

is capable of great expansion (Mines Report, 1913, p. 35). There are several small claims on high country (4,000 ft. or 5,000 ft.) which can be worked only during summer.

In the adjoining Mid-Wakatipu district Professor Park states that there is reason to believe that quartz lodes carrying scheelite will be found between Moke Lake and Benmore, between Bob's Cave and Mount Crichton, and on the ranges round Lake Luna. (N.Z.G.S. Bull., No. 7, 1909, p. 94.)

The Alta lode, east of Bendigo (Cromwell district), which was worked for gold over forty years ago, carries a considerable amount of scheelite. The descriptions of it given by G. H. F. Ulrich, A. M. Finlayson, and J. Park all agree in regarding the lode as worth reworking.

A 2 ft. gold and scheelite lode at Saddle Hill, worked for a short time about 1889-90, and at that time visited by me, is, I believe, worth reopening. The scheelite-saving appliances used were crude, and the price of the mineral was low, so that much better results might be expected to-day than were possible a quarter of a century ago.

During 1914, 204 tons of scheelite concentrate and ore, valued at £21,498, was exported from New Zealand. For 1915 the corresponding figures are 194 tons and £27,784. The decrease of 10 tons in the production, though small, is somewhat surprising, in view of the greatly increased price of tungsten ores since February, 1915, but is partly to be explained by the uncertainty of the market during the preceding six months. This factor probably affected the 1915 production more than that of the preceding year.

## 9. NOTES ON THE LIMESTONES OF THE MANAWATU GORGE AND OF MAURICEVILLE.

(By J. HENDERSON, Mining Geologist.)

The writer, in company with Mr. B. C. Aston, Agricultural Chemist, paid a hurried visit to the above-named localities on the 10th September, 1915.

The sequence of the Tertiary beds exposed between the Manawatu Gorge and Woodville has been described by McKay\* and Park,† the latter of whom also illustrates his report by a section. As noted by these writers, several limestone layers occur intercalated with conglomerate and sandstone beds always more or less calcareous. The conglomerate bands consist of well-rounded cobbles set in a matrix chiefly made up of very well smoothed grit-sized particles, while the limestone beds are mainly formed of shell fragments and contain throughout numerous grit particles and occasional layers of rounded stones. The whole succession is clearly of littoral origin, and the beds were laid down as the beach deposits of a Tertiary sea, the land area of the region considered being at that time represented by what is now the Tararua-Ruahine Range. In such deposits the alteration in nature and texture of the different beds is very rapid. Thus the limestone band which above the Gorge Railway-station is perhaps 40 ft. in thickness grades to the dip into a calcareous sandstone containing numerous scattered stones. The examination made was insufficient to determine its horizontal variation, but from considerations of the origin of the deposit it is unlikely that its variation will be as rapid along the strike as down the dip. In this locality the strike varies between 25° and 40° east of north, while the dip is eastward at about 40°, with a flattening of the beds on the hill-tops. Where the Railway Department is at present obtaining ballasting-material the limestone layers are decidedly thicker and the rock itself contains as a whole fewer grit particles. The strike is here about 70° east of north, with a southerly dip of about 60°. This locality is much better suited for the opening of a quarry for the supply of ground limestone than that at the Gorge. Not only is the rock here more friable, but it contains less grit and fewer pebbles, while the amount available is many times greater.

At Mauriceville the limestone deposit is also indubitably of littoral origin. The rock is made up of shell fragments and contains a few particles of greywacke, while towards the top a layer of calcareous conglomerate perhaps 6 ft. in thickness is interbedded. The whole is overlain by blue fossiliferous sandstone, but contact with the underlying strata, which also consist of sandstone, was not observed. Where worked the limestone strikes about 170° and dips eastward at a very steep angle, its thickness here being about 300 ft. Southward the limestone is decidedly thinner, being replaced by conglomerate, of which a section is well exposed in a cutting on the road to Mauriceville West, 20 chains from the railway-station. A similar condition is reported to obtain to the northward, but the writer did not explore the district in this direction.

The deposit contains a very large tonnage of high-grade limestone, and is admirably situated for cheap exploitation. With a more up-to-date method of quarrying and modern drying machinery ground limestone could be produced at a cost materially lower than at present.

The following fossils, most of which were given to the writer by Mr. G. Dryden, manager of the Mauriceville Limestone Company's works, have been determined by Mr. H. Suter:—

Manawatu Gorge: *Ostrea tatei*, Suter (= *O. hippopus*, Tate, non Lamarck).

Mauriceville: *Calliostoma pellucidum* (Val.); *Calliostoma selectum* (Chemn.); *Siphonalia mandarina* (Duclos) (?); *Mytilus canaliculus* (Martyn); *Panopea zelandica*, Q. and G.; *Astraea sulcata* (Martyn); *Lithophaga truncata* (Gray).

All the species mentioned are found Recent, and the last two have not hitherto been recorded fossil.

\* McKay: "Report on the Country between Masterton and Napier." Rep. of Geol. Expl. during 1876-7, No. 10, 1877, pp. 75-6.

† Park, J.: "On the Geology of the Western Part of Wellington Provincial District and Part of Taranaki." Rep. of Geol. Expl. during 1886-87, No. 18, 1877, p. 34.