species' extant relatives, however, hunting strategies effective against one might also be effective against the other. In this context, Frison presents information on feral horse behavior and on the culling of African elephants. His experiences on elephant hunts, in which he used reconstructions of prehistoric weapons on dead or dying animals, are a good illustration of the value of experimentation.

The temporal coverage of subsequent chapters is broader, extending into the late prehistoric and historic periods. Included are more detailed treatments of bison (Chapter 4), pronghorn (Chapter 5), mountain sheep (Chapter 6), deer, elk, bear, small mammals, and birds (chapter 7), and weapons and tools (Chapter 8). Chapter 8 considers the bow and arrow, atlatl, dart, and other weapons and tools made from stone, ivory, bone, antler, metal, and wood. The usefulness of an experimental approach for interpreting the manufacture and use of these items is emphasized. The type of information provided in chapters 4–7 is similar to that of chapter 3, and for most of the species includes paleontology, archaeology, ethnohistorical accounts, and behavior as it relates to human hunting strategies. Frison is very adept at describing different procurement strategies (e.g., jumps, corrals, pens, nets, arroyo traps, and sand dune traps), and then explaining how a species' behavior patterns could be exploited by some strategies, but not others. Interpretations of a procurement site must be consistent with the behavior of the species of interest, taking into account the potential influence of terrain, time of year, and other factors. "If animal behavior does not appear commensurate with a procurement strategy as indicated in its archaeological context," Frison cautions (p. 226), "it is time to step back and rethink the data."

*Survival by Hunting* is a fun read and is well-illustrated with maps, drawings, and black and white photographs. For readers interested in hunting, faunal studies, or the prehistory of the plains/mountain region, this book usefully pulls into one place thousands of observations accumulated over a lifetime by an expert hunter and archaeologist. The information on hunting strategies and animal behavior makes this a good resource for faunal archaeologists and others hoping to understand human hunting in the past. For others, this book serves as an excellent demonstration of the value of an experimental approach to anthropology. As Frison notes in an account of an exhausting day spent butchering a bison with stone tools, more can be learned from firsthand experience than secondhand observation.

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ANIMAL LOCOMOTION. By Andrew Biewener. New York: Oxford University Press. 2003. 296pp. ISBN 0-19-850022-X. \$97.50 (paper).

Animal locomotion has captured human interest and imagination throughout history. Physical anthropologists in particular have been drawn to the study of movement, perhaps as a result of the remarkable diversity of locomotor and postural modes exhibited by the order Primates. Its members display above-, below-, and between-branch behaviors ranging from ponderous knuckle-walking to rapid scurrying, cautious climbing, to ricochetal leaping, bounding quadrupedalism, acrobatic brachiation, and, perhaps most curious of all, bipedalism.

Biewener's richly figured volume provides an excellent broad-based introduction to how different movement patterns are achieved in a vast range of biological organisms. Although the text centers around principles gleaned from hallmark studies on vertebrates and insects, the occasional consideration of ciliated unicellular organisms and such exotic movers as aggregated slime molds stimulates the reader's imagination about the underpinnings of locomotion in other branches of life. Full of real-life examples, the text is ideal for advanced undergraduates and graduate students alike. Yet accessibility does not limit utility; this book serves as an equally excellent reference for professional interests. Most importantly for the physical anthropologist, this volume helps place primate locomotion into a broader context, considering not only how primates are unique, but also how their movement patterns obey physical and physiological laws that govern all manners of animal locomotion.

Supplemented with more detailed articles about particular aspects of primate locomotor behavior, this book constitutes a robust framework for a course in primate biomechanics. Chapter 1 sets the stage with a consideration of common principles associated with movement, mentioning the role of physical properties influencing motion through different environments, outlining biological principles of scaling, loading, and energetics, and introducing basic units and equations employed to describe and study animal locomotion. Chapter 2 provides an essential overview of muscular and skeletal systems, beginning with a description of crossbridge cycling, and proceeding quickly to address relationships between muscle force, length, and contractile velocity. Excitation-contraction coupling, muscle fiber types, and their architecture are discussed prior to an introduction to the skeletal lever systems to which muscles attach. Chapters 3–7 consider different manners of animal locomotion, with an emphasis on the different environmental media across which animals propel themselves. Of these, the treatment of movement on land and the chapter on jumping, climbing, and suspension are of particular interest to students of primate locomotion.

