

favour of his theory and resorts to microscopic evidence in its difficulties. The popularity of this method of settling problems which concern the roots of all geological reasoning is assured, if only the exclusive discussion of authors whose decisive sections are totally erroneous by their own testimony can be persistently maintained.

P. W. STUART-MENTEATH.

ST. JEAN DE LUZ.  
*September 15, 1908.*

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#### GLACIER GRAINS.

SIR,—I have pointed out<sup>1</sup> that in caves cut in the ice of glaciers, and also on the surfaces of glacier ice at high altitudes in places protected from the sun, the glacier grains are finely striated, the striations on different grains running in various directions. As each glacier grain is a distinct more or less strained crystal, it seemed advisable to determine whether the surface striations produced by evaporation bear any relationship to the crystalline structure of the ice grains.

Tyndall has pointed out that when, by means of a burning glass, the sun's rays are focussed in ice, liquid discs or flowers appear in the interior. These discs or flowers would, of course, be at right angles to the optic axis. I, therefore, last August, from the upper cave of the Rhone Glacier, cut samples of ice which showed these striations, and then by means of a burning glass produced the liquid discs within. In all cases these discs proved to be parallel with the external striations. One crystal in particular showed this very clearly. It was cut from a prism of ice and was striated on three sides. Not only were the striations on these faces in agreement, but the liquid discs produced by the sun's rays throughout the interior of the ice were in all cases in the same plane as the striations on the surfaces.

R. M. DEELEY.

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#### THE OCCURRENCE OF FLINTS IN AN OLD GRAVEL-BED NEAR NEWBIGGIN-BY-THE-SEA (NORTHUMBERLAND COAST).

SIR,—Some years ago I first found flints in this deposit. Previously their presence had been unknown, and, so far as I am aware, nothing has since been published concerning them. The gravel-bed is of pre-Glacial age and lies upon sandstone of the Coal-measures, the only available section being that exposed in the cliffs between Newbiggin and the mouth of the River Wansbeck. Here it may be traced for a distance of 480 feet. At its northern boundary it is seen to rest against an ancient cliff running in a direction normal to the present sea-front, and at this point the gravel is over 18 feet thick, the total height of the cliff being 22 feet.

<sup>1</sup> *GEOL. MAG.*, 1907, p. 529.

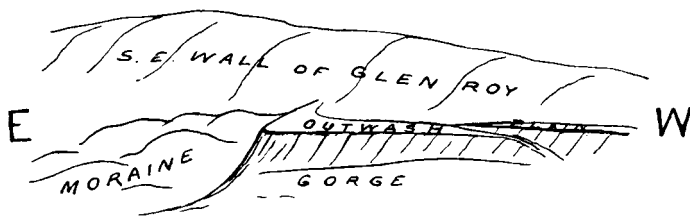
Southward the gravel thins out, until at a distance of 470 feet from the old cliff the section is only 1 foot thick. The bed consists of pebbles for the greater part, sandstones, porphyry, etc., of the neighbourhood. They are all well-rounded and water-worn. The flints are old chalk flints, usually broken and angular in form, occasionally flaked as if broken by impact with other stones, and sometimes red in colour. Their presence here seems to indicate the existence, somewhere in the bed of the North Sea, of Cretaceous deposits, probably derived from the Chalk formation which appears to have at one time existed in the North of Scotland, and of which the rounded, water-worn flints of Aberdeen are remains.<sup>1</sup>

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#### A RECENT VISIT TO GLEN ROY, BY AN AMERICAN GEOLOGIST.

SIR,—In June last it was the writer's good fortune to visit Glen Roy with the excellent paper by Jamieson in his hand (*Quart. Journ. Geol. Soc.*, 1892, vol. xlviii, pp. 5–37). It is a pleasure to confirm from observation the correctness of the conclusions reached by the author. It seems to the writer, however, that there are indications in the valley of a later chapter of glacial history, which, from enquiries, it is inferred has not yet been worked out, if it has indeed been noted. The object of this communication is to draw attention to the more clearly revealed facts in order that others who are nearer the locality may search for additional indications of this glacial episode.



The great glacial dam at the south base of Bohuntine Hill is clearly a terminal moraine laid down at the margin of the ice which proceeded from the Ben Nevis centre and impounded the drainage of the glen to produce one of the local lakes. There is, however, another heavy morainal obstruction in Glen Roy, situated just above the entrance to Glen Glaster, which affords the clearest evidence that the glacier

<sup>1</sup> [See the following:—(1) "On the Cretaceous Fossils from the Drift of Moresat, Aberdeen," by G. Sharman & E. T. Newton, *GEOL. MAG.*, 1896, pp. 247–54, giving a list of fifty-three species belonging to the Lower Greensand, Gault, Upper Greensand, and to the Upper and Lower Chalk. (2) A second paper also in this Magazine for 1898, pp. 21–32, by A. J. Jukes-Browne & John Milne, giving a list of fifty-nine species, all from the Speeton Clay, Lower Greensand, Gault, and Upper Greensand, but none from the Chalk.—*ED. GEOL. MAG.*]