

microscopists. Mr. Cheeseman, to whom I am indebted for the samples just alluded to, forwarded some of the water to Mr. Skey, of Wellington, whose report, just received, I will now read.

The other sample I have now to mention is a hot spring at Motuhora (Whale Island), in the Bay of Plenty. Here the water flows out of a valley in large quantities into the sea, the heat being so great as to cause volumes of steam to rise as the water flows over the sand. The temperature of this spring, where it rises from the ground, is 198° Fahr., the taste being extremely acid, and the water very clear. I am indebted to Mr. Tunny for the analysis, which is as follows:—

Sulphate of Soda .. ..	17·60 grains per gallon.
„ Lime .. ..	7·52 „ „
„ Magnesia .. ..	5·00 „ „
„ Alumina .. ..	48·48 „ „
„ Iron .. ..	9·38 „ „
Sulphuric Acid, free .. ..	138·32 „ „
Silica.. .. ..	24·00 „ „
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	250·30

ART. LXXXVI.—*Notes of a Traditional Change in the Coast line at Manukau Heads.* By S. PERCY SMITH.

[Read before the Auckland Institute, 18th November, 1878.]

SOME thirteen years ago, when encamped one night with a party of natives on the long beach which extends from Manukau to Waikato Heads, the conversation over the camp fire turned upon some old tribal boundaries, one of which ended at a place said by Aihepene Raihau, the narrator (who was then living at Waiuku, but who now, having married the Princess Sophia, resides in the King's country), to be now covered by the sea. Upon enquiring further of him as to this particular place, he informed me that many generations ago the coast-line extended much further seaward than it does at present, projecting in a curved line from Manukau Heads to the Waikato River. This point he described as a low, sandy country, with numerous sand-dunes, fresh-water lakes, with clumps of tall manuka trees scattered over its surface.

The lakes were much resorted to by the natives in those days, on account of the great number of eels found in them.

He further stated that it was a three days' journey at that time for a man following the beach from Manukau to Waikato Heads, whereas the present coast-line is a very nearly straight line, and the distance may be

walked by an ordinary pedestrian easily in one day, being only about twenty-five miles.

Aihepene also told me that the Manukau bar, even within the memory of those living, was dry land ; and that he himself, when a boy, had accompanied his parents to the bank on which H.M.S. "Orpheus" was wrecked, for the purpose of fishing and collecting birds' eggs. The natives did not, as I understood him, live upon these banks, but used to make periodical visits to them in their canoes, for a few days at a time for fishing purposes, living in houses which they had constructed there.

I much regret that I did not at the time make further enquiries of the old natives living at Waiuku and its neighbourhood, with a view of getting corroborative evidence of these changes. With respect to that part of the story, however, which relates to Manukau bar, I think there could be no mistake, as my informant said he had himself visited the place, and I can conceive of no possible reason for his imposing on me, especially as the information was volunteered. That such changes do take place in the coast-lines of various countries, without the aid of submergence or elevation, is well known, as, for instance, on the east coast of England, where, within the historical period, vast changes have taken place ; villages, the names only of which are now preserved in old records, have entirely disappeared—swallowed up by the ever-encroaching waves.

As for any evidence remaining of such a low, sandy country having once existed, I think we could scarcely expect much. The Admiralty chart of that part of the coast is very bare of soundings, and those given do not differ much from soundings at the same distance from the shore for many miles both north and south, until the great "bottomless pit" is reached, north of Kaipara Heads. The present coast is an almost continuous line of steep cliffs, with, at their bases, in some few places, a small strip of sandy flats, generally covered with high manuka ; but even these are fast disappearing, as I learn from a settler resident in that locality. These cliffs are covered on top by a range of sand-dunes, which extend uninterruptedly from Manukau to Waikato, and are the source from whence is derived the strip of fertile land lying immediately to the east of them. The origin of these sand-hills, occurring as they do on top of perpendicular cliffs, is often obscure, for we cannot suppose the sand to have been blown perpendicularly upwards from the beach, in direct opposition to gravity, although in the few gaps or gullies breaking through the cliffs down to the beach, the sand undoubtedly gradually is forced upwards by the strong westerly winds, and then accumulates in dunes on top. But on the supposition of the existence of the submerged country as described, occupying a position at the foot of an older coast-line now represented by the present cliffs, a probable origin is suggested, thus :—

In a low sandy country exposed to the full force of the westerly winds, the light materials would continually be driven easterly until brought up by the cliffs, against which they would be piled until a sufficient slope was formed to allow of their finally mounting the top, and then forming the sand-dunes we now see. Those who are acquainted with the strip of country lying on the South Kaipara head, and extending thence to Muriwai, will at once recognize that the above supposition is applicable as a description of that part of the country. Here the cliffs are present at from one to three miles from the beach, but generally hidden by a sloping bank of sand, partially covered with vegetation, with a line of sand-dunes forming the highest parts of the range. Even the traditional lagoons, forming a long interrupted line of fresh water, and celebrated for their eels, are also there, completing the similarity between this country and that described by Aihepene. The north head of Kaipara furnishes perhaps a better illustration than even the south head, for here we have in close conjunction the low sandy tract with its moving sand-dunes, lagoons, and scattered thickets of manuka, with the inland line of hills, covered by sand; and to the north, a few miles, the same line of hills rising perpendicularly from the beach with the long and broken range of sand-hills capping the cliffs.

The natives of Kaipara have a tradition that the banks at the bar of that harbour were once dry land upon which their forefathers lived and cultivated; but this must have been at a much earlier age than that in which part of the Manukau Bar was dry, for here we find that this tradition is mixed up with one of their old myths, inasmuch as this is given as the locality in which Tinirau's pet whale, Tutunui, was killed by Kae as related in Sir George Grey's "Mythology and Traditions of the New Zealanders."

We need not seek far for sufficient causes for these alterations in the coast-line. The known alternations in the level of the sea-line, caused by elevation or depression of the land giving rise to and altering the directions of currents, is ample to account for the disappearance of such a strip of land as is described in Aihepene Raihau's tradition as above.

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