

APPENDIX 4.

REPORT ON THE TASMAN GLACIER BY MR. T. N. BRODRICK.

THIS glacier, the largest in New Zealand, is 18 miles long, and has an average width of 1 mile 15 chains, the widest place, which is opposite the Murchison Valley, is 2 miles and 14 chains, the narrowest, just above the junction of the Rudolph Glacier, is only 60 chains. To insure accuracy in the survey and to leave permanent marks which might be of use hereafter, the triangulation was extended up to the Hochstetter Icefall. The remainder of the survey was conducted by carrying a set of triangles up each valley. The lettered marks on the plan indicate the stations; they were only marked on the ground by a cairn of stones, but the triangles were calculated, because on their accuracy depended the heights of the surrounding mountains, &c.

It is always more or less difficult, in making a survey up a narrow valley, to tell when the highest point of a mountain is visible; to assist in ascertaining this, we ascended the Hochstetter Dome and fixed station Z, 9,179ft. above the sea-level. Many of the peaks on the main range present to the Canterbury side such a rounded appearance that it was very difficult to make sure that my observations were taken to exactly the same point, and it is satisfactory to find how nearly my heights agree with those calculated by Mr. Roberts, from the West Coast side, viz., Mount Dampier, which is, I think, our Hector, 11,323ft.—11,287ft.; Tasman, 11,475ft.—11,467ft.; Haidinger, 10,107ft.—10,063ft., 9,183ft.—9,121ft.: De la Bèche, 10,058ft.—10,040ft., 8,744ft.—8,777ft., and 8,752ft.—8,704ft.

An exact traverse of the terminal face of the Tasman was made on the 21st November, 1890, commencing at sub-trig. Y, which is a large peg with a circular trench round it. This is recorded in Field-book No. 387, page 10; it was made, you will remember, by your directions, in order to ascertain within a reasonable time whether the glacier is advancing or receding. I noticed a considerable change in many places since 1889, but years must elapse before the question can be decided for certain, small fluctuations are sure to occur annually from various causes.

The dotted burnt sienna line along the west of the Tasman marks the horse-track to the tourists' hut, at the Ball Glacier, which we made this season, and about which I have already reported to you. The hut is on the site of Green's fifth camp, which, I consider, to be the safest place available; the spur above it is not high enough for the snow to avalanche to any considerable extent, and an examination of the ground shows that it never has done so. I am afraid there is some chance of damage to be apprehended from the possibility of the soakage from the Ball Glacier forming a small lake between the moraine, the hill, and the shingle slip. However, no place is absolutely safe, and I believe the present site to be the best which could be found; later on I shall say something about the continual changes which are taking place, and it will give you a better idea of the impossibility of saying any particular place is safe. The hut is 19ft. long and 12ft. wide, and divided into two compartments; each compartment has four bunks in it, and a large tin-lined box for blankets, &c., and table. The hut is strongly built of corrugated iron and lined with Willesden roofing-paper. Any one who has been over the road will understand what a tedious job packing and carrying the material up to the site was; most of it had to be carried by the men; only the short pieces could be packed; and it is rather a wonder the animals would carry what they did, for instance, the long iron by which the horse was completely covered all except his legs, the poor brute having to keep his head in one position all the time.

The red line from Trig Z to Mount Cook marks the route taken by Mr. Green in 1882, and Messrs. Mannering and Dixon in 1890, when making the ascent of the mountain. It will be seen from the plan that, although the distance is short, the track is a very steep one, especially from the ice-plateau to the summit. I did not visit the plateau, but its height above the sea-level, where the track crosses it, may be taken to be about 7,000ft., for the point marked 6,903ft. is a rock which is level with the ice-plateau at that place. As the distance to the highest point of Mount Cook is only a little over two miles from the above point, and the rise 5,349ft., the average slope is about 1ft. to 2ft. I am indebted to Mr. Roberts (West Coast Survey) for a plan showing that David's Dome branches from Mount Hector instead of Mount Cook. When I made the survey of the Hooker Glacier I could not get far enough up to see this, but it looked to be a spur of Mount Cook, which I showed it to be. Messrs. A. Harper and Blackiston, who ascended the Hooker Saddle this season, also noticed the same thing, and told me of it on their return; Mount Cook is therefore not on the main range, and is in the Provincial District of Canterbury.

On the map will be found transverse sections of the Tasman Glacier, drawn to a natural scale taken at points C, D, E, and of the Murchison at A. As they are numbered to correspond with the general map they can easily be traced; the black surface represents the moraine-covered portion, the blue the clear ice, and the black chequered part at the ends of the sections the lateral moraines. Section B compares the fall of the Tasman and Murchison Glaciers—the red line being the former, the blue the latter, the dotted lines the respective river-beds, the datum the sea-level. These sections can also be traced on the ground plan by the numbers.

You will see the Tasman is thickly covered with moraine matter; but, except at the sides where large lateral moraines have accumulated, I have every reason to believe the covering is not very thick, and I should say does not average more than from 18in. to 2ft.

From line D to abreast of sub-point T the glacier is very much crevassed along its eastern side; and although crevasses exist in many other places, there is nothing to compare with the huge system I have mentioned. The widening out of the Tasman into the Murchison Valley is very ancient, the lateral moraine there being covered with grass and scrub, but just under Trig. V will be seen