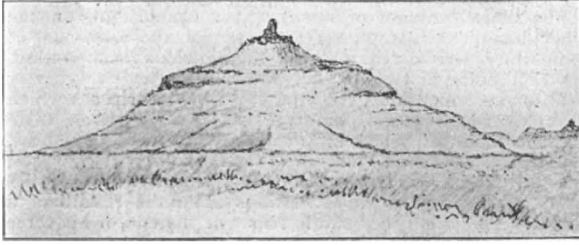


reminds me of similar columns of ancient lava not uncommon among the trap rocks of the Deccan, and I enclose a copy of a sketch I made of one of these in 1839, the re-



markable similarity of which to the column on Mont. Pelée seems to be worthy of notice. A second similar column is seen in the distance on the right. RICHARD STRACHEY, 69 Lancaster Gate, W.

"Lessons on Country Life."

IN your issue of September 24 you published a review of "Lessons on Country Life," by Messrs. Buchanan and Gregory, but may I ask, with all deference, if your reviewer has not omitted to read an important part of this useful little book? He refers to Mr. Buchanan's earlier works, "Country Readers," Nos. 1 and 2, as "most excellent books for children," but had he read the *preface* to the "Lessons" he would have found that these were intended, not for children, but for teachers. Your reviewer truly says:—"Country life is a vast subject, so vast that no child can learn during his school life even a fraction of the information it may be desirable he should possess," and the same remark may be equally well applied to teachers. This book travels over much the same ground as "Reader" No. 1, but the matter is differently treated. In one case simplicity of language is aimed at, in the other the information is condensed, with a view, as it appears to me, of leaving it to the discretion of individual teachers to use such lessons, or portions of each lesson, as are most suitable to their own districts.

I do not wish wrongly to attribute ideas to the joint authors, but I fancy their intention is to put before rural teachers (many of whom have had little or no country training) as complete a summary as possible, taking it for granted that they would be able to pick out and study the essential parts.

This series of agricultural Readers and Lessons will, I think, do much to create a love of country life, may even help to counteract the attractions of town life. Rural depopulation is one of the most serious problems of the day, and if these books will assist, in only a small way, to arrest this migration, I feel sure you will not detract from their value by a few words which were probably due to a pardonable oversight.

A. H. H. MATTHEWS, Secretary.

Central Chamber of Agriculture, Broad Sanctuary
Chambers, 20 Tothill Street, Westminster, S.W.,
September 30.

MR. MATTHEWS has hardly grasped the point of our notice—that Messrs. Buchanan and Gregory's book approaches the subject in the wrong spirit. The teacher is provided with a mass of indifferently selected information about farming matters, which he will pass on to his class instead of trying to lead it to observe and reason on its own account. The latter process is more difficult, but it happens to be education. We have of late had only too many occasions to deplore the "rural teachers with little or no country training" who hand out "condensed information" from little books about the country. It is this kind of instruction which offends both farmers and educationists, and if Mr. Matthews imagines it is going to counteract the attractions of town life and arrest rural depopulation, we can only hope that on this occasion he does not represent the opinion of the Central Chamber of Agriculture.

THE REVIEWER.

NO. 1772, VOL. 68]

CRATER LAKE IN OREGON.¹

TWENTY years ago, as Mr. Diller informs us, this picturesque record of a strange episode in volcanic history was unknown to any but the Indians. It is still not very accessible, for it lies in an unfrequented region, deep set in the summit of the Cascade Range, some sixty-five miles north of the California line, but the United States Government, "recognising its worth as an educational feature," has already wisely secured it from the speculator and spoiler by making it a national park. An area of two hundred and fifty square miles is thus protected, of which we find a description in the present memoir. The first part, by Mr. Diller, deals with the geology and physical history of the great volcano, named after a local society Mount Mazama, which was shattered to form Crater Lake, and the second, by Mr. Patton, discusses the petrography of its rocks. It was virtually discovered by Captain Dutton, by whom and by Mr. Diller it has already been noticed; the U.S. Geological Survey has also published a special map, but the story is now completed in this excellently illustrated memoir.

