

where we could scarcely have gone alongside for this purpose.

Considerable shore collecting was done at Easter Island. We must have brought together at least thirty species of plants. The flora of Easter Island is very poor. There are no trees nor native bushes—not even the bushes which characterize the shore tracts of the most isolated coral reefs of the Pacific are found there; and yet some of the equatorial counter-currents must occasionally bring some flotsam to its shores. We collected a number of shore fishes and made a small collection of the littoral fauna. The fishes have a decided Pacific look, and the few species of sea-urchins we came across are species having a wide distribution in the Pacific.

While coaling, we spent some time examining the prehistoric monuments which line the shores of Easter Island. During our stay at La Pérouse Bay we visited the platforms studding the coast of the bay, and made an excursion to the crater of Rana Roraka, where are situated the great quarries from which were cut the colossal images now scattered all over the island, many of which have fallen near the platforms upon which they were erected. Near Rana Roraka, at Tongariki, is the largest platform on the island, about 450 feet in length, to the rear of which are fifteen huge images which have fallen from the pedestals upon which they once stood. The plain in the rear of the platform is crowded with stone houses, most of which are in ruins.

On our return to our anchorage at Cook Bay, we examined the platforms within easy reach of the settlement, and also the crater of Rana Kao, on the north rim of which, at Orongo, are a number of the stone houses built by the people who quarried the great stone images. At Orongo are also found sculptured rocks, but neither the sculptures nor the images show any

artistic qualities, though the fitting of some of the cyclopean stones used in building the faces of the platforms indicate excellent and careful workmanship. To Mr. C. Cooper, manager of the Easter Island Company, we are indebted for assistance while visiting the points of interest of the island. He was indefatigable in his exertions in our behalf.

We took a number of photographs during our stay, illustrating not only the prehistoric remains, but giving also an idea of the desolate aspect of Easter Island during the dry season.

We arrived at Wreck Bay, Chatham Island, Galapagos, on the third of January, where we found a schooner with a supply of coal. As soon as the ship has been overhauled and coaled we shall start for Manga Reva, where we ought to arrive the last days of January. We reached Chatham Island towards the end of the dry season. Everything is dried up, the vegetation seems dead with the exception of a few small wild cotton plants, weeds, cactus and an occasional mimosa; and the great barren slopes present fully as uninviting an aspect as when Darwin described them. When the *Albatross* visited the Galapagos in March, 1891, everything was green, presenting a very marked contrast to its present desolate appearance.

ALEXANDER AGASSIZ.

#### SCIENTIFIC BOOKS.

*Problems in Astrophysics.* By AGNES M. CLERKE. London, Adam and Charles Black; Agents in America, The Macmillan Co. 1903. Pp. xvi + 567, with 81 illustrations. \$6.00 net.

Qualified by her authorship of those excellent works 'The History of Astronomy in the Nineteenth Century' and 'The System of the Stars,' and by her obviously minute and critical study of current research in this field, Miss Clerke presents in her latest work a lucid account of pending problems in astrophysics.

Her brilliant style of writing is maintained throughout, and is sure to fascinate even the reader who does not fully comprehend her meaning. Sometimes, indeed, her lavish use of synonyms must puzzle those not familiar with the subject; but it carries her and her readers lightly and pleasantly over some chapters that would certainly be dry in the hands of most authors.

The keynote of the book is suggestiveness, as the author points out in the preface, and there could be no better tribute to her success in this respect than the use made of her work by astronomers. She clearly differentiates the known and the unknown, and emphasizes what ought to be found out.

The book can be commended to the attention of the physicist and the chemist. It is unfortunate that so few workers in the field of chemistry seem to take a positive and active interest in the problems of astrophysics; for in many respects its progress is being delayed while developments are awaited from the chemical laboratories. When these developments come, as when Ramsay solved the mystery of helium, the forward movement is rapid. Students of electricity also ought to find considerable of interest in this book and its topics, for our nearest approaches to laboratory representations of stellar phenomena seem to be of an electrical character. Yet we really do not know at all how these electrical phenomena can be brought into their proper relation to the thermal conditions which doubtless obtain in the stars.

The work before us is divided into two parts, 'Problems in Solar Physics' and 'Problems in Sidereal Physics,' the second part occupying something more than two thirds of the volume. The fourteen chapters of the first part deal with the sun's chemistry, and separately with its successive envelopes. Two chapters are devoted to sun-spots, and they sufficiently disclose our ignorance as to the nature and cause of these familiar but no less puzzling phenomena. The last three chapters treat of the solar rotation, the solar cycle and 'the sun as a whole.' The author's point of view is the safe and conservative one which has been taught by Young and by Huggins.

Schmidt's refraction theory of solar phenomena is regarded as largely of academic interest. The general reader may safely accept the author's comments as well balanced; and there is no concealment, but rather a frank avowal, of the extent of our present ignorance on the problems of the sun.

