

## **Here Be Dragons: How the Study of Animal and Plant Distributions Revolutionized Our Views of Life and Earth**

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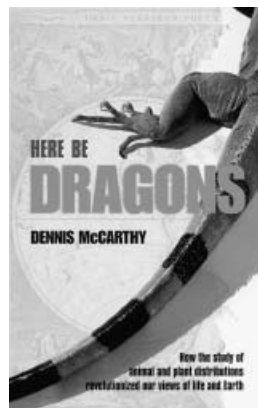
## Here Be Biogeographers

**Here Be Dragons: How the Study of Animal and Plant Distributions Revolutionized Our Views of Life and Earth.** Dennis McCarthy. Oxford University Press, New York, 256 pp., illus. \$29.95 (ISBN 9780199542468 cloth).

How could one not want to review a book with a catchy title like *Here Be Dragons*? And fortunately, this volume lives up to its promise. Dennis McCarthy has written an engaging and at times witty book popularizing one of the fastest-growing biological disciplines. Although biogeography has a long and distinguished history predating many other sciences—its roots arguably date to the earliest efforts of humans to understand nature—it is only in the past few decades that it has begun to achieve scientific prominence. In the past, many have perceived its aims to be primarily historical and descriptive. The publication of quantitative works such as *The Theory of Island Biogeography* by Robert H. MacArthur and Edward O. Wilson, coupled with new technologies and the availability of large synthetic data sets, has led to a renaissance for this field. And biogeography's synoptic approach to exploring geographic variation in nature from a number of different perspectives makes it particularly relevant to pressing issues in ecology and conservation biology. As David Quammen writes in *Song of the Dodo*, "Biogeography does more than ask *Which species?* and *Where?* It also asks *Why?* and, what is sometimes even more crucial, *Why not?*"

*Here Be Dragons* begins with the story of two men: the venerable Charles Darwin and the outsider Alfred Russel Wallace, who has been referred to as a prisoner of scientific parentheses because of his underappreciated role in the codiscovery of the theory

of evolution. In chapter 1 (Galápagan Epiphany), McCarthy tackles the familiar story of Darwin and the seminal HMS *Beagle* voyage that shook his theological underpinnings. The narrative goes back and forth from Darwin's intellectual problems when confronted with biological implausibilities, such as the markedly disjunct distribution of insular plants and animals, to vignettes about modern studies. Here the narrative is interesting, but not particularly novel.



McCarthy draws parallels between Darwin and Wallace in chapter 2 (The Mesosaurus Problem) when he states, "the path...was eerily similar to that of his more well-known counterpart. Like Darwin, Wallace was a globetrotting naturalist" (p. 23). Of course, Wallace is best known for his studies of the distribution of flora and fauna in the Malay Archipelago, but he traveled widely and made many other seminal contributions. Clearly, McCarthy is referring to the fact that both scientists were highly influenced by their firsthand observations of nature, but frankly I find the differences between them more striking than the similarities. Whereas Darwin came from a wealthy family and took a position as a gentleman companion during his single voyage accompanied by his manservant Covington, Wallace came from humble origins and worked for many years as

a commercial collector of specimens. Darwin's ideas were slowly developed and refined over 20 years at his estate in England, whereas Wallace developed his in the steaming jungles of Indonesia as he suffered through numerous bouts of malaria and rotting feet. It is truly remarkable that they converged on many of the same ideas.

Chapter 2 goes on to describe several other key and intriguing figures in biogeographic history, Alfred Wegener and Alexander du Toit; the former developed the idea of continental drift, the latter was one of its most vocal proponents. McCarthy deftly weaves stories about all four men (Darwin, Wallace, Wegener, and du Toit) as he discusses "fractured distributions" and plate tectonics. This discussion is particularly compelling, although a bit romanticized. McCarthy employs sentences such as "Grand and intrepid adventures. Swashbucklers, all," and then goes on to state that the link between "bold natures and biogeographical impulses even continues to this day" (p. 22). As much as I'd like to think of biogeographers as the Indiana Joneses of the science world, I'm personally more likely to be wearing duct-taped Levi's than a fedora. But passages such as this are at the very least interesting to read: "The long-standing tradition of the adventurous biogeographer may offer another clue as to why the subject has produced so many revolutionaries... [Their writings] do not smell of the classroom, they smell of rivers, beaches, swamps and jungles. The risk-takers who wrote them are not the type to be daunted by professors or swayed by conventional wisdom" (p. 22). It would be gratifying to think that modern biogeographers maintain some of this grand spirit of adventure.

