

## V.—FOSSILIFEROUS PLIOCENE CLAYS OVERLYING BASALT, NEAR THE SHORE OF LOUGH NEAGH.

BY EDWARD T. HARDMAN, F.C.S.; H.M. Geol. Surv., Ireland.  
(PLATE XXII.)

IN the Report of the British Association for 1874<sup>1</sup> will be found the abstract of a paper on the Age and Mode of Formation of Lough Neagh, with a description of the Pliocene clays which form an ancient and extensive delta at its southern extremity. At the time I penned the paper in question, although I was perfectly satisfied from cumulative circumstantial evidence that the clays were of much more recent date than the Miocene Basalt which surrounds the lake on three sides, I had no actual proof to bring forward—the junction of the basalt and the clay beds being nowhere visible, so far as I had had an opportunity of examining the district, this comprising all the shores of the Lough, with the exception of a small corner near Crumlin; and it was therefore necessary to state, even at the risk of tediousness, the reasons why the clays must be considered to be the uppermost, and to be of Pliocene age.

During a recent visit to this hitherto unexplored locality, accompanying Professor Hull, for the purpose of tracing the eastern boundaries of these beds, we were so fortunate as to meet with a well-exposed section, showing the clays resting on a denuded surface of basalt. This was a pleasant encounter. At the same time, one could hardly help a slight feeling of regret that so much elaborate argument had been already in a manner “fooled away,” as Mark Twain has it—to prove what was here a self-evident fact, had one but seen it in time. We were also so lucky as to find at this place the only fossils which, with the exception of plants, have yet been discovered in the Lough Neagh clays.

It may be well to mention that these beds form a very extensive and important deposit, spreading (under water and on shore) over an area that cannot be less than 180 square miles, and probably in some places about 500 feet thick. They repose on the basalt, and are covered by drift. All the evidence we have points to their being of Pliocene Age.

The locality where the particular beds I propose to describe now are found is on the Crumlin River, about a mile from the eastern shore of the Lough, and about 2½ miles from Crumlin village. The basalt is exposed for some distance along the stream, and following it downwards we came upon the following section:—

SECTION IN CRUMLIN RIVER. <sup>2</sup>										Ft.	In.
A.	River Gravel and Alluvium	...	...	...	...	...	...	...	...	18	0
	Dark Grey Laminated Sandy Clay	...	...	...	...	...	...	...	...	2	0
f.	”	”	”	”	”	”	”	”	full of <i>Unio</i> -like shells	1	0
	Dark Grey Clay	...	...	...	...	...	...	...	...	1	0
m.	Coarse Gravelly Clay—pebbles of quartz and basalt—resting in pockets and erosions of basalt	...	...	...	...	...	...	...	...	3	0
B.	Nodular Zeolitic Basalt, greatly eroded	...	...	...	...	...	...	...	...	3	0
										28	0

This section is exposed for about 40 yards. The clays are visible for some distance lower down, and in one place exhibit very well

<sup>1</sup> Trans. of Sections, p. 79.<sup>2</sup> See Pl. XXII. Fig. 1.

Fig. 1.

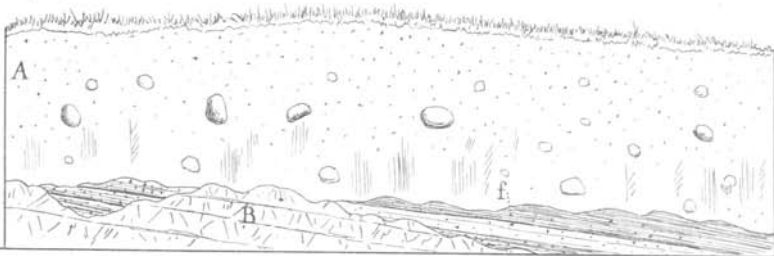


Fig. 2.

