

gives very good summaries of the subsistence strategies used by Inupiaq hunters for various types of animals ranging from a catalogue of birds to the elaborate social strategies used to retrieve a whale. All of these sections are engaging and informative, but one wonders if they are best represented as an 'economic process.' Fortunately, the same exacting descriptions of subsistence technique are allied later in the chapter to descriptions of ritual, distribution, and health. Indeed this 172-page chapter reads like a book in its own right.

One of the more unusual chapters is the last, entitled 'the integration process,' which brings together language, pedagogy, traditional games, and descriptions of ritual specialists to describe, in Levy's words, how 'individuals make a positive adjustment to their life situation.' This wide-ranging discussion of individual social intuition is an important counterweight to sociological functionalism. As it best represents Levy's critique of Parsonian sociology, here it provides the insight into Inupiaq society that brings economy and polity alive. Unfortunately, this chapter is quite short (50 pages). Much like classic ethnographies on 'mental culture,' the chapter provides a guide to various forms of ritual and entertainment that would otherwise not be immediately obvious from the objects held in museums. Ritual and taboo are described as the attempt by Inupiaqs to 'integrate' with uncertainty. Emotions and aesthetics are said to be as adaptations to a large amount of free time. Judging from the loving way that Burch himself describes skill and intuition in preceding chapters, one gets the impression he himself feels there might be more to these activities than mere entertainment, but for a definitive account we may have to wait for another volume.

The book ends abruptly with an epilogue that summarises the works of the main explorers and observers whose writings have been published in English. The intent of this short chapter is to help the reader evaluate the strengths and weaknesses of each set of observers. From this it is evident that the bulk of the author's data comes from the latter half of the nineteenth century (the time of the integration of Russian America into the United States). I am aware of a substantial published and unpublished literature available only in Russian on this region for the earlier part of this century, which might strengthen the overview of this region. From the text it is clear that the author's own fieldwork has provided an important guide to his interpretation of the sources, and a summary of that fieldwork would have been appropriate here.

The book is well produced by the University of Alaska Press, with rich illustrations, an accurate index, and many maps (although in my copy maps 7 and 8 seem to have been typeset poorly).

This volume, and the two that proceed it, are a reliable and encyclopaedic guide to the English language published and unpublished literature on the region. The ethnography is organised with a transparent and unobtrusive functionalist scheme that makes it easy to find

material once one realises the way that Burch stretches these traditional systemic categories. (David G. Anderson, Department of Anthropology, University of Aberdeen, Aberdeen AB24 3QY.)

References

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THE ANTARCTIC SUBGLACIAL LAKE VOSTOK: GLACIOLOGY, BIOLOGY AND PLANETOLOGY.

Igor A. Zotikov. 2006. Heidelberg and Chichester: Springer/Praxis Publishing. xviii + 139 p, illustrated, hard cover. ISBN 3-540-42649-3. £77.00; US\$129.00; €99.95. doi:10.1017/S0032247407007255

I first met Igor Zotikov in Cambridge, England, during a 1999 meeting on Antarctic sub-glacial lakes. After spending several afternoons with him in working group sessions, it was clear that he possessed a wealth of information on the history of exploration at Vostok Station that had never been documented. Being located at the Pole of Inaccessibility, having the lowest documented temperature on Earth (-89.2°C), and being the site of one of the deepest ice cores on our planet have made Vostok Station the centre of much lore. Beyond these features, Vostok Station was serendipitously located over the largest sub-glacial lake yet discovered. At more than 14,000 km² in surface area, 800 m in depth, and with a volume of near 5400 km³, it is among the largest lakes on Earth. Despite these superlatives, the lake has yet to be sampled directly, owing to the logistics involved with penetrating the nearly 4 km of glacial ice that overlies it. Since the seminal publication that formalised the presence of a giant lake beneath the station by Kapitsa and others (1996), numerous myths have been circulated about strange life within the lake. A simple search of 'Lake Vostok' on the internet reveals sites with such titles as 'Does Lake Vostok Harbor the Fourth Life,' 'Raiders of the Lost Lake,' 'The Lost City of Atlantis,' and 'The Inner Guide to Mortality.' As drillers and scientists from the Russian Antarctic Expedition continue their efforts to penetrate the lake, these myths continue to escalate, along with a global concern for environmental and scientific stewardship. As convener of an international group of experts that has focused on promoting sub-glacial lake science (<http://scarsale.tamu.edu/>), I have been contacted by numerous scientists concerned about possible contamination of Lake Vostok and regarding proposals to maintain it as one of the last pristine bastions on our planet. Clearly, it is important that the history of this fascinating area be put forth for others to appreciate the hardships and dedication required to work

in this environment and to highlight the engineering and scientific achievements that have been reached.

I found this book to contain a fascinating account of the early years of research at Vostok Station by the Russian Antarctic Expedition (formerly the Soviet Antarctica Expedition). Dr Zotikov tells his story in a colourful manner and highlights the main characters that have moved the drilling and science efforts ahead. Importantly, he describes results published in many hard-to-obtain Russian journals that are virtually inaccessible to all but those scientists versed in the language (I counted at least 20 references published in Russian). The aim of this book, as stated by the author is to 'collate material about Lake Vostok and to organize and synthesize it to establish its complete geographical picture.' This book fulfills this aim in a popular vein and keeps the reader interested by unfolding drama after drama, all of which makes it very readable.

