

was the first to show, in 1842,* that the Lancashire Boulder Clays were formed in the sea, and that the erratic pebbles and boulders, mainly derived from the Cumberland Lake Districts, were brought south by means of floating ice.

Most of the erratic pebbles and boulders in the Lancashire clays are more or less scratched and scored, many of them (though quite rounded) in so many directions that Mr. De Rance believes the Cumberland and Westmoreland hills to have been surrounded by an ice-belt, which, occasionally thawing during summer or warm episodes, admitted "breaker action" on the gradually subsiding coast, wearing the fragments of rocks brought down by rivers or by glaciers into pebbles that, with the return of the cold, became covered with the "ice-belt," which, lifted by the tides, rolled and dented the pebbles one against another, and gradually allowed them to be impressed into its mass, with which they eventually floated away.

The Middle Sands and Shingles in England have also afforded a great number of shells of mollusca. At Macclesfield they have been described by Messrs. Prestwich and Darbishire as occurring at an elevation of 1,100 to 1,200 feet above the level of the sea.†

Among other proofs of glacial action and submersion in Wales may be mentioned the case of Moel Tryfaen, a hill 1,400 feet high, lying to the westward of Caernarvon Bay, and six or seven miles from Caernarvon. Mr. Joshua Trimmer had observed stratified drift near the summit of this mountain, from which he obtained some marine shells; but doubts were entertained as to their age until 1863, when a deep and extensive cutting was made in search of slates. In this cutting a stratified mass of loose sand and gravel was laid open near the summit, thirty-five feet thick, containing shells, some entire, but mostly in fragments. Sir Charles Lyell examined the cutting, and obtained twenty species of shells, and in the lower beds of the drift, "large heavy boulders of far-transported rocks, glacially polished and scratched on more than one side:" underneath the whole, the edges of vertical slates were exposed to view, exhibiting "unequivocal marks of prolonged glaciation." The shells belonged to species still living in British or more northern seas.

From the gravels of the Severn Valley, described by Mr. Maw, thirty-five forms of mollusca have been identified by Mr. Gwyn Jeffreys.

* In 1840 Dr. Buckland described the occurrence of boulders of Criffel Granite between Shalbeck and Carlisle, and attributed their position to the agency of ice floating across the Solway Firth.

† Mr. Darbishire records seventy species from Macclesfield and Moel Tryfaen, taken together, of which 6 are Arctic, and 18 are not known in the Upper Crag.