water Cretaceous sea and covered the old muds with sand and clay deposits. The material which entered this basin after the salt water of the sea disappeared at the end of the Cretaceous period, was deposited in fresh-water lakes, and in this period—the early Tertiary—a large part of the material deposited consisted of sand and light-coloured clay. Some of the material came from the west shore, originating in the British Columbia highlands; but much of the clay was probably derived from the disintegration of the Archæan rocks to the east.

The plains during early Tertiary times were being slowly elevated. The movement was more rapid in the west than in the east and a slope to the east soon developed. The apex of the elevation, which seems to have been caused by a compressive strain in the outer crust, was in the region of the Rocky mountains, and the continuation of the uplift there developed into great earth fractures and the tilting up of large blocks in parallel ridges. The debris from this newly-broken surface was probably moved eastward and strewn over the area of the present plains. As the denudation of the plains was also being accomplished, little of this coarse pebble material has remained except the beds found on the top of the Cypress hills and another small outlier on the Hand hills. Assuming that this material represents the debris of the mountain building, the date of this would seem to be about Oligocene time.

Part of the denudation of the Tertiary and Cretaceous beds which had covered the basin with great thicknesses of shale, clay and sandstone, may have been accomplished at this time, especially in the elevated region near the mountains; but the greater part was due to a general elevation in Pliocene times. The amount of material removed may be judged when it is considered that, in horizontal strata, the valley of the South Saskatchewan shows a thickness of 2,000 feet, from the bed of the river to the top of the Cypress hills. Just where the material was ultimately carried it is difficult to say, but it was swept away, a large part probably reaching Hudson bay; and the plains assumed largely their present form.

Many of the valleys of to-day are broad depressions formed in pre-Glacial time, and some of them show old stream gravels covered by boulder clay.

The advance of the ice-sheet was from the north and northeast and the material carried by the ice was spread in a mantle of drift which extended to near the mountains. A general smoothing of the area probably occurred; but in Manitoba the edge of the Cretaceous plateau, which was deeply serrated by easterly-flowing streams, was steepened by the shearing action of the ice as it was deflected southward along the face of the plateau.

The question of the limit of the extension of the ice-sheet westward is still an open one; and the glacial till of the western part is believed by many to have been carried by floating ice. During the closing stage of glaciation the ice front held back large lake-like basins, of which the best known is glacial lake Agassiz which occupied the basin at the eastern edge of the Cretaceous plateau. This lake at first drained southward to the Mississippi. The retreat of the ice front lowered the water; but apparently the melting of the ice relieved the crust and allowed a general rise to the north, so that the lake continued to spill its waters southward over the rim of the basin until another outlet was provided to the north. This is unmistakably shown in the many beaches formed by the waters of the lake at its several stages. The upper beaches, laid down no doubt on an approximately level plain, now rise gradually toward the north. The lower ones, though curved, are tilted in less degree. At Winnipeg the lake, in its highest stage, covered the surface to a depth of 560 feet, and reached westward to near Brandon.

As many of the large drainage channels, such as the Saskatchewan river, were ice blocked during the existence of this lake, a large part of the drainage of the plateau entered the basin by the valley of the Assiniboine river. As a result of the valley cutting which ensued from this increased drainage, a great burden of fine-grained