pebbles and blocks abound on the Silurian hills at the bottom, forming the lower slopes of the Cross Fell range, and even on the lower portions of its magnificent limestone escarpments, the lowest of which, the Melmerby Scar Limestone, is 131 feet in thickness. The escarpment runs along the strike of the beds, but here and there they have been cut back, and deep openings and narrow valleys break the uniformity, and well show the inward dip, even at a distance. This was particularly the case when I first saw this range, at the end of April, when the escarpments were picked out with snow, which lingered on in crevices until nearly June.

II.—NOTES ON THE EXTENSION OF THE BOULDER-CLAY OVER THE GREAT AND LITTLE ORME, AND THE CEMENTING TOGETHER BY LIME OF SOME LARGE BOULDERS IN THE CLAY NEAR THE LITTLE ORME.

By W. C. LUCY, F.G.S.

HAVING seen an account, in Notes of the Geology of the District round Llandudno, by the Rev. W. S. Symonds, that shells had been found by Mr. R. D. Darbishire, F.G.S., in some clay near the New Baths at the Great Orme, it occurred to me that the clay was Boulder-clay, and would probably not be limited to so small a patch, but that it most likely extended far over the hills. And I now propose to give, very briefly, the result of some observations on the subject made during a short stay at Llandudno.

The Orme is composed of several squatted, rounded masses of Carboniferous Limestone, resembling huge farmhouse loaves, which give form to small valleys or gullies. Now I noticed that in these valleys or gullies there was vegetation; some corn crops were growing, and on examination the soil was found to be the remains of the Boulder-clay. Near the Copper Works is a large boulder of several hundredweight, resting on the clay, which is traceable over the hill, but in places only a very thin covering is left. The highest rounded portions are bare, which may be owing to there having been no place for it to rest at the time the clay swept over the hill.

In the cuttings made in forming the roads, good sections of drift occur several feet thick, containing boulders of large size.

On the shore at the Little Orme is a fine exposition of the Boulder-clay, with imbedded drift, as shown in the accompanying sketch. It varies very much, but at the point marked + the following is an accurate section:—On the surface is about a foot of soil, resting upon four feet of Boulder-clay, followed by eight to ten feet of angular drift, some blocks of great bulk and cemented together by lime, and reposing upon ten to twelve feet of drift of smaller size only partly cemented.

Several masses of the cemented drift were lying upon the beach, and the largest two are represented by the following drawings:—Fig. 1 shows a big block of smooth limestone with a face of about 5 ft. 6 in. long, 4 ft. 6 in. wide, and 5 ft. thick, to which was attached a huge mass of the drift 7 ft. long by 4½ ft. thick, containing large

Sketch of the Little Orme from the shore, with section of Boulder-clay exposed at (+), and masses of cemented blocks lying on the beach at (o).

angular boulders with some small pebbles in a clayey matrix, all cemented together by lime, which formed a septa or division presenting a singular appearance.

Fig. 1. Mass of smooth limestone, from the shore at the Little Orme, cemented together with angular boulders and small pebbles in a clayey matrix.

Fig. 2 represents a large mass of irregular form, being 15 ft. across the top and fully 7 ft. thick. It is cemented in like manner to Fig. 1, and so firmly is it held together that it is difficult to knock out a piece with the hammer. On one side it will be seen there is an opening running into the centre about 3 ft.

Fig. 2. Large mass of breccia, similar in character to Fig. 1, lying on the beach at (o). See sketch of Little Orme.

The large blocks are mainly of Carboniferous Limestone, but in the mass are Basalt, Syenite, Quartzite, Granite, Felspathic Porphyry, Greenstone, rolled Slate, Trap, etc.

As the whole of the lime which passed through the surface soil and cemented these large masses together must have been derived from the infiltration of rain-water, acting upon and dissolving the limestone of the Little Orme, and as this occurred subsequently to the deposition of the Boulder-clay, a considerable time must have elapsed to form these conglomeratic masses of cemented detritus.

A careful mapping of the two headlands, showing the remnants of Boulder-clay and drift, would be of much service to amateur geologists of glacial phenomena like myself, when visiting this district, and I trust the same will be undertaken by some one of our Professors of Geology this Autumn season.