

great sea-captains of his time—Gilbert, Davis, Frobisher, Hawkins, Cavendish, and others of the remarkable band that created the sea-power of England. Dee had settled at Mortlake, where he was frequently visited by the Queen. Elizabeth had ever an eye for a comely man, and Dee was remarkably handsome, tall, stately, and of a dignified mien. The picture which Miss Fell Smith draws of his home life there, with his second wife—"his paynful Jane," as he calls her, the staunchest, truest friend he ever had—with the great Queen, either when "taking the ayre" or when on her way from Hampton Court or Isleworth to her palace at Greenwich, cantering up to his garden gate in order to get sight and speech of her courtly philosopher, is a charming piece of word-painting. But these were not altogether halcyon days for Dee. Elizabeth was gracious, even profuse in promise, but she was a very niggard in performance, and her astrologer was occasionally hard put to for the means of living.

Edward Kelley—*alias* Talbot—clipper, coiner, forger, and thief, now appears upon the scene, and the aspect of things becomes very grim. This man was Dee's evil genius. Their connection is one of the most astonishing and perplexing circumstances of his history. How Kelley could have acquired such complete ascendancy over his patron is almost inexplicable. Kelley was a first-class ne'er-do-well, a lover of loose company and of strong waters, and a consummate liar. He professed to be a clairvoyant, a skryer, or crystal-gazer, and Dee's passion for occultism was such that no tale of mystery or message from the spirit world was too gross or outrageous for him to swallow, as his own records of their *séances* demonstrate. Dee was an operative alchemist of no mean reputation, and the supposition is that Kelley sought to worm himself into Dee's confidence in order to gain information concerning the manufacture of the philosopher's stone, about which Dee never professed any knowledge. It is impossible here to go into any detail of the extraordinary partnership into which the pair entered, or to tell how they were induced, mainly at the instigation of a Polish adventurer, to wander, with their wives and Dee's children, on to the Continent, through Holland, North Germany, Poland, and eventually to Prague, where Kelley took service under Rudolph II., the "Hermes of Germany."

The story of that morose, half-witted, loose-living fanatic, who secluded himself for years in his gloomy palace at Prague, occupying himself with astrology, thaumaturgy, alchemy, necromancy, and every other form of aberration of which the human mind was then capable, is one of the most striking chapters in the book. Here Kelley was in a congenial atmosphere; he became wealthy—how is not very clear—flourished, in fact, like the bay tree, and was ennobled, only to fall more rapidly than he rose. He had previously shaken off Dee; he had no further use for him. The poverty-stricken, disillusioned man, after six years' wandering over Europe, now set his face once more towards Mortlake, only to find that, in his absence, his precious library of 4000 volumes had been rifled, and his instruments and apparatus broken by his neighbours. Well might he exclaim:—

"Have I so long, so dearly, so farre, so carefully, so painfully, so dangerously, fought and travailed for the learning of wisdom and atteyning of vertue, and in the end am I become worse than when I began? Call you this to be learned? Call you this to be a philosopher and a lover of wisdom?"

Could anything be more dramatic? The peaceful home on the banks of the Thames, into whose "silver" stream Dee's children occasionally tumbled without risk of being poisoned by the filth of Brentford; the surprise visits of the Queen; the advent of Kelley, and with him all the ghastly, skrying, crystal-gazing business—just as it is done to-day in Bond Street—communings with Annael, Anachor, Anilos, Uriel the Spirit of Light, Bobogel, Michael with his fiery sword, Gabriel, Raphael, Il, Ave, and the rest. Then comes Madimi, the first of the female angels who appeared to the pair, sometimes as "a pretty girl of seven or nine years attired in a gown of Sey, changeable green and red, with a train," and at other times as "a wench in white," and who had learned Greek, Arabic, and Syrian on purpose to be useful. Next enters the Mephisto of the story—Laski, the Polish adventurer, introduced by an angel named Jubanladec—who enjoined him to "live better and see himself inwardly." At his solicitation the pair decide to go with him to Poland. Then comes the journey across Holland, and along the devious peat-coloured waterways of East Friesland and out to sea by the islands up to Embden, and so to Oldenburg, Bremen, and Lubeck. Thence to Cracow, and eventually to Prague, where we have the mad Emperor, and all the diabolical doings in chicanery and fraud which bring the cropped-eared Kelley to his end. Lastly, we have the return of Dee—a ruined man, cheated by those he trusted, shunned by his acquaintance, scorned by his enemies—to the wrecked house at Mortlake he called home.

What a phantasmal tragedy it all seems! And yet it is sober history, capable of being verified in detail, as Miss Fell Smith demonstrates in her vivid, scholarly, and deeply interesting narrative.

T. E. THORPE.

THE PRECIOUS METALS.

The Precious Metals, comprising Gold, Silver, and Platinum. By Dr. T. Kirke Rose. Pp. xvi+295. (London: A. Constable and Co., Ltd., 1909.) Price 6s. net.

DR. ROSE, as is well known, is the author of the chief text-book on the metallurgy of gold; a book on the "Precious Metals" from his pen is, therefore, most welcome, and although in dealing with this subject details of processes and methods are for the most part left out, yet nothing of importance as introductory to the study of these metals is omitted.

