

BOOK REVIEWS

Concepts of Order

Classical Scientific Papers: Chemistry. Second Series: Papers on the Nature and Arrangement of the Chemical Elements. Arranged and introduced by David M. Knight. Pp. xiii+441. (Mills and Boon: London; American Elsevier: New York, November 1970.) 100s; \$15.

THE *Classical Scientific Papers: Chemistry*—which I reviewed in 1968 (*Nature*, **218**, 605)—was not described as the first of a series, but, as I said then, it could not be left on its own. Dr Knight obviously knew how to pick papers of individual merit, how to put them together and how to present their significance and relation in a few stylish, sensible words of his own. He has done equally well in this second series, devoted to papers on the nature and arrangement of the chemical elements. The volume is intended primarily for English language readers, with only one short entry in French (Berthelot) and one in German (the abstract of Mendeléeff's first paper).

There are five sections, each chronological, but overlapping in period. The first, "The Rise and Fall of Prout's Hypothesis", establishes Knight's theme: that the search for an underlying unity in matter lay constantly at the back of all nineteenth century fundamental studies of matter from Prout himself to J. J. Thomson. Dr Knight argues that, as it stood in the early nineteenth century, the corpuscularian hypothesis was not susceptible to any direct quantitative test; the position was altered by Prout, when he adopted the Daltonian concept of atomic weights, put forward his concept of integral weights, and so laid the way open to the establishment of a prime matter of unit atomic weight. (The failure of this hypothesis in the face of analytical results which never threw up the kind of integral values Prout hoped for is not well illustrated in the texts because it was chiefly the detailed work of continental chemists, but this part of a long story cannot be told in a few striking papers.) The second section concerns an aspect of nineteenth century scientific thought which is little known but ought to appear very striking at the present time: theories of a fourth state of matter. It would be interesting to see what a philosopher of scientific ideas made of the apparent persistence of the ideas of

Faraday and Crookes in modern matter theory. The recent celebrations of the centenary of Mendeléeff's 1869 paper have emphasized the classification eventually reached, but the path to this peak has running alongside it constant reflexions on the composition of elements. There was an interesting interplay of ideas. Davy saw that as the ammonium radical behaved like an alkali metal, the alkali metals might themselves be compound. Later on, the phenomenon of organic isomerism suggested that a parallel phenomenon might exist in the elements: that although differing in properties, like isomers they were all compounds of some more elementary constituents. The development of the Periodic classification of the elements, achieved by modest men of modest pretensions, must surely rank as one of the great illuminations of the mind. Mendeléeff deserves his reputation. Dr Knight reprints a long serialized paper of 1879–80 which demonstrates all his grip and all his fluency. No wonder he was so welcome a visitor to England. The fifth group is headed "The Revival of Prout's Hypothesis". Is this really what Dr Knight means? None of the papers from Gladstone's of 1883 onwards really urges a naive Proutian theory, although the contribution of chemists to the eventual new theory of the atom is clear.

Most of the papers are theoretical or critical, but some are worth reading for their lessons in the interaction of one science with another and the interplay of theory and practice. Follow through, for example, Norman Lockyer's marvellous development of a line of enquiry into the origin of spectral lines, their meaning for a theory of atomic constitution, and the experimental programme demanded by unanswered questions. Crookes's patient fractionations of rare earths and his theory of "meta-elements" seem less marvellous because they ran into the sand, but none the less they are worth looking at because they were at least original in conception and expression.

The historian of science will value this collection for the stimulus it will give his own work. This sort of reprint, however, ought also to be read by research scientists, particularly young ones, as a corrective to the reading of modern scientific publications, with their soul-less

manner of presentation, which falsify the real scientific enquiry which lies behind them. These papers really say what people did and how they felt about it. They had not been subjected to dead-pan standardization either by institutional or publishing society editors; and they read like the work of live men, not of scientific battery hens. Perhaps *Nature* will hive off yet another section, in which authors will be able to write as they worked: worries, doubts, passions, rivalries and all getting across to the reader. In a hundred years' time papers like that would still be worth reprinting and reading for pleasure.

FRANK GREENAWAY

Stability and Change

Freedom in a Rocking Boat: Changing Values in an Unstable Society. By Geoffrey Vickers. Pp. 215. (Allen Lane, The Penguin Press: London, October 1970.) 50s.

THIS is the fourth of a series of books in which Sir Geoffrey Vickers is seeking to call on us to change our values and our priorities. This one concentrates on the need to reappraise the liberal-individualistic values of the western world in the face of the threat posed by the world's population explosion and by the consequences of technological change.

The discussion is conducted at several different levels, the economic, the political, the biological, even the religious, but the most powerful argument that Sir Geoffrey can present to his readers, and apparently the issue which weighed most heavily in his own mind, is the discovery of the ecological threat to the survival of humanity as a whole. Air and water pollution, the destruction of the ionosphere, the using up of oxygen faster than the plants can replace it—we do not know where the most fatal blow may fall, but sooner or later the anarchy of individual or national selfishness will bring about some great disaster unless humanity devises appropriate control mechanisms. Basically, the problem is not really as new as all that. Old-fashioned economists knew about "external diseconomies"—creating costs for others, for all in fact, that were not borne or considered by the firm making them. Old-fashioned socialism knew