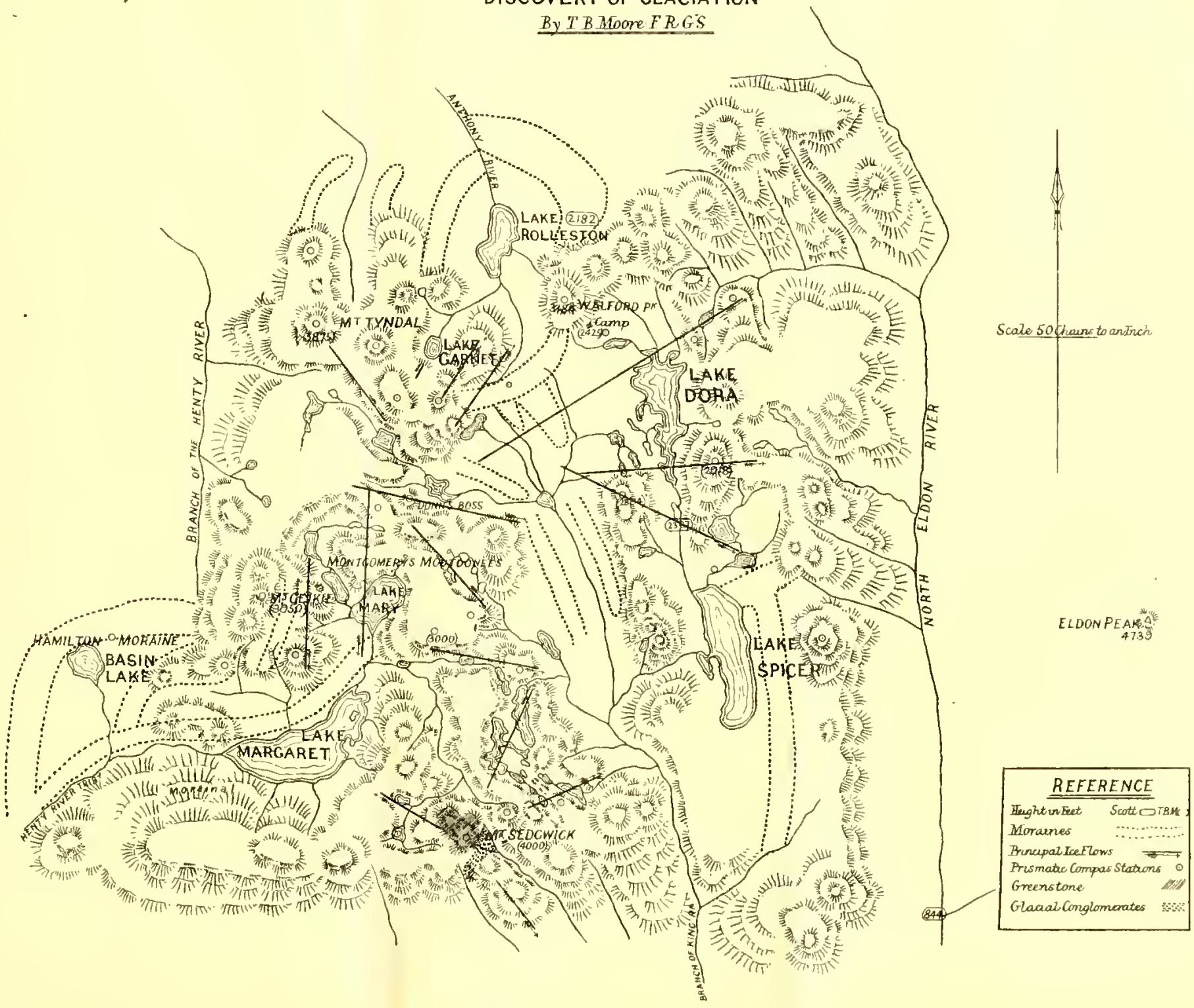
MAP

TO ILLUSTRATE PAPER ON

DISCOVERY OF GLACIATION

By T B Moore F R G S



DISCOVERY OF GLACIATION IN THE VICINITY OF MOUNT TYNDALL, IN TASMANIA.

By T. B. Moore, F.R.G.S.

(Map.)

