

hours, and that it was particularly useful in warming a bedroom, where only a slight elevation of temperature was required, and perfectly free from the production of dirt or the slightest smell.

None of the products of combustion entered the room, and the ventilation was improved rather than impeded.

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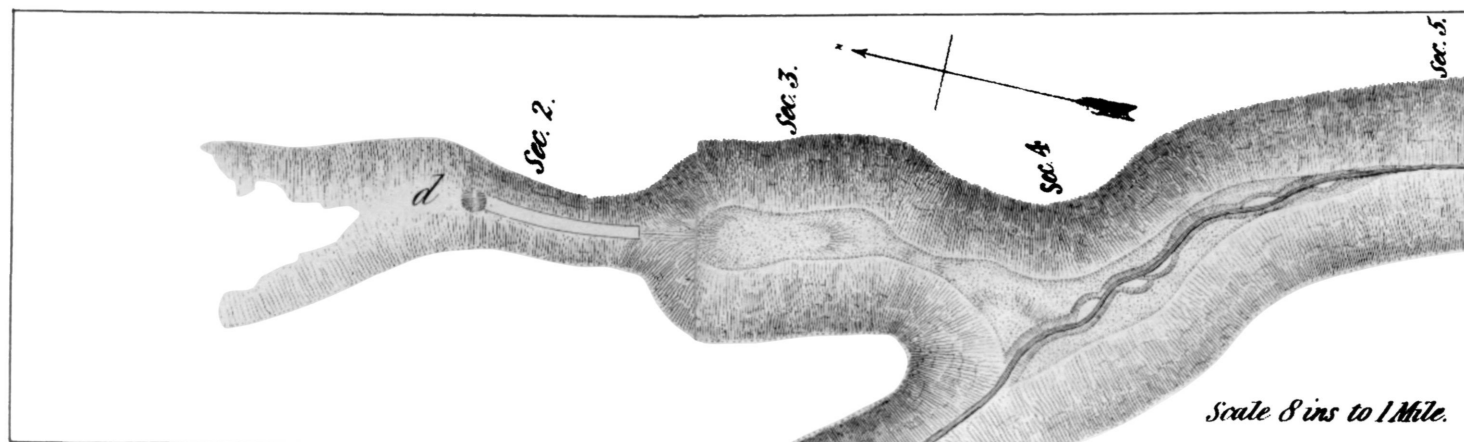
ON THE EXCAVATION OF THE VALLEYS IN THE TABULAR  
HILLS, AS SHOWN BY THE CONFIGURATION OF YED-  
MANDALE, NEAR SCARBOROUGH. BY H. C. SORBY,  
ESQ., F.G.S.

The Tabular Hills are a range of flat-topped hills, extending from Scarbro' westwards to near Thirsk. They are composed of coralline oolite, or calcareous grit, at the top, overlying Oxford clay, Kelloway's rock, cornbrash, and the upper sandstone and shales; and their peculiar configuration is very clearly traceable to this structure. The part to which I shall particularly refer is that near Scarbro'. Proceeding from the low flat tract of the vale of Pickering, the surface of the hills rises gradually to the north for some distance, and then the top becomes nearly level, having no undulations, and diversified only by deep-cut ravine-shaped valleys; the configuration and origin of which is the subject to which I wish to call your attention.

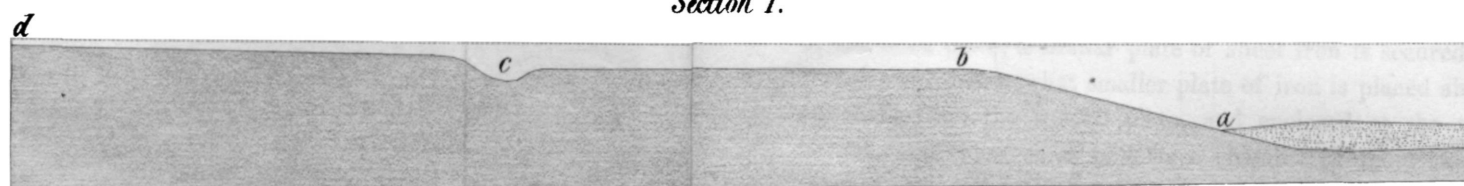
The nature of these valleys will be best understood from *Sec. 5, Plate III.*, where a portion of the level top will be seen on both sides, and the ravine-shaped valley cut sharply out, with the sides inclined at an angle of 30°.

We have, therefore, in these valleys a case in which it might with considerable propriety be concluded that they had been produced by the action of the streams now running in them, inasmuch as their form is the same as would be produced by such action, continued for a long period. We

PLAN AND SECTIONS OF YEDMAN DALE



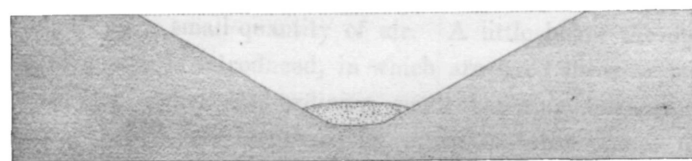
Section 1.



