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In Search of Remote Health Care

Nelson Norman

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Nelson Norman will be well known to the older generation of British Antarctic personnel. He was the doctor at Halley in 1959 which he has described in his book “In search of a penguin’s egg” (Norman 2009) and later, as an academic surgeon, was a consultant in Aberdeen in the early 1970s when the North Sea oil bonanza started. He took an interest in the injuries and other problems associated with the North Sea oil rigs and diving and this led him to change the focus of his career from surgery to remote healthcare and environmental health and he spent a lot of time trying to form an institute to combine healthcare, teaching and research. After links with both the University of Aberdeen and Robert Gordon University, the current incarnation is the Institute for Remote Health Care. Links with the oil industry in Aberdeen led to work with the industry elsewhere, especially in the Gulf States and from there, to work with universities in the Gulf. Telemedicine is an essential component of remote healthcare and Aberdeen was a pioneer in this. The closeness of Aberdeen to the Cairngorms led to links with mountain rescue teams and research into hypothermia. The problems of providing medical care on North Sea oil rigs with having to manage casualties at a distance, difficulties in evacuation of casualties due to bad weather, severe risks of hypothermia and the medical problems associated with diving are not dissimilar to the problem of providing care in the Antarctic and almost inevitably this ex-British Antarctic Survey (BAS) doctor started providing medical training and assistance to BAS, initially on a relatively informal basis and, later, formally, with the formation of the BAS Medical Unit (BASMU) in 1986. This, too, involved the provision of medical care, teaching and research. He was awarded the Polar medal in 1998.

Biomedical research in the Antarctic is very varied and while much revolves around the problems that occur in that environment and how best to provide care at a distance, Antarctic bases with a small captive population are a perfect laboratory for research which is of wider relevance. For example Antarctic bases have been used as a model for long distance space. Understanding how bacteria spread from one individual to another is vital for the understanding of how infections spread in hospitals but it is almost impossible to study in a hospital because of the huge number of variables including the large but transient population of patients, staff and visitors: an Antarctic base may provide the ideal environment to study this.

The book is well written and is an interesting description of the development of the specialty of offshore medicine and remote healthcare, with some amusing anecdotes.

He describes the difficulties of dealing with university bureaucracy but this was nothing compared to the problem of getting agreement between universities, the NHS, oil companies and government!

Although interesting, the book is frustrating and, in many ways, disappointing. As a historical document, it suffers from a lack of dates. We are told of the closure of the Medical Research Council Division of Human Physiology and the creation of the National Hyperbaric Centre and many other events but, more often than not, we are not told when these occurred. As a self-published book, it is not surprising that its focus is the achievements of Professor J Nelson Norman in developing this new specialty rather than a history of the specialty, though (unlike many self-published books) he does give fulsome praise to his colleagues. However it is not an autobiography in that it starts in the early 1970s and we get no idea of his career before then or his activities outside work. There is an appendix listing his own publications and while a list of publications coming from his unit might be too lengthy, one longs for more detail of what his and his colleagues’ research found and achieved. As an example, he briefly mentions the links with Professors Pennington and Arendt who supervised (and one continues to supervise) the work of generations of BASMU doctors in microbiology and chronobiology respectively with no mention as to the outcomes of the research and whether it has been of practical benefit.

It is an easy read and, at £9.99, it is not going to break the bank. Those who know Prof. Norman or with connections to the remote health care organizations based in Aberdeen will want to read it and this will include those with connections to BASMU when it was based in Aberdeen. However those who want the history of remote healthcare or who want to understand what has been achieved by the researches will not find it here.

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Reference

NORMAN, N. 2009. *In search of a penguin’s egg*. Milton Keynes: AuthorHouse 138 pp.

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Antarctic Subglacial Aquatic Environments

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Antarctic subglacial lakes fulfil every sense of the word obscure. Dark, remote inaccessible, and, until the 1950s, unknown, they might go unstudied, if all these qualities did not make them so interesting to scientists. Their isolation

from the atmosphere and from other aquatic habitats makes them potential refuges for exotic microorganisms, their distribution gives information about subglacial hydrology and thermal conditions, and they may contain sedimentary records giving information about the ice sheet over multiple glacial cycles. This range of topics lures scientists from a broad range of disciplines to the study of subglacial lakes, from microbiologists, who study the biome of the lakes, to oceanographers who model the circulation of water within the lakes, while geophysicists provide radar and seismic data to characterize the lakes through the ice cover and glaciologists study the interaction of the lakes with the ice sheet. This research has also captured the attention of the popular press, which has covered recent attempts to drill into Lake Ellsworth, and regularly reports on progress in studies of Lake Vostok. The latest volume of the AGU Geophysical Monograph series presents a group of papers that give a snapshot of the current state of knowledge of Antarctic subglacial lakes, and on progress towards further exploration.

