

Given Bern Will Brown's long, colourful, and at times controversial career in the North, it is tempting for the reader to seek more from the author than he could possibly have packed into two volumes. Brown has given us two thoughtfully written and well-crafted books that leave me hoping he will continue to write about his years in the North.

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GENERAL GEOCRYOLOGY. By E.D. YERSHOV. New York: Cambridge University Press, 1998. ISBN 0-521-47344-9. xxiii + 580 p., b&w illus., bib., index. Hardbound. US\$120.00.

The Earth's polar regions are among the coldest, harshest and most remote physical environments on the planet and, as a result, remain one of its least understood systems. Cold regions research, particularly the study of frozen ground properties and processes, is a relatively recent field of science that since the mid-1940s has emerged as a distinct subdiscipline of Earth Science. Its growth has been closely linked to the unique demands of construction in areas underlain by permafrost and activities associated with both the Arctic oil and gas industry and the Cold War. The geographical and ideological isolation of the former Soviet Union from other northern countries resulted in the development of two distinct and often disparate bodies of frozen ground literature. One is primarily in English and dominated by North American and European examples; the other, in Russian, focuses on Siberian examples. The literature also reflects strong philosophical differences: for example, the North American-European approach has a strong geomorphic bent that is rooted in climatic geomorphology, while the Russian approach is firmly based in physical geology and stratigraphy. Until recently, the West has had little access to the extensive Russian literature. Notable exceptions are the translations of books by Shumskii (1964) and Tsytoich (1975) and papers published in the proceedings of seven international permafrost conferences. However, these translations are extremely specific. *General Geocryology* is an English translation of the Russian textbook *Obshchaya Geokriologiya*, published in 1990, which provides unique insight into the Russian approach to frozen ground science as well as into its historical and geographical context.

Although *geocryology* is widely accepted as referring to the investigation of frozen ground, in the Russian literature it is a general term that embraces not only processes and phenomena associated with seasonal frost and permafrost, but also areas covered by glaciers (Fyodorov and Ivanov, 1974). Professor Yershov describes

geocryology as the branch of geology that includes the study of physical laws governing frozen ground and its structure and properties. It also includes the investigation of cryogeological processes active in permafrost formation. In North America, on the other hand, cold climate and frozen earth studies have traditionally been the domain of permafrost and periglacial science (Washburn, 1973; French, 1996), although in recent years the term *geocryology* has gained widespread acceptance. For example, in 1979 Washburn republished his 1973 text, *Periglacial Processes and Environments*, under the title *Geocryology: A survey of periglacial processes and environments*. Thus, in the English literature *geocryology* includes mainly the geomorphic and geotechnical characteristics of permafrost and periglacial systems.

General Geocryology presents a rather uneven overview of frozen ground topics. It begins with background notes by the editor, including useful translational notes that identify key sources and potentially problematic terms. Next come the author's preface and an introduction that provides general background material on topics ranging from planetary cryology and patterns in permafrost occurrence in past geologic periods to the evolution of permafrost science in Russia and theoretical and methodological approaches in Russian *geocryology*. The neophyte will find these materials both interesting and a good indication of the very different nature of Russian permafrost science.

The main body of the text is divided into five sections comprising 19 chapters. There is significant inconsistency in detail and technical level between the various sections. The first section, entitled "Thermal, physical, physico-chemical and mechanical processes in freezing, frozen and thawing ground and their manifestation in permafrost regions," is the longest (five chapters) and most technical part of the book. In this section, Yershov describes in detail the theoretical and physical aspects of ground freezing and thawing. Included are chapters on moisture dynamics, physical and chemical processes, changes in structure, and physical manifestations of ground freezing. The second section, "Composition, cryogenic structure and properties of frozen rocks," is divided into four chapters that focus mainly on the geological character of frozen ground. This section is somewhat disjointed and descriptive, and it lacks the detail found in other Russian translations (e.g., Shumskii, 1964; Tsytoich, 1975). However, for those unfamiliar with the Russian approach to permafrost science, Section 2 will be very useful. Section 3, "Principles of the formation and development of the frozen strata and layers of seasonal freezing and thawing," deals with surface energy balance conditions and surface processes associated with the active layer, and permafrost formation. This section (four chapters) is reasonably technical and introduces a number of uniquely Russian concepts, for example, V.A. Kudryavtsev's seasonal freezing and thawing classification and Romanovskij's talik classification. Section 4, "Regional features and evolution of permafrost," is short (three chapters), descriptive, and the

