

PYRAMIDS OF DEL MAR—EROSION ON THE PACIFIC COAST.

BY CHARLES F. HOLDER.

When one hears of the pyramids of Del Mar one naturally associates them with the pyramids of the Orient; but there are small pyramids, as those of Mexico, and the smallest pyramids, those of the coast of California along the township of Del Mar. These pyramids were not made by hands, but are none the less interesting, covering a large area of the precipitous cliff that fronts the sea. The pyramids are very small, and in reality are not pyramids at all, being, as shown in the accompanying illustration, a broken cliff made up of cone or pyramid-shaped points and presenting a striking appearance. Erosion has been the master hand here, the rush of water during the winter rains of decades, perhaps centuries. The cliff is a friable disintegrating sandstone, in some places with belts or areas of adobe, with here and there a statum of pebbles. The water in running down from the mesa above strikes a hard obstacle and divides, forming a channel on either side which increases in depth until a perfect cone or pyramid is formed. But it is the regularity with which this has been accomplished that gives the striking result. Looking down upon it the observer seems to see a field of mimic volcanoes, tens of thousands rising in points—a mimic picture of desolation in marked contrast to the mesa a few yards away gleaming with flowers, or the beach below with its peculiar and characteristic flora. From the beach, or front, shown in the illustration, the pyramids might be a gigantic pipe organ.

This formation, which adds materially to the attractiveness of the long stretch of coast of Southern California, is not confined to Del Mar, but is found at various points, though by no means in so marked a degree. The location indicated is well included among the points worthy a visit by the wanderer through the oasis of Southern California. The shore line is particularly interesting from the many singular, indeed striking, examples of erosion or water-wear that it affords. At Point Firman there is an interesting instance. Here a bluff reaches out into the sea, formed of stratified rock; by natural causes in the past the strata have been tipped to an angle of forty-five degrees; the front exposed to the spray has been beaten into strange saw-tooth shapes, and out from the shore a lofty pillar has for centuries defied the wear and tear of the elements. The sea has smoothed off the softer strata until in places a level, slightly inclined, smooth floor of rock is left from which runs a lofty tower composed of layers of different strata which for some reason have sufficient hardness to resist the rush and swirl of the waters. This point is one of the most exposed in Southern California, lying so that it receives the direct swell of the ocean to the north of the island of Santa Catalina, which is a natural windbreak for the coast for twenty miles south. Daily the sea boils about the rock sentinel, often covering it and striking the lofty cliff, rising in fluffy masses high in air to the top of the bluff where the light stands.

An interesting and picturesque effect of erosion expressive of the wear and tear of the sea is seen in the well-known Arch Rock at Santa Monica, about seventeen miles from Los

Angeles. Here there is a long stretch of beach, the town being situated on a bluff which rises from thirty to fifty or more feet precipitously above it. At the north rise the Sierra Santa Monica Mountains, extending from ten miles inland to the very coast, terminating at the sea in the Arch Rock. The mountains here

are a mass of conglomerate formed of water-worn pebbles, from the size of an egg to a man's head, firmly cemented in a solid mass. There is every evidence that this mountain range once extended farther out into the ocean, but the sea battered it down, leaving a pseudo flying buttress which is submerged at high

tide. This point is exposed to heavy seas and, singularly enough, the wearing effect of the water told not upon the outer portion where the most force was vented, but upon the inner, with a result of breaking through it, forming a perfect arch about twenty-five feet high, which has now become one of the striking features of interest in this section of the coast, as beneath it runs the beach road from Santa Monica to the country beyond. At high tide the water covers the roadway here, and it is evident that the arch is growing and in time will be separated from the mountain and isolated.

One of the most picturesque and remarkable examples of erosion was found by the writer at the island of Anacapa, off Ventura County. This island is the top of a submerged mountain range. In fact, at one time in all probability the coast of Southern California has had an outer coast range parallel to the mainland. When the land settled, as it must have done here in one of the many convulsions of the previous geological ages, the peaks of these mountains alone remained, now representing the islands of the Californian coast, beginning with the Catalina Islands and possibly the Coronados. Anacapa is the last of the Santa Barbara group. It is low-lying, made up of rock with a top dressing of soil, rising at the southern end in a sloping mesa about one hundred feet above the sea. The island has been broken through by the sea in one place, and at the extreme south end a section has been separated, forming an isolated arch of great size and beauty visible a long distance away. The arch is the softer portion broken away by the sea, and is large enough to admit the passage of a good-sized vessel. On the island to the north of this other arches are found illustrating this wear and tear of the sea, while at the island of Santa Catalina strange features are seen.