The book is laid out in 11 chapters and covers topics such as glaciology, biology, and planetology. Each of these themes is cast in the context of the problems that had to be resolved to obtain the data and to make believers of other scientists. The first chapter presents a general overview of events leading to and surrounding the 20 June 1996 cover article in the journal *Nature* that described Lake Vostok as a 'Giant lake beneath the Antarctic ice.' The chapter describes the establishment of the Russian station in 1956, which was named Vostok – which means 'east' in Russian – after one of the ships of Fabian von Bellingshausen's Russian Antarctic Expedition in 1820. This chapter also elaborates on lore surrounding the lake and provides a background on its interest as an analogue of extraterrestrial sub-ice oceans on such worlds as Europa, an icy moon of Jupiter thought to harbor a sub-ice world of liquid water driven by tidal forces of Jupiter itself. Chapter 2 provides an interesting review of the Russian literature revolving around Vostok Station and describes prominent scientists such as Zubov, Robin, and Treshnikov, who played critical roles in ice thickness, radio-echo sounding of the ice sheet, and the selection of the location of Vostok Station. Chapters 3 to 6 provide a historical perspective leading up to the conclusion that a giant sub-glacial cavity containing a giant liquid water lake does exist beneath Vostok Station. In doing so, they highlight Kapitsa's role in interpreting seismograms taken from above the lake and the technology used by scientists to conclude that there is indeed a lake beneath the ice sheet.

Chapter 7 provides an excellent overview of the technology used through the years at Vostok Station to obtain deep cores for paleoclimate studies and the challenges encountered along the way. Of particular interest within this chapter is the description of the discovery of accretion ice (lake water frozen on the underside of the ice sheet). This discovery halted drilling at a depth of 3623 m, about 130 m above the actual surface of Lake Vostok, and unleashed a series of studies that led to the confirmation that a liquid water cavity did reside beneath the ice sheet. Importantly, these studies led to the first reports on the life

and associated ecosystem properties that may exist within the lake itself. Unfortunately, it is within the description of potential life in the lake that I encountered the first technical problems, reflecting the author's apparent lack of biological training. He refers to the work of Abizov (an eminent Russian microbiologist who was one of the first scientists to have insight into life in deep ice) as showing the dominance of 'grain-positive bacteria.' Clearly, this must refer to 'gram-positive bacteria,' a designation that represents a unique lineage of the Domain Bacteria. Also, Zotikov cites microbial cells numbers published by Abizov from different horizons of the Vostok ice core as ranging between $0.8 \times 10^{-3} \text{ cell m}^{-3}$ and $10.8 \times 10^{-3} \text{ cell m}^{-3}$ (which equates to $8 \times 10^{-10} \text{ cell cm}^{-3}$ to $1 \times 10^{-8} \text{ cell cm}^{-3}$, respectively). This differs significantly from the cell abundances reproduced in Figure 7.10, which shows cell numbers averaging about $2 \times 10^3 \text{ cell cm}^{-3}$. The last paragraph also provides misleading statements describing the use of genomic tools and referring to a phylotype of bacteria described in a previous publication as having thermophilic properties as a 'hemophilic' bacterium. Much of the biology contained within this chapter should be interpreted with caution.

Chapter 8 begins with the author providing a nice description of the geophysical methodology and data interpretation used to define the morphology of the lake basin and its potential salinity and related circulation patterns. Unfortunately, Zotikov again ventures into biology toward the end of this chapter and provides an inexact representation of the history leading up to our current understanding of life within Lake Vostok. He incorrectly infers that the Polymerase Chain Reaction (PCR) provides information of genetic potential, whereas it is really only a tool used to amplify DNA – it does not characterise it! He further refers to 'methophiles' as organisms with optimum growth rates near room temperature, whereas the correct terminology is 'mesophiles.' In general, all of the biological discussion lacks the historical development and accuracy of the geophysical discussion. Chapter 9 summarises new data on the lake derived primarily from workshops held in 1995 and 1999, along with a number of publications since that time. Given the 2006 publication date of this book, there are few citations referencing literature after 2000, a period when many new insights emerged regarding the origin and evolution of sub-glacial ecosystems. Chapter 9 provides a nice segue into Chapter 10, which summarises proposals for the international study of Lake Vostok. Unfortunately, as with Chapter 9, the description of the plans for international lake exploration stop with the report by Bell and Karl published in 1998; much has transpired since this report.

