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Review: Great Waters: An Atlantic Passage by Deborah Cramer

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BOOK REVIEW

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Great Waters: An Atlantic Passage. 2001. Deborah Cramer, W. W. Norton & Company, 500 Fifth Avenue, New York, New York 10110. 442 pages. Web address: www.wwnorton.com. Hardcover, ISBN 0-393-02019-3, US\$ 27.95. Paperback (published 2002), ISBN 0-393-32334X, US\$ 15.95.

The vast Indo-Pacific region is exotic and alluring, but the rhythms of the North Atlantic and adjacent Mediterranean drove the development of Western civilization. Now, of course, we are rapidly degrading the Atlantic. Being a relatively small ocean, the pressures of a burgeoning population are felt more strongly in the Atlantic than in the more expansive Indo-Pacific, but that other ocean is heading toward catastrophe as well. Deborah Cramer articulates in near-lyrical terms the sad litany of this accelerating downhill slide and pleads for environmental sanity in a thoughtful, well-researched and beautifully written volume. She uses a 3-wk sailing cruise from Woods Hole to Barbados, which she made with one of the Sea Education Association's undergraduate programs, as a device to explicate humanity's assaults on the Atlantic and associated water bodies (including the Gulf of Mexico) and to digress into a vast corpus of scientific information about its biology, physics, geology, and chemistry.

In Part 1, Cramer offers a short course in oceanography and marine biology. Her first chapter glides effortlessly through the chemistry of water and salt; primary productivity; nanoplankton, picoplankton, and the microbial loop; copepods and gelatinous zooplankton; oceanic-atmospheric teleconnections; the ozone hole; global warming; and the iron hypothesis of carbon sequestration. The next chapter is about the loss of North Atlantic groundfish stocks and the cascading ecological effects of the collapse of those fisheries. Chapter 3, which ends Part 1, is a brief essay on the continental slope and deep sea and the influence of terrigenous input on the seafloor.

The focus of Part 2 is the open ocean. Cramer's chapters cover the worldwide thermohaline conveyor belt and how it distributes pollutants (Chapter 4); the connections between ocean, climate, and culture (Chapter 5); the decimation of large, open-ocean beasts, includ-

ing turtles, tuna, and whales (Chapter 6); and the effects of pollution on the Sargasso Sea and its inhabitants (Chapter 7). Her words in Chapter 7 on the decline of that most emblematic of Atlantic sea creatures, the American eel, are a callback to Rachel Carson's meditation on *Anguilla* in *Under the Sea-Wind*.

Part 3 moves from the mid-Atlantic ridge and its biota (Chapter 8) to plate tectonics, the geological history of the planet and the origin of life (Chapter 9), and the development of the Atlantic Basin (Chapter 10). The tectonic origins of the Atlantic are exceedingly complex, and although Cramer's detailed verbal descriptions are impressive, her treatment would have benefited from more extensive illustration than the four maps borrowed from Chris Scotese's PALEOMAP project. More maps would also have avoided some ambiguities in discussions of the timing of major tectonic and paleobiological events.

The final two chapters, which constitute Part 4, pull together Cramer's thoughts on the state of the Atlantic and the marine realm in general. Chapter 11 discusses several issues of current interest to marine scientists who work in the northern Gulf of Mexico: harmful algal blooms, dead zones, and nutrient loading; invasive species; and the decline of coral reefs. Chapter 12 concludes with the ultimate geologic fate of the Atlantic and the volcanic harbingers of that end in the Caribbean region. The message here is that any fossil record of our activities in the Atlantic and on its surrounding lands is not likely to be flattering unless we begin treating the environment in a more ethical fashion.

The few minor inaccuracies can be forgiven (a misstatement about the phylogenetic relationship of ammonites and the nautilus on page 292; a claim on page 337 that fossil coral reefs along Caribbean shores were exposed by tectonic uplift, which is true in Barbados but is generally not the case) because this book is astonishing in its breadth and depth. I particularly liked the geological chapters, which are enlivened by frequent references to familiar geographic features. Factual statements are backed up by an extensive set of references at the end of the book, a valuable resource for the scientist as well as the general reader. This book would be perfect for an undergraduate seminar.

The bottom line in all this is the increasing

size of the human population, and in my opinion Cramer does not make the point strongly enough. Environmental awareness, conservation activity, and grassroots political will at the edge of the sea will not stop the human juggernaut. The population must be stabilized well below carrying capacity if we are to work successfully toward a decent quality of life for all and repair the Atlantic and the rest of the world.

Comparisons with the works of Rachel

Carson are as apt as they are inevitable. Sixty years after Carson published *Under the Sea-Wind*, however, we are in a dead panic about the environment, or we should be. Despite an encouraging decline in human fertility rates in some quarters, there is much to be done and time is short.

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