A most important and extremely interesting discovery of glaciation was made by Mr. E. J. Dunn, F.G.S., of Victoria, in the first week of October, 1892, on the high plateau in the vicinity of Lake Dora, Tasmania. Having been with Mr. Dunn at the time of his discovery, and as it was his intention to write on the subject, I now wish to record in the proceedings of our Royal Society the result of a more extended search made by me on the high peaks and surrounding tableland, and illustrate the most important features of the glacial action on the accompanying sketch map compiled from prismatic compass bearings. The Tyndall Range and Mount Sedgwick have been the principal seats of the prehistoric glaciers; respectively these mountains are about thirteen (13) and nineteen (19) miles in a direct line from the town of Zeehan, and twenty-two (22) and nineteen (19) miles from the port of Strahan. They rise 1,500ft. to 1,600ft. above an elevated plateau, on which are situated Lake Dora and numerous other lakes and tarns at an altitude of 2,400ft. above the sea level. The plateau is drained on the north by the Anthony River, a tributary of the River Pieman, on the west by the Henty River and its tributaries, and on the east and south by the head branches of the King River. The formation of the higher land is a quartzose conglomerate, probably Devonian. A band of silurian schist, overlaid in places with a schistose conglomerate over a quarter of a mile in width, adjoins on the east, to which I shall allude in this paper as the Devonian conglomerate, and further east, as far as the North Eldon River, close-grained quartzites and conglomerate occur. The summit of Mount Tyndall beautifully illustrates the direction in which the glaciers have retired. The Devonian conglomerate rock shelves off at different points of the compass, is worn perfectly smooth, and within 20ft. of the summit the rock is polished and striated. The glaciers descending from the higher peaks have flowed in many directions down the numerous valleys, in their course beautifully polishing, grooving, striating, and moutonnising the Devonian conglomerate, deeply grooving and furrowing the softer silurian schists, and scooping out the rock basins now forming the present lakes and tarns; then in places rasping over hard quartzite and conglomerate ranges 400ft. and 500ft. higher than the lower land over which they have travelled, indicating on all rocks the direction each flow has taken by the striæ and the erratics and perched blocks left behind. The largest erratics and blocks are composed of Devonian conglomerate. Some examples are 20ft. high by about 15ft. broad and long respectively, many are planed and striated splendidly, and are often found forming segments of circles at the edge of the morainal matter, or scattered in confused masses over the moraines. Mount Sedgwick (4,000ft.) is even more interesting than the Tyndall country. Greenstone forms a cap to the mount, 800ft. to 1,000ft above the lower surrounding Devonian conglomerate; naturally the trap rock has weathered, yet deep grooves and furrows are perceptible to within a short distance of the summit. (Mount Dundas is the only other eminence in the West Coast range capped with a similar formation, but without signs of glaciation.) The elevated country round Mount Sedgwick, especially to the east, has been swept bare, and, with the exception of a few small boulders, all other morainal matter has been carried down the steep slopes and river valleys. The quartzite and conglomerate rocks show the striæ polishing, etc., similar to those round

Mount Tyndall. At an elevation of 3,500ft. above sea level, adjoining the greenstone on the south-east side of the mount, I was pleased to discover a bed of glacial conglomerate containing coal measure fossils; the pebbles are scored in all directions, and many beautifully polished. The conglomerate is composed of rocks quite foreign to the country granites, slates, porphyry, etc., and as they occur at such a high elevation, embedded together, intermixed with carboniferous fossils, and the pebbles scored before the mass was consolidated, there is not the slightest doubt that the conglomerate has been formed from the *debris* deposited by floating ice when the land was under water. This also points to the fact that the deposit was laid at a previous period to the epoch of the land glaciation. A small accompanying chart shows the position and extent of the bed of conglomerate, which, at the junction of two small streams, rises in a cliff 50ft. high, the greatest depth observable. The principal ice flows have been from the N.E. and slightly north of east. As all the chief features are depicted on the chart, and the scorings of the rocks, etc., illustrated by specimens, I have avoided a detailed description, but before closing would like to briefly describe the moraines. Some rise from two to three hundred feet above the lower valleys, those to the west of Lake Margaret are the most extensive, and it is in these moraines that the only scored small pebbles and rocks were found. Montgomery's Moutonnées, named after our much loved Bishop, is a spur, the rocks beautifully moutonnized, grooved and striated with perched blocks resting picturesquely here and there, and before Sir Robert Hamilton, our late Governor and President, left Tasmania, I received permission from him to name "The Hamilton Moraine," the largest discovered. The point marked Dunn's Boss is the best illustration of a roche-moutonnée met with, and is named after the discoverer of glacial action in Tasmania. Mr. Dunn named most of the prominent features in the part he visited, therefore I have not encroached upon his domain. The extremely hard ice-worn country rocks, grooved and striated on the plateau to the highest peaks of the mountains, indicate that a vast sheet of ice of great thickness (probably 1,000ft.) has covered this region in a colder period. As far as I have observed, the principal flows have been to the east and south, the striæ being more discernible, and the morainal matter being carried into the lower lands; to the west and north the ice has melted away before reaching a great distance, leaving the morainal matter closer to the high points of the range, and in these directions the striations are not so marked. As far back as 1883, in a report to the Government of an exploration to the West Coast, I pointed out the probable existence of glaciation on the Eldon Peak and Mount Gell, owing to the erratics and accumulations of boulders met with in the Collingwood Valley, and perched blocks found resting on the higher hills, and now the glacial action is proved to exist beyond doubt. From personal knowledge, morainal matter is scattered over a wide area on the West Coast, and now it will not be difficult to trace the course the vast sheets of ice have travelled, and before many weeks have elapsed I hope to supplement this paper with an account of other discoveries of glaciation remote from the locality described. Two names occur on the chart which are not yet officially sanctioned, viz., Mount Geikie and Lake Mary. It will be observed that Mount Geikie is a distinct mountain from Mount Tyndall (name conferred by the Hon. J. R. Scott), is separated by water channels, and is 75ft. higher.

