which call for more careful and precise statement, but on the whole the work is calculated to be useful, and we can recommend it for school use.

Glimpses of Feverland: or, A Cruise in West African Waters. By Archer P. Crouch, B.A. Oxon. (London: Sampson Low, 1889.)

IN this volume Mr. Crouch presents a record of the impressions made upon him by the land and people of certain portions of West Africa, which he visited in connection with the laying of a cable to put various places, principally French and Portuguese, in telegraphic communication with Europe. A large part of the book is devoted to an account of what he saw during his passage from Accra, on the Gold Coast, to the Portuguese island of St. Thomé. Afterwards we have a full description of St. Thomé and St. Paul de Loanda, and in several concluding chapters the author sums up the incidents of his voyage homewards. Mr. Crouch is so good an observer, and has so frank and lively a style, that his narrative, taken as a whole, is fresh and interesting, although his subject is often, apart from his treatment of it, dreary enough. He is particularly successful in those passages in which he seeks to give his readers glimpses of native customs and superstitions. It is worthy of note that he has formed a very unfavourable judgment as to the intellectual and moral qualities of the Negro race; but on this question, with regard to which he differs widely from Mr. Stanley, he perhaps speaks rather more positively than the extent of his experience warrants.

LETTERS TO THE EDITOR.

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The Meteoritic Theory.

I HAVE during the past six months been led from the study of our own atmosphere to consider certain phenomena relating on the one hand to the solar *atmo-physics*, and on the other hand to the evolution of our own globe and its atmosphere. There has thus arisen in my mind a system of cosmogony which has led me, quite independent of Mr. Norman Lockyer's published course of reasoning, back to a meteoric theory that will, I hope, be acceptable to yourself and others. Awaiting the preparation of these views for publication, I have had occasion to look over the report on the total eclipse of the sun, July 1878 (Professional Papers of the Signal Service, No. 1, Washington, 1881). I quote from pp. 49 and 50 some paragraphs to show the connection between views then held and those at which I have recently arrived.

Washington, April 29.

CLEVELAND ABBE.

"Under these circumstances, I could but regard the suggestion that occurred to me on July 29 as a slight but important extension and modification of the views previously held. . . . It amounted to saying that a large part of the phenomena of the outer corona is essentially non-solar, having to do with cold meteoric matter that is beyond the solar gaseous atmosphere and is shining by reflected light, . . . rushing on its way to plunge into the sun's atmosphere, where, within a few hours, it would be dissipated. . . . That these beams were due to wholly new meteor streams . . . now for the first time approaching the sun. . . . I am now inclined to extend this view to very many of the radiating dark and bright lines observed during eclipses, and would explain most of them as due to brightly illuminated groups and streams of meteors and to large meteors followed by trains. . . . Those meteors that enter the solar atmosphere and become incandescent will of course shine with a greatly increased splendour, and thus constitute a portion of the inner corona; these thus show us the limit of the gaseous atmosphere of the sun. . . . The extreme limit may be located at a distance

of five minutes (of arc) above the sun's surface, and is very likely to be less than this. . . . Meteors glow as shooting-stars when they strike our atmosphere with a relative velocity of from twenty to forty miles per second, and at an altitude of about one hundred miles, where the density of the atmosphere may be about 3×10^{-9} times that which prevails at the surface. Now these same meteors will, when they have approached to within 130,000 miles of the sun's surface, have a momentum at least a hundred times greater than that with which they enter the outer limit of the earth's atmosphere; therefore we are allowed to assume the density of the outer limit of the supposed solar atmosphere to be but the hundredth part of that of the earth, or 3×10^{-11} ; this gives us for the base of the solar atmosphere a density and a pressure quite within plausible bounds."

The Structure and Distribution of Coral Reefs.

THOSE who have read the additional appendix in the edition just published of Mr. Darwin's work on coral reefs will doubtless have observed that whilst the recent evidence there produced against the theory of subsidence lies chiefly in observations on living reefs in the Florida seas, in the Western Pacific, and in the Indian Ocean, the new testimony advanced on behalf of the theory is in the main indirect in bearing, and is based on assumptions that have yet to be proved.

Referring to the latter evidence in the order of mention, I come first to the 90-fathom reef off Socotra, a reef that is assumed to have been lowered by a movement of subsidence into its present position. So defective is our knowledge of the depths at which coral reefs may grow, and so incomplete is our acquaintance with the complex agencies that combine to produce a coral reef or to limit and prevent its growth, that the inference respecting the depth of the Socotra reef may be truly characterized as based on an unproved assumption. At present our acquaintance with the fauna of the submarine slopes of tropical islands in the Indian and Pacific Oceans, between the depths of 20 and 100 fathoms, is of the scantiest description; and we are not in a position to hazard even a guess on the subject, much less to assume that an island like Socotra has experienced a movement of subsidence because it possesses a reef "submerged in some places to a depth of over 90 fathoms." It is owing to our ignorance of the fauna in these depths that it has not been possible to identify the great numbers of minute molluscan shells, which occurred in the upraised post-Tertiary muds discovered by me in the Solomon Islands; and it is of the lack of such knowledge that Prof. K. Martin in his recent great work on the Tertiary formations of Java naturally complains. Surely, when the biologist is fain to acknowledge his want of acquaintance with the matter, and when as a consequence the palæontologist and the geologist have to bring their labours to a standstill from the lack of comparative material, it seems rather dangerous for the coral reef speculator to assume what has never been properly examined.

If, therefore, we have yet to determine the limit of depth of the growth of coral reefs, we are scarcely in a position to advance as evidence in behalf of subsidence the thickness of certain upraised beds of coral limestone in the West Indies and in the Sandwich Islands. Even if such evidence should be ascertained to be valid in itself, it must be remembered that Mr. Murray in his theory places no limit to the possible thickness of coral reefs, and that in the outward growth of a reef a considerable thickness may be produced. There was, in truth, no circumstance more impressed on my mind in the Cocos-Keeling Islands than the seaward extension of coral reefs.

Once more, however, I would impress on future investigators the extent of our ignorance of the depths in which coral reefs may form. In one of my papers (Proc. Roy. Soc. Edin., 1885-86, p. 887) I have pointed out that the estimates of observers in different regions vary between 5 and 40 fathoms. It is also singular how different observers may vary in the conclusions they draw from the same lines of soundings. The soundings off Keeling Atoll were made by Captain Fitzroy himself, and he places the limit of depth at 7 fathoms ("Voy. *Adventure and Beagle*," ii. 634); whilst his companion, Mr. Darwin, judging from the same soundings, concluded that it lay between 12 and 20 fathoms. In truth, as long since pointed out by Prof. Semper, the whole question of the depth of the reef-coral zone has never been methodically investigated. It never occurred to Mr. Darwin or Prof. Dana that coral reefs might grow in depths beyond the belt of sand that apparently limited their growth. Yet