NOTES ON THE NEW HOBART STORAGE RESERVOIR.

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As the New Storage Reservoir will probably be completed before the next evening meeting of the Royal Society, I submit some remarks upon the geological conditions of the locality, based upon notes made at various times during the progress of the works. In a paper read before the Society on the 11th of September, 1877, on the causes of the failure of the dam of the old reservoir, I mentioned incidentally that another fault, in addition to those then under consideration, crossed the valley of the Sandy Bay Rivulet close to the upper end of the reservoir. In the following year I visited the place in company with the members of the Waterworks Committee to inspect the site selected by the Corporation Engineer for the dam of the proposed new reservoir, on which a good deal of work had already been done, and which proved to be at that part of the valley which I had described as being traversed by a great fault. A cutting had been made into the mudstone rock on both sides of the rivulet, and a shaft sunk to a depth of about 40 feet in its bed, with the object, I believe, of ascertaining whether the character of the rock was such as to serve for a good foundation; but all the information thus obtainable might have been readily gathered from an examination of a few of the sections exposed in road cuttings or otherwise, where an opportunity is afforded of studying a far greater thickness of the beds of the mudstone series.

The two points at which I had noticed signs of a break in the formation were about half-a-mile apart, and the intervening rocks were at that time too much obscured by surface soil and low scrub to enable one to trace its direction with accuracy. The evidence, however, was too strong to be set aside, and after another look at the country, I had no hesitation in informing the Waterworks Committee that the fault previously described must cross the valley near where the shaft was being sunk, and that it would intersect the line of the dam not far from the S.E. end of the open cutting. Whether a secure dam could be constructed under such conditions would depend on the character of the filling of the fissure produced by the break in the rocks, and to test this point I recommended that the cutting should be extended for a short distance in a S.E. direction, by which means the question of security could be set at rest at a trifling expense.

The engineer, however, preferred to try the ground at a lower level, and tunnels were driven from the bottom of the shaft towards the N.W. and S.E. respectively, for 45 feet each way, the mudstone being continuous for that distance. It is, perhaps, just as well that this mode of testing the ground stopped where it did. Had the S.E. drive been continued for about 20 feet it would have broken into the fault, and an additional element of insecurity would have been imported into the affair.

When matters had arrived at this stage the works were suspended. When they were renewed in 1885, under the management of the present Director of Waterworks, the open cutting was extended, and, on cutting down to the rock at the point which I had indicated, a vertical fault crossing obliquely the line of excavation was clearly exposed. The break in the rocks constituting the fault was about three feet wide, with a well defined wall of mudstone on one side, and of soft sandstone on the other, the remaining portion of the cutting being through the latter rock. The fissure, instead of being partly open, or loosely charged with angular fragments of rock, as very commonly happens, proved fortunately to be well and compactly filled with finely comminuted material from the bounding rocks intermixed with vertical bands of black clay. As a foundation for a properly laid puddle wall it might be considered at least equal to that afforded by the mudstone; and though a better selection of a site might easily have been made in the first instance, there was no sufficient ground for incurring the large additional expenditure that would have been entailed by abandoning works on which so much money had been spent. To describe the progress made from this stage with the construction of the embankment and the other extensive works connected with the formation of the reservoir, is for the engineer rather than the geologist, and I believe that a full account of the undertaking will be written by a more competent hand than mine. Having had to criticise somewhat unfavourably the planning and construction of the old Storage Reservoir, I am glad to have an opportunity of testifying to the sedulous care and skilful management with which the physical difficulties of the situation have been met, and which have set at rest all doubts that might otherwise have been entertained as to the permanent success of this important work.

The excavations at the new reservoir have not added anything new to the geological record. The so-called "mudstone" to which reference has been made is, in South-Eastern Tasmania, the highest member of the Upper Palæozoic marine series, of which some representative beds are

found in almost every district. The ridge to the N.W. of the old Storage Reservoir consists entirely of this rock. The beds dip somewhat sharply to the east, the whole mass of the ridge having been tilted by a movement independent of those which have affected other portions of the marine beds of the immediate neighbourhood.

Next in order above the mudstone are thick bedded sandstones, which furnish most of the building stone for which Southern Tasmania is famed, but this rock has been entirely removed by denudation from the ridge in question, though it is seen in its normal position to the S.E. of the Sandy Bay Rivulet, dipping towards and partly under the massive diabase which bounds the valley on that side. The lowest beds of the sandstone probably represent the epoch at which the floor of the Upper Palæozoic sea, after being gradually built up from the waste of older rocks during subsidence for a vast period of time, began to emerge, and a considerable part at least of the covering beds was of aerial formation. That these and other sandstones generally classed with them, as well as a long series of shaly beds, and part of the southern and eastern coal measures, are to be seen in places distinctly conformable to the Palæozoic Marine beds, is unquestionable; but conformity does not necessarily imply continuous deposition, and it is probable that a long period of time, and a distinct stratigraphic break, intervened between the formation of the most recent of the marine beds of the Palæozoic series and that of the rocks forming the base of the so-called Mesozoic coal measures. Of this, however, we have at present no distinct record.