

have detracted from the value of such stone in other parts of the country. The stone in the quarry referred to is rather soft than hard, but as induration and excessive hardness are what is most common and most to be feared, if we have regard to other localities where this rock is found, this softness is, on the whole, a favourable circumstance. What remains to be done is to prospect the district for different varieties of the stone, have slabs raised in a proper and workmanlike fashion, and fairly tested as to quality and the purposes for which the different varieties are most suitable.

Rocks of the nature of lithographic stone are abundant throughout both Islands of New Zealand, usually closing the sequence to which the coal rocks belong. Younger Tertiary limestones in places have been altered in the near presence of volcanic rock to a kind of lithographic stone, as, for instance, at Oamaru; in some parts of the Amuri district of Nelson; and in the Chatham Islands. But all such deposits are local, irregular, and unimportant.

Lithographic stone occurs at Abbey Rocks, South Westland, and for a time was quarried for the purpose of its being placed upon the market. The undertaking was abandoned owing in part to the difficulty of shipment, but much more on account of defects in the stone itself, which was not wholly of an earthy character, but often contained minute foraminiferal shells, thin veins of calcite filling joints, and minute crystals of iron pyrites disseminated through the stone.

Earthy limestones are found along the east coast of the South Island from Stonyhurst to Cape Campbell, and at places they are flaggy and could be raised of such size as would make them suitable and fit for lithographic purposes; but usually they labour under the defects that have been referred to as disqualifying the Abbey Rocks lithographic stone. The same class of limestone is largely developed along the east coast of the North Island from Cape Palliser to Castlepoint, and at places might be found suitable for lithographic purposes. In the north-east district of Auckland limestone of the same age occurs abundantly, but is usually broken and uneven in its bedding. In the valley of the Motu River, falling into the Bay of Plenty, there is a great development of limestone of this class; and, judging from what appears in the river-bed where crossed near the sea, there is a likelihood of its being massive and even in grain in the mountains on each side of the lower gorge of the river.

The considerable market for, and the prices paid for lithographic stone, should stimulate prospecting for stone of high quality, or stone that would have a commercial value, and the different localities above mentioned have been cited in the hope that those having opportunity will collect and have tested samples of the rock occurring in their neighbourhood.

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ALEX. MCKAY.

NOTES ON THE AURIFEROUS IRON-SANDS OF NEW ZEALAND.*

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AURIFEROUS iron-sands (chiefly magnetic oxide) are, for the most part, confined to the west, south, and south-east coasts of the Middle Island of New Zealand, commonly known and hereafter to be spoken of as the South Island.

The titanic iron-sands of the west coast of the North Island, though mixed with magnetite, are not usually gold-bearing, and south of Auckland have not been ascertained to contain gold in sufficient quantity to pay for working such deposits. For the most part, these sands have been derived from volcanic rocks of young Tertiary date, associated with which, except on the western flanks of Mount Egmont, there are no lodes carrying gold.

On the east coast of Cape Colville Peninsula, at Mercury Bay, there are deposits of black sand that contain gold, and which it has been proposed to work for the precious metal. Possibly, also, there are other similar deposits on the west shore of the Bay of Plenty, where such sands have been derived from auriferous rocks. The magnetic and titanic iron-sands of the North Island are, however, not usually regarded as a repository of gold in paying quantities.

On the west coast of the South Island, from near Cape Farewell to Preservation Inlet, the sea-beaches, formed of material of moderate fineness of grain for the most part, show the presence of magnetic iron-sands, and often such sands form a considerable part of the total material of the beach between high- and low-water mark. Such sands are at almost all places auriferous, and for the past thirty years have been worked for gold. At first these deposits were extremely rich, and were worked again and again, as often as the material was acted upon by a heavy surf during storms, or rearranged more slowly by the ordinary action of the tides. Often the auriferous sands would be covered by a variable depth of grey quartz-sand, which, if not too deep, would be removed to reach the auriferous layer; but as frequently they would appear at the surface, varying from a few inches or a mere skinning to a foot or more in thickness. Such deposits, when formed, were treated as rapidly as possible, or, at all events, removed beyond the action of the tide, as they are apt to be suddenly swept away by a change in the direction of the wind or by a varying force or direction of the tide and sea-currents. Gradually, in the course of years, these beach deposits became less auriferous; but they still yield, on all the more important beaches, a profitable return to miners expert at this form of mining.

Beach workings of this description are carried on from thirty miles north of the mouth of the Buller River to the southern extremity of the Island, and east along the northern shore of Foveaux Strait and the south coast of Otago to the mouth of the Molyneux River, and along the east coast in a northerly direction to the boundary of the Otago Provincial District.

* These notes on the auriferous iron-sands of New Zealand were written in reply to a request for information by Messrs. Angus Macdonald and Co., of Victoria, British Columbia. Mr. Macdonald states that he is the inventor of a process of extracting gold from black sand and other earthy bodies, whether the gold lies free or coated with iron, and he wished to obtain data about the gold-bearing sands of New Zealand, having been informed by Mr. Partidge, of London, that on the West Coast they are in abundant quantities.