

N.W. of England it is a strikingly *original* formation, as proved by the freshness of the numerous and generally parallel striæ on the included stones. It is, however, confined to low levels.

D. MACKINTOSH.

FURTHER REMARKS ON VULCANICITY.

SIR,—The statement of your footnote at p. 127 of my Reply to Mr. Scrope (*GEOL. MAG.* for March, 1874), in which you say that "Mr. Mallet in this and other passages certainly misapprehends Mr. Scrope," does not seem to me justified by the facts, and I beg of you to permit me to explain why.

The objections made by me to the supposition of a thin crust and a great liquid nucleus are alike applied by me to the hypothesis of Hopkins, of a thin crust covering his subterranean liquid lava lakes. I have throughout my reply linked these together. Whether, therefore, Mr. Scrope now continues to adhere to the former notion, as I am warranted in taking from the tenor of almost all his writings,—or whether, as in the papers in the *GEOL. MAG.* Vols. V. and VI., to which you direct attention, he more recently is disposed to abandon the moribund thin crust and liquid nucleus theory, and to fall back upon the thin crust and fiery lakes of Hopkins (for the views in the papers above referred to seem to me neither more nor less than that),—I have not, as I believe,—certainly not consciously,—misapprehended Mr. Scrope. The difficulties of Hopkins' notion, as adopted by Mr. Scrope, are just as great as those of the older one of thin crust and liquid nucleus, with this additional disadvantage,—that whereas the latter is an assumption that may stand alone, the former (Hopkins' or Mr. Scrope's) is an hypothesis as arbitrary, and which cannot be admitted at all without admitting another hypothesis previously, upon which it must depend.

10th March, 1874.

ROBERT MALLET.

ORIGIN OF THE FLEET.

SIR,—I can assure Col. Greenwood that I have read his valuable book more than once, and each time with considerable profit to myself; still I cannot agree with all his conclusions. My paper on the origin of the Lagoon called the Fleet is not as explicit as I would wish, as I intended to point out that the sea-banks are due to the principal currents, which are usually the incoming tidal currents. In some places, as off the S.E. coast of Ireland, the prevailing winds and incoming tidal currents act conjointly; but west of Carnsore point [the S.E. headland of Ireland] there are cross-tides, apparently due to the curl round the Salter Islands: and here we find, at the lagoon called Ballyteige mudlands, that the beach travels from Crossfarnoge Point towards the W.N.W., although the prevailing winds are from the S.W. and S.S.W.; while on the coast of Mayo, between Killiney Bay and Clew Bay [a coast apparently most favourable to the formation of bars and lagoons], the beach has no regular set, but goes sometimes north, at other times south, or inland or seaward, although there are on this coast nearly constant winds from between the south and west, generally a few points off S.W. From what I

have seen, it would appear that, no matter how the wind blows, it has very little effect on shingle beaches, except while the tide is coming in; on sand beaches, however, it is otherwise, as the wind acts most while the tide is out, as it has a greater extent of bare sand to blow over. Perhaps, however, it is not fair to draw a comparison between the tidal work in the open seas west and south of Ireland with that effected in the narrow seas round England, as in the first there may be great oceanic waves rolling in, unaccompanied by wind, which, as on the previously-mentioned coast of Mayo, may obliterate all windwork; while in narrow English seas windwork ought to be more effective. Col. Greenwood in his letter (*GEOL. MAG.* March 1874, p. 143) states: "It is the prevalent S.W. wind which throws beaches across the mouths of our streams on the south coast,"—while I would suggest that it is the incoming tidal current from the W.S.W., aided in part by the wind, that is the great worker; for if wind could act alone, in no place would we find a beach travelling up wind.

On a coast where there are never any breakers or high waves except during winds, a vessel could not be floated by the tidal current over one of these sea-banks. But all shores are not so situated; for at Aranmore, at the entrance of Galway Bay, on the 15th Aug. 1862, during a perfect calm, a wave, over twenty-five feet high, came in and swept 15 people off who were fishing on the Glassan rock: while at the same island, in A.D. 1640, a wave, at least 60 feet high, came in and swept over the low portion of the island known as the Blind Sound [*Mem. Geol. Survey, Ex. Sheets, 103 and 113, p. 12*]. But in general great waves are due to the incoming tide with a wind blowing in a similar direction.

G. H. KINAHAN.

ON THE ORIGIN OF THE ESTUARY OF THE FLEET. REPLY TO MR. KINAHAN.

SIR,—Mr. Kinahan has not attempted to disprove my theory of the formation of the Fleet, but has substituted another which he prefers. I have, however, some objections to offer to it. He considers the shore-line of the Fleet to have been formed by marine erosion. That this has not been the case appears evident from a mere inspection of the Ordnance Map. Compare, along the whole sheet, the outline of the open coast with that within the Fleet, and it will be seen at a glance that its character is totally different. "The old marginal cliffs" of the Fleet, supposed to have been degraded into slopes, never, in fact, existed. There are no cliffs old or new except the very low ones, which have been formed by the lap of the small waves got up within its confined area.

Mr. Kinahan says that "as long as the lagoon exists, so must the Chesil Bank, as the waters of the Fleet keep the bank from travelling inwards." This is incorrect, because the bank does travel inwards, slowly but surely, as may be seen by examining its inner margin. In heavy storms, like that of 1824, the sea washes over it, and heaps of shingle are thrust forwards into the Fleet, where they remain undisturbed.