

Increased sea traffic during and after the war was the reason that Canada wanted better to comprehend its ice-patched northern seas. The Scott Polar Research Institute was asked to recommend someone for the work, and Charles was the man. He visited all possible meteorological and maritime bases, went to libraries and museums for background research, and he sailed in the Canadian ice-breaker *Labrador* for practical observations on the distribution and density of sea ice for his *Ice atlas of Arctic Canada*.

More exciting is his discussion of the exploration for year-round transport of oil from the BP wells drilled in Prudhoe Bay. He sailed in the 150,000-ton tanker *SS Manhattan*, 306 m long, with her special naval architecture to break sea ice and push it out of her way. This last was the main problem, in spite of a high ratio in horse power to beam. The conclusions are quite remarkable in suggested ship design, such as a very narrow beam at the waterline or a submarine tanker. It is even more remarkable to read that the power of the press and allied big business preferred to build the Alaska oil pipe-line. There was no Greenpeace at the time, and Swithinbank doesn't conjecture whether a spill would have been more readily dealt with over land than in ice-bound waters.

Complementary to that record-breaking voyage on the ocean surface followed an equally exciting experience in the submarine *HMS Dreadnought*, making its first voyage under the sea ice to come up at the North Pole. The deep ice keels below the surface pressure ridges were quite a new phenomenon.

Cartography has changed markedly through the last half century, with the recording and interpretation of satellite signals. Medium-scale maps drawn from these, when cloud cover hadn't intercepted, permitted Swithinbank to plot the tracks of icebergs and the breakup of some of the small ice shelves.

The Scott Polar Research Institute has always gathered the most able people in polar history, literature, and science, unassumingly gathering old records, producing new scientific equipment, and proving this in exciting field results. Swithinbank traces some of this, with names that many readers of *Polar Record* will recognise from reference lists of international scientific journals.

Field observations from members of the Falkland Islands Dependencies Survey were worked up at different universities according to subject. Gathering this work into purpose-built laboratories and an administration centre in Cambridge gave Swithinbank the opportunity to join the consolidating polar crew under its new banner: the British Antarctic Survey. Remote sensing, mainly from De Havilland twin-engined Otters, rapidly advanced vertical sounding of ice and in some locations the slope and composition under the ice. Half the book has Swithinbank in the air advising on the snow surface or as co-pilot ensuring good navigation, while some young scientist pored over an oscilloscope, occasionally enjoying the dramatic landscape. Swithinbank emphasises that any

figure, be it ice depth or the strength of the Earth's magnetic field, is of little value without precise position.

Swithinbank revelled in the rise of the Natural Environment Research Council funding that followed the Falklands War, during which he and Ray Adie were summoned to an interview by the Prime Minister. Their names had been passed on by Lord Shackleton. Swithinbank seized the opportunity to increase the range of subject and distance, as BAS scientists had requested. This went further in sharing many field resources with the American National Science Foundation and, although not to the same scale, the Chilean programme.

Swithinbank spent much of his working life in hands-on administration and field support of these polar, physical developments, first from SPRI, later from BAS, and then privately. Not many men are fit enough in retirement to team up with an expedition to find and test bare-ice runways for wheeled aircraft. Four-engined planes, grading up through the Douglas DC-4 and DC-6 and the Lockheed Hercules are now flying tourists, mountaineers, and private expeditions to the Antarctic continent. This heralds a different concept of the polar regions.

Shipping routes and material resources attracted the early explorers. Resources, not known or not quantified, are an attraction to some governments today, but the Antarctic Treaty has frozen that for the present, and, fortunately, science is dominant, with tourism a much-debated appendage. Swithinbank's autobiographical account hints at some of these changes and ends in applause of wonderful people he met and the progress they have wrought between them.

It is all an exciting story, considerably helped by seven outline maps with every place-name, and by an excellent set of photographs, an index, and chapter notes. (Hal Lister, 4 High Park House, Oxenholme, Kendal, Cumbria LA9 7RE.)

GLACIAL ANALYSIS: AN INTERACTIVE INTRODUCTION. Jane K. Hart and Kirk Martinez. 1997. London: Routledge. CD-ROM. ISBN 0-415-15971-7. £39.99.

Many UK university geography and Earth science departments teach glaciology at some level. Many such courses are predominantly lecture-based. Ideally, however, there should be a requirement to undertake field studies in order to understand fully the processes active in glacial environments. Unfortunately, most glaciological courses are unable to provide glacial fieldwork. It is imperative, therefore, that a means other than fieldwork be used in which undergraduates can gain a general understanding of glacial environments outside the lecture theatre and library. To this end, Jane Hart and Kirk Martinez have compiled an interactive CD-ROM on a variety of subjects relevant to field-based glaciology. Although the CD cannot claim to replace fieldwork it is a very good introduction to the subject, and a necessary and worthwhile experience for those undergraduates who are unable to undertake field classes.

