



## Review: Behavior and Evolution of the Tai Forest Chimpanzees

Reviewed Work(s):

*The Chimpanzees of the Tai Forest: Behavioural Ecology and Evolution* by Christophe Boesch; Hedwige Boesch-Achermann

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# Book Reviews

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## BEHAVIOR AND EVOLUTION OF THE TAI FOREST CHIMPANZEES

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Boesch, Christophe, and Hedwige Boesch-Achermann. 2000. **The chimpanzees of the Tai Forest: behavioural ecology and evolution.** Oxford University Press, New York. viii + 316 p. \$95.00 (cloth), ISBN: 0-19-850508-6 (acid-free paper); \$45.00 (paper), ISBN 0-19-850507-8 (acid-free paper).

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That chimpanzees are humankind's closest genetic relative is undisputed. Recent studies among both captive and wild chimpanzees have also suggested a close relationship in terms of behavior and cognitive ability, however these studies have focused on captive chimpanzees (e.g., the ape language experiments). Data on cooperative hunting and tool use in the wild have been collected. However, a study on the behavioral ecology and intelligence in wild chimpanzees has been lacking.

*The chimpanzees of the Tai Forest* details the authors' research with the chimpanzees of the Ivory Coast for the past 15 yr. Building on previous studies of chimpanzee behavior, the authors recount their findings regarding chimpanzees' social organization, aggression, demography, tool use, hunting, and intelligence. The difference between this volume and previous studies of chimpanzees is the emphasis on behavioral ecology and evolution. While the first chapter introduces the study and the chimpanzees of Tai, the rest of the book can be broken down into three parts that contain 11 chapters. The first part addresses biological issues and includes chapters on demography and the life histories of both male and female chimpanzees. The next part focuses on social organization and includes general information on basic social structure (Chapter 5), and social relationships (Chapter 6), as well as detailed studies of aggression and territoriality (Chapter 7), hunting (Chapter 8), and tool-use (Chapter 9). The final part of the book treats chimpanzee intelligence (Chapter 10) and the authors' attempt to suggest a very close evolutionary relationship between chimpanzees and humans (Chapter 11).

The book is well written by two established primatologists with many years of experience between them. The length of the study (15 yr) lends validity to their findings. Among the most interesting and important information provided by this study is the information on chimpanzee demography. Because of the duration of their study, the authors were able to track changes in population size and social structure of the Tai chimps and to directly observe numerous births, deaths, migrations, and even power struggles among the chimpanzees. The data on territoriality, warfare, and infanticide is also of critical importance. Such information is necessary for improving our understanding of chimpanzee behavior, as well as, perhaps, that of our early hominid ancestors.

Another important and useful aspect of this study are the constant comparisons the authors make among the various chimpanzee groups that have previously been studied. In-

cluded in the comparisons are various data on the chimpanzees of Bossou, Gombe, Kibale, Mahale, and the bonobos of Wamba. Such comparisons not only confirm the results of Boesch and Boesch-Achermann's findings, but also clearly point out the similarities and differences among the various communities of chimpanzees.

Another critical part of this study is Chapter 9, in which the authors detail the tool using behaviors of the Tai chimpanzees. The focus is not only the types of tools used, but also how tools are made and how tool-use behavior is transmitted through teaching. One of the most fascinating aspects of this part of study (aside from the fact that it shows the great range of tool-use activities) is the idea proposed for the "intelligent understanding of a tool." In captivity, chimpanzees use tools to bring "a visible object within reach," while in the wild they use tools to reach invisible objects or food—e.g., probing for termites. This difference points out the flexible and intelligent nature of chimpanzee behavior and paves the way for the final two chapters.

In the last two chapters, the authors examine chimpanzee intelligence and provide compelling data that chimpanzees possess cognitive abilities very similar to those of modern humans. They point out, for example, that chimpanzees and humans both live in fission-fusion societies; both hunt regularly in groups for meat; and both regularly and flexibly use tools. This discussion leads the way for their suggestion that the combination of these three characteristics selected for higher cognitive abilities and increased intelligence. In addition, they set humans and chimpanzees apart from other animals species while showing the close relationship between the two both from a behavioral and an evolutionary perspective.

There are only a few problems with the study. For example, in the section of Chapter 3 that deals with female reproductive profiles among apes and humans, the authors undertake an interesting and useful comparison that considers age of first pregnancy, interbirth interval, length of reproductive span, and total fertility rate. Included in the comparison are various chimpanzee groups, bonobos, gorillas, hominids, and modern hunter-gatherers. However, their comparisons lack data in some of the categories, while other categories contain data that go uncited. For example, an inter-birth interval is given for the bonobos of Wamba, but no reference is provided for the source of these data. In addition, data are given on interbirth intervals for three hominids that are gross generalities and the data are cited from much older studies that, themselves, provide no real evidence for the general interbirth interval. To compound matters, these data are not discussed in the text, merely provided in tabular form. This part of the study would have been just as informative and perhaps less suspect if the authors had simply omitted these data, made the comparison between modern great apes and humans, and then, perhaps, interpolated data on hominids from the com-

parison. There are also a few typographic errors present (mostly in the photo captions) that detract only slightly from this interesting and important study.

