

d-orbitals of the polyvalent atom. Bonds of partially ionic character are represented as resonance between electron assignments corresponding to electrostatic and co-valent (2-electron) bonds. Metallic bonds are described in terms of resonance between alternative positions for one- and two-electron bonds. Finally, the specially important case of "resonance of molecules among several valence bond structures" (or mesomerism) is described and extensively illustrated.

No mathematics is introduced, conclusions which can be justified or made plausible only by arguments more or less mathematical in nature being stated without proof. The method of treatment is an excellent one for enabling much ground to be covered in a short space, and is a procedure that is wholly justified for the author, who (with E. B. Wilson) has already produced a first-class text of chemical quantum mechanics; but the reviewer hopes that a study of the more cursory treatment in the present text will not be regarded as an adequate alternative to an acquaintance with the elementary ideas of quantum mechanics as a foundation for the theory of the atom and of valency. More might have been written, for

example, of the subjective nature of resonance, as shown by the general character of the variation theorem, or, more remotely, by the subjective aspect of much of quantal philosophy. The difficulties illustrated would be cured if readers of the book could be persuaded to read Prof. Pauling's other book, and his original papers, especially those which form the basis of the present work and were published under an identical title.

On the experimental side, one of the most valuable features of this work is the large extent to which it co-ordinates the mass of information, that has in recent years accrued from the various physical methods of investigating molecular structure. The tables of ionic radii, bond lengths, valency angles, bond energies, etc., alone would be important, but they are made much more so by the synthetic and suggestive manner in which they are presented and discussed. Alike in this field and in the theory, the book is in large measure a record of Prof. Pauling's personal contributions, and it will be assured of as permanent a place as its three predecessors in the contemporary history of chemical science.

C. K. INGOLD.

THE STUDY OF HANDWRITING

Analysis of Handwriting

An Introduction into Scientific Graphology. By H. J. Jacoby. Pp. 286+27 plates. (London: George Allen and Unwin, Ltd., 1939.) 10s. 6d. net.

HANDWRITING is obviously a form of individual expression by hand gesture; no two children who have been taught to write from the same copy and even by the same teacher will ultimately develop identical handwritings. The differences in handwriting must, therefore, be due to personal characteristics—manual, æsthetic, emotional or intellectual—of the writers themselves.

The author makes no attempt to investigate the pictographic origin of writing, or to link it to other forms of expression by gesture, or with precision (or the reverse) in articulation—with which, in particular, handwriting might be expected to be associated. He claims that handwriting is significant of the writer's "general manner of working". But this, though possibly true as to craftsmanship, might not be true of other forms of work. Some very able individuals are notoriously 'butter-fingered'.

Many of the author's conclusions will be readily accepted, for example, that in handwriting, good

spacing and regularity indicate orderliness and self-discipline: that exaggeratedly large writing denotes love of display, and that small and precise handwriting implies an unemotional or pedantic nature. Other dicta, such as that convex curves (arcades) indicate "shutting to the outside world", or that movements to the right manifest tendency towards the outside world (and *vice versa*) need further proof.

The book would be easier to read if the 161 illustrations—which are well reproduced—were more systematically related to the descriptive text. Fewer illustrations, more carefully chosen, would have been better. The index, too, could have been improved by additional headings.

The author claims for 'graphology' a high percentage (87–95 per cent) of correct judgments as to character, psychological condition, ability, etc. To check this claim, the Institute of Industrial Psychology, for example, might provide Mr. Jacoby with specimens of the handwriting of a number of cases examined by them, so that the correlation between the findings of graphology and of psychological analysis might be measured.

This book is certainly interesting, though somewhat discursively written.

R. A. S. PAGET.