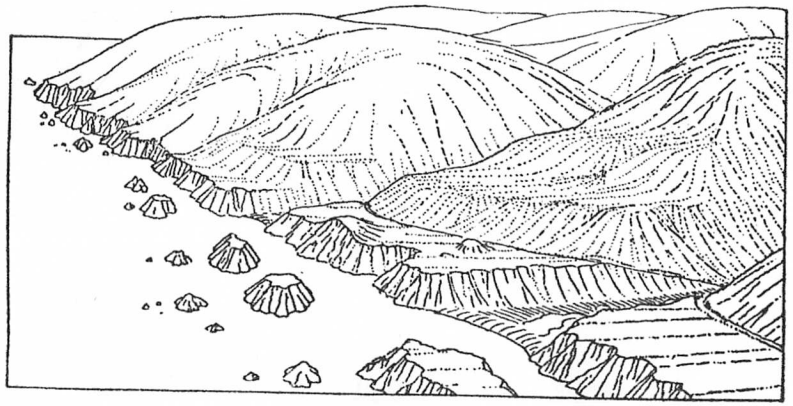

Fig. 411.—Marine terraces near Cape Viscaino, on the coast of northern California. (After W. M. Davis.)

Fig. 412.—Marine terraces at Orongorongo, Wellington, New Zealand. *C. A. Cotton, photo.*

The attack of the sea during either pauses or reversals in progressive emergence has caused the development of flights of terraces reaching up considerably more than 1000 feet above present sea-level on the coasts of Southern and Northern California (fig. 411) and central New Zealand (especially Wellington — fig. 412); but in the latter region the terraces have been strongly warped by later movements (fig 458).

CHAPTER XXX

COASTAL PROFILES (*Continued*)

The built platform. The continental shelf. The beach. Organic accumulations: coral reefs. The continental slope. Submarine canyons. Plains of marine erosion. Progradation. Offshore bars. Progradation controlled by supply of waste. Sedimentation in landlocked waters.

The Built Platform.—Far out on the platform developed by wave action at the margin of the land the waste that results from marine erosion, together with that brought down to the sea by rivers, is moved about in various directions on the bottom by the to-and-fro movement of wave-agitated water and by chance currents, some of it becoming very finely comminuted in the process, but, as the undertow gives the bottom water a preponderating seaward movement, the waste is worked slowly outward. Though the upper layer of this comminuted waste is in motion, there is generally a sufficiently thick accumulation of it on bottoms even considerably shallower than the depth of wave-base to protect the bedrock floor from abrasion. The cut platform does not then extend out to the level of wave-base, but is flanked seaward by a bank of sediment consisting in its deeper parts of waste that has travelled out into water too deep to be stirred to the bottom by wave action—that is, deeper than wave-base—and has come to rest there, and in its upper part of sediment above wave-base, the upper layer of which is subject to movement and is in process of transportation. This bank of sediment forms the *built platform* (fig. 396). The equilibrium of the sediment forming that part of the built platform above wave-base depends on continuance of the supply of waste, for, if the supply were to be cut off, transportation due to movement of the bottom water would continue, the sediment lying above wave-base would thus be gradually removed, and if bedrock were exposed by the stripping away of the sediment it would be subject to abrasion as long as any fragments large enough to act as tools remained upon it. The depth at which the cut platform ends and the built platform begins thus depends on equilibrium between waste supply and

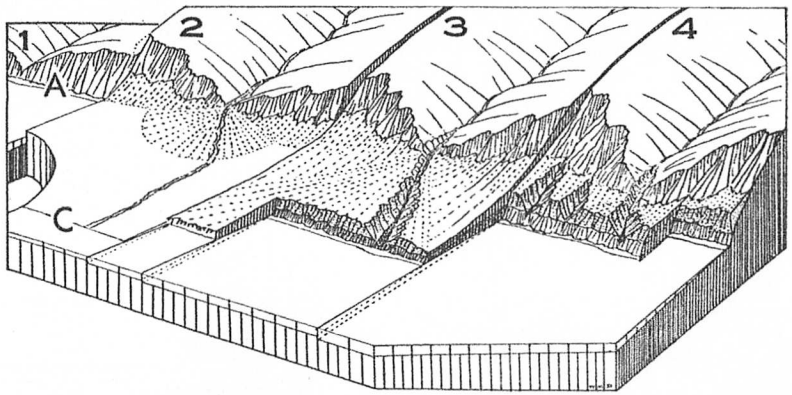

Fig. 408.—A marine platform bordering a coast (1) is uplifted (2) so that the sea withdraws from *A* to *C*. It is then deeply buried under a "head" of cover, cliffed at the margin by the sea (3), and reduced to a marine terrace (4). (After W. M. Davis.)

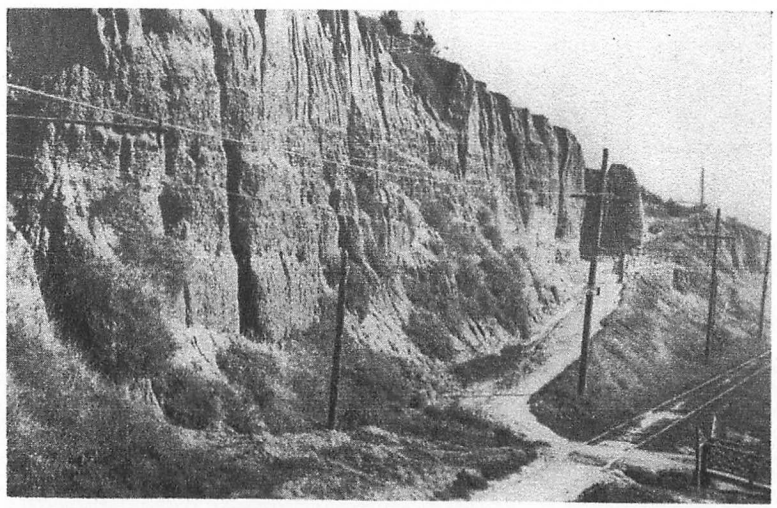

Fig. 409.—Cliffs of an alluvial cover head on a marine-cut platform, Palisades, Santa Monica, California.

C A. Cotton, photo.

Profiles of Progressively Uplifted Coasts.—Three marine terraces of the coast of Southern California have been ascribed[1] to a slow (and possibly continuous) emergent movement of the land, an uplift which might have caused continuous negative movement of the shoreline but for the contemporaneous occurrence of periodical advances (positive movements) of the sea, which must have been caused by the melting of the ice of successive glacial epochs. All the advances except the latest have been followed by withdrawals.

Fig. 410.—Marine-cut bench at the head of Palliser Bay, New Zealand, with alluvial cover head.

C. A. Cotton, photo.

To the intermittent advances of the sea may be assigned the cutting of platforms, each of which after it has subsequently emerged has been cliffed at the margin by the sea during its next advance.

It does not seem necessary to assume that sea-level rises during the cutting of every marine platform; but deepening water on a platform will certainly keep wave action vigorous while the platform is extended landward and will thus speed up the process of platform-cutting and cliff recession. Steepness of the seaward slope of a cut platform, such as that shown in profile in fig. 401, may perhaps be an indication that sea-level was rising during this cliff-cutting episode.

[1] By W. M. Davis. The mechanism is possible, whether or not correctly applied to this particular case.