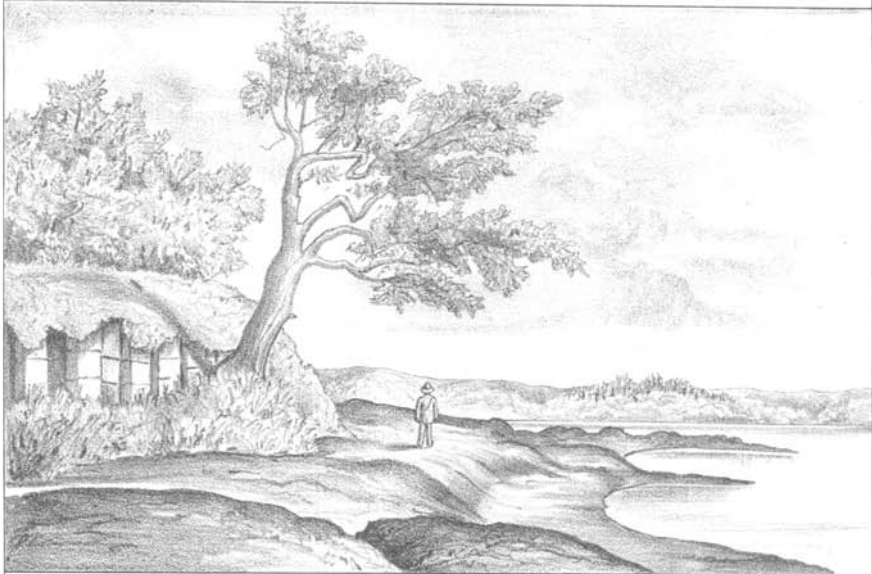
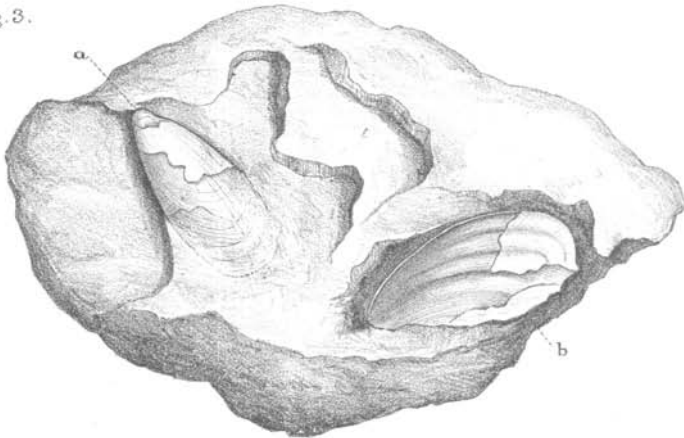


Fig. 3.



E.T. Hardman del.

A. West & Co. imp.

Fossiliferous Clays resting on Basalt Lough Neagh.

marked cleavage. The basalt on which they repose was evidently the ancient shore of the lake. It is greatly water-worn, and the pebbly clays lying on it and in the hollows are clearly shore-beds. A little higher up the stream the basalt rises abruptly into what must have been a bold shore cliff. A deposit of drift disguises the surface appearance of this, but in section it is very distinct. Some distance south of this, on the Glenavy River, the basalt presents an exactly similar aspect. The old cliff is very well shown, while a little lower down the Pliocene clays, full of plants and lignite, are found; but the junction is hidden.

The presence of these ancient cliffs not only serves to mark the former extent of the lake—which must have been at least double its present dimensions—but also shows that glaciation could not have acted very energetically in that district, since in that event it would have undoubtedly removed all traces of them.

A similar shore and cliff may be seen on the northern margin of Lough Neagh, just under Shane's Castle, Antrim (Pl. XXII. Fig. 2). But the clays do not extend so far north as this, and the basalt is laid bare on the shore, presenting rather a remarkable appearance in some places, and rounded as if by ice. Another old cliff occurs along the south side of the point jutting out by Langford Lodge. Both of these are, however, more recent than the drift.

The Lough Neagh Clays had hitherto proved barren of any fauna. I had examined carefully every excavation that had been made in the potter's clay on the south side, without success; nothing but plants being obtainable. The Rev. Dr. O'Meara, whose valuable researches on Irish Diatomaceæ are so well known, thought it likely that these clays might yield Diatoms, and I procured some specimens for him at Professor Hull's request. These, I understand, gave no result; and it appeared certain, therefore, that no fossils, save land-plants, were to be expected from these strata. It was, then, with much satisfaction, that while examining the section detailed above, I came on a bed of clay full of shells.

