

an incredible feat when he revised his original plans after the disappearance of the *Karluk*, trekked hundred of miles along the north coast of Alaska from Barrow to the Mackenzie River, and emerged with a schooner, new supplies, and all the manpower he needed to carry out his exploration programme—all within a few short months” (p. 114). And again: “The Canadian Arctic Expedition 1913–1918, in spite of its tragic losses of life and shocking over-expenditures, was the most successful northern accomplishment in the early years of the twentieth century... [Stefansson’s] Expedition was the vision of a remarkable Arctic explorer...” (p. 336).

Jenness cannot be faulted for his thorough and accurate use of archival sources, but he appears to be less familiar with the published literature. Thus, in discussing Stefansson’s citizenship (p. 16), he correctly reports that on 3 May 1913 Stefansson took the oath of allegiance to King George V, implying that he thereby became a naturalized Canadian citizen (although born in Canada, he had lost his Canadian citizenship when his father became a naturalized American while Stefansson was still a child). But as Cavell and Noakes (2009:239) have pointed out, Stefansson did not complete two other requirements for becoming a Canadian citizen; thus, since his swearing the oath of allegiance meant that he had lost his American citizenship, he had not officially become a Canadian, and in fact was stateless from 1913 until 1937.

On p. 75–76 Jenness reports that the Russian icebreaker *Vaygach* had been within 10 miles of Wrangel Island on 4 August, when her captain heard a radio report of the start of World War I and was ordered back south to Anadyr, which implies that the Russians left the *Karluk* survivors in the lurch. In fact, on 4 August *Vaygach* was at Cape Dezhnev, in the narrows of Bering Strait, while her sister ship *Taymyr* was visiting Nome specifically to get further details of the situation at Wrangel Island. On learning of the start of the war, *Taymyr* proceeded to Anadyr, where she contacted St. Petersburg; the two icebreakers were ordered “to proceed with our mission” (Starokadomskiy, 1976:188). Meanwhile *Vaygach* had been trying to reach Wrangel Island but had become solidly beset in Long Strait within sight of the island on 12 August. In the battle with the ice she lost one blade from her propeller and at one stage was immobilized by an ice tongue jammed in the propeller. After coaling from a collier at Kolyuchinskaya Guba, both icebreakers made several further attempts to reach Wrangel Island, but were defeated by the ice on each occasion.

On p. 44, Jenness reports the “loss of all hands” from G.W. De Long’s ship, USS *Jeannette*, after their ship was crushed by the ice north of the New Siberian Islands [Novosibirskie Ostrova] in 1881. In fact, of the 33 members of her crew, 21 of them reached the Siberian mainland, although only 12 ultimately survived (De Long, 1884).

But all these errors in Jenness’s text pertain to topics that are really peripheral to the main theme of the book, and they do not significantly detract from it. Jenness is to be congratulated on having produced the first complete

account of all the intricacies of the Canadian Arctic Expedition 1913–18.

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GRØNLANDS TEKNOLOGIHISTORIE [THE HISTORY OF TECHNOLOGY IN GREENLAND]. By HANS P. STEENFOS and JØRGEN TAAGHOLT. Copenhagen: Gyldendal, 2012. 631 p., maps, illustrations, index, bib., index. In Danish. Hardbound and e-book. Price DKK350; US\$62.00.

September 2012 saw the least sea ice ever recorded in the Arctic basin. Not only was the Northwest Passage open across the top of North America, but a Northeast Passage lay open across the top of Siberia as well. Earlier, satellite observations had shown that the entire surface of the inland ice in Greenland had unmistakable signs of thaw and that an ice floe twice the size of Manhattan had detached from Petermann Glacier in northwest Greenland. It is clear that the Arctic is warming rapidly. Although there are still many details to be filled in, all signs point to greater accessibility and more benign working conditions across much of the Arctic.

The History of Technology in Greenland provides a timely, nearly encyclopedic account of the development of Greenland’s technological infrastructure beginning in the 18th century, through World War II and ending in the first decade of the 21st century. During this time Greenland was transformed from a hunting society into a modern industrial society that differs little from that of mainland Europe.

The investment that made this transformation possible was largely provided by Denmark in the form of subsidies that supported the nascent Greenland government as it built the infrastructure that a modern society depends upon.