For example, Chapter 3 introduces limb use and posture during terrestrial locomotion, exploring the support and swing phases of the stride cycle and describing how limb postural data may be combined with ground reaction forces in order to better understand joint moments and mechanical advantages of the limbs. Along with increasing velocity, this interaction between a limb's configuration and the strains it experiences is presented as a partial explanation for the selection of different gait patterns, here defined following mechanical and not ki-

nematic standards as the walk, trot, run, and gallop. Mechanisms that influence velocity, including stride length, stride frequency, and body size, are discussed, as are potential tradeoffs between stability and maneuverability in relation to substrate type, body size, and limb design. A number of other concepts significant to the study of primate locomotion are introduced, including limb compliance through the lens of the mass-spring model, and use of the Froude number to compare forward velocity across animals differing in body size. Fluctuations in kinetic and potential energy as a function of the movement of an animal's center of mass are examined, as are mechanisms for reducing the work performed by muscles via the use of energy storage structures such as viscoelastic tendons. Students of paleo-anthropology will enjoy the discussion regarding inferences about velocity and gait, using fossil trackways of animals long extinct. What the book lacks in terms of a detailed treatment of arboreal quadrupedalism, it more than makes up for with its comprehensive overview of the principles of terrestriality, providing a rich backdrop for discussions regarding how and why the locomotor strategies of arboreally adapted animals such as primates depart from patterns observed in terrestrial forms.

Chapters 4 and 5 address movement through fluid environments, namely water and air. A host of locomotor considerations are addressed, including the importance of overcoming inertia, basic elements of thrust, lift, and drag, and the anatomical structures responsible for propelling animals through media of different densities. Along with the cellular crawling mechanisms introduced in Chapter 6, these discussions provide an additional comparative biomechanical context in which to place arboreal and terrestrial locomotion.

Aspects of Chapter 7 may appeal more directly to physical anthropologists, as they address leaping, suspension, and climbing as locomotor strategies. Of these, jumping is most comprehensively considered, beginning with an introduction to ballistic motion and relationships between the distance covered in a given leap and factors such as force magnitude, take-off angle, and limb length. Preparatory countermovements and energy storage in elastic structures such as ligaments, tendons, and muscle aponeuroses are also discussed as potential ways of increasing leap distances. Mechanisms that assist with climbing, and pendular aspects of brachiation, are also briefly mentioned in the chapter, but will require supplementary readings to satisfy the interests of primate specialists.

The remaining chapters consider metabolic pathways and energy costs associated with locomotion, addressing sensorimotor integration and neuromuscular control. These chapters provide students with direct links between the mechanics of locomotion and the mechanisms by which animals power their movements using highly conserved anaerobic and aerobic pathways. Energy cost is examined in relation to body size, locomotor velocity, and gait pattern, prior to comparisons of the costs of different forms of locomotion. An overview of sensory input from muscle spindles and Golgi tendon organs is followed by a mention of the complex integration of sensory input and motor control using muscle reflex pathways. The book concludes with a consideration of muscle recruitment patterns, and a discussion of how movements can be coordinated by simplified circuitry, resulting in reciprocal inhibition of muscle antagonists, and coordination of muscle



timing patterns among limbs, using central pattern generators.

Common threads shaping the fabric of this text include the use of comparative analyses to understand common biomechanical principles, the influence of body size upon animal locomotion, and the use of an integrative evolutionary perspective to examine why convergences or new designs work. At times conversational yet always concise, the author's elegant discourse on each of these themes lends insight into the study of animal locomotion and provides ample opportunities for classroom discussion about promising areas for future research.

Biewener lists three primary goals in constructing this volume: to synthesize general biomechanical, physical, and physiological principles governing animal movement, to provide an accessible discussion of animal locomotion for undergraduates without compromising value for graduate stu-

dents and professionals, and to create a springboard to address future directions in the study of animal locomotion. These three objectives are accomplished with ease, in a text that is as pleasant to read as it is informative. This volume will no doubt serve as a fine reference for years to come.

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**KINSHIP WITH MONKEYS: THE GUAJA FORAGERS OF EASTERN AMAZONIA** Loretta A. Cormier. New York: Columbia University Press. 2003. 234 pp. ISBN 0-231-12525-9. \$29.50 (paper).

At a time when some anthropologists are questioning the existence of holism in anthropology, it is encouraging to see strong scholarship supporting it. Loretta Cormier's *Kinship with Monkeys* epitomizes this approach. Through ethnography, primatology, and a theoretically diverse anthropological lens, Cormier presents an overview of the Guaja foragers and the primates they live with.

The text itself is a broad ethnography of the Guaja foragers and at the same time an analysis of the co-ecology of the Guaja and the monkeys that live with them. The book begins with a helpful "Notes on Orthography" section and segues into the "Introduction" where Cormier introduces us to her field experience and, briefly, to ethnoprimateology. Stating that "Monkeys are actually more human than anthropologists to the Guaja," Cormier draws us in to what might at first seem a fantastical scenario: foragers who hunt monkeys but also nurse and raise them, and a culture whose cosmology and daily practice have non-human primates as central themes (ecologically and behaviorally). In this book we are provided another example of human cultural complexity and the importance of examining multiple perspectives in order to understand what it is to be human. Understanding the Guaja requires understanding their historical ecology and their intimate relations with monkeys and the forests.

