

before the moraines, when the ice ran to the south, the direction of ice motion had scarcely changed at this locality during the retreat from the terminal moraine.

West of Tappan in New Jersey other frontal deposits similar in form to the morainal ridges at this place occur in the form of a crescent open on the north, indicating the position of the ice front at this stage in that direction.

The extension of the ice front east of the Hudson at this stage is not clearly shown by any facts now at hand.

The moraines at Tappan N. Y. and in Harrington N. J. appear by their alinement to be synchronous deposits. The water-laid drift confronting the Tappan deposits rises to 60 feet above sea level, but the plains confronting the Harrington deposit appear to rise to 100 feet. It is evident that these slopes of washed drift were not controlled by one and the same water level. Sloping plains and fans of drift are built up along certain ice fronts and along the flanks of gullied mountains, independently of water levels, to quite different altitudes above the stream beds at their base. It is therefore legitimate to suppose that these deposits may also have developed without regard to sea level or lake level, so that the sea level of the time may have been at or below the level of the lowest of these diluvial fans.

*Nyack terraces preglacial (pre-Wisconsin).* There are two well marked terraces in the vicinity of Nyack on the west bank of the Hudson, but these are so many benches formed by the Triassic sandstones outcropping beneath the Palisade trap sheet. They are everywhere except in the southern part of Nyack covered by glacial till. The lowest of these terraces is about 80 feet above sea level. The red sandstones crop out in a low bluff on the water's edge south of the village. The upper terrace is strongly marked between 180 and 200 feet and corresponds closely to the rock terrace of the Hudson at many points. Another less extensive terrace occurs south of Hook mountain between 280 and 300 feet.

On these terraces the drift is largely reddish till derived from the red sandstone and shale. For about 50 feet above sea level the surface drift is grayish and clayey, as if the ice had smeared earlier glacial clays over the rock benches.