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Book Review of *Nouragues: Deep Rainforest Ecology*,
edited by Frans Bongers, Pierre Charles-
Dominique, Pierre-Michel Forget and Marc Thery

Walter P. Carson
University of Pittsburgh

Stefan A. Schnitzer
Marquette University, stefan.schnitzer@marquette.edu

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Stefan Schnitzer was affiliated with the University of Minnesota at the time of publication.

Book Reviews

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NOURAGUES: DEEP RAINFOREST ECOLOGY

Bongers, Frans, Pierre Charles-Dominique, Pierre-Michel Forget, and Marc Théry, editors. 2001. **Nouragues: dynamics and plant-animal interactions in a neotropical rainforest.** Monographiae Biologicae. Volume 80. Kluwer, Boston, Massachusetts. xvi + 421 p. \$115.00, €125.00, £79.00, ISBN: 1-4020-0123-1 (acid-free paper).

In 1986, a group of dedicated tropical biologists from France established a remote biological field station in the middle of a 1000 km² old-growth rainforest in French Guiana. The site is named in reference to indigenous groups who were present in the area up until the 18th century. The goal of the present edited volume is to “present a synthesis of the scientific output of the research undertaken” to date. The objective was not to present an “exhaustive overview” of the forest but rather to synthesize the results of research programs that were active at the station. The resident research programs were operating under the assumption that “long evolutionary processes lead plant and animal communities of different phyletic lineages to establish complex interactions that govern forest dynamics and the distribution of biodiversity.”

The book is divided into five parts including an introduction and sections entitled “Plant communities,” “Vertebrate communities and evolutionary ecology,” “Frugivory and seed dispersal,” “Forest dynamics and recruitment,” as well as an extensive set of appendices listing the major plant and vertebrate taxa. The book is focused primarily on vertebrates and the interactions of vertebrates and seed dispersal, topics that reflect the interests of the founders of the Nouragues site. The flow of these sections and chapters was logical and well organized.

The first section consisted of three chapters that introduced the field station, geography, and climate, as well as an oddly placed chapter detailing understory light environments. This latter chapter explored patterns of understory light quality, for which few data exist, and confirmed patterns of light quantity, many of which have been found elsewhere. It would have been helpful, however, if the patterns of light quality had been included in a broader theoretical context, explaining why these patterns were important. The chapter describing the field station and its history was brief and to the point, with photos displaying the gridded 50+ ha permanent forest plot as well as the housing facilities and the canopy walkway. With regard to research, one never really obtained a feel for what sorts of studies would be allowed and encouraged at the site. Apparently, experimental studies are allowed, but to what extent is unclear. Regardless, the site seems a very attractive place to conduct research and this is certainly a site more North, Central, and South American scientists should consider for their own research (for more information see www.cnrs.fr/nouragues). Indeed, only six of the 43 contributors came from countries other than France and The Netherlands. This is not a criticism but rather suggests an

opportunity for North American and Latin American tropical biologists to interact with European biologists at this site. Perhaps the Organization of Tropical Studies or the Smithsonian could be enticed to explore some cross-site comparisons with the Nouragues station.

The section on plant communities consisted of four chapters, one of which was focused on paleoecology. These chapters gave a very nice introduction to the community ecology of the site and the tremendous plant species diversity found there. Nearly half of the tree species, however, remain unidentified below the family level. Rectifying this situation is currently an immediate priority of the botanical researchers. The coverage of the flora goes well beyond descriptions of lowland high rainforest and includes very nice descriptions of more xeric vegetation types that are associated with inselbergs and granite outcrops. The current descriptive work sets the stage for more experimental and process-oriented studies that will be necessary in order to understand the causes for the observed patterns. The chapter on paleoecology provides a nice, albeit brief, discussion of the interaction of both short-term and long-term temporal processes in shaping forest structure and composition.

The chapters in the section on vertebrate communities and evolutionary ecology focused on the diversity and composition of primates, bats, birds, fishes, and amphibians and reptiles. In general, these chapters were well done and well written, though typically the result of relatively short-term studies of a few years or less. Consequently, it was hard to get a feel for interannual variability in the taxa of interest. A chapter on canopy positional differences among primates seemed a bit out of place and could probably have been better justified in terms of the scientific motivations. There was a strong chapter on the adaptive significance of flocking in birds.

The section on frugivory and seed dispersal was nicely done and informative. The opening chapter, although brief, demonstrates the thoroughness of much of the research at Nouragues and confirms once again the importance of animal dispersal in tropical forests. For example, primates could create clumped patterns of seedling recruitment that could apparently overwhelm the subsequent effects of predators and pathogens that attack these seedlings in these localized patches. A chapter on bat frugivory and seed dispersal was quite thorough, but drew conclusions about species coexistence and the intensity of interspecific competition based upon putative niche differences; such conclusions are fraught with danger and circular in their reasoning. We suggest that these conclusions are in fact testable hypotheses that warrant further investigation. A chapter on frugivory and dispersal by kinkajous provided a wealth of information on this common but little-studied mammal.

The final section of the book focused on forest dynamics and recruitment and, in our view, was the strongest part of the book, but this may very well reflect our own research

biases and interests. The chapter on tree-fall gaps provided a valuable comparison of gaps among tropical forests and of contrasting methods used to estimate gap size (methods by Brokaw, Runkle, and Van der Meer). The results demonstrated that, depending upon the method used, new canopy gaps ranged annually from less than 0.2% to more than 2% of the study area. A chapter devoted to the ecology of root climbing vines in the Cyclanthaceae and Araceae shed light on an important guild of plants that have received very little attention. This chapter combined studies of both biotic (dispersal) and abiotic (e.g., humidity and light) factors that together influenced observed patterns of recruitment. There were two informative back-to-back chapters on the relationship between seed predators/dispersers and recruitment. A much greater sample size of species (only four species in two families in one study) would significantly increase the value of these studies and allow more substantive generalizations and conclusions. Regardless, these chapters were valuable and in one the authors made the salient point that the evidence for a mutualistic relationship between scatterhoarders and their food source is “merely circumstantial” and based on limited evidence. The authors then provided a concise and thoughtful review weighing that evidence.

Overall, the editors and contributors are to be congratulated for producing an excellent volume. They have established a new and important research site in South America and have now completed many of the baseline studies that will make this site attractive for researchers worldwide. Greater integration and collaboration among this site with other sites in Latin America would be beneficial for all scientists involved.

WALTER P. CARSON

*University of Pittsburgh
Department of Biological Sciences
Pittsburgh, Pennsylvania 15260
E-mail: walt+@pitt.edu*

STEFAN SCHNITZER

*University of Minnesota
Department of Forest Resources
St. Paul, Minnesota 55108
Current address: University of Wisconsin–Milwaukee
Department of Biology
Milwaukee, Wisconsin 53211
E-mail: schnitze@uwn.edu*
