A FURTHER NOTE ON THE TOPOGRAPHY OF LAKE FENTON AND DISTRICT, NATIONAL PARK OF TASMANIA.

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(With 2 Text Figures.)

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Visits to the Mt. Field Plateau since compiling my previous paper (Lewis, 1921) have confirmed all the observations therein contained, especially as amplified and explained by Professor Griffith Taylor, D.Sc. (Taylor, 1921).

Lake Fenton is a paradox. It lies about 3,400 feet above sea level, almost at the top of a mountain ridge in the drainage basin of the Broad River. But the outlet, instead of draining down the slope of the hill to the river, breaks through the main ridge of the plateau in a gorge 500 feet deep into the Tyenna Valley. The lake is clearly of glacial origin, but the reason for the direction of its overflow requires further explanation.

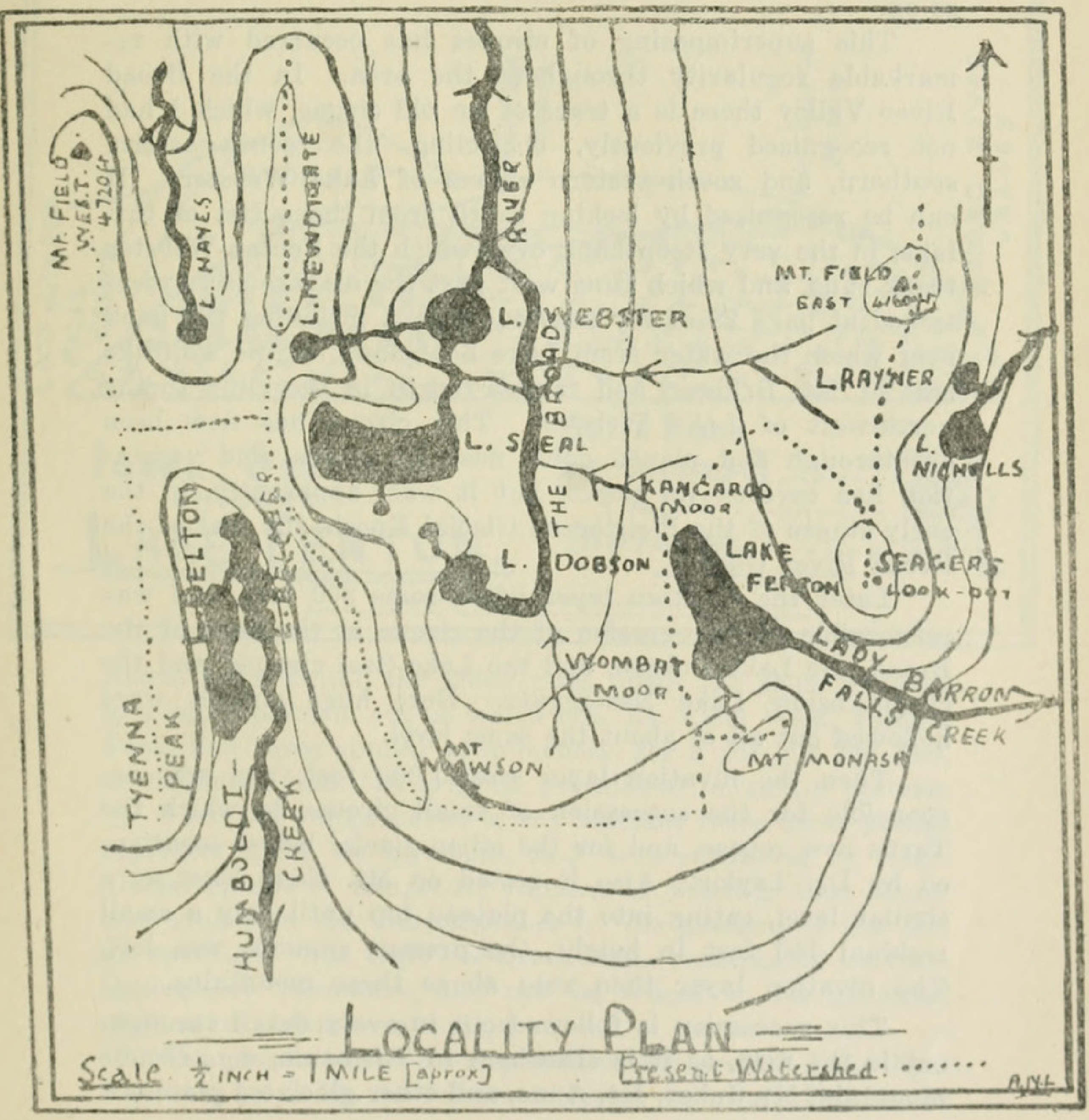
As I explained in my previous paper, the general watershed of the plateau runs in a westerly and north-westerly line from Mt. Field East, through Seager's Look Out, Mt. Monash, to the long ridge of Mt. Mawson. The Broad River drains this plateau, and has pushed its tributaries right to the edge overlooking the Tyenna Valley. On the southern side of the watershed the water that falls on the slope runs away in many mountain rills down to the Tyenna Valley, from which the land rises 3,000 feet very steeply to the edge of the plateau. The surface of the plateau slopes down gently to the northward from its southern edge, and the Broad River runs through its lowest valley.