Greenland's population during development, fewer than 25 000 native-born inhabitants (a comfortable fit in most football stadiums), had almost nothing to export and were cut off from the outside for all but three or four months of the year. Denmark not only provided the seed money to give Greenland its jumpstart, but also, over several generations, sent a small army of engineers, construction workers, doctors, nurses, teachers, and administrators. About one Danish family in seven has had a member work in Greenland.

Greenland is now at the critical time when climate change and the results of this investment of money and work will enable the Greenlandic people to complete the development of Greenland and make productive use of the natural resources that retreat of the ice will make accessible. *The History of Technology in Greenland* amounts to a handbook of how to design and install things that will work under severe conditions out at the end of the supply chain. Anyone that does industrial-grade work in high latitudes can save time and money by learning about how it was done in Greenland.

The book begins with an overview of the environment of Greenland; how the Inuit coped with the challenges of building a successful culture based on hunting; how Norse settlers thrived for centuries in southern Greenland before their settlements were abandoned in the 14th and 15th centuries; and how traders and explorers interacted with the Inuit and gradually built up commercial ties with Europe. This introductory section ends with World War II and the sudden appearance of American weather stations, airbases, and a hospital. The local infrastructure at the time consisted of electric power in some of the larger settlements, radio communications between a few settlements and to Europe, a few small harbors with some commercial fishing activity, and a tiny mining and quarrying industry.

The second part of the book takes up the story after World War II. In his foreword, Jonathan Motzfeldt (1938–2010), Greenland's premier political figure in its formative years, describes how Greenlanders' experience ("but at a distance," as Motzfeldt dryly remarks, p. 17) of American technology inspired both Greenlanders and the Danish administration to open Greenland to development so that Greenlanders could benefit from technology to create healthier living conditions; to establish better forms of communication, such as radio, scheduled shipping and later, aviation; and to find new sources of employment, at first, mostly by export of fisheries products. Now, suddenly, the explorers and traders are gone and the engineers and builders arrive.

The authors, both Danish engineers with years of experience in Greenland, pick up the narrative of how this bare-bones economy was transformed into a modern one, piece by piece. The authors' own experience is backed up by contributions from more than a hundred expert co-authors (including native Greenlanders) who fill in the details on building construction, harbors and roads, aviation, energy, water supply and sewage disposal, telecommunications, public media, shipping and navigation, hunting and

fisheries, sheep raising, ship building, mining and minerals, public services, education, and library services, just to list some major topics. This section closes with three chapters on Greenland's relationship with the European Union and with other Arctic territories. In all, there are 34 chapters, each of which deals with a particular aspect of development.

In their foreword, the authors point out that in discussing technology in Greenland, it is helpful to differentiate between adapting existing technology and developing specialized Arctic technology. Technological solutions to the challenges of the Arctic are largely an adaptation of known technology to cold conditions, while the development that took place within the framework of Greenland's institutions normally began as specific, well-defined tasks. The political and administrative system was interested in results, functionality, and the lowest possible cost—marching orders familiar to all engineers.

The difficulty comes, though, in defining what the actual costs are and who pays them. As in every other developed country in the world, some of the costs of development were paid by people whose opinion was not consulted. There is no question that some aspects of a way of life that was in perfect equilibrium with its environment have been lost. The amount of detail that the reader finds in this history will make it clear, however, that the postwar development of Greenland was undertaken with exceptional attention to protecting the environment and to preserving those elements of an ancient culture that define the very nature of its people. It is also fair to ask whether the old society could survive the climatic changes that are already affecting Inuit settlements in coastal Alaska, for example.

This rich mine of information is well indexed and cites archival materials in both Greenland and Denmark. The text is presented in an easy, journalistic style and illustrated with hundreds of tables and color photos (many by the authors). The overall quality of editing, binding, and reproduction is excellent, well up to Gyldendal standards; this reviewer noticed a couple of typos and some inconsistency (not surprising) in Greenlandic place names.

This book is not merely for engineers and administrators; it is a valuable resource at a bargain price for anyone who is involved in hands-on work in the Arctic. Properly, the book deals only with Greenland, but lessons learned there can be applied in many challenging environments. The authors have managed to balance a broad view of society's concerns with hundreds of vivid vignettes about how to do hard work in tough surroundings. We hope that *Grønlands Teknologihistorie* will soon find its way into English.

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