

Hutchinson, R. W., Spence, C. D., and Frankin, J. M., eds. *Precambrian Sulphide Deposits* (H. S. Robinson Memorial Volume). Waterloo, Ontario (Geol. Assoc. of Canada; Special Paper 25), 1982. viii + 791 pp., 232 figs., 152 pls., 1 map. Price (non-members \$57 (+ \$2.50 postage and handling).

This special volume contains twenty-three papers covering a wide variety of Precambrian sulphide deposits.

Four pages outline the regional geological and metallogenic framework of various portions of the Precambrian shield of North America, and these are followed by eighteen papers covering case histories of individual sulphide deposits. Each of these papers has been abstracted [MA 83M/4256, 4269-73 and 4305-21].

In the concluding review paper, Dr Hutchinson reviews the contributions of the other papers. The understanding of the genesis of Precambrian sulphide deposits has changed markedly during the past twenty years. The timing of the metalliferous hydrothermal fluids is now generally believed to have been syn-depositional (or only slightly post-depositional) rather than epigenetic. Sulphide emplacement was by chemical precipitation on the sea-floor, diagenetic reaction within already deposited sediment, or sub-sea-floor infilling of pores, rather than by large-scale replacement of rock. Hydrothermal fluids were generated mainly by deep convective circulation of marine or meteoric waters rather than by magmatic differentiation.

This authoritative and up-to-date account of many recently discovered deposits expresses their wide range in both type of environment and through time, from the earliest Archaean to latest Proterozoic. It forms a welcome addition to our knowledge of these important sulphides deposits and should find a place in all libraries dealing with economic geology.

R. A. HOWIE

Steadman, R. *Crystallography*. New York and London (Van Nostrand Reinhold), 1982, viii + 120 pp., 125 figs. Price (paperback) £3.95.

This excellent little book will be welcomed by any student of solid-state science who is meeting this, often battling, subject for the first time. The author states that his aim is 'to convince students that crystallography is based on a few simple ideas which are very easily understood'. This he does with commendable clarity. The style is informed and reassuring; the illustrations are simple and clear. There are numerous worked examples and exercises. I found commendably few errors (typographical or otherwise), though, unfortunately, one

I did spot was the answer to a problem (on p. 7 the first lattice said to be centred rectangular is actually oblique).

Dr Steadman begins each section by summarizing what is to follow and, after each topic has been covered, the important concepts are reiterated. It is the simple formula that new lecturers are encouraged to use: tell them what you are going to say, say it, then say it again. But how often is it used in a book (or lecture for that matter)?

Section 1 introduces the concept of the lattice and its relation to crystal structure by means of many excellent two-dimensional examples. The three-dimensional lattices and the seven crystal systems are discussed from the point of view of the shape of the unit cell, but without using examples of simple structures at this stage.

Sections 2 and 3 cover planes, directions, and their nomenclature. Miller indices are defined as the number of intercepts the family of planes makes of each axis. However, the author does not point out that if, for instance, $h = 3$ then the first plane from the origin cuts the x axis at $a/3$. This information would, I think, help the student to draw the three-dimensional planes on p. 35.

Section 4 is entitled 'Atomic co-ordinates'. Some simple structures, e.g. Cu, Mg, CsCl, ZnS, NiAs, are described, and their lattice types are deduced. The description of atomic positions by co-ordinates is explained together with their representation as two-dimensional projections.

Section 5 very clearly explains X-ray powder diffraction and the powder camera, though, curiously, Dr Steadman assumes that students have already met the Bragg Law and it is not derived. Fourteen powder patterns are illustrated, either as examples or exercises.

Section 6 is a lucid exposition of the reciprocal lattice and its relationships to the Bragg Law. Electron diffraction is covered in Section 7; thirteen actual patterns are illustrated. The student is shown how to index them if λL is known and the measurement of λL itself is described. Finally, the relationship between the diffraction pattern and the image in the microscope is explained, though diffraction contrast in the electron microscope is not covered.

The content of this book is so laudable that I am a little reluctant to criticize it. However, the print of the text could have been larger and clearer and, if the paper (in the paperback edition) were thicker one would not have to look at three diagrams at once! As a mineralogist I was surprised to learn that 'it is highly unlikely that you will ever meet [examples of forms in other systems than cubic]' (p. 38). For the student of mineralogy inclusion of the stereographic projection, symmetry, and point