The Cascade Range is largely, if not wholly, built up of volcanic material. In Cretaceous times it had no existence, "there flowed the sea"; this retreated during the Eocene, when vents opened in the Coast Range region, possibly also, though that is not yet quite certain, on the site of the Cascade. Here, however, volcanoes were in full activity during the Miocene, and built up a large part of the Range, where eruptions have continued almost to the present time. Post-Glacial outbursts occurred in some places, but seem to have ceased before history began, though hot springs and fumaroles show that the subterranean hearths are not yet cold. Some of the peaks rise above 10,000 feet, Mount Rainier even attaining 14,525 feet, and the surface of Crater Lake is rather more than 6200 feet above sea-level. It is an oval basin between twenty and twenty-one square miles in area, surrounded by cliffs which range from more than 500 to nearly 2000 feet in height, the ground falling more gradually from their rim to the present upland level. This great sheet of blue water, in places almost 2000 feet deep, is interrupted near its western margin by a pyramidal rocky mass, called Wizard Island, itself evidently a volcanic vent, and a study of the enclosing walls of the great caldera proves them to be built up in the usual way by ash-beds and lava-flows, dipping outwards from its axis, and riven by occasional dykes. The exterior slopes are dotted by parasitic cones, and exhibit occasionally moraines and Glacial striæ; they are also furrowed by valleys, which in some cases run up to and actually notch the edge of the cone, so that they evidently cannot have been formed on Mount Mazama as it now exists. They, like it, have been truncated, and the bowl occupied by Crater Lake has been formed by the destruction of a volcanic cone which must once have risen some six thousand feet above its present rim. Of this there can be no doubt; it is substantiated by numerous facts cited in this memoir, and we have only to study the geological map which it contains to see that the present lava streams are merely remnants of those discharged from sources at a greater elevation and nearer the central axis of the cone.

But the precise mode in which the upper part of the original Mount Mazama was destroyed, and Crater Lake formed among its ruins, is not quite so certain. Two explanations are possible. All the upper part of the mountain may have been hurled in shattered fragments through the air by a series

¹ "The Geology and Petrography of Crater Lake, National Park." By Joseph Silas Diller and Horace Bushnell Patton (U.S. Geological Survey). Pp. 168. Plates i-xix. (Washington, 1902.)

of tremendous explosions, like those which truncated Papandayang in Java and shattered Rakata in Krakatoa, or the cone may have collapsed and been engulfed; mother earth, like the fabled Saturn, devouring her own offspring—which has happened on a smaller scale at Kilauea. Mr. Diller, after a discussion of the rival hypotheses, follows Captain Dutton in preferring the latter. Space does not allow of a full discussion of the reasons, but it may be enough to say that the explosive destruction of a great central cone might be expected to have piled up the fragments more or less symmetrically around the margin of the void; but, though much fragmental volcanic material has been scattered over not a few square miles of the surrounding region, this does not exhibit any such arrangement, and its presence may be explained by eruptions posterior to the formation of the caldera, such as that which built up Wizard Island. It must, however, be admitted that such a vast engulfment seems to demand the withdrawal of a corresponding quantity of lava from beneath the cone, and its discharge—as in the Kilauea eruption of 1840—from some distant vent, of which at present no evidence has been found. It is thus possible that each hypothesis is in part correct, for engulfment

tion, owes its present position to being caught up and carried away by the general mass of molten material. This, however, is a very small criticism. The memoir is a most valuable one, and its printing and illustrations maintain the usual high standard of the publications of the United States Geological Survey.
T. G. BONNEY.

THE BRUSSELS AND TERVUEREN MUSEUMS.

FOR many years past the Royal Brussels Museum of Natural History has presented attractions for the vertebrate palæontologist which can be rivalled by few and excelled by none of the institutions of a similar nature in Europe. But those who have not had an opportunity of seeing the collections recently will scarcely fail to be surprised at the vast increase which has been made in the exhibited series, and at the excellent manner in which the specimens are displayed even in the limited space at present available. A still greater degree of astonishment, and, we may add, of admiration, will be expressed by the visitor when he is shown the new buildings, now nearing completion, designed for the housing of the entire recent and fossil fauna of the country.

