the growth of crystals and these have been considered responsible for cracks by Smekal and of secondary structure by Goetz. The impurities may either form solid solutions and may go the same space lattice as the mother atoms (Ag in Cu) may give rise to super-lattice as in alloys, form layers or lacunes in crystals or accumulate at the boundary of groups or build up adsorption layers superficially or internally or both. In either case these may disturb lattice, in some cases these may give rise to the formation of minute crystals (as in glass[17]) or distort the crystalline form and change the dimension and form of crystal structure. Their presence may also bring about a re-distribution of energy and hence result in stable forms other than perfect lattice. Removal or rearrangement of impurities may be effected by heat or other agencies and thus lead to a more perfect structure. Cold-working may have the reverse effect. Special care taken to exclude impurities may yield ideal crystals. It may be noted that the inequality in thermal expansion measured by optical and X-ray methods disappears if impurities are absent. Details of the effect of adsorbed matter on crystal structure and properties of crystals will be discussed elsewhere.

In conclusion it may be observed that real crystals are usually different from ideal ones which can be obtained only under special circumstances. Absolutely pure crys tals should ordinarily have ideal lattice as the most stable, but pseudo-stable imperfect crystals may also occur at ordinary temperature. None of the existing theories are free from defects. A satisfactory theory is however difficult to propound unless the rôle of impurities is properly understood. In fact the study of imperfect crystals reminds one of colloidal substances on the one hand and of liquids on the other.

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India's Mineral Wealth.*

THE excellent account of India's mineral industry prepared by Dr. Coggin Brown should be in the hands of all those interested in the subject whether they be geologists, mining engineers, mine owners or mineral buyers, or those interested merely in the resources of the country. Dr. Coggin Brown's many years of service in India and Burma, with the Geological Survey, is a guarantee of the reliability of the subject-matter, more especially as he was always concerned more directly with the economic side of Indian geology. He displays here that facile ability with his pen, which is noticeable in his past work, to assemble the principle features of each subject in such a way as to make its reading both interesting and pleasurable.

The four parts of the book deal in succession with the mineral fuels, the metals and their ores, other useful minerals, gems and semi-precious stones. Each mineral is taken in turn, its mode of occurrence described, and an outline of each separate industry given, wherever possible. The whole work is nicely balanced. The only criticism which may be made is that the geological map of Bihar and Orissa might have been brought up-to-date.

There is a liberal supply of graphs and tables to illustrate the production of most of the minerals.

The list of selected papers at the end of the volume should be useful to those interested in any particular subject.

J. A. DUNN.

* *India's Mineral Wealth*, By J. Coggin Brown. Oxford University Press. Pp. 335; Rs. 10. With 6 maps and 8 plates.