The volume contains 13 chapters, each formatted as a review paper. They are organized into three sections: the first, "History and Background" describes how lakes were first detected, describes their geographical distribution, and gives an overview of recent measurements and modelling of subglacial discharges of water. The second section, "Vostok Subglacial Lake and Recognition of Subglacial Aquatic Environments" covers a broad array of topics about subglacial lake conditions, including geomorphology, chemistry, and biology. The third section, "Future Exploration Missions" describes ongoing work to explore lakes around Antarctica, and the technical, environmental, and legal challenges this can pose.

The background section, making up about a fifth of the volume, will be of interest to most scientists pursuing subglacial lake studies. The inventory of subglacial lakes is constantly evolving as more radar data are collected and analysed, and the chapters give a snapshot of the current state of the inventory, as well as its implications for the ice sheet. The chapter on lake discharge expands on the observational record to discuss the mechanisms involved in lakes' ability to store water, and how water can travel into and out of lakes.

The second section covers a broader array of topics, but gives in-depth discussions of each. A review of Lake Vostok, the largest subglacial lake on earth, could as easily have been part of the introductory section, but provides a good introduction to the second chapter in this section, a discussion of subglacial microbial communities, many of which are known from Vostok ice. The microbial community chapter highlights how few samples have been recovered from Antarctic lakes, but describes the microbes found in Vostok ice and in sediments recovered from Whillans and Kamb ice streams, and explores the range of chemical conditions in different glacial environments where life might be found. The third chapter discusses sedimentary records that may be preserved in Antarctic subglacial lakes. As no sediment had been sampled from

a lake bottom at the time of writing, this chapter uses analogies with sub-aerial lakes and deglaciated subglacial lakes in speculating about the types of records that might be found. I found this chapter impressive, both for the detail it provided in its description of different kinds of lake environment, and in its candour in discussing the difficulty we may face in interpreting the records once they have been retrieved. In a similar vein, the fourth chapter describes the record of subglacial floods found in Wright Valley, which gives some of the most direct evidence about the kinds of flood processes discussed in the last paper of the first section. A final chapter describes the potential analogies between subglacial and extraterrestrial environment. Together, this section's chapters cover many of the topics that make subglacial lakes interesting to science, and should be a useful reference in drafting future plans for lake science.

The last section delves into the attention-grabbing topic of the exploration of subglacial lakes. The first chapter discusses efforts to protect the lakes from contamination and the legal framework that protects the lakes. This, in part, helps motivate the next four chapters about specific efforts to explore subglacial lakes, each of which faced significant difficulties in planning to collect data without contaminating the lakes. Three groups were slated to sample lake water in 2012-13, from Lake Vostok, Lake Whillans, and Lake Ellsworth, and all three groups authored chapters. Some of the technical details provided in this section will be of interest to a smaller number of readers, especially as two of the sampling programmes have not gone forward entirely as anticipated. However, the third and fourth chapters, on the Whillans lakes and Lake Ellsworth, both provide good descriptions of the geophysical setting of their lakes, and give a good picture of the logistic requirements that a lake-sampling investigation poses.

The volume as a whole is well edited, with attractive presentation of figures and tables. There is some overlap between material presented in different chapters, as multiple authors use the same lines of evidence. In particular, images of the landforms in Wright Valley appear twice, and maps of Lake Vostok are scattered throughout the volume. As the chapters are likely to be approached as self-contained units, this is not a serious problem. While the level of technical detail in most chapters may daunt the casual reader, the organization of the book by topic, and the detailed index, will allow a scientific audience to locate information of interest easily. This volume will probably be of most use to scientists with a specialized interest in subglacial lake systems who need a reference that gives an up-to-date snapshot of the field, to and to graduate students who need an introduction to the topic. I expect to use it as a benchmark for the state of the field in 2012; the quality and quantity of research presented here suggests that science in this area will develop rapidly in years to come.

B. SMITH