

a considerable depth", show worn-down surfaces of low relief. Holmes is quoted as saying that "the steep slopes of the Inselberg¹ peaks and mountain blocks [of Mozambique] are always free from deposits of lateritic constituents"; but the stage of physiographic evolution in areas where laterite occurs is not mentioned. In Fermor's review of the studies by Lacroix on laterites in Guinea, to which reference is made by Mr. Dixey in a footnote, it is said that "lateritization is everywhere intense where the slope of the ground is low enough to permit the infiltration of water and allow it to remain for a long time in contact with the rocks" (*GEOL. MAG.*, 1915, p. 128). As laterite is usually developed on deformed or crystalline rocks, the most probable means of giving them a surface of low slope is by long-continued degradation; that is, by permitting their physiographic evolution to advance to a late stage in a cycle of subaerial erosion.

The principle here involved has found application in the active search for manganese ores by members of the U.S. Geological Survey during the War; for the ore was often found to be related to some former lowland of erosion, now uplifted and more or less dissected. The nickel ore of New Caledonia is similarly situated; it occurs on uplands which, as far as I could judge, during a trip around that long island in 1914, are residuals of an uplifted and subaerially dissected peneplain (see "Metalliferous Laterite in New Caledonia": *Proc. Nat. Acad. Sci.*, vol. iv, 1918, pp. 275-80).

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GLACIAL EROSION.

SIR,—I must leave it to my friend Professor Gregory to discuss in detail Professor W. M. Davis' paper on "The Glacial Erosion of Snowdon", but as the question covers a far wider area, I should like to state that I still think glacial erosion to have been, comparatively speaking, an agent of minor importance in the formation of mountain valleys. My views were expressed in the paper on "Alpine Valleys in relation to Glaciers" (*Quart. Journ. Geol. Soc.*, 1902, p. 690), in which I refer to three others in the same journal in 1871, 1873, and 1874, which three were the fruit of some fifteen years' work. Since then I have visited the Alps (more than thirty three times in all), the Pyrenees, and several other regions, with this question always in mind, with the result that I doubt whether Professor Davis has really explored any of the regions which I describe. How many of the lateral valleys in the Alps has he ascended to their head? Has he seen the Creux de Champ, the Fer à Cheval, the Am Ende der Welt, the Croda Malcora,

¹ Is the English language really so geographically incompetent that we must say Inselberg, Hinterland, and Thalweg instead of residual mountain, back country, and stream line?

the Rothstock Cirques, the Creux du Vent (Jura), with Gavarnie and other cirques in the Pyrenees? I may add that I saw in 1908 from a steamer two rather small but good cirques on the flank of Salina (highest point 3,156 feet) in the Lipari Islands. In these and other countries, this question has been always in my mind, so that I cannot recede from the position which I have assumed.

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THE CAUSES OF GLACIATION.

SIR,—In *Nature* of July 29, 1920, is an article by Dr. C. G. Abbott, of the Smithsonian Astrophysical Observatory, entitled "Solar Variation and the Weather". In it he gives an account of observations on solar radiation. These "showed on their face a variability over an extreme range of 10 per cent. . . . The sun appeared to be a variable star having . . . a fluctuation in the march of years . . . a fluctuation running its courses in a few days, weeks, or months. Both are highly irregular". The article contains comparisons of observed changes in terrestrial temperatures with observed changes in solar radiation. "It is very striking that the solar changes produce such large and prolonged temperature effects."

In speculations on the causes of Glacial Periods the suggestion has been put forward that sun-heat may have varied in past ages. Apparently there is evidence that variation is occurring even now, and that its variation is capable of producing considerable changes in temperatures on the surface of the earth.

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