

but, perhaps partly because of persecution, it is not the conspicuous animal its cousin has become. A prodigious tunneler, the Chinese Alligator has hard winters to put up with, floods, and, in most areas, a less than supportive human populace. Indeed as the authors say, it is their ability to remain hidden most of the time in underground burrows that has enabled them to survive in the modern agricultural landscape. Here one will find nest size, clutch size, and literally everything that has been found out about these beasts from Chinese biologists studying them in the field and in captivity and American biologists at the Bronx Zoo and Rockefeller Wildlife Refuge, where they were bred for the first time outside of China.

Next is a chapter on the 'Dragon's Demise,' a chronicle of what happened to what was once a wide-ranging crocodilian and to the Yangtze River, the wetlands of which were its primary home. In many ways this history typifies what has happened (is happening) in many parts of the world: rivers being raped, plundered, dammed, diverted, and emptied of water and life for the sake of agriculture to feed burgeoning populations of humans. The recent extinction of the Chinese River Dolphin in the Yangtze is a tragic and ominous portent of what is facing the other major wetland life form, the alligator. In the 1930s it survived "only in the great swampy lakes lying to the south of the Lower Yangtze" in Anhui, Jiangsu, and Zhejiang provinces. By the 1970s it was found only in a small region in Anhui and Zhejiang provinces.

The Chinese authorities have long been aware of the demise of the alligator and the initial response was for the Anhui Forestry Bureau to set up the National Chinese Alligator Reserve, a 433 km<sup>2</sup> area, later reduced to 308 km<sup>2</sup>, with an estimated total population of 150 wild alligators. The chapter on habitat and population status graphically describes how the alligator became more and more confined to a few pockets as the human population increased by over 200% since the 1930s. In the past alligators were revered, but local beliefs that alligators make it rain worked against them in recent years when floods were blamed on them! But nothing was so devastating to the alligator as the spread of human settlements and agriculture into virtually every last wetland they inhabited in China. In the early 1980s the Anhui Research Center for Chinese Alligator Reproduction was established as a captive breeding facility and stocked with animals caught from the wild and for a long time every nest that was found in the wild was taken to the Center for hatching and rearing. Releases were made but follow up and monitoring was minimal so the results were questionable.

The final chapter in the book is the longest, 'The Future of the Alligator in China' and provides a comprehensive look at China's efforts so far and the authors' vision of what efforts should be made in future. Basically the authors bemoan the fact that the Chinese authorities seem quite complacent as long as there are plenty of captive animals (about 10,000 today), but precious little effort was being spent on securing wild habitat. This resonates strongly with Indian croc biologists as we watch the steady demise of the Critically Endangered Gharial, primarily due to loss of its riverine habitat. As in China, government schemes for egg collection and captive breeding have now become the visible 'feel-good' face of conservation efforts while habitats are distorted beyond ecological utility and river people are further alienated from conservation goals.

Altogether an excellent and important read (if I had one quibble it would be for more photos and in color), *The Chinese Alligator* is a rare combination of science, common sense, and a

passionate plea to look carefully at what we have left in the world and to nurture the last dragons. In his foreword, George Schaller writes: "*The Chinese Alligator* shows with detail, insight and vision that an attempt must be made to save species no matter how complex the problems." The authors are optimistic: "Despite its present dilemma, the Chinese alligator is a species with a potentially promising, perhaps even dramatically successful, future. It is with this hope that we have written this book."

As I wrote this, I envisaged John T., dressed in his trademark Hawaiian shirt, smoking a Cuban cigar quietly holding forth about salties in Burma, gharial in India, Cuban crocs in the Zapata swamp, or Orinocos in Venezuela with other obsessed members of the croc biologist fraternity. A mosquito felled this titan and he is sorely missed across the planet.

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## Hunters in the Trees: A Natural History of Arboreal Snakes

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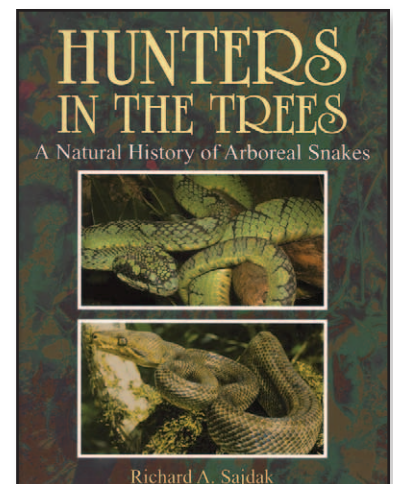
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There are approximately 3309 named species of snakes, with arboreal forms accounting for more than 500 of these. Arboreal snakes do not represent a monophyletic lineage but rather a collection of species with arboreal habits, distributed primarily within the families Boidae, Colubridae, Elapidae, Pythonidae, Ungaliophiidae, and Viperidae. No strict definition exists for what constitutes an arboreal snake, but given that most snakes have the ability to ascend vegetation, and do so for various reasons (i.e., bask-

ing, sleeping, foraging, and predator avoidance), 'true' arboreal snakes are best considered those that spend the majority of their time, and carry out the bulk of their activity, in arboreal habitats.

