Book Reviews

Works intended for notice in this column should be sent direct to the Editor (A. J. C. Wilson, Department of Physics, University College, Cathays Park, Cardiff, Great Britain). As far as practicable books will be reviewed in a country different from that of publication.

Growth of Crystals. Edited by A. V. SHUBNIKOV and N. N. SHEPTAL. Reports at the First Conference on Crystal Growth, 5–10 March, 1956, in English Translation. New York: Consultants Bureau, Inc. London: Chapman and Hall. 1959. Price 120*s*.

Published in Russian in 1957, by the U.S.S.R. Academy of Sciences Press, and in this English translation in 1958, this is the report of a conference held in Moscow in March, 1956 (about 10 months of the delay in reviewing it can fairly be blamed on the reviewer). The attendance at the conference was entirely Soviet, apart from two Czechoslovak guests. Seven years had elapsed since the Faraday Society's more international discussion on the same subject. It is interesting to observe what progress had been made in the interim. The weakest feature at the time of the former conference was undoubtedly the general approach to problems of diffusion and heat transfer arising in the growth of crystals: this was naive, timid, and ignorant. The 1956 conference (as would a Western conference held at the same date) shows notable advances in this respect. Even so, Ivantsov's paper on this subject gives the impression of a mathematician telling crystal growers the answers, and hardly expecting them to be interested in the methods: they will have to learn these (and those of hydrodynamics, too) if they are to understand some of their problems. As an example of the sort of problem unlikely to be solved while experimental observation and mathematical analysis are separated from each other is the periodic distribution of impurities in crystals grown from the melt reported by Petrov and Kolachev. One would like to be assured that the period is not generated by a rotation period, for example, in the withdrawal apparatus, but if genuine its explanation is almost certainly more subtile than that proposed: the reviewer does not believe that the diffusion process invoked will lead to oscillatory solutions.

The most substantial section of the report is that concerned with the practical growing of crystals. This shows a systematic attack on the development, up to technological production, of methods of growing, usually from the melt, various types of crystal required for practical use. The materials and methods employed are, in general, orthodox but as usual in crystal growing, a great deal of effort has had to be expended in countering the effects of minor impurities. Particular success and mastery of the subject is shown especially for the optically useful crystals such as fluorite and lithium fluoride.

Complete uniformity of orientation is not of extreme importance for optical applications of cubic crystals, and little interest is displayed here in methods of testing for crystal perfection. Work on the growing of semiconductor crystals is, of course, reported, but this was at a date when the electrical effects of dislocations were only beginning to be appreciated, and none of the workers reporting to this conference make assessments of the dislocation content of the crystals produced. The role of dislocations in crystal growth is one of the subjects covered by Sheetal in his general introductory paper: it is invoked only once again (by Gorodetzky and Saratovkin) to account for some experimental observations on what they call 'antiskeletal growth', and then without convincing proof that the explanation given is the uniquely necessary one. Lemmlein, one of the first experimenters to observe spiral growth hills, and still active in the subject, though thanked by several contributors for advice, is not a contributor to this report. Generally speaking, the papers classified as 'Experimental Research' show a disappointing lack of new departures. This earnest concentration on what is useful in preference to the merely inquisitive search for understanding no doubt shows a proper sense of proportion, and one almost feels ashamed for the injustice that those who go the other way about it from time to time learn something useful by accident.

An unusual feature in this report, well worthy of mention, is a short final paper describing the students' practical course on the growing of crystals given in the Department of Crystal Physics in the Physics Faculty of Moscow State University.

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Cours de Cristallographie. By R. GAY. Vol. 1 (Geometrical). Pp. 253 and 108 diagrams; Vol. 2 (Physico-chemical). Pp. 232 and 151 diagrams. Paris: Gauthier-Villars. 1959. Prices 2300 Fr.

It is difficult at this stage to judge this work as a whole because, although neither volume carries any explicit statement about any future additions, two footnotes (pages 158 and 182 of the second volume) refer to volume 4. But it is easy to get a clear view of the field of the present two volumes from the detailed contents pages at the end of each. Perhaps a reviewer may be permitted to welcome, in a French textbook, the alphabetical index that is also provided for each volume.

In the first volume the approach is historical and somewhat formal—Steno, Haüy, Sohnke, Schoenflies—and there are 111 pages of morphology and other geometrical argument before the modern concept of the lattice is reached; then 37 pages are devoted to lattices and space groups. After 8 pages on atomic and ionic binding, there are 60 pages on the geometry of the main types of crystal structures. There are 11 pages of appendixes, including a very brief description of the stereographic projection which, however, is never used in the diagrams of the two present volumes (Fig. 8 in volume 1 being entitled 'Principe de la projection stéréographique). Finally there are 9 pages of exercises, the answers being given for some of these.

The second volume brings a new approach to crystallographic teaching and one that is very welcome. Its development is based on thermodynamical considerations applied to the crystalline state, and the field covered can be seen from the chapter headings—thermodynamical concepts, specific and latent heat, atomic diffusion, surface phenomena, polymorphism, isomorphism and