

## Book Reviews

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## Book Reviews

TUNDRA-TAIGA BIOLOGY: HUMAN, PLANT, AND ANIMAL SURVIVAL IN THE ARCTIC. By R. M. M. Crawford. New York: Oxford University Press, 2014. 270 pp. \$125.00 (softcover). ISBN 9780199559404.

Professor Emeritus R. M. M. Crawford has written an engaging, thorough, and current text describing the arctic biome and its inhabitants. The unifying theme, as laid out in the preface, is considering how resident arctic organisms are able to survive the long, harsh winter period. An evolutionary perspective is woven throughout the book, reminding readers of the history of this part of the Earth and the adaptations the flora and fauna must have to persist in the Far North.

Generally, the book seems to be written for the lay person who has an interest in natural history, but with occasional in-depth, technical descriptions of a particular biological process or pattern. Thus, the text is appropriate for an upper-level undergraduate or graduate level course. In addition, this book would be an excellent introduction to the tundra and boreal forest for anyone traveling to the region to conduct research or with a strong interest in biology.

The text is accessible, well written, and easy to understand. Crawford enhances particular case studies and descriptions with terms like “surprising” and “counter-intuitive” so that his own voice rings through. Other colorful phrases like “marauding botanists” enliven the text along with occasional personal anecdotes. He often places biological discoveries in their historical context, such that scientific inquiry and debate are central to the narrative. By elaborating uncertainties and knowledge gaps where they exist, he inspires the reader’s own curiosity. Case studies of unusual adaptations are intriguing, and Crawford’s interest in them engages the reader. The transitions between chapters emphasize the themes of the book, and guide the reader along well. In particular, intra- and inter-annual variations in abiotic conditions are touched on repeatedly so that the evolutionary context for the adaptations is well described.

The individual chapters can stand on their own, which leads to some repetition among them. For an instructor using this text this would be an advantage, as individual chapters could be assigned to students to focus on particular topics. The history described in the first three chapters would help students understand how current environmental changes fit in the context from the past. For example, Chapter 1 presents the history of the arctic climate and could be an excellent supplement to a course on climate change that includes the Arctic as a region undergoing dramatic change. Chapter 2 describes the paleo-arctic environment, setting up the themes of inter-annual variation and biological adaptations. Students studying the tundra and taiga today would greatly benefit from this historical perspective.

Not surprisingly, given Crawford’s expertise, Chapter 9 on evolution is excellent. For readers relatively unfamiliar with the Arctic, Crawford’s recurrent theme of adaptations will be illuminating. In addition to the adaptations of year-round residents, the migration of other animals is explored relative to its biological costs and benefits. In this vein, the discussion regarding how

plants need to be able to *not* grow in the Arctic to avoid damaging weather conditions provides a memorable topic. Phrasing like this is colorful and helpful in reinforcing the unique environment of the tundra and taiga.

Some readers might find it surprising that Crawford allocates a significant amount of text to the discussion of human inhabitants and explorers of the Arctic. In addition to a section devoted to human biogeography and survival (Chapter 3), the evolution of humans (Chapter 9) and the effects of pollution (Chapter 10) in the Arctic are discussed at length. Here, too, Crawford emphasizes the theme of adaptation and resilience in an adverse environment. A tasteful balance of history, science, and anecdote in these sections frames the central issue: conserving and living in the Arctic in a changing world.

Importantly for use as a text, recent literature and key up-to-date references are cited throughout the book. For example, Chapter 4 discussing tundra diversity incorporates current understanding of climate change. Predator-prey interactions (Chapter 8) highlight recent studies suggesting that predation may be quite important in arctic ecosystems because of limited food web length. However, a handful of topics in the text were not as well supported by the ecological literature. For example, in Chapter 8, Crawford suggests that mammals are required for nutrient cycling in the tundra. Although several studies confirm that nutrient cycling can be significantly affected by intense mammalian grazing (e.g., Väisänen et al. 2014), grazing intensity varies substantially across the landscape both temporally and spatially; thus, such generalizations are not well substantiated. Occasionally some organisms seemed to be missing from certain chapters. For example, there was no mention of insects or migratory songbirds in the first discussion of diversity in Chapter 4. But these are relatively minor issues, as the text as a whole is well supported and an excellent description of this region.

The figures in general are terrific, with high-quality photographs and a great use of color. The inclusion of many maps is helpful to the reader unfamiliar with this region. More complex scientific figures, many taken from recent primary literature, enhance the utility of the book as a learning tool for biology students and researchers. These are complemented by a glossary and an excellent list of references, which would also be helpful to instructors wishing to design a course or discussion centered on a topic in the book. In terms of presentation, a future edition of the book would benefit from some minor editorial corrections. Occasionally, the maps need better placement as they were out of context, and in some cases the figures are not cited in order, making reference a bit challenging. There are a few typographic errors.

Finally, the last chapter looks forward and considers how tundra and taiga may respond to current and predicted environmental changes. The theme here is resilience, emphasizing the past changes that these organisms and communities have withstood. These are topics covered by other authors as well, but Crawford develops a convincing argument for resilience based on the background reviewed in the previous chapters. This is an excellent book.

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