CORRESPONDENCE.

A NATURAL "EOLITH" FACTORY BENEATH THE THANET SAND.

SIR,—A paper by Mr. H. Warren has been published recently by the Geological Society (*Q.J.G.S.*, vol. lxxv, part 3, No. 303, January, 1921), entitled "A Natural 'Eolith' Factory beneath the Thanet Sand", which, in view of the erroneous statements it contains, I ask permission to criticize in the pages of the GEOLOGICAL MAGAZINE.[1] Mr. Warren describes a certain series of naturally fractured flints found in the Eocene Bullhead Bed at Grays in Essex, and proceeds to compare these specimens with others—regarded by most archæologists as humanly fashioned—found under totally different conditions in various parts of this country. To those who take an interest in pre-historic archæology, the occurrence and nature of these pressure-fractured Eocene flints, such as Mr. Warren discusses, have been known for years past. In 1910 M. l'Abbé H. Breuil published in *l'Anthropologie* (t. xxi, 1910, pp. 385–408) a detailed account of a large series of specimens—similar to those found at Grays—discovered by him at Belle Assise in France, while in 1914 I was able to describe the flaked and broken flints which I had found in the Bullhead Bed at Coe's Pit, Bramford, near Ipswich (*Proc. Prehis. Soc. of E. Anglia*, vol. i, part 4, pp. 397–404).

It is not my intention to reopen the discussion upon the characteristics of these typical examples of flints broken by natural pressure, nor again to point out the fundamental differences between them and those found by Mr. Harrison upon the plateau of Kent, and of others of different forms recorded from the sub-Crag detritus bed. I would merely ask those who may regard Mr. Warren's paper seriously to compare the drawings of the specimens found by him with those of the Kentian and sub-Crag implements which have been illustrated in the publications of various learned societies. Such a comparison will at once show the marked differences between these shattered and fragmentary Eocene specimens, and the two other classes of flaked flints mentioned. I may say that I saw the selected material exhibited by Mr. Warren when he read his paper before the Geological Society, and I do not hesitate to affirm, with a full knowledge of all the facts, that it is preposterous to claim that the Grays specimens have any real bearing upon the flints found by Mr. Harrison and by myself. And I am amazed at Mr. Warren's lack of caution in describing, in his paper, such fractured specimens as he has found as "Kentish and sub-Crag forms of chipping" and "Carinate sub-Crag forms of chipping". The publication of such statements makes it perfectly clear that he has no real knowledge of

[1] Those who wish to refer to my published opinions upon this question will find them set forth in *Science Progress*, No. 41, July, 1916, pp. 37–50.

the Kentian and sub-Crag implements. If a comparison is made of the drawings which illustrate the Abbé Breuil's paper, already mentioned, with those published by Mr. Warren, it will be seen that the two series portray specimens of a very similar character. Both papers describe and illustrate fractured flints of the haphazard kind, such as would be expected to be produced by some natural, non-human force, and it would be easily possible, by imitating Mr. Warren's methods, to claim that at Belle Assise and at Grays there exist "Natural 'Palæolith' Factories", and so to emulate the efforts of those who, in the past, refused to believe in the human origin of any pre-Neolithic flaked flint.

I notice that on p. 243 (paragraph 4) of his paper, Mr. Warren draws attention to one of the Eocene flints, in the following words: "A polished mark, associated with a series of V-shaped incipient fractures, indicates the passage of an intermittent jolting force. . . . Among these Bullhead flints such marks are usually lines of high polish, and not scratches. Upon exposure to atmospheric influences the crushed flint would weather out and leave a slight groove."

I have never yet seen a "V-shaped" incipient fracture such as is described above, nor do I believe that it exists, except in Mr. Warren's imagination. These incipient cones of percussion—for that is what they are—are caused by the point of the agent of striation passing over the surface of the flint subjected to the striating movement. They are more or less circular in form, but, in such a case as Mr. Warren describes, none are complete, and a series of half-circles (occurring in a line) very close to, and sometimes overlapping, each other is to be observed. This line indicates the path taken by the agent of striation, and the succession of contiguous semicircles is caused by the numerous blows administered by the unevenly travelling point of the agent of striation.[1]

In course of time small cracks appear to develop from the ends of and extend these incipient fractures (giving rise to what are sometimes known as "centipede markings", from their superficial resemblance in outline to the legs of this creature), and these extensions have, apparently, misled Mr. Warren, and have induced him to describe the incipient fractures upon his specimen as being definitely shaped like a V.

I am interested to see that he adopts the view, already published, as to the weathering out, under atmospheric influences, of such incipient fractures, but I notice that he omits to mention the original paper in which this matter was first made public. In case the suppositions contained in this paper should turn out, eventually, to be

[1] For a very complete and interesting description of analogous incipient fractures produced in the surface of glass by grinding and polishing the reader is referred to a paper entitled "More Notes on Glass-grinding and Polishing" by Mr. James Weir French (*Transactions of the Optical Society*, vol. xviii, January, 1917). In this paper Mr. French points out (p. 22) that the direction of the movement of the agent of striation was always found to be towards the *convex* side of the semicircular fractures.

incorrect, and Mr. Warren caused to bear a responsibility which there is no need for him to shoulder, I beg to state that the paper to which I refer will be found in *Science Progress*, No. 44, April, 1917, pp. 597–603. It is entitled "Scratches on Flints", and was written by me.

On p. 247 (paragraph 6) of Mr. Warren's paper a description is given of a large flake, the bulb of which is "cross-cut by the éraillure which was formerly supposed to be the exclusive character of the human blow". Who is the unfortunate person who has been responsible for making such a palpably absurd statement as this? Perhaps Mr. Warren can supply me with the needed information, but whoever made such a statement must be singularly devoid of even a rudimentary knowledge of flint fracture. Mr. Warren's paper is, in my judgment, not calculated to help towards the solution of the serious archæological problems it purports to discuss.

J. Reid Moir.

February 26, 1921.

THE GLACIATION OF IRELAND.

Sir,—I accept Professor Gregory's implied reproof of my habit of "regarding views that" I "do not accept as simple mistakes", and plead in mitigation of any penalty that my article in the February Geological Magazine is only the second time in twenty years that I have indulged in public controversy. I should be greatly interested if Professor Gregory would suggest any logical method by which I could indicate my dissent from opinions with which I disagree without regarding their author as mistaken.

As to the general subject of the glaciation of Ireland, I am perfectly content to leave such of your readers as are interested to compare my criticism with what Professor Gregory deems an adequate answer.

There is, however, one point which raises wider issues than those of Irish Geology. In answer to my observation that the Roscrea esker is not at the northern end of the mountains, but a few miles south-west of the southern end, he retorts that "They" (the Roscrea, Clonaslee, Mount Mellick, and Maryboro' eskers) "are part of one crescentic series around the northern end of the range. Moreover, the term Slieve Bloom Mountains is sometimes used (e.g. Phillips [*sic*] *Atlas of Comparative Geography*, and the map used in Carvell [meaning Carvill] Lewis' *Glac. Geol. Gt. B. and I.*, 1894, opp. p. 83) to include the geological continuation of the range south-west of the Roscrea Gap".

To make good this extended use of the name Professor Gregory does not appeal to his own map or to any authoritative map of Ireland, neither to Griffith's nor the beautiful layered maps of the Ordnance Survey, but to Carvill Lewis's little "track-chart" on the scale of 31·5 miles to 1 inch, in which—apparently to meet the exigencies of space—the lettering of "Slieve" begins about 5 miles south-west of Roscrea, and, actually, to a half-crown school atlas!