On the rocks

J. Oerlemans

The Growth and Decay of Ice. By G. S. H. Lock. Cambridge University Press: 1990. Pp.434. £65, \$100.

Writing a treatise on the appearance of ice on Earth on all possible space scales, from the molecular to continent-sized ice sheets, is truly ambitious. From a general scientific point of view, I can appreciate the charm of placing our knowledge of ice in a single framework, naturally built around the basic physical principles involved.

When reading *The Growth and Decay of Ice*, my initial enthusiasm turned into doubt. In which sense, for instance, can freezing in an ice-resistant insect be related to the effect of solar insolation variations on ice sheets? This book actually shows that parallels in conceptual development of methodology between the study of ice on the molecular/microscale and the study of its role in the large-scale geophysical environment are hard to find. Frozen water is the binding element, but that is all.

After a general introduction, two chapters are devoted to a thorough treatment of the thermodynamics of ice. This treatment is formal and rigorous, and of considerable didactic quality. Then chapters follow on 'ice and water', 'ice and air', 'ice and Earth', 'ice and life' and, finally, 'decay of ice'. It is not surprising that these topics fill over 400 pages. With respect to 'ice and water', an interesting discussion is provided on the effect of convection (free and forced) on planar growth, and a short but instructive view is given on freezing on submerged bodies. In 'ice and air' the discussion centres around the formation of cloud droplets and ice crystals, riming and icing on off-shore and land-based structures. Surface energy exchange is the starting point in the chapter on 'ice and Earth', followed by sections on the pores system, with reference to the surface morphology of glaciers, and on permafrost. In 'ice and life', topics of study are freezing in biofluids, small organisms, plants, animals and, partly as an interesting application, foods. The final chapter on the 'decay of ice' is surprisingly short.

Throughout the book, the treatment loses considerable depth when larger-scale features are considered in the global context. Many statements on glaciations, ice ages, climate sensitivity, large-scale snow cover

and sea ice are superficial and based on old material (for instance, a single sentence stating that S. H. Schneider and T. Gal-Chen have calculated (in 1973) that a two per cent drop in the solar constant would lead to a global temperature below 0 °C, without further discussion). For a text of this type, the number of listed papers from the past decade is remarkably small. This cursory treatment is not justified; in the past 10–20 years, a tremendous amount of work has been done on such topics. Furthermore, the possibilities offered by satellites and powerful computers are hardly mentioned.

In making a personal judgement, it appears natural to split the material in this book into two parts. The first is on the

Sunset on ice — the Lemaire Channel in the Antarctic (taken from *Wild Ice*, by R. Naveen, C. Monteath, T. De Roy and M. Jones (Smithsonian Institution, 1990, \$29.95)).

thermodynamics of ice, nucleation, growing of crystals under various conditions, that is, the microscale aspects. The treatment of these subjects is of high quality and studying it can be advised to anyone involved in ice-related projects. The second part then deals with the macroscale aspects, a bit scattered through the book (mainly chapter 1 and parts of chapters 6 and 8). This material provides a superficial introduction to the role of ice in regional and global systems, which is not up to date. □

J. Oerlemans is at the University of Utrecht, Institute of Meteorology and Oceanography, Princetonplein 5, 3584 CC, Utrecht, The Netherlands.

Charting a revolution

Kevin Struhl

DNA Science: A First Course in Recombinant DNA Technology. By David Micklos and Greg Freyer. Cold Spring Harbor Laboratory Press: 1990. Pp.477. \$29.95.

In the early days of the recombinant-DNA revolution, it was frequently remarked that experiments were so easy that they could be performed by high-school students. It is now nearly 20 years later, and despite extensive publicity and controversy, there are few high schoolers who are familiar with the theory or practice of recombinant-DNA technology. Even at the college level, courses in this subject are generally restricted to the small minority of upper-level undergraduates in biology. Given that both recent and future advances in biology will undoubtedly have profound effects on society, the current level of ignorance is deplorable.

Although such ignorance has many causes, one problem is the lack of suitable books that convey the excitement, power, knowledge and actual techniques of recombinant-DNA technology. There are, of course, several molecular-biology cookbooks that are designed to instruct 'non-experts' in the art of performing the vast array of available experimental techniques. But these collections of current protocols are intended for laboratory researchers, not high-school or college students. Thus, there is a crucial need for a book that introduces true novices to basic experimental concepts and techniques, although maintaining high scientific standards and relevance.

This niche is now admirably filled by *DNA Science: A First Course in Recombinant DNA Technology*, by David A. Micklos and Greg A. Freyer. The combined skills and experience of the authors, one a science educator and the other a practising molecular biologist, have resulted in a unique book. It has elements of a textbook, laboratory manual, historical novel and popular magazine article, yet is remarkably cohesive. In particular, there are numerous connections between the scientific concepts advanced in the first half of the book and the laboratory experiments that constitute the second half.

The text is written in a journalistic style that can be read from cover to cover (but not in one sitting). The two initial chapters cover some basic themes of molecular biology by tracing the history of DNA science from Linnaean classification of species through the cracking of the genetic code. By emphasizing what the important questions were and how they were experimentally solved, the science is lucidly explained while conveying the excitement of discovery. The pivotal third