may be said to have been deflected from its usual course by valleys. But this will not explain the three general directions of drift, to the southwest, to the south, and to the southeast, in New England. These, with all the minor intermediate variations, must have been produced by variations in the direction of the principal current at different altitudes of the continent.

The Beach and Sea Bottom Period.—When the land had risen to the level of the highest ancient sea-beach—about 2,600 feet in North America—the higher mountains would appear as islands. Oceanic agencies would act upon these, especially in working over and rearranging in sheltered spots the angular and crushed fragments of the unmodified drift. These would be sea-beaches: at first very limited, because the surface acted upon was small, and no streams of much size could exist to aid in the work. Every hundred feet of additional elevation would add to the number and perfection of the beaches.

The irregular accumulations described as Moraine Terraces were formed at this period. If masses of ice were stranded against the sides of hills, and deposits of sand and gravel were mixed with or piled upon them, when the ice melted elevations and depressions of this character would result.

The ancient subaqueous ridges might be formed along the shores of the ancient ocean, just as they are now produced in lakes and seas. Osars might also be formed by the currents sweeping detritus into the rear of obstructions, either of rock or ice, and escars along the eddies. Sea bottoms were deposited at the same time with the beaches.

Some writers have objected to the theory, that the drift, beaches, and terraces, were produced in connection with oceanic agencies, because no organic remains are found in them. We reply: 1. In unmodified drift in this country, the climate may have been so severe as to prevent the existence of such animals as would have left behind traces of their being. Undoubtedly they existed at that time in other parts of the world, beyond the limits of the cold. 2. In the unmodified drift of England and Scotland, broken and comminuted marine shells have been found as high as 2,300 feet above the ocean, the upper limit of the deposit. No one doubts the former presence of the ocean there; but this fact has been only recently discovered. In this country broken marine shells have been found 100 feet above the ocean in unmodified drift, and uninjured specimens more than 500 feet above the ocean in modified drift. It may be that these remains will yet be found in the whole of the unmodified drift, when more thorough explorations shall have been made. 3. Pelagic shells, or such as live in very deep water, have been found at the height of 400 feet in Canada. Hence the ocean must have been nearly a thousand feet deep in the latter part of the drift period. 4. This deposit of pelagic shells lies immediately upon the bowlder clay. Now, had this clay been produced by a glacier, and not by the ocean, the country must have sunk at least 3,000 feet between the deposition of the bowlder clay and the