These slight errors aside, I congratulate Christophe and Hedge on their dedication and on producing one of the most important works on chimpanzee behavioral ecology and evolution. This book will stand for many years as one of the most significant books on chimpanzee behavior. I recommend this book highly to anyone with an interest in chimpanzee

behavior, primate ecology, anthropology, and studies of human evolution.

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#### POLLINATION BIOLOGY—LINKING BOTANY AND ZOOLOGY

Chittka, Lars, and James D. Thomson, editors. 2001. **Cognitive ecology of pollination: animal behavior and floral evolution**. Cambridge University Press, New York. xiii + 344 p. \$95.00, ISBN: 0-521-78195-7.

Ecology is, by definition, an integrative field, encompassing the distribution and abundance of organisms, interactions among and between organisms, and the transformation and flux of energy and matter. Yet ecology, like many scientific disciplines, has become fractionated into sub-disciplines both along a taxonomic level (e.g., botany vs. zoology) and along a topical level (e.g., population vs. community vs. ecosystem ecology). Although this specialized approach may have advantages—it allows us to gain deeper insight into specific scientific processes and mechanisms—it also has disadvantages. Among these disadvantages is the failure to read broadly; thus, not only do we not recognize advances in other sub-disciplines that may shed light onto our own work, but also we cannot identify workers in those disciplines as potential collaborators. Thus, we miss the opportunity to take our taxonomic or system-specific themes and bring them into a broader ecological framework.

Nowhere is this specialization more pronounced than in the field of pollination ecology. In pollination ecology, the fields of zoology (including physiology, neurobiology, and animal behavior) and botany (including evolutionary ecology and plant ecology) are intertwined. Animal pollinators rely on flowers for pollen and nectar provisions, and plants rely on animal pollinators for the transfer of pollen. In addition, the taxonomic distinctions between zoologists and botanists studying pollination ecology are mired even further by topological boundaries—the first interested in the *mechanisms* by which floral signals provoke and modify pollinator behavior, and the second interested often in *adaptive* explanations for floral characters.

In their current book, *Cognitive ecology of pollination*, L. Chittka and J. D. Thomson clearly identify this problem of compartmentalization in the field of pollination ecology and set out to link the fields of zoology and botany together. The idea for the book arose from a symposium at the XVI International Botanical Congress in 1999. The preface of the book

sets the stage for the chapters to follow—the authors clearly state their intent to “bridge the gap between the two traditions” in pollination ecology. I particularly liked the honesty of Chittka and Thomson; they readily admit that the “book does not represent the successful reconciliation and fusion of the viewpoints” but, rather, serves as a starting point for the two sides of pollination ecology to initiate a dialogue.

The 16 chapters in the book are logically organized—moving from the more zoological to the more botanical in nature, with much overlap in between. The book starts with several chapters on pollinator sensory and cognitive abilities. These include some mechanistic pieces on learning, memory, and choice behavior in pollinators, primarily bees. The reader is then treated with chapters on pollinator sensory modalities used for flower detection, including color and pattern vision, olfaction, and echolocation. Among these chapters are two excellent pieces, the first by R. A. Raguso on floral scent and olfaction (Chapter 5). Raguso does a singular job at spanning the field of pollination ecology, linking floral fragrances to pollinator sensory abilities and back to pollinator-mediated selection on variation in floral scent. The second is by Chittka et al. (Chapter 6). Conventional wisdom has viewed the biological signals emitted by plants and the pollinators receiving those signals as mutually tuned to one another. Chittka et al. do an excellent job of providing alternative mechanisms to this pair-wise plant-pollinator view, using flower color as a model.

The book then turns to chapters on foraging energetics and optimal foraging. M. R. Weiss (Chapter 9) provides an interesting twist by reviewing the current knowledge on the “neglected pollinators”—beetles, flies, moths, and butterflies. The primarily zoological chapters end with a review of the effects of predation risk on pollinators and their interactions with plants, given by R. Dukas (Chapter 11). One could not help but be intrigued by the risks of predation that pollinators are faced with and how this risk may influence their foraging behavior. More work on this topic, however, is desperately needed, especially from the plant perspective.

The last third of the book focuses on the importance of pollinator cognition and behavior to the evolution of floral traits. Topics covered include pollinator preference and frequency-dependent selection on floral traits, pollinator-medi-