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How to live in the north

Tundra–Taiga Biology: Human, Plant, and Animal Survival in the Arctic. Robert M.M. Crawford, 2013, Oxford University Press. 288 pp. £75.00 (hardback) / £37.50 (paperback). ISBN: 978-0-19-955940-4 / 978-0-19-955941-1; <http://oup.com>

This book presents a comprehensive survey of the organisms that live at our northern high latitudes and the environmental challenges that these organisms face in their attempts to survive, grow, and reproduce as individuals, and as elements of populations and communities. The book begins appropriately by defining the Arctic which, as Crawford notes, given the multitude of different definitions used among various groups, “presents problems.” Crawford provides several of these definitions from which the readers can choose their favourite, or most reasonable with regard to their interests. I was disappointed however that Crawford does not inform the reader which definition is being used as the context for the book, which would certainly have been helpful. At the extremes, one definition of the Arctic might include no (or very few) taiga habitats, whereas another definition could include several biome types in addition to tundra and taiga, making the scope of the book highly dependent on defining the Arctic. Following the discussion of the Arctic's extent, Crawford describes the physical attributes of our Earth that drive the unique properties of polar climates, and then presents the history of the Arctic climate since the Cretaceous.

Although the biota do appear in Chapter 1 in the form of ancient forests, a freshwater aquatic fern, and a cyanobacteria, they become more prevalent in Chapter 2, as Crawford discusses the period since the Last Glacial Maximum, the refugia of Arctic plants and animals during the last Ice Age, and the dynamics of some of these species during the Holocene to form their present distributions. Chapter 3 is a nice chronicle of human migra-

tion to and across the Arctic, and the different groups of indigenous peoples that have and still do reside on Arctic lands. The bulk of the remainder of the book (Chapters 4-9) leads a tour of the wide variety of species (including humans) that live in the Arctic, discussing their distribution across the Arctic, and how they have evolved to survive and reproduce in the harsh polar environment. The final chapter (10) discusses recent environmental changes in the Arctic (largely anthropogenic), and the impacts that these changes might have on the conservation of Arctic species, with a focus on some of the more charismatic Arctic megafauna, such as polar bears, muskoxen, and caribou.

The back cover of the book provides a note from the publisher, briefly summarising the text in addition to noting the potential utility of the book for students, scientists, and practitioners. I had a somewhat differing opinion on the practicality of the book. While I am sure that this book could “appeal to researchers new to the field,” I am less confident that those with some experience in the Arctic would see it as a “concise but authoritative overview of the biome” (actually more than one biome – tundra and taiga) – concise, maybe, but I would hesitate to call it authoritative, certainly not from a scientific perspective. In an attempt to cover the generalities of the physical environment and the biota of the Arctic, Crawford has a tendency to oversimplify; simplification of course is necessary in a text such as this one, however, in places it leads to misinformation. To provide some examples, I was discouraged immediately by the first paragraph of the Preface, which set the

tone for my expectations of the book. In the third sentence, Crawford states that when “contemplating the future in the far north a distinction has to be made between the maritime and the terrestrial Arctic.” This comment left me baffled – when would we *not* make a distinction between the maritime and terrestrial Arctic? The following sentence suggesting that the “Arctic Ocean is a relatively monotonous region whether it be frozen or unfrozen,” is likely to enrage nearly everyone who studies any aspect of the Arctic Ocean. I would also have to disagree with the generality that “All life in polar regions has to contend with similar problems” regardless of its phylogenetic kingdom. The third sentence of Chapter 1 suggests that “Unlike the Antarctic, the concept of the frozen Arctic began and remains an idea.” As a reader, I’m not really sure what that means; why did the Antarctic not begin as an idea? Why is the Antarctic not still an idea (because there is a continent there?), but the Arctic is? It was unfortunate that the lack of specificity in the very first few things that I read in the book set the stage for the remainder of my reading.

As an ecologist, who largely studies tundra vegetation and its interactions with soil, climate, and herbivores, I was surprised by some of the less accurate information presented in certain sections. While Crawford emphasises the differences in the climates, flora, and fauna of the Arctic continents (North America, Europe, and Asia), those who have visited the Arctic on multiple continents are often struck more by the similarities in their environments and biota. Specific examples of information issues are found in the section on tundra classification (4.2), where “Prostrate and tall shrub tundra” are included as a single class, when in actuality they rarely co-occur, with prostrate shrubs (generally <20 cm in height) occupying the High Arctic and

tall shrubs (up to several meters in height) found in the Low Arctic and the forest-tundra transition zone. Similarly, in the section on *Prostrate Shrub Tundra* (4.2.2), shrub tundra is divided into two categories, *Dwarf Tundra* and *Tall Shrub Tundra*, neither of which is *Prostrate Shrub Tundra* (although *Dwarf Tundra* can include, but is not exclusively, prostrate shrubs). I won’t go on, but I am only left to wonder about the accuracy of the coverage of other topics about which I am less knowledgeable.

Nevertheless, the book does contain a vast amount of information about many things Arctic, including the climate, people, plants and animals. I’m a big fan of defining terminology, so I loved things like Table 5.2, which described the terms for numerous Arctic wetland landscapes and structures. The book is certainly comprehensive, and each topic is treated with its share of graphs, maps, and photographs, making it extremely accessible to a range of readers. As I mentioned above, this is a fine book for someone generally interested in the Arctic, or for new researchers, but for those who wish to delve deeper into any specific aspect of the Arctic system, take the information here as a guideline, and investigate the science.

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