The author states in the preface that his aim "has been to provide an introduction to the study of the precious metals and an elementary book of reference for those who do not wish to pursue the subject further." This aim has been admirably attained.

In the first chapters we have a brief but accurate summary of the history of gold from the earliest times, followed by an account of the properties of the metal and its compounds of special value to the metallurgist. The important subject, the alloys of gold, is treated at greater length in the fourth chapter, which is one of the most valuable parts of the book, and contains an account of these alloys, brief, it is true, but no essential points have been overlooked. The attention of the metallurgical student is especially called to this chapter, as it forms a comprehensive introduction, such as is not found elsewhere, to the detailed study of these interesting mixtures of gold with other metals. The constitution of these alloys, according to modern views, as deduced from freezing-point curves and micro-structure, is ably and clearly explained. In the subsequent chapters dealing with gold, the occurrence of the metal in nature and the methods of extracting it from ores are dealt with. Commencing with the simplest and most primitive method of extraction, that of simple "washing" practised from the earliest times and culminating in the modern system of "dredging," the various processes of amalgamation are passed in review, and, finally, the so-called "wet" processes are considered. Of the latter, the cyanide process, to which we owe the extraordinary production of gold in the Transvaal, is dealt with at considerable length in the eighth chapter.

Silver, now of much less importance than gold, since it is no longer in use for the standard coinage of most countries, occupies only about half the space given to the nobler metal.

The alloys, compounds, and ores of silver are first discussed, and then methods of extraction. The important methods are described, and even those which have become, or are becoming, obsolete receive fitting attention. The time-honoured *patio* process in Mexico, where the climate and other conditions were specially favourable for its success, which has produced many millions sterling of the metal, has evidently had its day, is being replaced by the modern cyanide process, and is now mainly of historical interest. The same is true of other "wet" processes in many silver-producing districts.

An entire chapter is devoted to the processes employed in the refining of gold and silver, operations dealing annually with enormous values. Thus gold to the value of 50,000,000*l.* is refined every year by the sulphuric-acid process, 12,000,000*l.* by the chlorine process, and about 4,000,000*l.* by electrolysis.

The chapters on assaying, minting, and the manufacture of gold and silver wares are written with great clearness, and give the best brief and trustworthy account which has yet been published on these subjects. They will be read with interest by both technical and non-technical readers. Platinum, although not usually included in the term "precious metals," yet, being in common use and more valuable weight for weight than gold, has been rightly given a place in the book. The condensed account given of it deals with its occurrence, properties, alloys, extraction, purification, and assay.

The volume concludes with a series of statistics relating to the production and consumption of the precious metals.

The accounts of the various operations by which these metals are extracted from their ores and refined or adapted for minting or industrial use, although brief, are clear and accurate, and the essential points in each process on which its success depends are carefully set forth. A valuable feature, too, is the chemical reactions and changes which occur in the operations, and the principles on which they are based, which appear under each metal.

Dr. Rose is to be congratulated on his book. He has succeeded in compressing within the limits of 295 pages an excellent summary of the metallurgy of gold, silver, and platinum, marvellous in conciseness, quite up-to-date, and without the omission of anything of serious importance.

It deserves many readers, and can be strongly recommended to metallurgical students, by whom it can be studied with advantage before or at the same time as the larger text-books.

W. G.

FLOWER CULTURE.

Beautiful Flowers and how to Grow Them. By Horace J. Wright and Walter P. Wright. Pp. 198. (Edinburgh: T. C. and E. C. Jack, n.d.) Published in seventeen parts at 1*s.* each, or two volumes at 10*s.* 6*d.* each.

THIS work will take a high place amongst recent publications dealing with the popular and fascinating art of floriculture. The authors have made a selection of the best and most beautiful flowers for cultivation in the garden and greenhouse. These flowers, numbering 100 in all, are illustrated in full-page coloured plates, which are excellent reproductions of flower paintings by such well-known artists as Beatrice Parsons, Eleanor Fortescue Brickdale, Anna Lea-Merrett, Hugh L. Norris, Lilian Stannard, Margaret Waterfield, A. Fairfax Muckley, and Francis E. James.

Such a collection affords a very valuable guide to amateurs as to which flowers are likely to give them most pleasure, and, in the majority of cases the kinds presented will be found amply sufficient for their study; but, not only so, the plates will prove useful in two further directions. In the first place, many of the pictures depict the particular flowers grouped with other kinds with which they harmonise perfectly in the garden, and, in the second place, as the paintings were in most cases prepared from first-class specimens, they set before the amateur a high standard of culture he will do well to emulate. Both these lessons are given in such plates as a "Bed of La France Roses," "Dwarf and Climbing Roses, with Zonal Geraniums," "Madonna Lily (*Lilium candidum*) and Roses," "Pyrethrums and Lupins," "Foxgloves and Poppies," "Asters, Phloxes and Sweet Peas," "Hippeastrums," "Single Dahlias," "Rosé-arch and Campanulas," "Hardy Chrysanthemums," and "Water Lilies." In certain others a supremely satisfactory result is obtained by showing a single plant depicted in all its glory, such, for instance as