as activity increases and aircraft reports (hitherto a rarity here) start to displace the others, as they have in the Arctic. Before many years, it is possible that the greater part of sea ice observation will be by satellite, and the volume of data will further greatly increase. None of this, of course, lessens the value of the information about the past presented here—quite the contrary. For the rest of the Southern Ocean, we rely still on the U.S. Navy Hydrographic Office's atlas (1957) (reviewed in *Journal of Glaciology*, Vol. 3, No. 27, 1960, p. 659–60)—an excellent compilation, but with the disadvantages inherent in an isopleth method of presentation. As more observations are recorded, the sector diagram method could be extended to cover other parts of the Southern Ocean.

The reader will by now be aware that critical comment on Heap's method is not to be expected from this reviewer, who must admit to having played some part in its formulation, and who will therefore not go beyond saying that he can think of no better method, and is delighted to see how effectively it has been applied to this area. The detailed working out, which includes introduction of a number of improvements and necessary modifications, has been carried out with extraordinary application, accuracy and patience, and it may surprise some to know that it is entirely the work of one man, unaided by any team of assistants. The Admiralty Hydrographic Department have made an excellent job of the printing. Criticism of their contribution may be restricted to two small points: absence of any pagination can be irritating, and binding in limp covers makes a work of this bulk (certainly the weightiest work on sea ice) difficult to handle. The price, which is fixed by the Stationery Office rather than the Admiralty, is excessively high; not that the work is not worth it, but it may deter many, and not only individuals, from finding out how good the work is.

TERENCE ARMSTRONG

REFERENCES

Swithinbank, C. W. M. 1960. *Ice atlas of Arctic Canada.* Ottawa, Defence Research Board.

U.S. Navy. Hydrographic Office. 1957. *Oceanographic atlas of the polar seas. Part 1. Antarctic.* Washington, D.C., Hydrographic Office. (H.O. Pub. No. 705.)

Spitsbergen: southern Ny Friesland. 1:125,000. [London], Royal Geographical Society, 1962. 10*s.* 6*d.*

THIS map has been compiled following surveys during a series of Cambridge Spitsbergen Expeditions between the years 1949 and 1958 under the direction of W. B. Harland and D. Masson-Smith. It is the first medium-scale map of much of the heart of Vestspitsbergen, incorporating in part details from a number of earlier charts and maps. The visual impression of the map is very pleasing. While clearly portraying the major features of the topography it also includes a wealth of detail; nunataks, ice margins, moraines, alluvial flats, mud-flats and huts are easily identifiable. Trigonometrical stations and the relative reliability of mapped features are indicated. Included on the map margin are a location map, triangulation diagram and a list of 181 new place-names used on the map. A minor criticism concerns the key, from which one or two symbols seem to have been omitted.

A paper by Harland and Masson-Smith (1962) describes in detail how the map was surveyed in the field and later compiled in Cambridge. It is fully documented and includes lists of previously published maps which overlap the area.

BRIAN JOHN AND DAVID SUGDEN

REFERENCE

Harland, W. B., *and* Masson-Smith, D. 1962. Cambridge survey of central Vestspitsbergen. *Geographical Journal*, Vol. 128, Pt. 1, p. 58–70.

W. A. BENTLEY *and* W. J. HUMPHREYS. *Snow crystals.* New York, Dover Publications, Inc.; London, Constable and Co., 1962. 266 p., illus. $2.95, 24*s.*

THE exquisite beauty of snow crystals, seen in the classical elegance of the simple geometrical

shapes and the delicate tracery of the more intricate forms, has long been recognized and recorded by the scientist, the artist, and the industrial designer. The modes of formation and growth of the snow crystal have exercised some of the greatest scientific minds. I have been studying Kepler's absorbing essay on "The six-cornered snowflake" which has just been translated into English for the first time. Writing this in 1611, as a Christmas present for his Patron, Kepler puts forward six alternative theories to explain the hexagonal symmetry of the snow crystal, only to reject them all and leave the problem to future generations. It is still with us! For, although much has been learned in recent years about the factors that control the shape and development of the snow crystal, some important details still elude us. But if, at times, we feel a little discouraged, we have only to look at some of the many beautiful photographs of our subject to receive inspiration and encouragement. The most outstanding collection of micro-photographs from the artistic point of view, is undoubtedly that built up over 50 years by W. A. Bentley. Taken in Vermont, in the early days of photography, out of doors, in sub-freezing temperatures, these pictures have never been surpassed. In 1931, the American Meteorological Society had the happy idea of gathering together a permanent collection of Bentley's work. Accompanied by a brief text, written by W. J. Humphreys, they were published by McGraw-Hill in one of the most handsome of scientific books ever printed. It contained more than 2,000 beautiful pictures of snow crystals, no two being exactly alike.

In recent years, this classic work has become virtually unobtainable, and it is therefore with great pleasure that I welcome this excellent reprint by the Dover Press. It is an exact, unabridged copy of the original, printed on high-quality paper in a glossy paper cover at a remarkably low price. The publishers deserve much credit for making this beautiful book available to a wide audience.

B. J. MASON

W. D. KINGERY, *ed. Ice and snow; properties, processes, and applications: proceedings of a conference held at the Massachusetts Institute of Technology, February 12–16, 1962.* Cambridge, Mass., The M.I.T. Press, 1963. xv, 684 p., illus. $16.

A GLANCE at the spine of the dust-cover or the binding of this book suggests that it is a work on snow and ice written by W. D. Kingery. This is not the case; he is the editor of a collection of 46 papers by workers of international repute, presented by invitation to a conference originally entitled "Engineering Glaciology" and sponsored jointly by the U.S. Air Force Cambridge Research Laboratories and the U.S. Naval Civil Engineering Laboratory.

The papers are grouped under six main headings: ice properties, glacier flow, solidification phenomena and sea ice, bearing capacity of sea ice, snow properties, and ablation. Within each heading there are papers of high quality on a wide variety of topics—even wider than the headings suggest. Many of the papers have a strong engineering or utilitarian flavour (for example there is one on the construction of sea ice platforms and another on ice reinforcement), but there are also several on basic physics, such as the Eshelby-Schoeck viscous dislocation damping mechanism applied to the steady-state creep of ice, and studies of ice etching and dislocation etch pits. As a whole the volume is probably outstanding for the number of contributions on sea ice. Details of some of the papers are given in "Glaciological literature" in this *Journal* (Vol. 5, No. 37, 1964).

The book is produced by a photo-litho process; the general layout, which is consistent and clear, and the good quality of the diagrams and photographs, are a credit to the editor and the publisher, but at some cost to the purchaser. It will annoy some authors to find, and many busy readers to learn, that the abstracts have been deleted from the texts. None of the conference discussions are included.

The book will find a useful place in the library of any snow and ice specialist, or of anyone concerned with engineering operations in that field.

W. H. WARD