THEORETICAL EXPLANATIONS OF GEOLOGICAL FACTS.

Essai d'une Explication par les Causes actuelles de la Partie théorique de la Géologie. Par H. Hermite. Pp. 115. (Neuchâtel : Attinger, 1901.)

M. HERMITE believes that the facts of geology admit of much simpler theoretical explanations than they have hitherto received. Whether his substitutes will be generally adopted is, we think, open to question ; but as it would be a lengthy business to criticise them in detail we must restrict ourselves to a brief outline of their leading features. Mountain-making is not, as is generally thought, the result of a cooling of the liquid earth's interior, for that is not in accord with the theory of heat. It is caused thus :—The crust is very flexible. Materials deposited upon it produce a downward movement in that part with a corresponding upward one in another, so the ocean basins are constantly sinking and the continents rising. This upward movement is concentrated on the periphery of the basins, where the strata are bent, strained, and finally fractured. Motion is converted into heat and the temperature of this zone is elevated. It then communicates heat to the adjacent ocean, and thus increases evaporation. That results in a heavier rainfall. The precipitated water works down into the rising land, thus cooling it, and producing of course the greatest effect nearest to the surface. So the rise of temperature observed in sinking wells, &c., is due to a local cooling rather than to the cause usually assigned. That the consequence of mountain-making is abundant rain is proved by the prevalence of sandy deposits in the earliest geological ages. Another consequence is that periods of extensive and rapid deposit of detritus are succeeded by others of slow and regular sedimentation. M. Hermite passes on to explain the occurrence of the warm era with which the earth's history began, and the glacial epoch of its later days. Crust cohesion, he says, was great in early times, so more material was needed to make it sink ; and thus the rise of temperature of the basins was greater. Evaporation was thereby increased and the whole surface covered with a veil of mist, resulting in a mild, uniform climate. But the heavy rains penetrating into the crust ultimately chilled it, and the streams which they produced cooled the ocean, till things returned to their former condition. As the cohesion afterwards became gradually less, this universal, warm, damp atmosphere did not recur, and the loss of heat by radiation gave rise to the seasons. But earth movements were augmented about the time of the passage of the Tertiary into the Quaternary, and led to precipitation which supplied the snow for the great glaciers. Thus this epoch was brought to an end rather by the diminished warmth of the ocean waters than by a rise of the general air temperature. At the present day the great glaciers of the Polar regions are largely fed by the water emitted from volcanoes. The Carboniferous period seems to have been a turning point in the history of the globe ; for the crust up to that time was less fissured, and so was not chilled by the penetrating water ; hence the high temperature of the seas kept the carbonic acid in the atmosphere. But after that became fixed in the form of coal the present conditions became possible. M. Hermite, we think, is not likely to get his theory adopted by geologists until he shows in more detail that it will harmonise with the facts ; for he usually contents himself with vague statements, which read like his impressions of books. Also, when he plays havoc with the names of fossils (*e.g.*, *Rhinocéros*, *Thycorinus*, for *R. Tichorhinus*), and attributes the cirques and gorges of mountain regions, with the cañons of more level districts, to the action of subterranean water, we feel that he is making a possible exception a general rule, and we cannot help doubting whether he has any practical knowledge of the science. In fact, much of his geology seems on a par with his statement (p. 29) that the volume of a series of spherical shells increases as the cube of their radii.

OUR BOOK SHELF.

La Géologie. Par H. Guède. (Bibliothèque des Sciences Contemporaines.) Pp. 724. 151 figures intercalées dans le texte. (Paris : Schleicher Frères, 1901.)

IN his very modest preface, the author of this volume disclaims any idea of adding to the accumulated mass of geological facts or of advancing new theories to account for them. His object is to present, in a lucid manner, a summary of acknowledged facts and generally received theories, following the encyclopædic treatise of M. de Lapparent, and to do so in such a way as to make the subject of interest to the general reader, while avoiding the claptrap style of certain so-called popular works.

In a task of this kind there is not much opportunity for originality of treatment, and the author wisely follows the general plan of geological treatises in discussing first the causes at present in operation in the earth's crust, secondly the changes in the earth's surface features, thirdly the internal forces at work within the earth's crust, and fourthly the evolution of the earth. In his classification of the geological periods, the author follows most French writers in treating the Quaternary era as the equivalent of the Tertiary, Secondary and Primary eras, a plan which is not without inconvenience to the student. The illustrations of the book appear to be all original, and are of a very simple character—indeed, nothing more than transcripts of such rough sketches as a teacher would draw upon the blackboard. While this plan has the advantage of enabling the teacher to emphasise the *essential* features in the sections and fossils he refers to—and these are often missed in more elaborate picture-illustrations—it is in some cases manifestly inadequate for teaching purposes. Thus the reader of this work would have no idea of the characters of the rocks described when seen in thin sections under the microscope. On the whole, however, the author may be congratulated on having produced, within a very moderate compass, a clear and exact exposition of geological science.

Farm Poultry. By G. C. Watson. Pp. x + 341. Illustrated. (New York : The Macmillan Company, 1901 ; London : Macmillan and Co., Ltd.) Price 5*s.* net.

THIS popular sketch of poultry farming is a very useful addition to the Rural Science Series. Mr. Watson has written for practical men, and gives working details on every part of his subject, but he has at the same time written in a really scientific spirit. Scientific terms are, indeed, entirely avoided ; the language is clear and simple ; but the principles which underlie good practice are in every case brought to the front, so that a rational

acquaintance with the subject is ensured. There is, perhaps, no department of farming which suffers so much from mismanagement as the poultry yard, yet the industry is of national importance. Mr. Watson reminds his readers that the annual value of farm poultry and eggs produced in the United States, according to the census returns of 1890, exceeded the annual value of the coal, iron, and mineral oil produced during the same period. In England we have no such statistics, but the Trade and Navigation Returns show that the imports of poultry and eggs to this country amounted last year to the value of 6,416,468*l*. The book has numerous illustrations.