From these beginnings, *Here Be Dragons* moves to a discussion of the evolutionary process in chapter 3 (Pygmy Mammoths and Mysterious Islands), the influence of plate tectonics on evolution in chapter 4

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(The Volcanic Ring that Changed the World), and the influence of isolation on biogeographic patterns in chapter 5 (The Bloody Fall of South America and the Last of the Triassic Beak-headed Reptiles). These are all interesting but a bit uneven in terms of scientific accuracy. For example, although chapter 4 is first rate, and includes a vivid and compelling description of the transformation of Antarctica from “liveliness and greenery” to an “icy, barren wasteland” at the end of the Eocene, I take issue with a few of the simplifications about evolution on islands. Writing that rodents get larger on islands because doing so gives them a “more relaxed metabolic rate” is simplistic. With the removal of constraints imposed by mainland predators and competitors, insular organisms evolve to a size that increases their net energy. When large size no longer ameliorates predation pressure, dwarfing may occur.

Similarly, the author’s description of the factors underlying Bergmann’s rule (the pattern of larger size in cooler habitats) is a bit flat. The fact that even ectotherms demonstrate clear and striking patterns suggests that body size is not due to “the environmental circumstances of the island,” but is rather a more general phenomenon. However, even here McCarthy shows his innate skill at making science accessible when he describes differences between ectotherms and endotherms: “Look at a reptile in the wild.... A good guess is that it is feeling too hot or too cold.... [Whereas, if] you look at some small mammal...more than likely it is hungry” (p. 66). This is a wonderful way of expressing the fundamental difference between these taxa.

The last portion of the book is quite eloquent, albeit on vastly divergent topics. Chapter 6 (Enchanted Waters) is generally engrossing and wide ranging although not comprehensive. McCarthy manages to logically intertwine discussion of physical oceanography with intriguing vignettes about the evolution of sonar, the behavior of orcas, the lack of large aquatic mammalian carnivores, and other interesting ecologies. Here again are a few broad

oversimplifications. For example: “The ocean environment is considerably more uniform than the continents. This is why marine mammals...only constitute 2.5% of mammalian species...they have not diversified to the same extent as have their continental counterparts” (p. 122). This statement ignores the fact that living in water poses all sorts of physiological challenges that limit the size of truly aquatic mammals to approximately 100 kilograms (kg) or more. (Although the influence of gravity is less, water has about 24 times the heat conductance of air. In practical terms, this means mammals spend more energy maintaining homeostasis.) About 30% of mammals bigger than 100 kg are aquatic, including the largest 20 or so found on Earth. Perhaps this point isn’t important to other potential readers, but as someone who thinks about mammalian diversity over time and space, I prefer more rigor.

Chapter 7 (The Battle Over Eden) is one of the most gripping accounts of biogeography. Here, McCarthy provides a provocative synopsis of modern thought about the diversity and biogeography of humans. He tackles directly controversial issues about human biogeography and evolution and does a fine job navigating these sensitive and tricky topics.

The phrase “here be dragons” conjures up visions of adventure, exploration, and danger, although apparently it refers to early efforts to chart biological distributions. The book aims to convey the same spirit of excitement and discovery about the discipline of biogeography. To a large extent, it succeeds. Overall, the text is exceptionally well written—a bit overly poetic in parts, perhaps, but engrossing. It is unfortunately replete with “go-to” statements (e.g., “as we shall see in the next chapter”); these are somewhat jarring to the narrative. The text makes good use of interesting quotes from writings of Darwin and others and brings in vivid and compelling stories.

*Here Be Dragons* is an exploration of the intersection of two fascinating ideas in biogeography—evolution and plate tectonics—and some of their key

figures, discoveries, and implications. It is not comprehensive, nor is it meant to be. Rather, the book serves as an hors d’oeuvre for those who might be interested in the field. As such, it makes quite satisfying and tasty reading.

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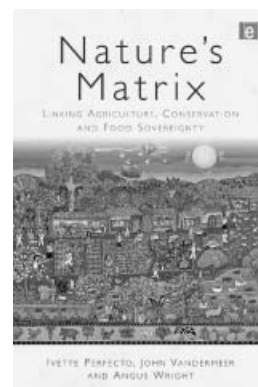
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## SUSTAINABILITY AND LANDSCAPE MULTIFUNCTIONALITY

### **Nature’s Matrix: Linking Agriculture, Conservation, and Food Sovereignty.**

Ivette Perfecto, John Vandermeer, Angus Wright. Earthscan, 2009. 272 pp., illus. \$34.95 (ISBN 9781844077823 paper).

**F**ood-system sustainability is intricately linked with the quality of the landscapes in which agriculture is imbedded. In this remarkable book, *Nature’s Matrix: Linking Agriculture, Conservation, and Food Sovereignty*, the authors describe how linking ecological theory, conservation, and food sovereignty movements can make any landscape’s multifunctionality of agricultural components the foundation for sustainable management of the natural and agroecosystem components of that landscape. With an emphasis on multifunctionality, the



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