In part xii the author finishes with some "general conclusions", but we rather disagree with him that "some conclusions seem inevitable". The volume is so essentially a collection and statement of facts that part xii might well have been omitted without much loss, especially as those who will use the book presumably have, or should have, at least a general knowledge of the theories of the origin and concentration of oil and gas. That subject in itself is so extensive and important that to skim lightly over it in a page or two hardly strikes one as in keeping with the rest of the volume. As is essential to a book of this nature it is well indexed, which adds materially to its value as a work of reference.

The publishers are to be congratulated on the printing and general style of the book, though here and there exception might be taken to the proof-reading, which has been by no means perfect.

CORRESPONDENCE.

S. B. J. SKERTCHLY'S STONE IMPLEMENTS.

SIR,—I am anxious to trace the implements obtained by the late Mr. S. B. J. Skertchly from deposits of the districts around Brandon and Mildenhall, which he claimed to be of mid-Glacial age.

I should be glad if anyone in possession of any of these would kindly inform me of the fact, giving all details concerning the labels, and if possible, outline-figures of the specimens.

I trust that you will be able to help me by inserting this letter in the GEOLOGICAL MAGAZINE.

JOHN E. MARR.

SEDGWICK MUSEUM, CAMBRIDGE.
August 5, 1920.

LINGULA IN THE CHALK.

SIR,—Mr. G. W. Butler will find published records, now of some standing, in Brydone's *Stratigraphy and Fauna of the Trimmingham Chalk* (London: Dulau & Co., 1900), and in Griffith & Brydone's *Zones of the Chalk in Hants* (London: Dulau & Co., 1911). At Trimingham it has been found both in the white chalk and in the grey chalk.

R. M. BRYDONE.

27 MAYBURY MANSIONS,
MARYLEBONE STREET, W. 1.
July 24, 1920.

PHYSIOGRAPHIC RELATIONS OF LATERITE.

SIR,—At the end of his article in the May number of the Magazine Mr. F. Dixey gave a summary of the conditions affecting lateritization in Sierra Leone, but did not include a physiographic factor

which appears to be of prime importance, namely, a late stage in a cycle of subaerial erosion, when the slow removal of rock waste from a worn-down land surface permits deep penetration of weathering with very slow movement of ground-water, and thus allows time for the various chemical reactions upon which lateritization so largely depends. The general statement of this aspect of the problem is as follows.

Conceive the changes suffered by a recently elevated region, composed mostly of such rocks as commonly underlie laterite. In the early or youthful stages of the cycle of erosion thus introduced, narrow valleys will be incised by the main rivers; the steep valley sides will exhibit bare rock or will be thinly covered with coarse rock waste which creeps rapidly down the slope to the river below, while the ground-water percolates downward more rapidly still. Laterite cannot be formed under such conditions. In a later or mature stage of the cycle, many branch valleys will also be incised, and all the valleys will be opened to slopes of a moderate degree; both strength and variety of relief will thus reach their greatest values. The valley sides will then be covered with a thicker cloak of finer rock waste, but the down-slope creep of the waste and the downward percolation of the ground-water will still be comparatively rapid; little or no laterite will be formed. In still later and much longer-enduring stages of the cycle, the valleys having been already deepened about as much as possible, the inter-valley hills will be slowly subdued to moderate or small relief, and their slopes will be reduced to gentler and gentler declivity. Thus a condition is reached in which the removal of rock waste from the general surface of the region and the movement of ground-water are very much slower than they were on the side slopes of the mature valleys. Weathering will now enter to greater and greater depths, ground-water will linger in the deep soil, and chemical changes will have time for deliberate operation. If no upheaval of the region takes place, the subdued hills may eventually be worn down to the gentle undulations of a peneplain, in the old age of the cycle, and on such a surface the processes of lateritization find their optimum.

If upheaval takes place after the peneplanation and lateritization of a region, the laterite will be quickly removed where narrow valleys are rapidly incised in the early stages of the new cycle of erosion; but the laterite will remain on the upland areas until, as maturity is approached and reached, these areas are invaded and consumed by branch valleys. The occurrence of laterite in different parts of the world gives much support to this view of its origin.

The relation of lateritization to physiographic old age thus involved is indirectly implied in Mr. Dixey's statement that "in the more hilly and mountainous parts of [Sierra Leone] . . . laterite is not nearly so well developed" (p. 214). It would be interesting to learn if the other areas, where "the solid rocks have been lateritized to

a considerable depth", show worn-down surfaces of low relief. Holmes is quoted as saying that "the steep slopes of the Inselberg[1] 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 submaturely dissected peneplain (see "Metalliferous Laterite in New Caledonia"; Proc. Nat. Acad. Sci., vol. iv, 1918, pp. 275–80).

W. M. DAVIS.

HARVARD UNIVERSITY.
May, 1920.

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?