

REVIEWS.

GEORGIO SPEZIA, *Professor in the University of Turin.* “*Sull' Origine del Solfo nei Giacamenti Solfiferi della Sicilia.*” *Torino, G. Candeletti, 1892, in 8°, pp. 130, 2 phototype plates.*

The origin of the sulphur so abundantly found in Sicily along one geological horizon, extending over a great area, has been the source of much discussion. Prof. Spezia has, in the book before us, made a very careful and critical study of the subject in all its bearings. We have first a description of the minerals that accompany sulphur, such as celestine, calcite, aragonite and the different forms of silica, together with that curious one known as melanophlogite. He shows that these minerals are superposed on each other in no special order, and therefore may be considered as in general contemporaneous, and that certainly they were deposited through the agency of water—at any rate so far as calcite and silica are concerned.

The author carefully studied these materials in the mines and likewise some springs met with in mining operations, the water of which was found to contain and to deposit minute crystals of calcite, sulphur, celestine and silica. The paragenesis, alteration and relation of the fissure and drusy deposits and their mineral species are discussed.

The origin of such an enormous quantity of strontium sulphate is the key-note of the author's arguments, for he very justly shows that its relative proportion to the gypsum beds is enormously different to what would be the case in ordinary sea-water. Silica to a certain extent offers a similar difficulty.

Another question that the author discusses is the intimate relation of the Tripoli beds with the sulphur deposits. Reference is made to diatomaceous deposits in all parts of the world, which in most cases are associated with volcanic action. The author suggests, therefore, that the soluble silica derived from hot springs only could afford the large amount of silica for the growth of the diatoms in such large proportions. The origin of the bitumen of the sulphur-bearing series is discussed, and the author favours the idea of the development of hydrocarbons by igneous action, independently of the remains of organic matter in the subjacent rocks. In this chapter several slips are made such, for instance, as the

statement that the occurrence of graphite and carbonic acid cavities as inclusions in the rocks and minerals of granites, porphyries and basalts prove the chemical origin of the bitumen hydrocarbons. These inclusions simply prove the penetration of carbonaceous strata by the eruptive rocks that contain them. The opinions of all those who have suggested an explanation of the origin of the sulphur deposits are given, and they are combatted one by one.

Finally the author gives his own conclusions. He considers that these different minerals are derived in part from thermal springs and in part from sea water of a salt lake only communicating by a very narrow inlet with the main ocean. The gypsum is deposited when the water reaches a certain point of concentration, but the salt cannot crystallise as it drains out by the canal, being replaced by dilute sea-water on the surface.

If Prof. Spezia has not proved his case he has made a very able pleading, and has done as much as a mineralogist is called upon to do. The final decision of the question must be left in the hands of the field geologist, who has in this valuable memoir a guide to the sort of evidence required to settle this knotty question.

Borneo: Its Geology and Mineral Resources. By Dr. Theodor Pozewitz; translated from the German by Dr. F. Hatch. Edward Stanford, London, 1892.

This work consists of nearly 500 pages. It has a good table of contents, but no index, and is divided into four chapters. Of these the first is "Historical" and is really of little use to the general reader. The second is "Geological"; the third, an account of the "Useful Minerals"; and the fourth on "Mining Operations."

There is throughout the whole work a tendency to treat the subject historically, involving a great amount of needless repetition; while far too many paragraphs are devoted to the statement that there is no accurate information upon some point or other. The book, however, contains much valuable information for those who will take the trouble to sift it out.

The principal points brought out in "Geological" chapter are briefly as follows:—

The whole scenery and structure of the island is dominated by a vast number of massive intrusions of granite, diorite, gabbro, etc., whose greater length usually lies north-east and south-west. This is the dominant strike of nearly all the other rocks in the island.

These igneous massifs are scattered all over the interior of the country; a large mass of the igneous material forming the great flat-topped mountain of Tebang in the centre of the island.

Near the north end of Borneo one of these igneous masses, Kinabalu, attains an elevation of 13,698 feet. As a rule, they are surrounded by schists, and the "Old-slate-formation," the latter probably of Devonian age.