The authors have utilised their skills in glacial geology and computer science to develop an excellent introduction to the analysis of glaciers and glacial environments. The amount of work required in the creation of this programme should not be underestimated. This is not only the first interactive educational CD-ROM in glaciology, it has extraordinary detail and depth. These facts indicate that a great deal of effort has been given to the creation of this package, a point that should be acknowledged by the university lecturers who will undoubtedly use it as a teaching tool.

The CD is compatible with modern PCs and Macintoshes and will run on machines usually mounted in university computer rooms. The visual display of the programme is arranged so that text appears on the right-hand column of the computer screen, a picture appears on the main central block, and a permanent menu (which guides the user around the package) is available at the base of the screen. Thus, the user is able to read about and synthesise the varied illustrative material that is introduced in the programme. One fault with the arrangement is that the dark blue colour of the menu and border mask the black lettering on the menu, which makes it difficult to identify the words. Thus, the navigation of the package is not as obvious as it should be.

Another problem is that the resolution of the images is often poor. In some circumstances, this hinders the interpretation of pictures. This problem is due to hardware constraints rather than any fault of the authors, and will probably be resolved through time as scanners and machines become capable of displaying high-resolution pictures. However, for this version, the images are often difficult to interpret unequivocally. This causes some problems when attempting to answer some of the questions set in the exercises at the end of the programme.

The CD-ROM begins by demonstrating how to navigate around the programme, introduces the themes of the package, and then goes on to the programme proper. The glaciological and academic contents of the CD-ROM are excellent. There is a great deal of information here, including pictures of glacial environments, diagrams of how to analyse and record data, several exercises to perform, a glossary that is available by clicking the mouse button over highlighted words, and a useful link to the Routledge on-line homepage via the internet.

The structure of the programme has been well thought out. The aims and objectives are stated clearly at the beginning, followed by information on how the CD-ROM package should be used. Glacial processes are then introduced in an appropriate order. The action of ice is first, since it represents the main process active in these environments, followed by glacial erosion and deposition (subaerial, glaciofluvial, and then glacialmarine). These sections set the background information for the remainder of the programme. A significant amount of time is spent on the teaching of interpreting and analysing glacial sediments. Techniques used in the analysis of these

sediments are well explained and illustrated.

The main element of the CD-ROM is the interpretation of subaerially exposed glacial sediments. However, no real time is spent on interpreting glacialmarine/lacustrine environments. This is a potential flaw with the package, since these environments are important. However, if the CD-ROM is meant as an introduction to glacial fieldwork, the marine setting is not as appropriate as the land-based analysis. Maybe in a future version, the glacialmarine environments could be examined in further detail.

One aspect that appears unusual is the lack of sound. One would imagine the reason for this is due to its use as a teaching package, where a dozen or so soundtracks would culminate in a dreadful din! However, the lack of a soundtrack made me slightly uncomfortable with the programme.

The package has several animated sequences of glacial environments. These displays are often awkward to visualise appropriately (that is, they are jerky, of poor resolution, and too small). One would assume that in future releases of this package, more of such animation will be included and that as computers become better equipped to handle multi-media, this problem will doubtless be resolved eventually. However, in this first version, the animation sequences are rather clumsy. One other point to mention is that the navigation of the programme sometimes 'freezes.' For example, when in the exercise section, there can be trouble moving onto the next questions. If this was user error, the instructions are not obvious. If not, then the programme has a few minor bugs that need ironing in due course.

In summary, this CD-ROM is a novel and unique introduction to glacial environments. It serves as an ideal start to undergraduate investigations of glacierised regions and as a prelude to field studies. (Martin J. Siegert, Centre for Glaciology, Institute of Geography and Earth Sciences, University of Wales, Aberystwyth SY23 3DB.)

TRIAL BY ICE: THE ANTARCTIC JOURNALS OF JOHN KING DAVIS. Louise Crossley (editor). 1997. Huntingdon and Norwich: Bluntisham Books and the Erskine Press. vii + 203 p, illustrated, hard cover. ISBN 1-85297-047-2. £29.95; \$US55.00.

John King Davis was the captain of the vessels engaged in many of the great expeditions of the 'Heroic age' of Antarctic exploration. His career in the south spanned the period from 1907 to 1930, and, during that time, he established a reputation as probably the most capable of all Antarctic masters. His first appointment in the area was as first mate of *Nimrod* on Ernest Shackleton's British Antarctic Expedition of 1907–1909. He eventually became captain of *Nimrod*, and this was followed by the captaincy of *Aurora* on Douglas Mawson's Australasian Antarctic Expedition of 1911–1914. He commanded the Ross Sea Relief Expedition of 1916–1917, and it is worth noting that in this case he was not simply the master of the ship. His final appointment was on board *Discovery* on the BANZARE expedition of 1929–1930.