Chapter 1 consists of the pre/postcontact history of the Guaja and an attempted reconstruction of their current foraging strategies in the context of their potential reliance on anthropogenically altered Amazonian landscapes. The chapter ends, as do many on modern indigenous groups, by listing the current pressures brought to bear on the Guaja by external economic and political forces in Brazil. Chapter 2 provides a brief evolutionary history of the neotropical primates and summarizes salient elements of the history of human-monkey interactions in Amazonia and elsewhere, contextualizing this study in a broader emerging understanding of the complexities in human-non-human primate relationships.

Chapters 3 and 4 lay the ethnographic foundation for the hunting and ethnobotanical practices of the Guaja

and their complicated kinship system. I recommend the reader glance at the "Notes on Orthography" before reading these chapters. The hunting and ethnobotany of the Guaja are similar to those of other Amazonian forager groups in many respects, and Cormier suggests that analysis of their ethnobotanical terms and knowledge suggests a more recent turn towards the Guaja's current pattern of foraging. The Guaja avunculate kinship system is intriguing, and Cormier draws heavily on Levi-Strauss' conceptualization of such systems and provides a quick review of comparable patterns in other Amazonian groups. Chapter 5 reviews Guaja beliefs in animism and their metaphysical relationships with the forests they live in and the organisms within them.

All of the preceding chapters lay the groundwork for Chapters 6 and 7, where Cormier outlines Guaja monkey-keeping practices and their specific cosmologies, especially in regard to symbolic cannibalism. Chapter 6 is especially innovative, as she examines the intimate Guaja practices of keeping and raising monkeys from the perspective of the ethnographer and the primatologist. She discusses the behavior of both the Guaja and the monkeys, and the costs and benefits to both, and ties this complexity into the larger discourse on "domestication," demonstrating how this system defies a simplistic "pet" label. For the Guaja, monkeys are an integral link between themselves and their surroundings, as mediators between humanity and the forest world. The discussion of Guaja cosmology and the proposed role of symbolic cannibalism is a particularly interesting insight into moving beyond a simple predator-prey relationship when examining the link between human and non-human primates. In a sense, these chapters serve to move the reader into an expansive perspective on the holistic ecology of forager groups. Through Cormier's analyses we gain insight into the integration the Guaja see in their lives and a clue as to how we, as anthropologists, might want to model cultural-ecological systems. Humans are niche constructors both physically and metaphysically, and until we take this perspective, significant aspects of human ecology and understandings of cultural complexities may elude us.

The concluding chapter is a brief review of the concepts of ethnoprimateology writ large. Cormier deftly weaves the Guaja story into a discourse on evolutionary theory and scientific creationism, the biomedical use of

nonhuman primates, issues in the animal-rights dialogue, and the impacts of complexity on conservation/management of both humans and nonhuman primates in tropical rainforests. The chapter ends with the now ubiquitous call to recognize the roles of global and national geopolitics and economics in all things, especially in the rights of indigenous people and the places of which they are a part.

Why should a reader of the *American Journal of Physical Anthropology* read this book? At the basic level, because it helps us visualize the complexity in predator-prey relationships in forager societies, which has an impact in our attempts to model human ecologies and evolutionary history. On another level, it is good for us to continuously think about our role within the broader framework of anthropology. This book brings up (but not in much detail) issues of physiology and co-ecologies, pathogen transmission, and the energetics of human foragers in tropical environment. All are arenas in which any thorough investigation requires a biological component. Reading across anthropology allows us to best discover points of synergy for collaborative, inter-subdisciplinary work. Finally, this book is very important for primatologists. An understanding of the behavioral ecology of primates is frequently incomplete without an assessment not just of anthropogenic factors, but of the types and patterns of connectivity between the lives and behaviors of primates, both human and nonhuman.

There are a few drawbacks to the text that reflect structural and background limitations more than purposeful omissions. I would have liked to see more specific information on Guaja caloric intakes and expenditures, their health status and epidemiology, and a broader description of the physical layout of Guaja villages/settlements. However, I point these out primarily as a biological anthropologist interested in further detail, as potential points of synergy, and as places for future collaborations between anthropologists.

This is a very well-written book and a terrific piece of anthropology. Its structure and length make it ideal for use as a text in a variety of undergraduate courses, as a general ethnography, an example of ethnoprimateology, a case study in aspects of conservation, or even a primer in the biocultural complexity of kinship systems. I recommend this book as an important scholarly contribution and as a truly enjoyable read that highlights much of the promise of anthropology.

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