

sea. Supposing, then, the general contour of the land to have been *in the main*, what it now is, previous to that submergence, are not almost all the phenomena described by Mr. Mackintosh precisely such as we might expect to have been produced by such a subsidence as would permit the sea to flow into the existing valleys of Wales? Are not the traces<sup>1</sup> of sea-action, which he finds, more consistent, in short, with the theory of a temporary submergence of land already modelled into nearly its present contour, than with that of the eating out of such an intricate network of "fiords" by the gradual operation of the sea upon an elevated and rocky land? How, again, I would ask, can Mr. Mackintosh possibly explain the formation of such a long tortuous gorge as that, for example, through which the river Alyn flows for some miles above Gresford? Taking that gorge in connexion with the ridge of Drift-gravel, at the east of Gresford and Wrexham (the old sea beach, perhaps,) through which the river cuts its way, we have as clear a case as may be of *river-action*. And if there, why not in other similar gorges throughout the country? Even Mr. Mackintosh will scarcely argue that the long alternations of tunnel and deep cutting, through which so many of the limestone rivers of Yorkshire find their way, were made for them by the sea.

I am, Sir, yours faithfully,

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*To the Editor of the GEOLOGICAL MAGAZINE.*

SIR,—Mr. Hull's letter on the "River-denudation of Valleys," in your number for October, is valuable as again calling attention to a very puzzling fact, which I agree with him in thinking has not yet received a perfectly satisfactory explanation. I pointed out some time ago two cases in North Staffordshire of a valley crossed by a watershed, exactly like the instances described by Mr. Hull, but on a larger scale.<sup>2</sup>

It is not, however, my intention to attempt a solution of this knotty problem, but to point out one sentence in Mr. Hull's letter, so plausible, and, at the same time, so illogical, savouring of the *post hoc ergo propter hoc*, that I hope the author will excuse me if I show the flaw in his reasoning.

The sentence is, "It is less incredible (to say the least of it) to assume the agency of the sea in the formation of these valleys (or parts of them), which we know *was* there, than that of a stream of which there is no trace."

The argument stated formally runs thus :

We know that the sea has been over the ground now occupied by the vale of Todmorden.

<sup>1</sup> Except, indeed, his supposed instances of "sea-worn summits of hills," about which I confess I am rather sceptical.

<sup>2</sup> See the Memoir of the Geological Survey on the country round Stockport, Macclesfield, Congleton, and Leek (p. 13).

We do not know *for certain* that any stream has run through the valley.

Therefore it is less incredible to assume that the sea cut out the valley than that it was made by a stream. In a like strain, a stranger, unacquainted with the antiquity of the valley, might urge.

We know that Mr. Hull, heavily shod and armed with a ponderous hammer, after the manner of field-geologists, has been often seen in the neighbourhood of what is now the vale of Todmorden.

We do not know for certain that any stream has run through the valley.

It is, therefore, less incredible that the valley should have been excavated by Mr. Hull than that it should have been hollowed out by a stream.

I do not say that Mr. Hull's argument is as absurd as this; but both break down for the same reason, because both involve a tacit assumption—the one, that the sea, and the other, that my worthy colleague, is capable of performing the task assigned to him.

Indeed, it seems quite to have escaped Mr. Hull that before the claims of sea against river can be entertained at all, we must show that sea and river *can* both cut out valleys like those described; we must be able to point to valleys excavated by the sea alone, as well as to valleys hollowed out by rivers; and, having thus shown that *a priori*, it is an open question whether the sea or a river has been the cause of any given valley, other considerations, like those brought forward by Mr. Hull, come in to decide which of the two has the better claim.

In short, the first clause of the argument wants to run thus:

We know that the sea has been over the ground now occupied by the vale of Todmorden, *and we can also point to cases of like valleys which have undoubtedly been hollowed out by the sea.*

Mr. Hull has tacitly assumed the important part in italics; and, if he were justified in doing so, his conclusions would legitimately follow: but I utterly deny that the above would be a true statement of the case in the present state of our knowledge; we are told, on good authority, of valleys which can be due only to stream-action—witness those of Auvergne; but where shall we find a long, narrow, winding inlet which has been undoubtedly cut out by the sea alone?

The ungrounded assumption, which I have noticed, is so constantly made, that I have thought it worth while to dwell on the subject at length, and have left no room for the more agreeable task of confirming, from other sources, the accuracy of Mr. Hull's facts, and endeavouring to give some explanation of the difficulties they offer: but this I hope to attempt before long.

I am, Sir, yours obediently,

A. H. GREEN.

116, DODWORTH ROAD, BARNSELY,  
October 10th, 1866.