Topographically, Lake Fenton belongs to the Broad River drainage basin. The land slopes away naturally from Seager's Look Out and Mt. Monash, across Lake Fenton to the Broad River Valley. But just at the site of Lake Fenton the main ridge has been cut through in a huge gap through which the lake empties itself, in exactly the opposite direction from that which appears natural.

The head of the Broad River Valley is here shaped like a horseshoe, cutting into the southern ridge of the plateau. Its southern end—its apparent source, although more water is collected elsewhere—lies in a cirque which has cut into the watershed. On the western side of its head lie Lakes Dobson and Seal in considerable cirques. On the eastern side at roughly the same level, and approximating in position to the two former lakes, lies Lake Fenton.

The problem of Lake Fenton is—"Why does its overflow not follow the main drainage flow of the plateau?

The solution is obviously to be found in the glacial origin of the lake, but in investigating this it can be seen that



the topography of the locality cannot be explained merely as an ordinary glacial valley blocked by a moraine.

In investigating the occurrence of glacial remains throughout the park, an observer cannot help being struck with the regularity with which the lakes occur in pairs or threes, one superimposed on another, at about an elevation of 300 feet. Dr. Griffith Taylor gives the clue to the cause of this phenomenon. (See particularly on this point Taylor 1921.) As he explains, the nivation layer or zone of maximum frost action has rested at one elevation for long enough to erode cirques in the hillside. Later, this zone has moved farther up the slope, where it has rested sufficiently long to erode a second series of cirques out of the older ones, and so on.

