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LITHOGRAPHIC LIMESTONE IN MONGONUI COUNTY

(REPORT ON THE OCCURRENCE OF, BY ALEXANDER McKAY, F.G.S.).

Presented to both Houses of the General Assembly by Command of His Excellency.

REPORT ON THE OCCURRENCE OF LITHOGRAPHIC LIMESTONE IN MONGONUI COUNTY, AUCKLAND.

Geological Survey Department, Wellington, 20th June, 1892.

LIMESTONES more or less suitable for lithographic purposes have been discovered at various times during the progress of the geological survey of New Zealand. As early as 1863 lithographic limestone is noted (Hector, Geological Reports on Otago, and Juror's Reports, Exhibition, 1865, pp. 33 and 392) as coming from Hutchinson's Quarry and the neighbourhood of Oamaru. This, however, occurred only as small thin bands of altered limestone associated with volcanic tufa, or as kernels in the rubbly calcareous sands of Hutchinson's Quarry itself; and from the limited quantity and small size of the samples to be obtained it proved of no commercial value.

At a later date Mr. H. H. Travers visited the Chatham Islands, where, although chiefly engaged in making zoological and botanical collections, he also made a collection of the rocks and fossils representing the different formations present in these islands. With the latter was a small slab of lithographic limestone of a cream or light-buff colour. This was flattened and grained and some crayon work printed from it, which seemed to prove it of good quality, but for some reason or other no further notice was taken of the occurrence of this rock at the Chatham Islands.

In 1875 Messrs. Docherty and McArthur opened out the Abbey Rock Quarries, which were situated on the west coast of the South Island, five miles to the south of the Paringa River, Westland.

This stone occurred as massive beds, and of such extent that want of material was no cause of its not coming into general use. But the stone was not uniform in colour even in the same slab; and, besides, contained imperfections in the shape of numerous small shells of foraminifera and small crystals of iron-pyrites, so that after some expense had been gone to in opening out quarries the works were abandoned.

During 1876 I visited and made an examination of the Amuri Bluff, Kaikoura County, where the fine-grained chalky limestone, known as the Amuri limestone, has its typical development. Some beds of this, I concluded, were suitable as a lithographic stone, and I brought with me to Wellington a small slab which, on being polished, though of a uniform colour, contained too many tests of foraminifera to recommend it as a suitable stone, and it was never printed from.

In 1885, and again in 1886, during an examination of the north-east district of the South Island a large area of country formed of Amuri limestone came under consideration, and at several places I noted that it in part consisted of flaggy bands, which, if of the proper grain and quality, might render it fit for lithographic purposes. But in most cases much stripping would be required to reach these special bands of the limestone, and there was, besides, the liability and the probability that the stone would not be sufficiently free from foraminifera and other impurities to make it suitable for the purposes of lithography. Also, where apparently most suitable for the purpose designed, it occurred in a mountain region, which, though not distant from the coast-line, is difficult of access. Possibly on the eastern slopes of Benmore Mountain, between the Kekerangu and the Ure Rivers, flaggy, chalky limestones, capable of being utilised as lithographic stone, may be found; but all the earthy limestones of the Marlborough District are liable to the defects which have already been mentioned.

During the course of an examination of the country between the township of Mongonui and the west coast of this part of Auckland Peninsula, I proceeded first to Oruru Valley, and thence from Peria passed into the valley of the Kaikaia River. On entering the latter watershed, I noted a distinctive change in the character of the Cretaceous-tertiary rocks. To the east, within the Oruru watershed, they consisted of firestones, a species of siliceous rock resembling imperfectly consolidated chert, underlain by shales and sandstones, including concretionary boulders, the whole resting on Palaeozoic rocks, a prolongation of one of the many spurs that descend from the northern side of the Maungataniwha Range. Passing the saddle between the two watersheds, the road—Fairburn's line—follows the main stream of the western watershed, and exposes from under the firestones a series of evenly-bedded soft green and brown sandstones, and dark-blue or grey clay marls. These dip at moderate angles at first to the eastward, but further down the valley to the westward, and finally are overlaid, without the intervention of the firestones, by beds of fine-grained earthy limestone, associated or directly underlain by calcareous greensands. These limestones, which constitute the lithographic stone, the main object of this report, cross the road-line and valley

in two thick bands, at points respectively twelve and thirteen miles east of Kaitaia Township. On the northern side of the valley they show as two lines of escarpment having vertical cliffs of exposed rock varying from 10ft. to 25ft. in height. Nowhere, however, has the actual thickness of this limestone been ascertained. On the south side of the valley and at some distance from the road-line the same limestone, dipping to the west or south-west, is seen forming cliffs at its out-cropping margin as on the northern side of the valley. Close to the roadside, where, however, no distinct cliff is formed, the limestone forms a hill of smooth outlines, and on the slope of this a quarry has been opened for the extraction of the limestone as road-metal. Passing this, along a road metalled with this material, I stopped to examine the rock, as this was exposed in the quarry itself. The nature of the rock was at first apparent, but it required an examination of the quarry to show that the stone occurred in such a manner that slabs or blocks might be obtained of almost any required size. Two thick strata of limestone resting on calcareous greensands were being excavated at the time I passed the place, and it was evident that other strata of a like character overlaid those being worked for road-metal. The stone is not of a flaggy character, but occurs in beds, without partings, of from 4ft. to 6ft. in thickness, and has backs and bedding, enabling the extraction of blocks of stone fully as long and wide as the vertical thickness of the stratum. On closer examination the stone appeared of a uniform dark-grey colour, free from flaws, spar-joints, or other defects and impurities. The exposure at the quarry clearly exhibits the lower beds of the limestone only, and, naturally enough, the lower stratum is liable to contain glauconite grains and fucoidal impressions, or be of a darker colour than beds further removed from the greensands and higher in the sequence.

The higher beds were not examined, as their exposure lay on the north side of the valley, and to the south-east in the range of wooded hills and broken hilly country flanking the Maungataniwha Range, and a special examination of the district would have been required for this purpose. Neither had I the certain knowledge that the stone was of a high quality for lithographic purposes, and other equally important work must have been given up had this exploration been engaged in at that time. Consequently, after apprising the quarrymen as to the probable value of the stone, I selected a sample, under the circumstances a small one, and which, much to its detriment, had afterwards to be considerably reduced. This I brought to Wellington, and prepared it as a test sample. On facing and polishing, the stone showed fractures, due to its being reduced to a thin slab by the hammer alone, and had to be set in a bed of cement to enable its being worked in the lithographic press. The resulting prints thus obtained show the stone to be of excellent quality. Unfortunately, under pressure, the fractures alluded to began to show more plainly, and a further and larger sample will have to be obtained to enable further tests to be made.

Similar stone is extensively developed in the district of Mongonui County, whence the sample here described was obtained, and the limestone strata usually occupy such positions that comparatively a trifling cost will be entailed in opening the quarries for the extraction of the stone.

The outcrops likely to be worked in the near future are situated sixteen to eighteen miles from water-carriage at Awanui, whence it can be conveyed direct to Auckland, or transhipped to a larger vessel at Mongonui; or it may, by Oruru Valley, be brought direct to Mongonui, and thence shipped to its destination.

As to the value of the find, so far there is the proof of the work produced and the opinions of the draftsman and lithographer that the sample tested is of excellent quality. The only objection raised by them is that for some kinds of work the colour of the stone is a shade too dark, but I am satisfied that the beds overlying the bed from which the sample was taken will be better in this respect.

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