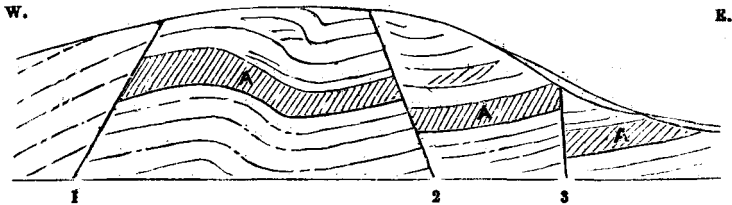


stratification, yet, I confess, the clearness of the bedding, and the sharpness of the fissures convinced me that in this instance there had been several vertical displacements. The following is the section:—



FAULTS IN DRIFT SAND AT ROCHDALE.

The height of the section is about fifty-five feet; the length two hundred feet. The throw of No. 1 is down to the west; No. 2 down to the east ten feet; No. 3 down to the east twelve feet. The beds between Nos. 1 and 2 are much contorted.

The whole section is composed of fine white or yellow sand, with occasional layers of gravel, and contains in the centre a well marked band of loamy sand (A. A. A.), which shows exactly the amount of displacement. Three faults are shown. The amount of throw in two of these is twelve feet and ten feet respectively; that of the third being uncertain. The sand is the middle member of the Drift series according to my classification, lying between the upper and lower tills, or Boulder-clays, neither of which are shown in this section.

As to the origin of these apparent faults I do not venture an opinion. It cannot be owing to mining operations, as the position is beyond the out-crop of the *Arley Mine*; besides this the amount of the slip is much greater than would be caused by the ground giving way in consequence of the extraction of a seam of coal less than five feet in thickness. On the other hand, it must not be forgotten that very considerable vertical elevations of the solid strata have occurred in the interior of the country since the Drift Period, amounting to at least 2,000 feet, and it is not improbable that old fissures may have been re-opened, or even new ones made in the older formations, which would pass upward into the overlying drift-beds.

I am, etc.,

EDWARD HULL.

#### ON THE PARALLELISM OF THE DRIFT DEPOSITS IN LANCASHIRE AND THE EASTERN COUNTIES.

To the Editor of the GEOLOGICAL MAGAZINE.

DEAR SIR.—I hope you will not think it highly objectionable if I address you twice in the same month; but while I have my pen freshly steeped in Drift, allow me to draw attention to the remarkable similarity of the Drift-series in the Eastern Counties as indicated by Mr. S. V. Wood jun., and that in Lancashire and Cheshire, described by myself in a paper "On the Drift Deposits in the

neighbourhood of Manchester.”<sup>1</sup> That this similarity may be made more apparent I here place the two series in juxtaposition.

DRIFT DEPOSITS OF THE NORTH-WESTERN AND EASTERN COUNTIES.

*N. W. Counties.*

3. Upper Boulder-clay, or Till.
2. Middle sand and gravel.
1. Lower Boulder-clay, or Till.

*Eastern Counties.*

3. Upper Drift (Boulder-clay).
2. Middle Drift (sand and gravel).
1. Lower Drift (Boulder-clay).

I see that Mr. Maw, in the March number of the GEOLOGICAL MAGAZINE, endeavours to show that the above is not the true order in time of the Lower and Upper Boulder-clays in the Eastern Counties; but he allows that the evidence is not conclusive, as the true relations of the coast Boulder-clay (1) and the high-level Boulder-clay (3) have not been laid open to inspection; but from his own account I should conclude that the evidence is in favour of Mr. Wood's classification, as he says, “there are very many instances of the coast Boulder-clay being capped with gravel, and of the Boulder-clay of the high ground being super-imposed on a subjacent gravel bed; it must be admitted that these gravel beds correspond in height, and in many cases present the appearance of continuity, but proof of their identity seems to be wanting.” I should say from the above, that if the *proof* is wanting, the *evidence* is very strong.

Any evidence which shows the sequence in the Drift deposits on the opposite sides of England to be similar is of such value, and is so great a stride towards simplifying our knowledge of the quaternary beds, that I, for one, sincerely hope Mr. Wood's classification will ultimately be established beyond the possibility of a doubt; and as regards the succession in Lancashire and Cheshire given above, more extended investigations made since my paper was written, have confirmed me in the belief that it is a real and widely-extended sequence of deposits of the Glacial period.

I am, etc.,

EDWARD HULL.

THE ORIGIN OF ESCARPMENTS.

*To the Editor of the GEOLOGICAL MAGAZINE.*

SIR,—May I beg the insertion of a few observations upon a letter by Mr. Mackintosh which appears in your MAGAZINE for March.

It will be remembered that Mr. Mackintosh, in the interesting articles which first invited discussion in your pages, repeatedly declared his belief in the marine origin of escarpments, and as frequently referred to “terraces,” etc., thereon which were thought to support his views. Bearing this in mind, I was a little surprised to find the following admission in his letter of last month. “These longitudinal valleys and basins, which are *not open plains*, and which often occur in what *must once have been land-locked situations*, appear the more mysterious the more frequently they are contemplated.” I think Mr. Mackintosh must admit that marine action would be wholly unable to erode continuous lines of cliffs in “land-locked

<sup>1</sup> Mem. Lit. and Phil. Soc. of Manchester, vol. ii. third series, 1863-4.