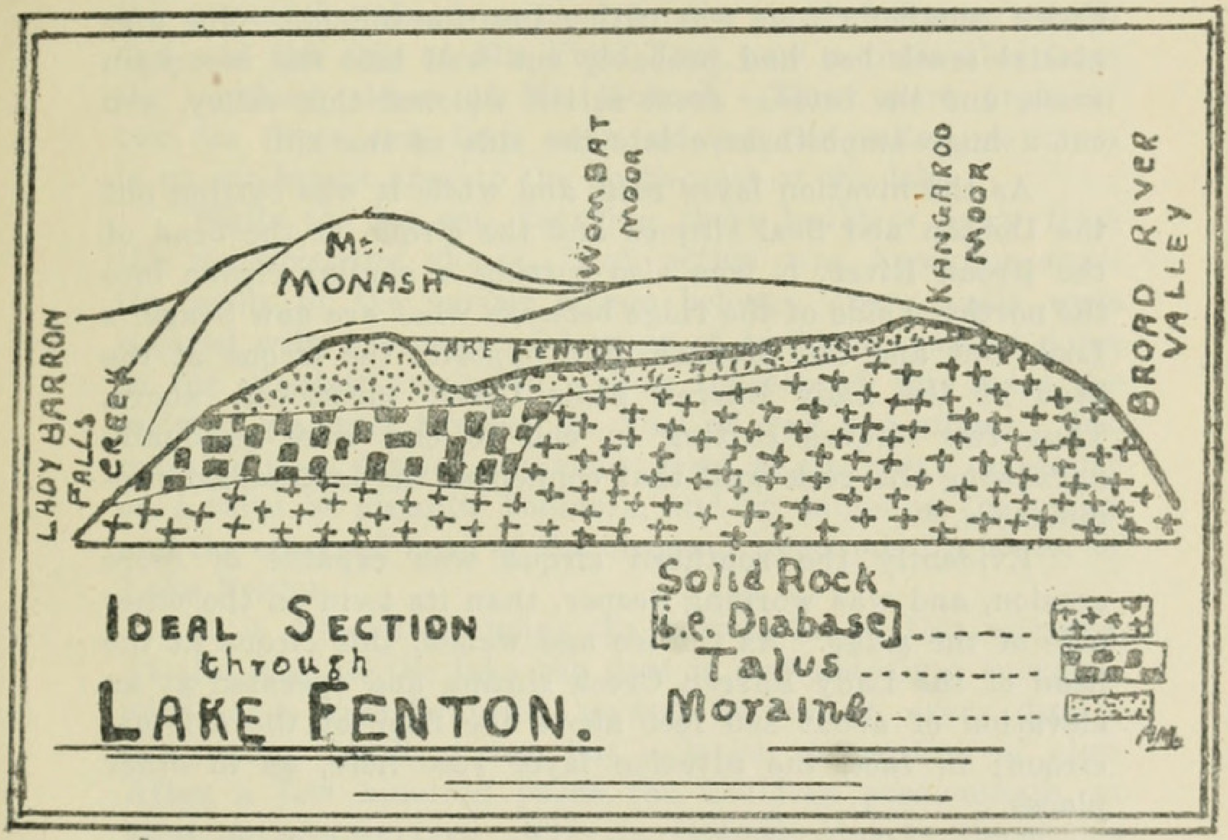
This superimposing of cirques has occurred with remarkable regularity throughout the area. In the Broad River Valley there is a trace of an old cirque, which I had not recognised previously, encircling the south-eastern, southern, and south-western shores of Lake Webster. It can be recognised by looking south from the outlet of this lake, in the very steep bank over which the Fenton-Webster track runs, and which runs west past the diabase cliffs mentioned at page 29 of my previous paper, including the bank over which the water from Lake Seal flows, to the wall-like side of Mt. Bridges, and farther north in the cliffs to the north-west of Lake Webster. This cirque has now been cut through and planed down near its centre, and vegetation has covered its slopes, but it was, apparently, in the early stages of the Pleistocene Glacial Epoch, the seat of the Broad River Glacier.

Later the nivation layer lifted some 300 feet, and was responsible for the erosion of the cirque at the head of the Broad, the Lake Dobson, and the Lake Seal cirques, and the cirque below Lake Newdegate. Here huge cirques were hollowed out all at about the same level.

Then the nivation layer rose 1,000 feet, and was responsible for the succession of small cirques in which the Tarns now repose, and for the other glacial ledges mentioned by Dr. Taylor. Also it rested on Mt. Field East at a similar level, eating into the plateau top until only a small residual 150 feet in height, the present summit, was left. The nivation layer then rose above these mountains.

This succession is followed out in every detail throughout in the field, as it is elsewhere in Tasmania, *e.g.*, Cradle Mountain, Mt. Jukes, Mt. Anne, and other glaciated plateaux.

In the National Park, Lake Nicholls, on the eastern slope of Mt. Field East, and Lake Belcher, under Tyenna Peak, are at approximately the same elevation as Lake Webster, and each lies in a cirque. From two to three hundred feet above each, another cirque has been cut, in which now lie Lakes Rayner and Belton respectively. Above Lake Belcher, on the opposite side of the valley to Lake Belton, and at the same elevation, there is a ledge which is probably an immature cirque. Above Lake Rayner the side of the mountain rises 1,000 feet nearly sheer to the top of the plateau, where the third phase has carved the Field East residual.



Above Lake Belton the ridge rises about the same distance to a small plateau, out of which rise Mt. Field West, Tyenna Peak, and three similar prominences, for a further 200 feet, as residuals from the original pre-glacial mountain plateau.

