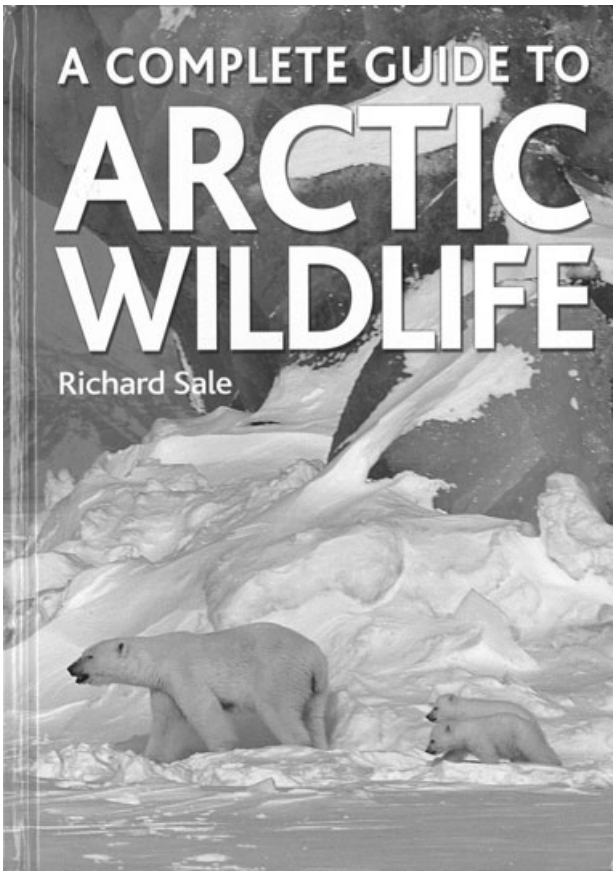
Review of *A complete guide to Arctic wildlife*, by Richard Sale (2006). London: Christopher Helm. 464 pp. ISBN 0-7136-7039-8.



A complete guide to Arctic wildlife is a lavishly illustrated, highly informative and comprehensive volume that will be an important addition to the library of anyone with a deep and abiding interest in Arctic natural history.

The book has three main parts: about 50 pages of introductory chapters, a field guide to Arctic birds and one for Arctic mammals. Much more comprehensive and detailed than one would expect in a field guide to birds and mammals, the introductory material is an enormous asset to the volume. "Defining the Arctic" compares the diverse ways that have been proposed to define the boundaries of the Arctic: the Arctic Circle at a latitude of 66°33'N, the timberline, the 10 °C summer isotherm and several other definitions. (In this book, the author takes the modified 10 °C summer isotherm as his starting point for delimiting Arctic wildlife.) The chapter that follows, "Arctic geology", covers plate tectonics, the Arctic Basin, Arctic rock types, snow and ice, sea ice, glaciers, and glacial and periglacial landforms. "The Arctic climate" covers temperature, precipitation and wind, as well as various solar phenomena such as the aurora borealis, parhelia and ice blink.

Together, these first three richly detailed introductory chapters—"Defining the Arctic", "Arctic geology" and "The Arctic climate"—provide the best general scientific introduction to the Arctic that I have encountered. Additional introductory material follows. "Humans in the Arctic" provides a very good overview of indigenous circumpolar peoples and the challenges they have faced in their dealings with the nonindigenous groups who have colonized the Arctic, or who have visited it in order to exploit its natural resources. The last four introductory chapters—"Arctic habitats", "Adaptations for Arctic life", "Speciation and biogeography" and "The fragile Arctic"—comprise an excellent introduction to the biology of the Arctic and the threats to its biodiversity, including airborne pollution, mining, oil and gas extraction and transportation, ozone depletion, nuclear waste, fishing, whaling, fur trapping, other kinds of wildlife exploitation, logging and climate change.

Students and visitors to the Arctic will find these introductory chapters an unsurpassed resource, and even seasoned Arctic scientists and permanent residents of the Far North will find a great deal of interest here. The wealth of information that Sale has brought together is enlivened by his clear writing style, in which the "dry" facts are animated with engagingly human touches. For example, in his description of how air is entrapped in glacial ice, in the section on snow and ice, Sale notes that "when added to a drink, glacial ice fizzes as the air is released, a trivial diversion, but one that has given a moment of pleasure to many a polar traveller" (p. 12). In a passage on thawed permafrost, the author describes how concealed pockets of the "gluey porridge" of taliks "can pour over the top of the boot of anyone unlucky enough to break through the crust" (p. 17). In the section on Arctic flies, Sale offers the "gloomy calculation . . . that a naked, unprotected human would die from blood loss from mosquitoes within a day" (p. 39).