R. W.

The Collected Scientific Papers of John Couch Adams. Vol. ii. Pp. xxxii+646. (Cambridge University Press, 1900.)

THE astronomical papers in this volume have been ably edited by Prof. Sampson. The first eighteen papers form a connected series on the lunar theory, and are substantially the lectures on that subject which Adams used to deliver at Cambridge. As an aid to the student they probably surpass any text-book that has been written on the subject. It has been said that the difficulties of the lunar theory begin where the text-books usually leave off, but Adams introduces the reader to many of the practical difficulties of the numerical work, such as the slow convergence and small denominators.

The other astronomical papers are miscellaneous in character and must have taxed the editor to the utmost, for, to quote the preface, "the papers . . . were almost devoid of arrangement. . . . It would have been a hopeless task . . . had not almost every page been dated. This permitted reference to a diary. . . ." Among the most interesting papers are those on Jupiter's satellites, a subject which Prof. Sampson has made his own, a paper on an infinite determinant in the motion of the moon's node which shows that Adams came nearer than anyone else to anticipating Hill in his treatment of the lunar theory, and some papers on the moon's secular acceleration.

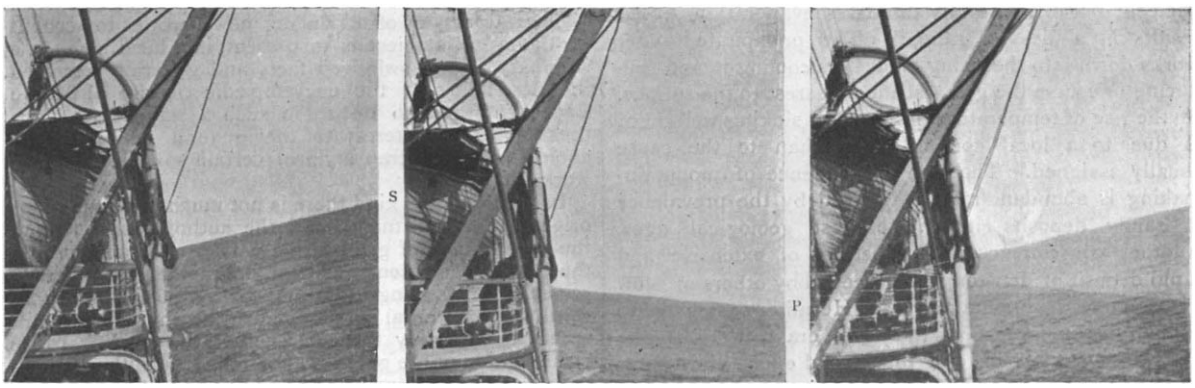
The second and larger half of the volume is devoted to Adams' papers on terrestrial magnetism edited by his brother, Prof. W. C. Adams. These consist chiefly in a determination of the Gaussian magnetic constants, a problem for which the material is even now scanty, owing to the fact that such magnetic observatories as there are, are for the most part closely grouped together in one portion of the earth's surface.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Rolling Angle of a Ship found by Photography.

WHILE crossing the Pacific Ocean between Auckland, N.Z., and Sydney, N.S.W., in the Union s.s. *Mokoia*, I wished to determine, if possible, the rolling angle of the ship by some means, other than that of the inclinometer, which the captain allowed me to inspect from time to time. As the period of rolling was long, it seemed quite possible that an ordinary kodak camera might be manipulated and a fresh film introduced, between the end of the roll to port and then to starboard. This turned out to be the case: the results are shown in the pictures A and B, which indicate the inclination of the ship to the horizon, to starboard and to port, respectively. The films when developed and finished were superposed, so that the pictures of the ship in each photograph coincided. The print made from this combination of the pictures B and A gives the composite picture C, in which the horizon in picture A is separated from that in picture B by the angle shown, which when measured with a circular protractor was found to be 19° 6′. After a few trials, no difficulty was experienced in making the exposure at the right time, viz., at the ends of a roll. Better results might have been obtained on dry plates, as films do not stand high temperatures well. The film B is very slightly distorted. The angle may also be found by means of a single picture; in this case a small stop should be used, and the exposure made for a longer period than that of one roll; the angle then appears as a rather faint fan, but the definition at the ends of the roll is not so well defined as when two pictures are made and then superposed.



Union Steamship Co.'s *Mokoia*. Rolling angle found by photography. A is a picture taken at the instant of the end of rolling to the right, S: B is a picture taken at the instant of the end of rolling to the left, P; C is a composite picture made by superposing the two films, A and B. The pictures of the ship are made to coincide, thus the angle between the two horizons in A and B is found. Lat. 34° 27′ S. Long. 157° 43′ E. To Sydney 325 miles.

Since my return to England, I find that M. Huet, of the French Navy, used a photographic method for indicating the rolling angle. But as his work on the subject is only in the hands of the French Naval Department, it cannot be consulted. His method is referred to in Sir W. White's "Manual of Naval Architecture." After obtaining the results shown in picture C, I devised an apparatus whereby the inclinometer angle may be simultaneously compared with that found by the photographic method. By this means, the positions of the inclinometer are also recorded on the films on which the horizon appears, so that the angle shown by the inclinometer may be at once compared with the angle found by the photographic method, which is entirely free from the errors inherent in pendulum inclinometers.

F. J. JERVIS-SMITH.

British Instruments at the Paris Exhibition.

IN connection with the English exhibits at the Paris Exhibition last year, it may be worth while to quote the concluding paragraph of this part of the impartial and very carefully con-