Prior to this book, the only comprehensive examination of the biology of arboreal snakes was Lillywhite and Henderson's (1993) review chapter in *Snakes: Ecology and Behavior*. There exist a number of inherent difficulties associated with observing and studying arboreal snakes, thus hard data on the biology of arboreal snakes are scarce. Nonetheless, there is enduring interest in these animals as reflected in the 427 references cited by Sajdak, many of which will be of use to anyone studying not only snakes, but arboreal organisms in general.



The book contains 13 chapters, the first five of which review general snake biology as it relates to arboreal species. Chapter 1 serves as a fascinating introduction to the features associated with arboreality in snakes. It outlines the morphological specializations for an arboreal existence, emphasizes convergence and the repeated evolution of arboreality among distantly related species, and considers the global distribution of arboreal snakes. Convergence in morphology, ecology, and behavior are hallmarks of arboreal snake taxa, and it is convergence that is the main organizing principle used by Sajdak to arrange this book. Nonetheless, few studies have empirically tested convergence or measured morphological adaptations in arboreal snakes (e.g., Henderson and Binder 1980; Martins et al. 2008; Pizzatto et al. 2007).

The subsequent four chapters continue with conventional information pertaining to coloration and its function, locomotor styles and the functional demands associated with moving in a three dimensional environment, and diet. Of particular interest is Sajdak's discussion of the ideas of arboreal ecomorphs, niche partitioning, and community structure. In these chapters, readers gain insight into why the snake body plan is advantageous for an arboreal lifestyle and what changes occurred in morphology in order for snakes to become successful tree hunters. Sajdak does an excellent job in summarizing the literature in these chapters and clarifying much of the physics and physiology associated with arboreal habits as discussed in Lillywhite and Henderson (1993), making the book easily accessible to a wide audience.

The remaining eight chapters are dedicated to the diversity of arboreal snakes. Here, Sajdak provides readers with an appreciation for the number of times arboreality has evolved in snakes, the changes to morphology and ecology that accompanied these evolutionary shifts, and the role of arboreal prey types in allowing multiple snake lineages to radiate and flourish in the trees. These chapters are organized by snake family or by similarities in morphology and prey type (guilds). However, I find this approach somewhat subjective and exclusive. For instance, individual chapters are devoted to snakes specializing on frogs, birds, mammals, and invertebrates. Lizards as prey are accounted for in Chapter 6, "The Snipers—Vine Snakes," making it seem as if only vine snakes feed on lizards, when they are, in fact, taken by a diversity of arboreal snakes. Likewise, the titles of other chapters such as Chapter 11, "The Night Shift—Boas and Pythons" or Chapter 12, "The Poisoners—Tree Vipers," are also somewhat misleading in suggesting that only boas and pythons are nocturnal and only vipers are venomous. In addition, although discussed in the chapter on vipers, I was expecting to read in Chapter 8 ("Birds and Snakes") about the extraordinary role birds played in shaping the morphology and driving the evolution of *Gloydius shedaoensis* and *Bothrops insularis* to an arboreal existence. Nonetheless, this treatment of the diversity of arboreal snakes is a fantastic overview of how creatures of fossorial ancestry evolved to overcome physical and environmental challenges and conquered the trees.

Certain chapters would have benefited from subheadings, as topics change unexpectedly between paragraphs, interrupting the flow of the book. But if the book suffers from anything, it is the deficiency of data for many arboreal species. As a result, a great deal of the information presented in the book is drawn from research on just a few well-studied taxa; in some cases, entire chapters are almost wholly dedicated to such species. This is, of course, a consequence of the state of arboreal snake research,

not a fault of the author, and indeed, Sajdak does provide commentary on lesser known species and indicates areas where more research is critically needed.

The book concludes with two appendices and a section entitled "Chapter Notes and References." Appendix 1 is a comparison of color patterns between arboreal and terrestrial snakes compiled from five regional guides and Appendix 2 is a list of blind snake species found in arboreal situations detailing the locality along with the height and substrate on which the snakes were found. However, 15 of the 19 records are from only a single reference. These two appendices might have been better presented as tables within relevant chapters. "Notes and References" does not include any notes, but simply lists the references used by chapter.

Of course no book on snakes is complete without color images. In this regard, the book lacks separate photographic plates, but instead intersperses images of varying size throughout the text. Some of the photos could be of better quality, but for the most part, they are superb images obtained from several photographers showcasing various arboreal species from around the world, often illustrating feeding behavior, threat displays, or other aspects of natural history. Other images show "non-arboreal" snakes captured in arboreal situations. Photographs aside, however, the book includes only five figures and no tables. The first two figures are the most useful, comparing the distribution of arboreal snakes with the distribution of the world's forests, suggesting that arboreality in snakes is predominately a tropical phenomenon. Unfortunately, Figure 1 also has a blatant spelling error that is hard to overlook. The remaining figures are less illuminating, but useful nonetheless, and I would have liked to have seen them adequately cited within the text.

*Hunters in the Trees* is undeniably a valuable compendium on the biology of arboreal snakes and will serve as a useful reference for researchers or hobbyists, and an excellent introduction to these snakes for members of the general public interested in tropical natural history. Sajdak's decades of field experience, knowledge, and passion for snakes are evident in his clear and simple writing style and engaging narrative, and readers will also appreciate his personal touch of illustrating postage stamps of arboreal snakes at the end of each chapter.

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