relationship with its present envelope, need bear little relation to position in the crust. Here in this memoir we have a synthesis of the now abundant factual record of the unusually well exposed Donegal granites and their envelopes—with one exception: surprisingly little is said about the geochemistry of the rocks (one table of major oxide averages for the plutons) and there is little attempt to link or relate results with those of modern experimental work other than that dealing with anatexis. Mineralogical details are also somewhat thin. But such criticism is perhaps ungracious. The authors have aimed to cover mainly such topics as varying modes of emplacement, internal structures in plutons, and the relationships between granitic plutons and the structures and metamorphism of the country rocks and in this they have succeeded brilliantly.

The book is beautifully produced and well illustrated, but with British geologists as a major market (despite its having been translated, in places, into American) it is highly priced and presumably aimed at libraries—for whom it is essential.

R. A. HOWIE

McCALL (G. J. C.). *Meteorites and their Origins*. Newton Abbot (David and Charles), 1973. 352 pp., 80 figs. Price £4·95.

The author has set himself the well-nigh impossible task of condensing meteoritics into 'a single readable volume . . . suitable for use as a general text for amateur scientists, university students, and professional scientists'. On the credit side, he has compressed a great deal of information into an inexpensive volume and appended a useful selection of references, but both the amateur and the professional will find much lacking.

As the author remarks, 'meteoritics . . . is bedevilled with strange names', many of which can hardly be avoided; the author carefully explains some (e.g. isomorphous series, on p. 87), but the amateur will find many descend on him out of the blue (e.g. 'twinning on the trapezohedron face', p. 98)—a glossary would have been a better solution of the problem. The professional scientist, on the other hand, will find the select bibliography a poor substitute for detailed references when he seeks for further information on any point; and the selection of references for inclusion is peculiar—for example, two short accounts of the Barwell fall are included, but the definitive paper by Jobbins *et al.* (*Min. Mag.* **35** 881) is not. And in the absence of a date of finalization of the text (there are only a few 1971 references) it is uncertain where updating should start (the discussion of Ga-Ge grouping of irons is already seriously outdated).

The segregation of metamorphism into Ch. 16 and of the chemistry of meteorites into Ch. 12 has resulted in a very inadequate discussion of the common chrondrites (pp. 129–32). The Fa_{21} boundary between bronzite and hypersthene chondrites is shown in fig. 16, but omitted from the text, as is the sharp distinction in total iron content (mentioned later, p. 157). Incidentally, the author uses Poldervaart's redefinition of bronzite and hypersthene, rejected with good reason by most meteoriticists, and the whole discussion of meteoritic pyroxenes is seriously incomplete.

Despite the title, only 11 pages are devoted to the origin of meteorites (Ch. 19), and only the author's modification of Mason's theory is discussed. His obvious preference for a single parent body leads to a good deal of special pleading, here and elsewhere.

Meteorite craters (Ch. 20) receive 22 pages. While a meteoritic origin has been suggested for many geographical features on very slender evidence, the author goes to the other extreme: Wolf Creek and Cañon Diablo are 'the only two well-established examples of mega-impacts besides the Henbury craters' (p. 267), though elsewhere the meteoritic origin of the Wabar craters is admitted; the nickel–iron spherules so plentiful at Cañon Diablo and in the Wabar glass are not mentioned. All other explosion-type craters are regarded as 'crypto-volcanic'.

Two chapters (39 pp.) are devoted to tektites—their distribution and properties and the various theories of their origin; but space could have been saved by leaving out the impossible theories and keeping only the improbable ones.

Despite its obvious failings this book should be useful as a second text for the university student, calling attention to the too-facile erection of theories on very slight evidence that is all too common in this field. M. H. H.

McConnell (D.). *Apatite: its crystal chemistry, mineralogy, utilization, and geologic and biologic occurrences.* Applied Mineralogy, Volume 5. Vienna and New York (Springer-Verlag), 1973. xvi+111 pp., 17 figs. Price S324 (DM 47; $14.90).

This slim volume brings together in consolidated form a critical summary of the many hundreds of articles that have appeared on apatite during the past thirty years. Many modern technological developments depend on phosphorus-containing compounds for which the basic raw material, phosphate rock or phosphorite, is a sedimentary rock of which the essential mineral component is normally a carbonate fluorapatite. Igneous and metamorphic rocks also may contain concentrations of apatite and one of the more important aspects of a theoretical knowledge of apatite is concerned with its relationship to teeth and bones. The structure, crystal chemistry, and mineralogy of apatite are described authoritatively and discussed in their relation to geological occurrence and use in industry. The author maintains a critical sceptism throughout: thus in discussing the carbonate apatites the $3PO_4 \rightarrow 4CO_3$ substitution is preferred but under the heading 'questionable interpretations', after mention of the possible substitution of CO_3 for 2F, we are told that numerous papers on carbonate apatites are not cited as the conclusions contained therein are incompatible with accepted crystallochemical theory, the experiments were not performed by appropriate methods, and/or alternative interpretations of the data have been completely disregarded without satisfactory explanation. It is pointed out that the inorganic phase of bone should not be called hydroxyapatite; it is a dahllite (if a mineral name is appropriate for something of organic origin) or carbonate hydroxyapatite (*carHap*) if one is attempting to designate both the composition and the structure.

In the final chapter, 'Critique', the author is challengingly outspoken. Although X-ray diffraction techniques have their uses, when the structures being studied show