monument descends solid into the volcano would be interesting were there any way of reaching the problem, but for the present there would seem to be none such.

On June 13 last, in company with M. Guinoiseau—one of the observers of the French Commission—I made the ascent of Pelée, and from the immediate crater-rim took a series of photographs of Pelée's singular process, probably the most impressive piece of nature that I had ever seen. The volcano, by comparison with what it had been before, had 'slumbered down to peace,' but yet it was too active to permit us to descend into the crateral-hollow, 300 to 350 feet in depth, that still surrounded the new cone. Steam- and sulphur-puffs were issuing everywhere, and avalanches of rock were repeatedly being disengaged from the obelisk. Pelée was still 'ugly,' and the night before, the southwest base of its crown or plug was glowing with fire—with the liquid lava that was rising in rift-passages. Two days later I noted a feeble line of steam issuing from the absolute apex of the summit, suggesting a continuous passage or channel extending from base to summit. On March 26 a discharge of incandescent balls was observed also to take place from the same position.

Geologists will naturally make a comparison between the Pelée structure and that which was observed to rise in Georgios, in Santorin, in 1867; but the dome of the latter is probably nearer to the cone of Pelée, and suggests little of the obelisk and of its method of formation. And, perhaps, not much more can be said in any comparison that might be made with the 'pyramidated' summits of some of the equatorial volcanoes of South America, whose contours have been given to us by Professor Stübel.

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July 18, 1903.

CURRENT NOTES ON METEOROLOGY.

HEALTH ON THE ISTHMUS OF PANAMA.

IN a recent number of the *Monthly Weather Review* (Vol. XXXI., No. 3) General Henry L. Abbot, who has for some years made a special study of the climatological conditions of the Isthmus of Panama, publishes a summary of the climate and health of that district which will prove of general interest at the present time. General Abbot has previously written several discussions of this subject, some notes on which have appeared in these columns. Probably what General Abbot has to say about health on the Isthmus will have the greatest interest just now. Regarding the earlier health statistics, during the construction of the Panama Railroad, it is stated that they 'are well known to have been appalling.' But, as is pointed out, "at that date it was not understood that natives of the temperate regions can not safely perform arduous manual labor under exposure to a tropical sun, and that dependence for such work must be placed upon the negroes of the West Indies. White men can supervise, but must not attempt more." The table of 'Official Health Statistics' of the Panama Canal, published in the article, may be briefly summarized as follows:

Old Company, 1881–1888, percentage of mortality from disease (European and tropical), 5.97.

Receiver, 1889–1894, percentage of mortality from disease (European and tropical), 2.88.

New Company, 1895–1901, percentage of mortality from disease (European and tropical), 2.61.

The marked improvement shown in recent years is attributed by Dr. Lavoisade, the medical director of the company hospital near Panama, to the better accommodations of the laborers, better drainage, and especially to the fact that the excavations have reached a level below the poisonous emanations of decaying organic matter. For the years 1898–1901 the percentage of mortality from disease was 2.35, which is said not to exceed that on large works in any country. The men herein concerned had, however, been long on the Isthmus. As to yellow fever, the disease most to be feared by unacclimated persons of the white race, during two recent epidemics (in 1899 and 1900), only two cases appeared among the personnel of the company. Dr. Lavoisade believes that yellow fever 'is in no wise necessarily endemic' on the Isthmus.

CLIMATE AND RAILROADING.

As the subject of a thesis in the course in General Climatology in Harvard University, Mr. Robert M. Brown took 'Climatic Factors in Railroad Construction and Operation,' and some of the results of the study are embodied in an article under the above title in a recent number of the *Journal of Geography* (Vol. II., pp. 178–190). For purposes of classification the different districts of the world are arbitrarily grouped as regions of heavy precipitation; of moderate precipitation; of light precipitation; of high altitudes and of severe winters. In each of these regions there are climatic difficulties which must be solved by the engineers and operating officials during construction, and after the road has been built. Where the rainfall is heavy there is decay of ties, sleepers and bridges; there are floods and landslides. In regions of light rainfall there is great danger of fire; water must be piped for long distances or else carried in tanks; labor is often difficult on account of the heat; sand is blown by the wind, accumulating on the rails, blinding the drivers, and injuring the machinery. When the altitude is high, mountain sickness, snow blockades and snow-slides must be overcome. In regions of severe winters ice breakers may be needed to keep open lakes and rivers, or temporary rails may be laid on the ice; snow and ice hinder construction and operation, and the number of working days may be seriously reduced. Mr. Brown mentions specific instances to illustrate these various climatic controls, and the article is a distinct contribution, albeit an incomplete study in itself, on the human side of climatology. It so happens that three railroads now building, or projected, furnish numerous excellent examples of the kind of control considered in Mr. Brown's paper. These are the proposed Trans-Canada and Trans-Australian lines, and the Uganda Railway. The former is interesting because of the high latitudes which it is to traverse; the second, because its route lies across the central arid portion of Australia, and the third by reason of its being in tropical Africa.

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RADIUM AND HELIUM.

A paper bearing in a remarkable way on the connection between these two elements, which is now exciting so much interest, has been received for publication by the Royal Society from Sir W. and Lady Huggins. Prompted, in fact, by theoretical ideas, they attacked the problem of the spectroscopic analysis of the light emitted directly by a radium salt at ordinary temperatures. Preliminary visual observation seemed to show traces of bright lines in a continuous spectrum. Preparations were accordingly made for photographic record by means of a small quartz spectroscope constructed some years ago for use on very faint celestial objects. After several trials, a spectrum, consisting of eight definite bright lines in the ultra-violet, entirely different from the spark spectrum of radium, and some faint lines together with a very faint continuous spectrum, was obtained by 72 hours' exposure to the glow. The lines were of some breadth, on account of the wide slit that had to be employed in order to admit sufficient light; but it was found possible to measure their wave lengths within an error of two in the fourth figure. On a comparison of this spectrum, so different in type from an ordinary phosphorescent spectrum, with the recorded measurements for helium, it appeared at once that four, and perhaps five, of the eight lines agreed with lines of helium within the uncertainty of the measurements. Another line, that of the highest refrangibility, agrees with a line in the spark spectrum of radium itself, which, however, has not been recorded by other observers; the two other lines, the lowest, have not yet been traced.

It will be remembered that last year Professor Rutherford produced striking evidence for the view that, in the very slow break-up of radium that is concomitant with its radioactivity, the inert gas helium is one of the products formed. Recently Sir W. Ramsay and Mr. F. Soddy have succeeded in detecting helium by the spectroscope in the gases extracted from a radium salt. If, as the present observations indicate, the radium salt shines spontaneously in the dark largely by light belonging to the different element helium, an-