

Usually, where magnetic iron-sands are found on the beach, deposits of the same kind, now no longer acted upon by the tide, are present on the higher grounds inland, or lie buried under grey sands between tide-mark and the foot of the first terrace. These beach leads have been a great source of gold at many parts on the west coast of the South Island. At many places, near the mouths of rivers and large creeks, the ground is wet, and by dredging or other means it is that considerable areas have yet to be worked. The first horizon above or inland of tide-mark has deposits of iron-sand in all favourable situations along the west and south coasts of the Island, and these are notably developed near the mouths of the larger rivers. Usually they have proved very rich in gold, and but for difficulties such as have been alluded to most of them had already been worked out. At many places they are covered by flood-deposits from rivers or by æolian sands, drifted back from the beach, and thus it is that discoveries are likely yet to be made.

At higher levels successive terraces of auriferous iron-sands are met with, principally between the mouths of the Buller and Hokitika Rivers, and some of the larger rivers of South Westland. These have been more particularly described in the "Geological Reports" for 1892-93 and 1895-96, and the descriptions of the blocks reserved for mining purposes, for which see joint report by Messrs. Gordon and McKay. Here it will suffice to mention Addison's Flat, Charleston, and Brighton; Darkie's Terrace and Rutherglen, near Greymouth; Ballarat Hill, in the Waimea Valley; and the Houhou Lead, near Hokitika.

On Addison's Flat and at Charleston the iron-sand deposits are developed on a most extensive scale, and have yielded, and still yield, great quantities of gold. At both places further oxidation of the magnetite has taken place, and rusty-coloured iron-sand cements are the results. This fact has entailed an enormous loss of gold to the claim-holders working the cement, as the gold coated with iron-oxide escapes being caught by the means employed for that purpose, and, finding its way into the tailing-channels and streams, a part of such escaped gold is again recovered by various contrivances placed so as to intercept it, and a part carried to the seaboard tends to enrich the black-sand deposits within tide-mark. Between Charleston and Brighton these deposits rise to a height of 600 ft. above the sea; more to the south they gradually attain to lesser elevations, and south of Hokitika are but little above sea-level.

On the shores of Foveaux Strait, it is only at Orepuki and near the mouth of the Waiau River that these deposits reach any distance inland, or more than a very moderate height above the level of high-water mark. East of the Bluff, and from the vicinity of Dunedin to the northern boundary of the Otago Provincial District, the auriferous black-sand deposits are confined to the limits between high- and low-water mark, or to less than 25 ft. above that.

Along the East Coast, within the Canterbury Provincial District, it is only between Lake Ellesmere and the mouth of the Rakaia River that auriferous sands payable to work are found. These, however, do not contain notable quantities of magnetic iron-sand, but for the most part they are grey or garnetiferous sands. North of Christchurch, while at places it is evident that great elevation of the land has (in modern times) taken place, and old beaches can be traced up to at least 400 ft. above the sea, only traces of gold have been found, and black sand does not abound.

The great richness in gold of these sands enabled them to be worked with profit when the means employed were both costly and of a rude description. At many places the yield was phenomenal, and thus there has been impressed on the New Zealand miner the full importance of the deposits, and black-sand claims are still in favour. Many deposits are rich only in particular parts, or are poor generally, and any means that tends to lessen the cost of extraction of the gold would be a boon to the black-sand miner, and should be hailed accordingly.

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## REPORT ON THE PUMICE-STONE DEPOSITS OF THE MIDDLE PART OF THE NORTH ISLAND.

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### INTRODUCTORY.

THE North Island of New Zealand is distinguished for the variety and extent of its igneous rocks. These are in great part eruptive and for the most part belong to a late tertiary period. Intrusive rocks are found on a large scale in the extreme north of the Auckland district and there, as diorites, probably belong to a Palæozoic age. More to the south igneous rocks appear in connection with Palæozoic and Old Secondary rocks in the main chain of mountains commencing between East Cape and the Bay of Plenty and continued south-west to the shores of Cook Strait. Tuffs and solid igneous rocks also appear in connection with the Younger Cretaceous strata of the East Coast of Wellington.

Cape Colville Peninsula, to the east of the Hauraki Gulf, in the Auckland district, presents a vast assemblage and a considerable variety of volcanic rocks, the oldest of which probably made their appearance in Cretaceous times. The youngest, belonging to the Pliocene period, are mostly acidic and are often pumiceous. The volcanic rocks of this region are characterised by the great preponderance of tuffs and fragmental ejecta.

Volcanic rocks supposed of Miocene age cover a considerable area of peninsular Auckland, south of Whangarei, and extend, though not continuously, along the West Coast as far south as Kawhia Harbour, but all these in area and extent fall short of the vast development of volcanic rocks to be met with, covering and obscuring the older sedimentary rocks of the central part of the North Island. The volcanic rocks of the central part of the North Island are in age from Younger Pliocene to Recent: some vents, such as Ngauruhoe and White Island, being active at the present time, while the terrible spasmodic eruption of Tarawera, in June, 1886, showed that the volcanic forces are far from being exhausted, and that mountains apparently extinct may burst forth afresh at any time.