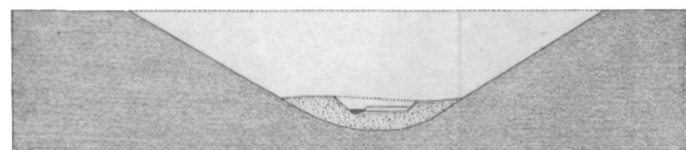
Section 2.



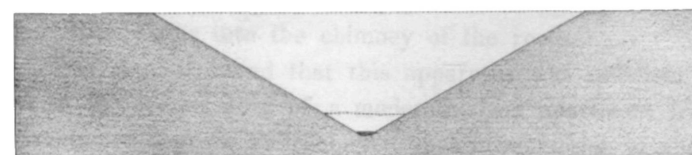
Section 3.



Section 4.



Section 5.



Scale of 100 Yds

have, however, in the case of Yedmandale, an association of circumstances that have, in a remarkable manner, preserved phenomena which clearly prove that they are not due to this agency, but to some other not now in action in the locality.

The configuration of that branch of this valley which exhibits these facts will be seen from the accompanying plan. The sides in every part, except those which I shall mention below, are inclined at an angle of  $30^{\circ}$ , and are quite straight from the top to the bottom, as shown by the sections. In the bottom we have a deposit of loose, coarse, not much water-worn detritus, of local origin, which is not deposited horizontally, but undulated, as indicated by the shading. It is owing to the coarse nature of this deposit, and to the fact of the neighbouring valley of the Derwent being about 300 feet deep, whilst Yedmandale is about 100 feet, that there never has been a brook in its northern arm; for the chief drainage passes into that deeper-cut valley, and what little runs into Yedmandale soaks away amongst the coarse detritus, without forming any brook. We have, however, a stream in the north-western portion of the valley, as will be seen from the plan; which, however, after passing along for some distance, is lost amongst the detritus, in a part below that shown in the plan. *Sec. 3* is across the northern arm of the valley, in the part indicated on the plan, the steep sides and the deposit at the bottom being shown; the dotted line in this and the other sections indicating the position of the surface before the excavating took place. Passing northwards from this part, it will be seen that the end of the valley is round and amphitheatre-like; the central portion being inclined at an angle of  $14^{\circ}$ , and each way quickly becoming steeper. Ascending up the centre we come to a small valley with a flat bottom, as shown by *Sec. 2*; and though I could not ascertain it for certain, I think it contains no detritus. The steep sides of this upper valley round into those of the

lower one, and gradually vanish away to the north, as will be seen from the plan; the northern part being only a rounded depression, with no flat tract at the bottom. But the most remarkable feature is the small depression at the northern end of the flat tract at the bottom of the upper valley, as will be seen from the plan. *Sec. 1* is in the direction of the length of the valley, along the bottom, from the point marked *d* on the plan, to a short distance in the lower valley. The above-mentioned depression is shown at *c* of *Sec. 1*; the part from *c* to *b* is the bottom of the upper valley, and from *b* to *a* is the inclination down the centre of the round end of the lower, with the detritus at the bottom. The brook coming down the north-western arm of the valley has cut out a small ravine, and formed some small alluvial tracts in the detritus at the bottom of the valley, as will be seen from the plan and *Sec. 4*; and as we proceed downwards it has removed the whole, and brought the valley into a state in which there is no evidence of its not having been wholly excavated by the brook, as shown by *Sec. 5*, where the lowest dotted line shows the original level of the detritus.

Taking all these facts into consideration, I think no one can imagine that any stream of water, such as now usually runs in such valleys, can have excavated Yedmandale; and from it I think we may safely infer the same of other similar ones in the locality, which, owing to circumstances, do not retain their original structure, but have been modified by the action of the brooks running in them. It is, however, not so clear what other action produced them; and though I do not wish to push theory farther than phenomena clearly lead, I must confess that a strong current from the north, when this part was below the level of the sea, offers a better explanation, in my opinion, than any other that I can suggest; and I would remark that, when on the spot, this view of the subject presented itself to my mind most strongly. The

part of all others which, I think, indicates such an origin, is the depression at the top of the small upper valley, which is precisely what a current coming from the north would produce there, as will be seen from *Sec. 1*: for a current coming in that direction, and passing the northern side of the depression, which is double the height of the southern, would have a tendency to scoop out such an excavation, in the same manner as we see in all waterfalls and eddies. Moreover, the large expansion of the valley agrees, I think, better with this supposition than with any other. Whether or no this current was one produced by sudden elevation of land to the north, and was directly connected with the erratic drift which is found in such large quantity in the neighbourhood, would be a problem of interest, but one which, I fear, would take up too much time to discuss. I might, however, remark, that I think it is more probable that it was excavated, and even laid dry to a certain extent, previously to the time when the chief part of the erratic drift was deposited; for, as far as I could ascertain, the detritus in this and similar valleys in the neighbourhood is entirely of local origin. On the contrary, the erratic drift appears to be confined chiefly, if not entirely, to a lower level, as though some portion of the higher lands had been above the level of the sea.

I will not, however, enter farther into this subject, for I am most willing to confess that I think there are many serious difficulties to contend with in adopting any theory whatever to explain the mutual connexion of all the phenomena associated together in the neighbourhood; though I am of opinion that the supposition of there having first been a wave of translation from the north, and subsequently drifting by means of ice-bergs, agrees with the whole phenomena better than any other.