

The Earth and its Story; a First Book of Geology. By Prof. Angelo Heilprin. Pp. 267. (Boston: Silver, Burdett, and Co. London: Gay and Bird, 1896.)

THIS is a most attractive little book of geology. It presents very clearly the general facts concerning the formation, structure and development of the earth; and notwithstanding its popular character, it contains a large amount of the more detailed information required by the elementary student of the subject.

Prof. Heilprin begins with the decay of rocks, and then describes the appearances and origins of the commoner rocks. The subsequent subject-matter follows in this order: formation of mountains and valleys, snow and glaciers, underground waters, relation of the sea to the land, the earth in its interior, volcanoes, earthquakes, coral and coral islands, fossils, physiognomy of the land-surface, common and useful metals and minerals, building stones, soils and fertilisers, and common rock-forming minerals. It will be seen from this outline that the book is comprehensive enough to meet the needs of the average student; its form is also popular enough to attract a large number of lay readers.

The volume is most liberally illustrated, and the illustrations possess the immense advantage of being reproductions from photographs. There are sixty-four full-page plates, most of them containing two pictures, and all of them exhibiting striking objects or phenomena. We do not know of a better illustrated introductory textbook of geology than the one which Prof. Heilprin has given us. The book is more suitable for use in American colleges and high schools than in our own; but there ought to be a demand for it on this side of the Atlantic.

The Climate of Bournemouth in Relation to Disease, especially Phthisis. By A. Kinsey-Morgan, M.D., &c. Pp. 51. (Bristol: John Wright and Co., 1897.)

THE important part which climate plays in the etiology and cure of lung diseases is well recognised. In this essay Dr. Kinsey-Morgan shows the advantages which Bournemouth offers to consumptive patients, or to persons suffering from any form of chest disease. He differs from writers on continental health-resorts and sanatoria, inasmuch as he points out how hygiene and medical influences must supplement climatic conditions, and insists that wholesome sanitary surroundings are more important points to be considered than particular thermal or mineral waters.

LETTERS TO THE EDITOR.

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Carbon in Bright-Line Stars.

IN an article "On the Question of Carbon in Bright-line Stars," in your issue of January 28, Prof. Lockyer makes the following statement in reference to our paper "On Wolf and Rayet's Bright-line Stars in Cygnus."

"As a result of their work, they make the following statement: 'Our observations appear to us, however, to be conclusive on the main subject of our inquiry, namely, that the bright blue band in the three Wolf-Rayet stars in Cygnus, and in DM 37° 3821, is not coincident with THE BLUE BAND OF THE BUNSEN FLAME.' The capitals are mine. It will be seen how carefully Vogel, in the case of comets, and myself, in the case of stars, had pointed out that it was not a question of the Bunsen flame!"

I am glad that the last words of the quotation from our paper were put in capitals, as they emphasise the assertions which we had to meet, namely, Prof. Lockyer's assertions in an article in NATURE (vol. xlviii. p. 344):—

"In the Bakerian Lecture for 1888, I gave a complete dis-

ussion of the spectra of bright-lined stars, as far as the observations went, and the conclusion arrived at was that they were nothing more than swarms of meteorites, a little more condensed than those we know as nebulae. The main argument in favour of this conclusion was the presence of the bright fluting of carbon which extends from 468 to 474."

Now, this bright fluting of carbon is that known as the blue band of the Bunsen flame. The variations of the position of maximum of brightness which may take place within it, were fully discussed in our paper, and do not affect the range of wave-length. Even the anomalous band photographed from a vacuum tube at South Kensington gives little help, for it is scarcely necessary to repeat that in two stars the bright band lies outside this region; and in the other, though the maximum falls near the more refrangible limit of the blue carbon band, a large part of it falls outside the carbon band.

But Prof. Lockyer himself puts beyond doubt that by his words, "the bright fluting of carbon," he did mean what we call "the blue band of the Bunsen flame," for he goes on to say (NATURE, *loc. cit.*):—

"Direct comparisons of the spectrum of all three stars in Cygnus, with the flame of a spirit-lamp, have been made by Mr. Fowler, and SHOWED AN ABSOLUTE COINCIDENCE OF THE BRIGHT BAND IN THE STARS WITH THE BLUE BAND OF THE CARBON SEEN IN THE FLAME. It was found quite easy to get the narrow spectrum of the star superposed upon the broader spectrum of the flame, so that both could be observed simultaneously."

The capitals are mine. Now, bright bands having an absolute coincidence with the blue band of carbon in the flame, could be no other than the blue band seen in the Bunsen flame. This was the assertion which we had to meet; an assertion stated to be supported by direct comparisons of the stars with a carbon flame. It was, therefore, necessary for us to make it clear that this assertion was incorrect; and to say, in words which could not be mistaken, that "the bright blue band in the three stars is not coincident with the blue band of the Bunsen flame."

I am not aware that Prof. Lockyer has withdrawn the observations made at South Kensington. They are certainly remarkable, indeed unique, in the annals of spectroscopic research, for Mr. Fowler saw the blue band of his flame to have ABSOLUTE COINCIDENCE with three different star bands, which, all three, differ from each other in wave-length.

If the blue band, differing in position in each star, were the blue carbon band, as Prof. Lockyer asserts it to be, we should certainly expect to find in the spectra of the stars indications of the other bands of the carbon spectrum, especially of the bright green band and of the orange band. Now, there are bright bands in these parts of the spectra of the stars: but we state in our paper, as the result of a very careful direct comparison of these bright places in the star-spectra with a carbon flame, that there is no connection whatever between the bright star bands and the carbon flutings. This important result has been fully confirmed by the recent measures of these bright star bands taken by Prof. Campbell. His measures of the bright places in the star spectra, which are well seen upon the continuous spectrum, show with certainty that they have not their origin in carbon. Prof. Lockyer says that "Prof. Campbell does not discuss the origins of the lines and bands which he has measured."

Prof. Campbell's words are:—

"It is now a question of identifying the lines and bands with the lines of known elements, and of assigning to these stars their true place along with other types of celestial objects. A most perplexing question! The hydrogen lines, H α , H β , H γ , H δ , are present, but the other lines do not admit of certain identification. Prominent iron and other lines may coincide with a few of the star lines, and the line at 4480 suggests a magnesium origin; but there are not enough points of identity with well-known artificial or stellar spectra to enable us to draw any safe conclusions" (*Astronomy and Astro-Physics*, 1894, p. 472).

As Prof. Vogel's name is prominently brought forward in Prof. Lockyer's article, it may be well to say that Prof. Vogel has nowhere identified the blue bands in the Wolf-Rayet stars, of which he was the first to determine the wave-lengths with any approach to precision, with the blue radiation of carbon.

I should perhaps point out that, though Prof. Campbell does suggest magnesium, he is careful not to make any suggestion as to the presence of carbon.

WILLIAM HUGGINS.
Upper Tulse Hill, S.W., January 30.