There is no clear statement from the author as to the relation of these three rocks to one another, but from other explorers' notes (quoted by him) it appears that the igneous "massifs" are intruded into the schists and slate. The schists are claimed as older than the slate, and, in fact, archæan, but without any evidence. The whole of these rocks hang together and form the greater part of the high ground or "Mountain Formation." They are much traversed by quartz-veins, which contain auriferous pyrites, gold and other minerals. Their decomposition is the source of the minerals to be met with in the superficial formations.

The *Carboniferous Series* is represented by conglomerates, sandstone, and limestone. Fossils have placed the age of the limestone beyond doubt.

Cretaceous.—A small patch of cretaceous rocks is shown in the south-west part of the island, and fossils have been collected proving the existence of such rocks in other places.

Tertiary, or Hill Formation.—The elevated areas or Mountain Formation are more or less completely surrounded by a fringe of low-lying hill land composed of Tertiary strata.

These are divided into two groups. (1). Older Tertiary, or Eocene; (2). New Tertiary, the exact age of which seems very uncertain; but the latter rests unconformably on the former.

Eocene.—A group consisting of sandstones, shales and coals in the best known area, in the south-east of the island, attains a thickness of about 500 ft., and contains 19 coal seams (given in a detailed section), but only two are thick enough to have much practical value. The coal is black and lustrous. The want of proper means of transport has largely limited its working. But in truth the fatal objection to the entire coal field of Borneo is the extremely disturbed state of the strata. Dips of 30 degrees are very common. With such dips as occur here the coal must be mined like a vein, a very expensive proceeding.

Both the groups of Tertiary rocks are much penetrated by igneous intrusions in which the dominant types belong to the andesite group,

There seems no doubt that these are more recent than the granites or diorites, &c., but there really is no clear evidence as to the date of the latter.

That portion of the book which deals with the useful minerals contains a considerable amount of information about the occurrence and working of gold, diamonds, platinum, antimony, mercury, petroleum, &c., but here, as elsewhere, the book is largely a compilation. An observer possessed of greater scientific knowledge and experience could doubtless have contributed more original observations on the geological and mineralogical nature of the island during a three years' residence in the country; but still the fact remains that the book is a convenient summary of the voluminous Dutch literature, and is practically the only available English treatise on the subject.

Minéralogie de la France et des Colonies. By A. Lacroix. Baudry et Cie, Paris, 1898. Tome I. (1re Partie), 304 pages.

M. Lacroix, whose numerous researches upon minerals and rocks, especially as regards their optical characters, are well known to all students of mineralogy, has in this book supplied a long felt want. Topographical mineralogies exist for most European countries; we need only instance the Lexicon of Zepharovich for Austria, of Toth for Hungary, of Wenzel for Saxony, the Materialien of Kokscharow for Russia, and the books of Greg and Lettsom for the British Isles, and of Kennigott for Sweden, but up to the present time there has been no such book of reference for France. The present volume is the first instalment of a work which bids fair to surpass any of the preceding for completeness of detail.

The part first published begins with the silicates, which, together with the titanates, are to constitute the first volume; this order being adopted because the author has many new facts to communicate with regard to these minerals; we may also expect that the first volume will be both the most interesting and the most prominent part of the work, considering the important development of crystalline schists and volcanic rocks in France and the comparative paucity of vein minerals and ore deposits.

The book is well illustrated; not only are the associations and modes of occurrence explained, special regard being paid to the geological nature of the associations, but the characters of the minerals are fully described; the physical data are given in the admirable form with which we have been familiarised by the book on the Minerals of Rocks written

by the same author in conjunction with M. Michel-Lévy ; and a large amount of the optical and other information is new.

The author does not hesitate to cross the frontier into Spain, Germany, Belgium, or the Alps, where the formations which he is describing are continued across the border.

We have no doubt that M. Lacroix will produce a work which must long remain our standard authority on French minerals.
