

procurable crystals for his investigations, and, if they are artificial chemical preparations, if he has followed and makes use of the recent work on the preparation of perfect individual crystals, and the precautions to be taken to avoid disturbance during growth, there will be a very different story to tell, and the deformations, striations, curvings, and lack of constancy of ten minutes or more will all disappear, and the angles will inform him, if he employs the most accurate goniometer in the market, of their constancy to the last minute. To speak, moreover, of "petites dimensions" as being a drawback is even more enlightening as to the author's lack of familiarity with practical crystallography. For it is precisely small crystals, varying from a very small pea to a pin's head in size, that the crystallographer chooses by preference for his measurements. For the liability to distortion is then at its minimum.

Sufficient will have been said to indicate the excellences and the defects of this volume, both striking in their way. Indeed, in spite of the aggravating defects which it has been essential to point out, the writer possesses so original and lively a style, and his remarks are often so well worth reading, that with all its shortcomings, the book has good and valuable qualities, and in the portions where the author is on his own domain is both well written and instructive.

A. E. H. TUTTON.

THE ORIGIN OF THE DIAMOND.

Diamonds. By Sir William Crookes, F.R.S. Pp. xvi + 146. (London and New York: Harper and Brothers, 1909.) Price 2s. 6d. net.

ALL who have had the pleasure of hearing Sir William Crookes's lectures on the diamond and its origin will be glad to find the valuable information contained in them put into a permanent form in the little book before us.

The author has had exceptional opportunities for studying the subject. During two visits to South Africa, in 1896 and 1905, he was allowed by the managers of the De Beers mines to have unrestricted access to valuable sources of information; and, as is so well known, his own physical and chemical researches have been largely concerned with questions connected with the properties and origin of the most remarkable, as well as the most highly prized, of the gems.

Concerning the Kimberley diamond mines, as well as the alluvial deposits of South Africa, Sir William Crookes can write with authority from his personal observations. As illustrating "the kind of speculative gambling" which goes on in the former class of workings, we are told of a claim where the owner had not seen a diamond for a fortnight, but just before then he had picked out a diamond worth 300l. On the other hand, the systematic work at the mines of the De Beers Company enables the management to regulate the annual supply with the greatest nicety, so as not to cause any fall in the price of the gem. In 1907 more than two and a half million carats were raised, which realised 6,452,597l. The mode of occurrence of the diamonds, the methods of working

adopted at different times in the wonderful pipes that yield the gems, and the ingenious methods of treating the "blue ground" and sorting out the stones, are described and illustrated by photographs taken by the author himself.

Sir William Crookes had the opportunity of handling and taking a photograph of the celebrated "Cullinan diamond" before it was cut, and his description of it is of much interest. He tells us that:—

"A beam of polarised light passed in any direction through the stone, and then through an analyser, revealed colours in all cases, appearing brightest when the light passed along the greatest diameter—about 4 inches. Here the colours were very fine, but no regular figure was to be seen. Round a small black spot in the interior of the stone the colours were very vivid, changing and rotating round the spot as the analyser was turned. These observations indicated internal strain. The clearness throughout was remarkable, the stone being absolutely liquid like water, with the exception of a few flaws, dark graphitic spots, and coloured patches close to the outside. At one part near the surface there was an internal crack, showing well the colours of thin plates. At another point there was a milky, opaque mass, of a brown colour, with pieces of what looked like iron oxide. There were four cleavage planes of great smoothness and regularity. On other parts of the surface the crystalline structure was very marked. The edges were rounded in parts, and triangular markings (depressions) were to be seen. I also noticed square depressions, nearly as sharp and perfect as the triangular ones."

Interesting as this description undoubtedly is, we cannot but regret that, before this unique specimen was deprived of its interest for mineralogists by being cut, no opportunity was afforded to the author, or any other scientific investigator, of carrying out such a series of observations in the laboratory as would have enabled him to place on record all the facts about it which it was desirable to obtain.

A full account of the Cañon Diablo meteorite, with its enclosed diamonds, and of the vast crater-like depression in Arizona where it was found, is given in the concluding chapter. The author, in discussing the genesis of diamonds, is clearly of opinion that, whether of inter-terrestrial or of extra-terrestrial origin, the conclusion is established, both by observation and experiment, that the solvent from which the carbon has crystallised must have been molten iron.

In conclusion, we cannot but commend, to all desirous of learning what is known about the most beautiful and interesting of gems, this terse and attractive—but withal trustworthy and complete—summary of all the information on the subject which has up to the present been acquired. J. W. J.

DIFFERENTIAL GEOMETRY.

A Treatise on the Differential Geometry of Curves and Surfaces. By Prof. L. P. Eisenhart. Pp. xii + 474. (London and Boston: Ginn and Co., n.d.) Price 20s.

THE well-known works of Darboux and Bianchi are so excellent, each in its own way, that one might be inclined to doubt whether another text-book on the subject was really required—at least, for the