I am not yet prepared to say whether these three phases represent three ice invasions, and were separated by interglacial epochs of temperate climate, or whether they represent stages in the disappearance of the glaciers of the *last* ice invasion. But their occurrence was remarkably uniform throughout Tasmania, and can be traced in all glaciated regions of sufficient elevation.

The stages in the development of the present Lake Fenton were probably as follows:—Prior to the Pleistocene times the line Field East—Seager's Look Out—Monash—Mawson, was a continuous ridge, unbroken by the Fenton gap, and thence the land sloped rapidly on the south to the Tyenna Valley, and gently on the north to the Broad River, which had by then captured the whole drainage of the top of the plateau.

During the earlier portion of the glacial epoch, the bottom of the Broad River was considerably deepened, and its sides made steeper. At the same time, the Lake Nicholls cirque, at the head of the Russell Falls Creek, was being eroded, and in the deeper bed of the Lady Barron Falls Creek another cirque was eating into the hillside. The preglacial creek bed had probably cut well into the mountain mass, and the intense frost action widened this valley, and cut a huge amphitheatre into the side of the hill.

As the nivation layer rose, and while it was cutting out the Dobson and Seal cirques and the cirque at the head of the Broad River, it was also cutting a similar cirque into the northern side of the ridge between what are now Seager's Look Out and Mt. Monash, and opposite the cirque at the head of the Lady Barron Falls Creek mentioned above. Thus two cirques cutting in end to end were gradually narrowing the rock wall that connected the last-named prominences.

Evidently the southern cirque was capable of more erosion, and was working deeper, than its twin on the other side of the ridge. As the ice age waned, this cirque at the head of the Lady Barron Creek shrank and operated at an elevation of about 300 feet above the floor of the original cirque; in fact, the nivation layer rose here, as in other places.

The southern cirque eventually ate right through the ridge, and invaded the drainage basin of the northerly flowing glaciers and streams. It carved a small basin about 100 feet deep, a mile long and half a mile wide, cutting deeply into the plateau mass, and thereby throwing the watershed a mile to the northward. It doubtless would have cut a cirque as imposing as the Lake Seal cirque, but for the fact that, since the old Broad River had eroded away the land surface, there was no rock face left from which to erode a cirque, and the result was a complete gap in the dividing ridge. The glacier probably vanished earlier than some others on the field, having eroded away most of the catchment area for its snowfield.

The larger and lower, earlier cirque can be clearly traced circling the foot of Seager's Look Out and Mt. Monash at a point some half-mile south-east of the overflow of Lake Fenton. The whole face of this cirque is now littered with talus, and tremendous landslides of disintegrated diabase. The upper cirque is now filled by Lake Fenton, whose depth of 90 feet in one part indicates the depth to which this cirque has cut.

While the second nivation layer was carving out the floor of Lake Fenton, a small flow of ice moved down the valley for half a mile or so, melting near the present edge of the lake. This flow carried boulders, stones, and finer debris, which it dropped where it was melting. Much of this material probably came from the back of Seager's Look Out and the side of Mt. Field East, and a little also from the northern slopes of Mt. Monash. There were probably two ice flows, one from each side of the valley, as there is no catchment area to the north-west of the lake.

While the ice was carrying these boulders down from the neighbouring slopes, frost action was breaking down the walls of the earlier cirque below. These walls were covered with a broken wilderness of boulders tumbled down in the greatest confusion. Over the top of this mass the melting glacieret tumbled its load of clay and stones. The moraine thus formed obviously rests at its lower extremity on a talus of gigantic boulders, and by damming the valley and the enlarged head of the cirque it impounds the water of Lake Fenton.

It is difficult to define the boundaries of this moraine. At the edge of the lake the dam is undoubtedly a moraine, with some huge boulders, several 20 feet in every dimension, many small stones, but a larger proportion of clay. After a few hundred yards the boulders predominate, at least, on the surface. This is probably due to the action of rain on the edge of the slope washing away the smaller particles. A little farther down, and on a continuation of the same slope, the ground is covered by talus.