One aspect of Sale's writing in these chapters that particularly appeals to me is his penchant for explaining the

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origin and meaning of many of the specialist terms, as well as some place names, that he uses. Indeed, this begins in the very first paragraph of the opening chapter, in which the reader learns that the Arctic got its name from the Greeks, who observed that below the constellation of the Great Bear—*Arktikos*—stars rose and fell and were not always visible. Some other examples: the term "roche moutonnée" is "usually said to derive from the sheeplike appearance of such rocks studding alpine meadows, but is more likely to be from the sheepskin wigs of the French court, which looked rather like these glacial boulders" (p. 16). The word for the conical periglacial formations English speakers know as "pingos" is borrowed from the language of the Mackenzie Delta Inuit; the Russian language has borrowed a Yakut word, "bulgunnyakh", for the same formation (p. 18). "Saxifrage" means "stone-breaker" in Latin, leading "to the occasional suggestion that these plants aid the production of soil in the rocky terrain they inhabit" (p. 33). However, according to Sale this is not correct: "the name actually derives from the claimed similarity of its reproductive buds to kidney stones, a similarity which once led to the use of the plant as a remedy for this ailment" (p. 33).

The "field guides" that constitute the bulk of this weighty book cover 77 mammal species and 213 species of birds. Preceding the individual species accounts are overviews of the larger taxonomic groups to which they belong. For example, the section on carnivores begins with a brief general description of this order of mammals, and then includes descriptions of the families with Arctic representatives that make up this order: the dogs, bears, cats and mustelids. Under these come the individual species accounts. Each species account includes the common English name(s), scientific name, a detailed description of the animal's appearance, "confusion species" (species with which it might be confused), and notes on size, vocalizations and other methods of communication (such as scent-marking in the case of some of the terrestrial mammals, and lobtailing and breaching among some of the marine mammals), distribution, diet, breeding, taxonomy and geographical variation.

Each species is illustrated with at least one, often superb, colour photograph (most by the author or Per Michelsen) and a clear distribution map, also in colour, all attractively laid out. Each species is also shown in one of the plates of first-rate colour drawings. These plates handily bring together groups of species to assist identification in both the summer and the winter seasons (some Arctic animals undergo seasonal shifts in pelage or plumage).

A drawback with the field guide sections of this book—and this is my biggest grouse about *A complete guide to Arctic wildlife*—is that they make liberal use of a number of specialist terms that are not defined for the benefit of the nonspecialist reader. Whereas the scientific terms Sale employs in his introductory chapters are usually clearly explained for the nonspecialist, in the species accounts words such as "polytypic", "monotypic", "nominate race", "nidifugous", "precocial", "altricial" and "nidicolous" are not defined anywhere in the volume. Recourse to an ordinary dictionary may not provide all the answers for the nonspecialist reader. For example, the chicks of the common raven (*Corvus corax*) are characterized as "nidiculous and altricial" (p. 311). My 2152-page edition of the *Oxford Dictionary of English* (2001), which is presumably a fairly comprehensive nonspecialist reference volume, offers a clear definition of "altricial", but under "nidicolous" the reader is simply referred back to "altricial". Another example: the young of the great northern diver (*Gavia immer*) are described as "nidifugous and precocial" (p. 60). My dictionary defines "precocial", but for "nidifugous" it refers the reader to "precocial". All these terms do, of course, mean different things to the biologists who study these animals. However, in the absence of a glossary in *A complete guide to Arctic wildlife*, the interested nonspecialist reader may have to expend some effort, on the internet or at a public library, to educate her- or himself about what those different definitions are.

Something else that Sale should have taken a few lines to explain is what a dental formula (given for each of the mammal species except the cetaceans) consists of. Another very minor complaint is that the "How to use the field guides" section refers to two bird books—"Howard and Moore (3rd edition) and Clements (6th edition)" (p. 55)—for which no further reference details are provided. All this lends an undesirable exclusionist tinge to a book that is otherwise very accessible to people who are not biologists.

To point out a final weakness, the "confusion species" parts of the species accounts could perhaps benefit from some revision. For example, no confusion species are listed for the Arctic fox (*Alopex lagopus*, but very recently reassigned to the genus *Vulpes*) or the red fox (*Vulpes vulpes*), yet one North American form of the latter is described as "blue-grey overall, similar to the blue-morph Arctic fox" (p. 387). As the ranges of these two species overlap considerably, one might expect the two foxes to be given as potential confusion species for one another.

The lack of a glossary and the other minor flaws noted above should be little trouble for the author to rectify in a subsequent edition of *A complete guide to Arctic wildlife*. And it is sincerely to be hoped that the information in this handsome, valuable volume will be updated in new editions as these become warranted. Many of the species covered in this book are the subjects of ongoing research

that is continually adding to, and refining, our knowledge about their behaviour. Moreover, climate change, which may be occuring much more quickly than imagined even just a few years ago, is expected to modify the distribution of many Arctic animals, as Sale observes in one of his introductory chapters. (At the other end of the book, in a concluding chapter called "A visitor's guide to the Arctic", Sale notes that "any guide to the region will be quickly out of date" [p. 456].)

"This book is a celebration of the Arctic" (p. 5) promises the author in his preface. He delivers.