least scientific part of the book. The final section, entitled "Rational use of frozen ground and environmental protection in the course of economic development of permafrost regions," provides a qualitative overview of Russian construction techniques, engineering philosophies, and remediation measures.

This book makes three contributions. First of all, it provides useful knowledge about basic geocryology. Secondly, it is one of the first texts published in English to offer insight into some of the uniquely Russian approaches to geocryology. Finally, it provides an interesting time line for the development of permafrost science in Russia.

Although more "readable" than most English translations of Russian permafrost material, *General Geocryology* suffers from a series of basic inherent problems. In particular, the scientific level is inconsistent: some sections are extremely technical while others are very general. Also, information and examples are inadequately referenced. There are only 21 references, and many studies cited in the text are not referenced. The references that are provided are incomplete and presented in a nonstandard format. On a general level, the book's narrow geographical focus and lack of references limit its usefulness to either a general reference or a supplementary course text. The dry and overly technical writing style typical of many Russian scientific translations makes reading quite challenging. The use of graphics is limited, and in most cases the figures are poorly linked to the text. Diagrams are small, plain, and complicated, often with either cumbersome or inadequate captions. The few photographs are mostly small-scale and in black and white. Despite a Russian geographical focus, there are few maps to provide spatial context. The book uses cumbersome and complicated terminology, which in some cases includes either new or unconventional words (e.g., "cryohydration" and "technogenic"). Equations contain nonstandard symbols, and the absence of a listing of these symbols is also problematic. As an active permafrost scientist, this reviewer was disappointed by the omission of details about the Russian approach to permafrost classification, ground ice and thermokarst, permafrost stratigraphy, gas hydrates, and permafrost hydrology.

In conclusion, despite some basic problems, *General Geocryology* makes a useful contribution to the permafrost literature with its wide-ranging review of Russian permafrost science and up-to-date perspective on some aspects of the Russian approach to frozen ground studies. In this reviewer's opinion, *General Geocryology* will be a worthwhile addition to the reference library of any researcher or upper-level university student specializing in permafrost geology and engineering.

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UNDER POLARIS: AN ARCTIC QUEST. By TAHOE TALBOT WASHBURN. Montreal & Kingston: McGill-Queen's University Press, 1999. xii + 247 p., b&w illus., maps, glossary, appendix, bib., indexes. Hardbound. US\$27.50.

Many times during the last 100 years or so explorers and adventurers adopted Inuit ways to learn how to survive in the Arctic. People like Amundsen, Stefansson, and Nansen, to mention a few, lived like Northerners, learning to hunt for food, convert hides into clothing, and eat what the Northerners ate. On a different scale, and somewhat later, the author and her husband did much the same. Link Washburn is a well-known geologist. They went to the Canadian Arctic in the late 1930s for the geological fieldwork that led to his Ph.D. degree at Yale University.

This book represents the author's journal writings from July 1938 to February 1941, a period the couple spent in that part of the Northwest Passage from King William Island in the east to the Beaufort Sea in the west. Her intent is to document the events involved in her husband's field studies and their daily activities of living and working with the Natives, Hudson's Bay Company employees, missionaries, and pilots of the aircraft that transported them to and from their field sites.

The 12 chapters are grouped into time periods and areas traversed during those years. Numerous black-and-white photographs help to tell the story of the conditions, not only in summer, but also in some of the winters. Six maps show the routes traveled by a combination of Norseman aircraft, RCMP vessels, Inuit schooners, and dog sledges. Because there were no constructed airfields in this area at that time, aircraft travel was by floatplane when there was