The fossils are mostly confined to a band about a foot thick, and are very abundant. They appear all to belong to a species of *Unio*. Owing, however, to their extremely delicate structure, and the soft and friable nature of the deposit in which they lie, it was very difficult to obtain good specimens, and unfortunately those which I brought away with me received such damage during their transit that it was almost useless to attempt to determine them. Mr. W. H. Bailey, F.G.S., to whom I submitted them, is inclined to think that they may possibly belong to a new species. They are not unlike the *Unio Solandri* (?) of the Upper Eocene of Hordwell Cliff, Hampshire, so far as external appearance goes. In Pl. XXII. Fig. 3 there is a representation of two of the shells, the originals are greatly crushed and dilapidated.<sup>1</sup> (a) will perhaps serve to give some idea

<sup>1</sup> Having been favoured by Mr. Hardman with an opportunity to examine the specimens in question, we have been led to the opinion that the lines of striae indicate rather a *Mytilus* or *Modiola*-like shell, than a *Unio*; but the shells are too fragmentary to enable one to speak with certainty even as to the genus.—EDIT. GEOL. MAG.

as to the general character of them—in this one the greater part of the shell is preserved; (*b*) shows only a cast—nearly all the shell having chipped away. The drawing is full size.

The shells are extremely thin and fragile, but the structure and markings are perfectly preserved and the nacreous lustre is still quite brilliant. I have no doubt but a palæontologist visiting the locality, and having leisure to make a careful examination, would find many perfect specimens capable of determination, and probably other species as well. In the mean time it is right to place the matter on record—seeing that this place is, so far as I know of, the only locality in the British Isles yielding lacustrine fauna of Pliocene date.

## NOTICES OF MEMOIRS.

### I.—ON CERTAIN PRE-CARBONIFEROUS AND METAMORPHOSED TRAP-DYKES AND THE ASSOCIATED ROCKS OF NORTH MAYO, IRELAND.<sup>1</sup>

By WILLIAM A. TRAILL, M.A.I., F.R.G.S.I.; H.M. Geol. Surv., Ireland.

THE author first described the locality as situated in the N.W. of the Co. Mayo, between Downpatrick Head and Broad Haven; and referred to the geological map of Sir Richard Griffith. The physical features of the district presented precipitous coast sections, attaining elevations of 352 ft. at Keady Point; 640 ft. at Benwee Geevraun; and 829 ft. at Benwee Head, and would compare favourably for grandeur and boldness of scenery with many better known localities. The geological formations composing the district belong to the Carboniferous and Metamorphic rocks. The older or Metamorphic rocks lie to the westward, extending from Broad Haven to the Glenglassera river, and consist of flaggy quartzites and micaceous schists, with partings of mica-schist; the mica is often largely crystallized out in hexagonal plates in nests or veins. Foliation is seldom developed, but the original bedding is still clearly retained, with a primary dip E.N.E. at variable angles. They are often much crumpled, contorted, and overlapped, more particularly in the western portions.

The newer or Carboniferous rocks lie to the eastward, and include the Carboniferous Limestones to the S.E. of the district, and the Lower Carboniferous Sandstones and Shales, the bottom beds of which are brought to the surface near the Glenglassera river. These latter comprise white, yellow, and red sandstones, with partings of red and green shales. They dip E.N.E. at from 3° to 8°.

They rest unconformably on the Metamorphic rocks. At Fohernadeevaun, at the mouth of the Glenglassera river, this most remarkable example of unconformability is best seen; it occurs at one side of a fault along which the sea has worn a narrow but deep chasm; the flatter Carboniferous beds dipping at 5° rest on the more highly inclined Metamorphic rocks dipping at 25° to 30°.

<sup>1</sup> Read before the British Association for the Advancement of Science, Section C Geology, Glasgow, September, 1876.