

far as the vicinity of Troy. The kettle holes in these terraces mark the sites of blocks of ice which melted out after the deposition ceased. Had the blocks melted out before deposition stopped the hollows thus formed would have been filled with gravel and sand. The deposits likewise serve to show that since the kettles took on their present shape the region in which they occur has not been subjected to sediment-bearing waters, and hence it is to be inferred that the lake stages which developed in front of the retreating ice sheet in the Hudson valley did not rise so high as these deposits. How long the buried ice remained after the withdrawal of the glacier from the terraces is not precisely known. But it does not appear likely that the ice remained in these positions during the subsequent lake stages whose duration as will be seen from the evidence here submitted must have been considerable.

North of Newburg the immediate banks of the Hudson exhibit stages of retreat of the ice in coarse gravels as near Staatsburg and Hudson with correlated finer deposits on the south of each such section, separated in many instances by banks of the old gorge in which till alone mantles the wall.

Where large streams enter the gorge as at Rondout, Kingston and Catskill there are also deltas with appropriate deposits. Clays are present in the southern part of the middle Hudson valley but they are subordinated to local deltas and to local stages of deposit in front of the retreating ice as is also the case throughout the river valley south of Newburg to the sea.

From somewhere near Kingston and Rhinebeck, clays begin to form a mantle along the rock terraces of the Hudson covering all the coarser deposits made in the gorge or over the immediate banks during the retreat of the ice from this vicinity northward to the Mohawk. This limitation of the clays was early recognized by Mather. The body of the clay is evidently to be correlated with the Mohawk delta and that with the discharge of a large body of water into the Hudson valley from Lake Iroquois on the west, a matter which is considered more in detail in a following chapter on Lake Albany.

Later stages of change in the valley are shown by low terraces partly within the gorge of the river and by the excavation which has taken place in that trench.