When the present writer (some twelve or fifteen years ago) last saw the collection, only a single skeleton of the far-famed Bernissart iguanodons was mounted in the exhibition galleries. Now there are no less than five such skeletons set up in their natural posture, while a sixth is shown lying on a mass of Wealden rock as it was exhumed from the quarry. A more magnificent display than the one presented by the skeletons of these mighty dinosaurs can scarcely be imagined.

Next in importance to the unrivalled iguanodons and associated reptiles from the Bernissart Wealden may probably be ranked the magnificent series of mosasaurian remains which have been obtained in working the phosphatic beds of the Upper Cretaceous strata of the Maastricht district and other parts

of the country. In addition to several more or less imperfect skulls and other parts of the skeleton of the typical Mosasaurus, the collection includes remains of several other generic types, some of which, such as Hainosaurus, are peculiar to Belgian territory. Unlike so many European fossil vertebrates of large size, most or all of these generic types are represented by skeletons so nearly perfect as to admit of their being set up like those of recent animals. One of the treasures of the museum is the skeleton of the fore-paddle of a representative of these gigantic marine lizards, this specimen being believed to be the only known example of this part of the mosasaurian skeleton hitherto discovered in Europe. Another noteworthy specimen in this group is the skull of Prognathosaurus, remarkable for the exquisite state of preservation of the bones of the elongated muzzle. The turtles of the Upper Cretaceous, as represented by the well-known *Chelone hoffmanni*, and a still more gigantic unnamed species characterised by the extreme flatness of the carapace, likewise form a large and interesting exhibit.

Much more might be written about the Mesozoic vertebrates, but, from exigencies of space; it must

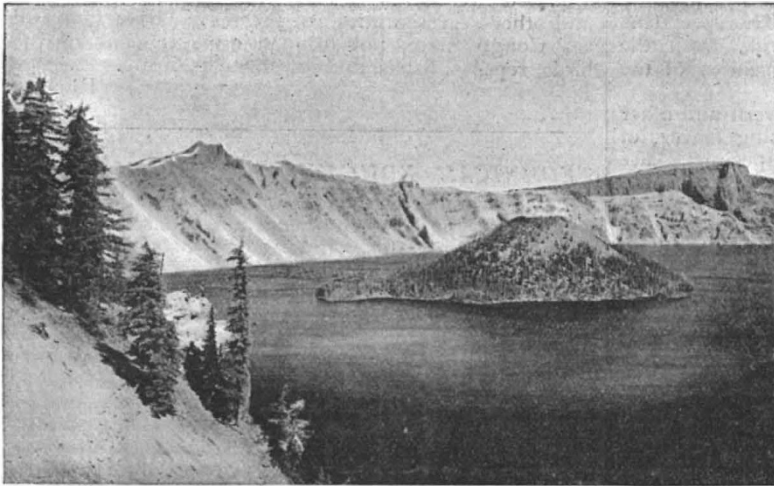


FIG. 1.—Western Border of Crater Lake with Wizard Island.

and explosion may have cooperated in the work of destruction, vast blocks of the ruined cone tumbling inwards to be blown out in shattered fragments and distributed over many miles of country—so that the volcano practically became an automatic muzzle-loader. But that Mount Mazama was not destroyed merely by an explosion like that of a colossal powder magazine, seems to be evident.

In the second part of the memoir Mr. Patton gives us a careful petrographical study of the materials of Mount Mazama. They are mostly, as is so usual with the volcanoes of the great mountain chains of the two Americas, andesites, among which the hypersthene-bearing varieties are common, though on the one hand dacites, and on the other basalts, are to be found. Full descriptions of these and their included minerals are given, as well as of certain portions of a rather different mineral character, which Mr. Patton regards as secretions. It is difficult to form an opinion without an actual study of the rock specimens and slices, but we venture to suggest that they may rather be inclusions—that is to say, material which, though it may have been originally separated by some kind of differential action, and might so far be called a secre-