

east, and to the southwest—while the glacier directions are exceedingly various, sometimes coinciding with, and often crossing those left by the drift.

2. Glacier striæ occur only in valleys, while the drift striæ overtop mountains; or, when found in valleys, may cross them obliquely.

3. Glacier striæ descend from higher to lower levels, except in limited spots, where they may be horizontal. Drift striæ as frequently ascend mountains hundreds of feet, and rarely descend to lower levels.

4. Drift is spread promiscuously over the surface, and the blocks are a good deal rounded. The detritus of glaciers more or less blocks up the valleys, and the fragments are frequently quite angular. These, however, are in part covered with other materials, which have descended from the mountains.

## II. MODIFIED DRIFT.

Whenever there is evidence that the coarse drift has been acted upon by waves, or currents, subsequent to its production, whereby the fragments have been rounded, comminuted, their striæ removed, and those of different sizes sorted and arranged in different layers, we call the mass *Modified Drift*. This term embraces what some authors call Pleistocene.

It should be understood, that not unfrequently, especially near the outer limits of drift action, we find beds of modified and rearranged stratified materials, beneath, and in the midst of coarse drift; nor is it possible in going upward, to draw a definite line between modified and unmodified drift. We can only say, that usually the coarse drift lies lowest, and shows less effect from water than the materials lying higher in the series. When we compare layers of the deposit at a considerable vertical distance, the difference is very distinct, but not so with those in immediate proximity. Hence it seems certain that drift and modified drift are the result of the same general causes, acting under modified conditions of the surface.

Some statements as to the means of distinguishing genuine drift from modified drift, oceanic from fluvial action, and that of ice from that of water, will be important, preliminary to a description of the several forms of modified drift.

1. *Drift proper* is the lowest part of the alluvial formation. 2. The fragments are coarser and less rounded than in modified drift. 3. The fragments are frequently striated in one direction, as if held firmly, say by being frozen into ice, and pushed over a rocky surface. 4. The materials are not generally sorted, though there is evidence often that water, as well as ice, was acting upon drift, during its production; so that in the same mass we find one portion mixed confusedly together, and another portion more or less stratified and laminated.

1. *In modified drift* the fragments are rounded, smoothed, and more or less destitute of striæ. 2. They are sorted and arranged in layers; the coarser and finer alternating. 3. In the most recent of these layers, which are superimposed upon the others, though usually lying at a lower level, the finer do the materials become, until the almost impalpable powder of alluvial meadows is met. 4. The most recent portions are deposited in a more nearly horizontal position; the surface becomes more and more level topped, and the terraces more regular, as we descend the side of the valley.

1. The deposits formed by the ocean are generally more irregular on their