Part II. includes forty-one chapters and enters into the personal details—the *vie intime*—of the stars, possibly rather too minutely for the general reader. But it is decidedly interesting reading, and the reviewer must confess that the belatedness of this review is due to the tendency to peruse these details repeatedly to the detriment of obtaining a broad survey of the book. The author adopts a rather simple scheme for classifying stellar spectra and gives to each class a chapter. Anomalous and bright-line spectra receive an ample treatment. Spectroscopic binaries and eclipsing stars also get considerable attention. 'The problem of Beta Lyræ' occupies a chapter of twenty pages, while the longest chapter is devoted to temporary stars, including Nova Persei. After clusters have been discussed, the nebulae are taken up in nine interesting chapters, and few of the objects of this class which have been carefully studied are omitted in the author's detailed treatment. A brief final chapter discusses the physics of the Milky Way.

References to the original sources are faithfully given throughout the work, and apparently with few typographical errors, from which the book is otherwise quite free. We wish that Miss Clerke would adopt the use of the convenient word spectrogram instead of making *spectrograph* serve for both the instrument and the photographic result of its use. Slips of the pen seem to be rare, and there are few points at which a conservative reader would interpret the results of observations very differently from the author.

The thirty-one insert plates are for the most part excellent. Those printed in the text, except diagrams, are less satisfactory, notably the picture of prominence on p. 104. The light weight of the paper makes the handling of the book a pleasure—and it is likely to

be handled rather frequently by many of its owners.

EDWIN B. FROST.

YERKES OBSERVATORY.

*La Montagne Pelée et ses Eruptions.* Par A. LACROIX. Ouvrage Publié par l'Académie des Sciences sous les Auspices des Ministères de l'Instruction publique et des Colonies, Paris. 1904. Pp. xxii + 662. 30 plates and numerous text figures.

The most complete report on Martinique yet published is that of Professor Lacroix, which embodies the results of his researches during two extended sojourns in the West Indies. Few geologists were better qualified to undertake the task and unusual facilities were offered him to make as exhaustive an examination as the conditions would permit of the volcano Pelée.

Professor Lacroix was sent, at the suggestion of the Académie des Sciences, by the Minister of the Colonies at the head of a scientific commission to study the effects of the eruption of Pelée and to examine into its causes. The commission consisted, in addition to Professor Lacroix, of M. Rollet de l'Isle and M. Giraud. After a preliminary visit of little more than a month in June and July, 1902, the party returned to France to arrange for a longer visit in the dry season. The eruption of the thirty-first of August hastened Professor Lacroix's departure and he arrived a second time at Fort de France on the first of October alone, the other members of the mission being unable to accompany him. During this second visit, which lasted nearly six months, the greater part of the material was gathered upon which the present report is based.

Two observatories were established from which the volcano could be watched day and night, and at these posts were cameras and various instruments for the purpose of recording with as minute detail as possible all events, or changes in the form of the mountain. The results of these observations were correlated by Professor Lacroix, who devoted a greater part of his own time to an examination of the volcano, the collection of speci-

mens, and to obtaining, if one may judge from the illustrations of the book, a large number of very remarkable photographs.

In presenting his results Lacroix has arranged them under three heads: The first part, which is by far the longest, deals with the geological and physical problems involved in the eruptions, and contains detailed descriptions of the more violent outbreaks. The second part is devoted to a petrographical study of the actual products of the eruption and to a comparison of these with rocks from the other islands of the Lesser Antilles. In the third part, the various products resulting from the conflagration of Saint Pierre are discussed, particular attention being paid to the secondary minerals developed and the effect of intense heat on the old andesite of which most of the houses were built.

Much of the information contained in the first part will be familiar to those who have followed Lacroix's earlier reports and the descriptions of the American observers, but certain chapters are of unusual interest to geologists, especially those which deal with the processes involved in the formation of the famous 'dome' and 'spine,' the theory of the 'burning clouds' (*nuées ardentes*) of the more violent eruptions, the deposits of fragmental materials, and the various secondary phenomena. After summarizing in chapter I. of the first part the geology of Martinique and the other Antillean islands, and describing earlier eruptions, the author calls attention in chapter II. to the single center of eruption and the absence of secondary vents. A study of the modifications in topography resulting directly from the great eruptions shows them to have been relatively slight, from a geological point of view, when compared with the devastation wrought. Judging from the records of cable repair ships no marked changes in submarine topography occurred and the breaking of the cables is attributed to the shelving of deltas at the mouths of streams descending from the flanks of Pelée.

In chapter III. Lacroix describes the evolution of the 'dome' and offers an explanation of the processes involved in its development. Briefly, the 'dome' is the eminence which has