

ridges, which are parallel to one another and to the direction of the principal valley of the district.”

Similar mounds are equally common in many parts of the Yorkshire dales: they occur, for instance, in Bishopsdale, Wensleydale, and Ribblesdale, and on the Haws between the latter dale and Wharfedale. In Westmorland, too, such mounds are common at the foot of the mountains, and they form a striking feature in the landscape of the low ground near Kendal. J. R. DAKYNS.

BRIDLINGTON QUAY.

FAULTS IN THE LONDON CLAY, NEAR HARWICH.

SIR,—The extensive excavations now going on at Ray Island, near Harwich, where the new docks are being constructed for the Great Eastern Railway Company, have exposed some splendid banded sections of the London Clay. One of these is plainly visible to the railway traveller, on the left-hand side, about a mile before he reaches Dovercourt Station. As nearly the whole of the humpy mass of land now called Ray Island is intended to be carried into the neighbouring estuary of the Stour for the erection of embankments, a notice of the dislocations now visible in the sections is of geological value.

In many places the London Clay is seen to be thrown into a series of very gentle folds. At no fewer than *nine* places in the section, small faults are as plainly visible as in a geological diagram, owing to the banded character of the strata. With one exception all the faults have an angle of about fifty degrees, the exceptional fault (seen in the railway cutting) being nearly vertical. The latter shows a dislocation of about two feet. The largest fault is visible in that end of the railway cutting nearest to Dovercourt, and measures upwards of twelve feet. A fault of more than eight feet is seen in a section near the estuary, and some of the minor dislocations occur at intervals of from fifty to one hundred yards. The line of fault is in most instances as sharply defined as if the strata had been diagonally cut through with a knife. J. E. TAYLOR.

PYRITIFEROUS SAND FROM LAKE WINNIPEG.

SIR,—I have had a sample of somewhat curious sand put in my hands by a man who has recently returned from America, and venture to think it may elicit some further information about it could you find space for my note. I send a sample of the sand; you will see that it consists of a very fine grained siliceous sand, grey in colour, the grey-ness being due to an innumerable quantity of almost microscopic concretions of pyrites. Under the microscope these are pretty objects, mostly globular, and when broken show very distinctly their concentric structure; they appear very similar on a minute scale to the concretions so commonly met with in the Cretaceous deposits, etc. Possibly they have formed round a foraminiferous or other organic nucleus, but I have not succeeded in detecting it as yet in any of the broken globules.

The locality from which the sand was brought is said to be on the

North shore of Lake Winnipeg, the section exposed being a natural one, and is as follows:—

1. Loam, 3ft.
2. Hard rock (Limestone?) 10ft.
3. Pyritiferous sand, silvery to the eye when fresh, 4ft. (exposed).

The pyrites forms so large a portion of the sand that it might be worth while to work the deposit; mere washing would probably separate the ore readily from its matrix. The composition of the pyrites is said to be Fe 46·4 S 53·6.

With regard to the origin of the pyrites, can it have been formed in situ in the sand, or is it as well as the sand the product of the disintegration of an older rock? I can find no account of any similar deposit elsewhere; the nearest approach to such a bed in character seems to be met with in beds containing diminutive spherical nodules of iron ore in Manitoba, but these are not pyrites; they are chalybite and much larger; and it is said in the report of the Survey of the 49th Parallel, that a thin film of pyrites in the Lignite deposits near Porcupine Creek was the first appearance of that mineral in connexion with those deposits.

J. MAGENS MELLO.

THE RECTORY, BRAMPTON, S. THOMAS,
CHESTERFIELD, *June 28, 1879.*

GLACIATION OF THE WEST YORKSHIRE DALES.

SIR,—Will Mr. J. W. Davis kindly tell us what evidence he has to show that either the Scotch or Lake Country ice, after traversing the valley of the Eden, passed down Wensleydale, Arkendale, and Swaledale, as stated by him in your last Number, p. 315? I think the statement must be new to most of your readers, unless they have seen a somewhat similar one in Davis and Lee's West Yorkshire. Surely if the ice took this course, these dales should abound in erratics. Yet so far as I know there are no foreign boulders in Wensleydale—only local ones. There are no erratics in Arkendale and none in Swaledale, except in the lowest part of the dale near Richmond, where it can be shown clearly that they came over the watershed from the north, out of Teesdale. Mr. Davis must have entirely misunderstood Mr. Goodchild's paper on this matter. It may look at first sight to an outsider as if the ice ought to have behaved differently, especially when it did not pass from the Eden Valley over the low watershed into Wensleydale. "But facts are chieft that winna ding." Perhaps it is not generally known that the Lake Country ice in passing over Stainmoor did not take the direction of the lowest pass, 1378 feet above the sea, and so cross where the Stainmoor railway goes over into the valley of the Greta, but it passed over higher ground further north into Deepdale, Balderdale, and Lunedale, and erratics have been found by Mr. Goodchild and myself at various heights up to 1800 feet on the watershed between the Eden and the Tees.

W. GUNN,

BERWICK-ON-TWEED,
July 12, 1879.

GEOL. SURV. OF ENG. AND WALES.