The final chapter (Chapter 11) focuses on the Russian 'concept' for penetrating Lake Vostok. The first few pages of this chapter provide a justification why the lake should be sampled and why the Russian programme is in a unique position to be the first to enter it. Within this context, I was a bit perplexed by the justification of using the present Vostok Station as a base for final drilling and exploration

of the lake. Part of this justification is: ‘... a rule of science states that if it is possible to conduct an “experiment” (in a philosophical understanding of the word), it should be done as soon as possible if there is a scientific demand for it.’ I, for one, am not familiar with such a rule and have a difficult time relating it to Lake Vostok, one of the last unexplored frontiers on our planet. Chapter 11 also provides the first text that describes the international politics behind the penetration of Lake Vostok. Statements such as ‘... regarding scientific studies of Lake Vostok and penetration of the lake, the earlier spirit of the Antarctic Treaty has disappeared’ are clearly the views of the author and do not appear to be reflected among the majority of the scientific community. The sub-glacial group of specialists convened by SCAR in 2000 has maintained deliberations within the spirit of the Antarctic Treaty and has attempted to promote sub-glacial lake exploration in international scientific terms, while still engendering the environmental stewardship inherent in all Antarctic ventures.

I believe that, except for the biological interpretation, Zotikov has done a nice job of presenting an overview of the history and future of Lake Vostok. The presentation of the Russian literature alone makes this book an important read for those interested in the exploration of Lake Vostok. However, given the price (originally listed at US\$129, but recently reduced to US\$85), it may be best to check it out of your local library. (John C. Priscu, Department of Land Resources and Environmental Sciences, Montana State University, Bozeman, MT 59717, USA.)

WHALING AND HISTORY II: NEW PERSPECTIVES. Jan Erik Ringstad (Editor). 2006. Sandefjord: Kommandør Chr. Christensens Hvalfangstmuseum (Publication 31). 192 p, illustrated, soft cover. ISBN 82-993797-7-6.

doi:10.1017/S0032247407007267

A quarter-century has passed since *The history of modern whaling* by Arne Odd Johnsen and Johan N. Tønnesen appeared in 1982 — a condensed version of their monumental four-volume *Den moderne hvalfangsts historie*, published between 1959 and 1970. Rightfully regarded as the standard reference work on the subject, it nevertheless had a leaning towards economic, technical, and legal aspects. And although the aim was to give a global overview, it was only natural that it was treated from a Norwegian viewpoint. Recent research has focused more on social, ecological, environmental, and ‘moral’ sides of the whaling industry.

In 2005, Kommandør Chr. Christensens Hvalfangstmuseum in Sandefjord, well-known internationally as the Norwegian Whaling Museum, hosted its Second Symposium on Whaling and History, calling for papers with primary focus on topics not or only superficially treated by Johnsen and Tønnesen. Eighteen speakers gave insight into their research results. While most papers were of Norwegian origin, the speakers hailed from seven

countries as far apart as Chile, Canada, the UK, and Germany. They presented a varied range of topics related to the whaling industry, of which 17 have been published in *Whaling and history II: new perspectives*, which appeared as number 31 in the series of publications from the Whaling Museum, edited by Curator Jan Erik Ringstad.

The symposium — and the book — concentrated on four main themes:

- People – The Whaling Man and his Family;
- The Economic Aspects of Whaling;
- The Environment – Ecology – Resource Management; and
- Opposition to Whaling.

Topics presented include comparative demographic studies of whaling families (Gunnar Thorvaldsen: ‘Whalers and their families in census data from the late nineteenth century’); the social and economic impact of land-based whaling stations on small coastal communities (Kjell-Ivar Berger: ‘The establishment of three whaling factories in Norway 1925–1971,’ and Steinshamn, Hestnes, and Skjelnan: ‘Their influence on the settlement, economy and family life’); blacklisting of whalers (Dag I Børresen: ‘The black book of 1913 — a means of disciplining whaling employees’); the interaction between whalers and polar explorers (Robert K. Headland: ‘Whalers and explorers; logistic assistance provided to people whose work, and indeed survival, depended on whalers,’ and Robert Burton: ‘Shackleton and the Norwegians’); and coastal and offshore whaling in Chile and Norway (Jorge Guzmán-Guitérrez: ‘Whales and whaling in Chile,’ and Berit Drejer: ‘Aukra Hval, Forsøksdrift and the Møre investigations’).

To me some of the most-engaging papers focused on ecological aspects: how the decimation of cetaceans by human whaling may have influenced the ecosystem — for example, the food chain, as exemplified by increasing number of avifauna — seagulls in the Arctic and penguins in the Antarctic — feeding on plankton and krill, and staple food for baleen whales (Louwrens Haquebord: ‘Two centuries of bowhead whaling around Spitsbergen: its impact on the Arctic avifauna,’ Dorete Bloch: ‘The Faroese whaling,’ Christina Lockyer: ‘Cetacean feeding, growth and energetics in the relation to the marine ecosystem: implications for management,’ and Arne Bjørge: ‘Are whales subject to management under the ecosystem approach?’).

While most topics deal with the twentieth century, one paper discusses how research into American nineteenth-century hunting for sperm, humpback, and grey whales can be helpful in the implications for management in the twenty-first century. By understanding the present status of populations of such species it may be easier to determine whether the current concerns about these species are well founded (Tim D. Smith and Randall R. Reeves: ‘Pre-20th century whaling: implications for management in the 21st century’).

Opposition to whaling and sealing is not a recent phenomenon, but the reasons behind resistance have