A few of Mr. J. R. Scott's heights are recorded on the chart marked thus (⎺), my own so ( ).

List of specimens sent to illustrate the rock striation, etc., for the Museum :—

No. 1. A series of polished, grooved, and striated quartz site.

No. 2. A series of polished and striated conglomerates.
No. 3. Polished corner of quartzite.
No 4. Striated hematite from a lode 60 feet wide.
No. 5. Planed "erratic."
No. 6. Grooved greenstone from Mount Sedgwick.
No. 7. Polished and striated pebbles from Devonian conglomerate (No. 2 series),
No. 8. Glacial conglomerate, containing coal measure fossils, Mount Sedgwick.
No. 9. Polished pebbles from glacial conglomerate.
No. 10. Scored pebbles from glacial conglomerate.
No. 11. Sheared pebbles from Devonian conglomerate.
No. 12. Scored morainal matter, near Lake Margaret.

SUPPLEMENTARY NOTES.

DISCOVERY OF GLACIATION IN TASMANIA.

Mr. T. B. Moore, F.R.G.S., contributed some supplementary notes to his paper, read at the April meeting, on "The discovery of glaciation in Tasmania." He said:—During a recent trip from Mount Lyell to the extreme southern termination of the West Coast range a few signs of glaciation were discovered, the most important being in the neighbourhood of Mount Lyell, where the Linda Valley is covered with a layer of morainal matter, and in the sidling cuttings of the horse track I picked up numbers of scored pebbles. It will be interesting for the Linda gold-mining shareholders to know that the deep ground hydraulically sluiced on their sections is nothing but a huge mass of morainal matter; many of the large boulders and smaller accumulation of stones of a soft nature are beautifully scored. It yet remains to be proved whether the glaciers have travelled from Mounts Sedgwick or Lyell; from the appearance of the latter mountain in the distance, I should say their first start was made there—travelling down the escarpments at the head of the Linda River and wearing away the soft hydra-mica schists and pyrites beds, which, in all probability, continue northwards from the Mount Lyell Co.'s property. By this erosion a quantity of auriferous pyrites has by degrees been brought down in the morainal mass carried by the ice, and has been principally deposited at the Linda Co.'s land at a point where the gullies are confined before they widen out into the Linda Valley. Along the base of the eastern slopes of Mounts Owen, Huxley, and Jukes large moraines extend into the lower land, and morainal matter is scattered over the broad valley of the King River. After the King River breaks through the range between Mounts Huxley and Jukes the morainal matter extends south to the end of the latter mountain. The boulder accumulations have a strike either to the south or south-east, showing that the ice flows have travelled in these directions, which are similar to the principal courses in the vicinity of Lake Dora. The most extensive glaciation has taken place at Mount Owen, where a large moraine forms a connecting ridge between that mountain and the Thureau Hills. The northern extremity of the Thureau Hills is well glaciated, as shown by the ice-worn rocks and large greenstone boulders perched high upon their slopes. Six years ago I was on the tops of all the mountains mentioned, and found on the summits of Mounts Owen and Jukes small tarns similar in character to those at Mounts Tyndall and Sedgwick. Yet, as far as I have observed, the locality of the first discovery has the best and most extensive illustrations of land glaciation in all its forms. On my recent trip only the summit of Mount Darwin was examined. Here I did not observe any distinct signs of ice action—the rocks are rounded, but no striæ visible.