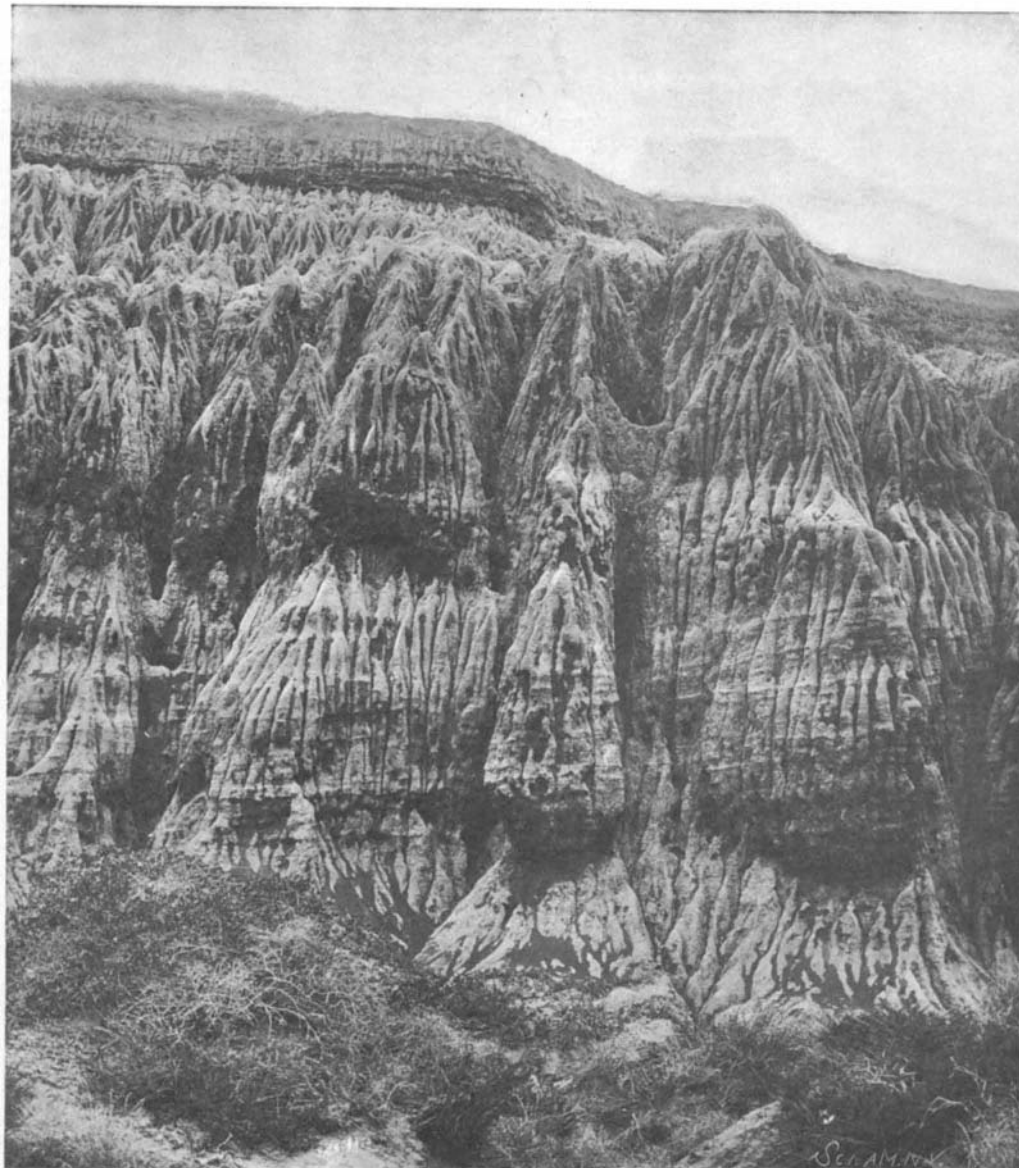
On this island the south and west coasts rise abrupt and forbidding, forming a wall often absolutely perpendicular, or even overhanging the sea, for miles there not being a beach or cove available at high water, the long rollers of the western ocean making a clear sweep upon it, rising high in the air. As a result, the coast is cut and worn in a marvelous manner, bringing out curious figures in the rock. At the north end a fine pedestal of rock surmounted by a natural figure is seen, the top ornamented with a turbanlike object which close observation shows to be an eagle's nest. Great fissures cut in here and there, narrow and deep, from which weird sounds of the seething and boiling sea issue. The base of the island has been worn into spouting caves, and as the sea rushes in the air is forced out, causing a deep, reverberating roar accompanied by a hissing sound like the escape of steam, while the water hurled upward and outward can be seen a long distance. On the south side of the island the water has worn an isolated rock into the image of a strange face, called the Sphinx, which looks into the west, not within the memory of man having changed.



ARCH ROCK, SANTA MONICA.



SENTINEL ROCK, POINT FIRMAN.



PYRAMID CLIFF, CALIFORNIA.