

place unless the area is depressed beneath the sea, and that marine denudation will obliterate all trace of such faults at the surface. But surely if we are to call in wide areas of upheaval, we cannot limit the effects to a marine area any more than we could to a terrestrial area. No doubt at the present day there would be just so much the greater chance of a marine area being raised, as extensive oceans preponderate over extensive continents. Certain great faults have left their impress on the configuration of the country, and if that impress is modified, it is sometimes as much by subaërial as marine denudation. The Bala fault might be quoted as an example.

ED. WILSON.

NOTTINGHAM, June, 1868.

#### ON THE DEVELOPMENT OF THE LOOP IN THE TEREBRATULIDÆ.

SIR,—In your last number, Mr. C. J. A. Mejer, in a paper on Cretaceous Brachiopoda, offers some observations on the loop of *Waldheimia*, *Terebratula*, *Terebratella*, etc.

I do not wish to enter into a discussion on the desirability of separating the two former generically, the greater or lesser extension of the loop being their only distinction, but simply to say that the correctness of the figures given in my paper on "The Development of the Loop in *Terebratella*," *Geologist*, vol. iii., pl. xii., figs. 1-4, does not admit of a moment's doubt. They are not, as suggested by Mr. Mejer, very minute; and as, in the examples figured, the loops are entirely free from the matrix, they can be studied with the greatest advantage. The original sketches of the loops having been carefully drawn by Mr. Davidson will be a sufficient guarantee that they are correct.

However difficult may be the question of a change in the calcified interiors of some of the Brachiopoda, it is quite certain that with the *Terebratella Buckmanii* we have a series of shells, none of which can be separated by their external conditions, but which have notwithstanding different forms of loops; and it will be necessary either to accept the suggestion that they are different stages of growth, or else to create separate *generic* designations for shells that cannot by their outer forms even be distinguished specifically. There is little doubt that had they been obtained singly from different formations the former would most probably have happened.

It may interest some of your readers to know that I have just found the genus *Thecidium* in one of the lead veins of the Carboniferous Limestone of Yorkshire, it not having been met with hitherto in England below the Lias, or on the continent below the St. Cassian Beds. The precise age of the vein yielding it will yet have to be determined.

CHARLES MOORE.

BATH, June 18, 1868.

#### DENUATION NOW IN PROGRESS.

SIR,—In the very interesting and able article in your last number, "On Denudation now in Progress," by Mr. Geikie, he has omitted to take into consideration some circumstances of a restorative character

which tend to neutralize the waste of land now going on from sub-ærial causes.

1st, The formation of vegetable soil, often difficult to account for, the depth in some cases being much greater than in others, and apparently without an assignable cause.<sup>1</sup>

I have often observed on the grass table-land of the Cotswold range, where valleys intervene so as to prevent soil being washed from a higher elevation, that there is a tendency to an increased depth of soil rather than to a diminution, and I think the same is the case with all pasture-land. I have lately seen an instance of how quickly grass will spring up and form turf in an occupation road, which was made about six years since, on a common in the Inferior Oolite, left perfectly bare, and covered with broken stone, which is now grassed over. Of course there is no carriage traffic upon it.

In woods there is often a considerable thickness of soil, arising from the decomposition of leaves; and, I believe, the decay of grass-roots, the manure from the cattle which graze upon the grass, fully if not more than neutralizes the soil which is carried away on permanent pasture ground, by rain. We know also that the surface of the soil is increased by the enormous deposits of coprolites and guano.

2nd. The quantity of different matter returned to the soil mainly in the form of manure is very considerable. In 1867 there were in the United Kingdom 11,431,940 acres of land planted with grain, and I estimate the produce to have been 10,087,931 tons, and in addition 14,217,941 tons of straw. There were also 1,493,762 acres under potatoes, 2,805,775 under turnips, mangolds, carrots, beet, etc., and 630,878 rape and colza. Of clover and other grasses the acreage was 5,648,425 acres, and permanent pasture 22,128,391 acres. At present I have not sufficient information to allow of my calculating the produce of the green crops. From the Government returns I find that there were imported in 1867, not including linseed oil-cake, and cotton seed, which are not given, of wheat, flour, barley, oats, maize, rye, buckwheat, peas, and beans, 3,117,140 tons.

I am fully aware that these figures do not accurately represent the addition to the soil, that the imports of 3,117,140 tons are taken away from other countries, and it is necessary to consider what amount the grain, grass, roots, etc., would produce in feeding the upwards of 46,770,000 cattle, sheep, and pigs in the United Kingdom, and which again must be converted to form part of the food of our people before it is returned to the land. Some allowance would have to be made for the amount subtracted from the soil in growing the grain, grass, and roots.

These figures may, however, enable an approximate estimate to be formed, and my object in writing has been to supply information of rather a special nature, which those who have studied denudation more attentively than I have, can appropriate for the benefit of all.

CLAREMONT HOUSE, GLOUCESTER.

W. C. LUCY.

<sup>1</sup> Mr. Jukes, in his Manual, remarks that vegetable soil has not received the attention it merits.