The side of Seager's Look Out has been subjected to rock slides on a tremendous scale at no very distant date, and the process does not appear to be completed yet. The old cliff walls of the cirque are rapidly disintegrating, and much of the talus so formed has covered the eastern edge of the moraine. The western limit of the ice deposits is undefinable on account of similar but less pronounced talus falls from Mt. Monash. So the only definite morainal deposit is a triangular-shaped bed, as shown in the diagram of my earlier paper, extending from the shore of the lake a few hundred yards down the hill.

The point where the overflow from Lake Fenton (which only overflows in flood time) passes under the large boulders probably marks the end of the moraine and its junction with the talus over which it has been deposited.

Probably much water escapes through the moraine, as often the creek is running freely at a distance of three-quarters of a mile from the lake when no water is passing the overflow. Also the Lady Barron Creek is steadily cutting into the moraine, and has already cut a considerable groove into the embankment. On leaving the lake the stream scarcely drops at all for 50 yards, then in the next 400 yards it drops about 200 feet. This leaves an extremely narrow ridge to be cut through by this very active creek before the lake will be entirely drained. Moreover, this ridge is composed only of loose earth and stones. The Lady Barron Creek will eventually drain Lake Fenton unless it is forestalled by a tributary of the Broad River in the following way.

As I have explained, Lake Fenton is lying on the south-eastern slope of the Broad River drainage basin. As it lies in a cirque cut into the Broad River basin from the other side of the divide, the lake still drains to the south-east through the watershed, but its north-western end rests merely on the old pre-glacial edge of the hill. This shore is bounded by a low moor, never exceeding 50 feet above the level of the lake. The surface of this moor slopes southwards towards the lake for about 300 yards back from the shore, then the land dips slowly, for a few yards, and then steeply in a north-westerly direction to the Broad River, 600 feet below, and not a mile away. A small tributary of the Broad River drains this moor, and rises within 600 yards of the *shore* of the lake.

This moor is littered with glacial debris. No solid rock is to be seen on the surface, and it is doubtful how far below the surface it lies. The tributary of the Broad is annually working its way through this, and capturing more and more of the drainage of Lake Fenton.

It will be a race between the Lady Barron Creek and the Broad River as to which drainage system will drain Lake Fenton, but there is nothing more certain than that the lake will be drained eventually by one of these streams. The Lady Barron Creek has reduced the level of the lake by about 10 feet since the glaciers receded, as lacustrine deposits can be traced at that height above the lake round the north-western and western shores. But as the lack of sediments flowing from the lake is a factor against the Lady Barron Creek, probably the Broad River will win eventually.

Then, again, the Broad River flows past the south-western end of the lake at a distance of less than a mile, and at least 100 feet lower. Each year its tributaries push farther and farther up Mt. Monash, diverting more and more water, and pushing back the narrow divide on Wombat Moor.

Lake Fenton in the future will be quite drained, and is to-day an excellent example of a "Wind-Gap" in the making. It also provides an example of the capture of portion of the drainage of one river system by another, the capture being effected not by water, but by frost and a glacier, a form of river piracy which does not appear to have been much noticed in Tasmania.

I have little further information to bring forward about any of the other lakes in the park, although much field work yet remains to be done, and there are many problems yet awaiting solution.

The Tyenna Peak-Mt. Field West ridge appears to be a sill of diabase which has forced its way horizontally west from the main plateau, and now overlies beds of Knocklofty series sandstone. The valley in which the Lakes Belcher and Belton lie appears to have cut right through the diabase, and enlarged itself in the softer sandstone below. The floor of the valley is covered with morainal material, which makes it difficult to tell whether the sandstone extends right up to the shores of the lakes, but a mile below the lakes the floor of the valley consists of this rock.

REFERENCES.

1921. Lewis, A. N. A Preliminary Survey of the Glacial Remains preserved in the National Park of Tasmania. Pap. and Proc. Royal Society of Tasmania, 1921.

1921. Taylor, Griffith. A Note on a Model of Mt. Field Ranges, National Park of Tasmania. Pap. and Proc. Royal Society of Tasmania, 1921.

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Lewis, Arndell Neil. 1922. "A Further Note on the Topography of Lake Fenton and Distinct, National Park of Tasmania." *Papers and proceedings of the Royal Society of Tasmania* 32–39.

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