

Report on the Geology of Inchnacardoch Forest(Forestry Commission Area)

The Forest of Inchnacardoch covers an extensive area on the north-west side of the Great Glen in the neighbourhood of Fort Augustus, Inverness-shire. About a mile north-east of Fort Augustus, at Allt na Criche, Inchnacardoch marches with Port Clair Forest, already reported upon (1938). From Allt na Criche the forest extends in a south-west direction along the lower hill slopes as far as Allt Dail a' Chuirn (Invervigar Burn), a distance of about 5 miles. It also includes a considerable area in the valley bottom in the vicinity of Auchteraw on the north side of the River Oich.

Solid Geology

Rock types:- Two distinct rock-types are present in the forest schist (Moine schist), and foliated granite.

Moine Schist:- Schistose rocks of the Moine Series extends from Allt na Criche to Allt na Graidhe (south of Auchteraw). The rock is a siliceous granulite similar to that prevalent in Port Clair, (see Port Clair Report), and like it may be considered as a rock with a high silica, moderate potash and low lime content.

A notable feature of these rocks in Inchnacardoch is the presence in them of narrow lenticular bands (one to three inches broad, and up to several yards in length) of a pale rock rich in garnets and epidotic minerals (epidote and zoisite), generally referred to as calcsilicate bands. These were detected at various points throughout the schist area.

The possible importance of these bands in silviculture depends on three facts, (a) they are rich in lime, yielding on analysis up to 10% of CaO, (b) the epidotic minerals easily break down under ordinary weathering agents to free calcite (CaCO_3) so that specimens frequently show a brisk effervescence with dilute acids, (c) the bands may be sufficiently frequent in an area to be the important source of easily available lime.

In Inchnacardoch it is not possible to estimate their frequency on account of the drift and peat. It may be mentioned, however, that where similar bands occur in drift-free country (Lochailort-Arisaig district) a frequency of one band per foot, equivalent to more than 10% of the surface area, has been noted over considerable areas.

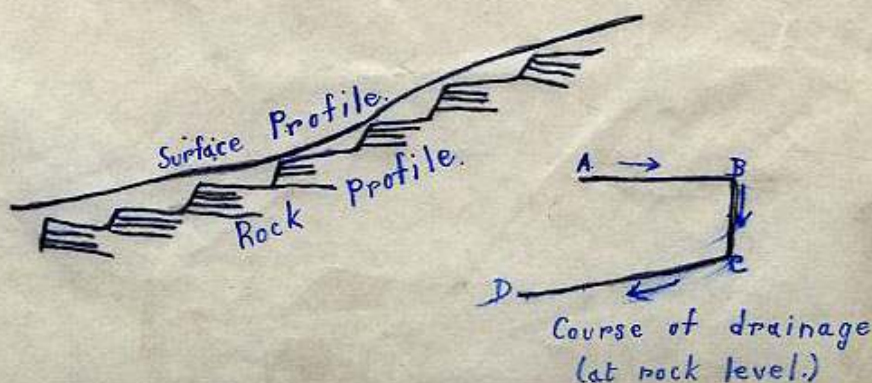
These bands, of course, may in your opinion, have no sylvicultural importance, and it is only desired to stress here that if such a question as the natural source of available lime in Inchnacardoch Forest ever arise these bands would have to be taken into consideration.

Foliated Granite:- The south-west proportion of the area, between Allt na Graidhe and Invervigar Burn, is occupied by a very different rock, which may here be called a foliated granite or granite-gneiss. Mineralogically it contains quartz, microcline (potash feldspar), hornblende and biotite. Accessory minerals are garnet and sphene. Chemically this rock is richer in potash (about 5%) than the schist.

Disposition of the Rocks:- From the point of view of silviculture the disposition both of the schist and granite gneiss in this area is worthy of attention.

The schists dip very consistently towards the north and north-west at low (less than 5°) angles. The granite-gneiss has developed bedding or joint planes which conform with the dip of the schists. The general slope of the ground, on the other hand, is south and south-east, the opposite direction. Profiles of the "soil" surface and rock surface, therefore, are in a sense opposed to one another (Fig. 1), so that drainage on reaching rock-level tends in its initial stage to run backward as from A to B (Fig. 1).

Fig1.



This is followed by lateral migration (B to C) for a greater or less distance before direct downhill (C to D) flow as streamlets commences. As the B to C stage is level, drainage, therefore, is obstructed and slow until the point C is reached, and further, as both rock-types are compact and impermeable the water tends to collect at rock-level.

Thus, irrespective of irregularities of topography developed in the ordinary course of denudation and irrespective of the nature (boulder clay, gravel, peat) of the soil cover there is always a tendency towards impeded drainage and stagnant wet conditions generally at rock-level.

Drift Geology

Under the above heading the "soft" deposits may be tabulated as follows:-

- (6) River alluvium.
- (5) Loch Ness High Level Gravel Terrace
- (4) Outwash Gravels and Kettle Moraine
- (3) Readvance Moraine (Gravel)
- (2) Varved clay
- (1) Grey Boulder Clay (Lower Drift)

(1) Grey Boulder Clay:- As at Port Clair the basal drift of the regional ice-sheet is present in Inchnacardoch Forest at all levels. It is grey sandy gritty till charged with schist and granitic boulders, tough and rather impermeable to water. It appears in greatest thickness on the edge of the valley floor (beneath other deposits). On the hill-slopes north-east of the limit of the Readvance moraine (see map) it is present but in no great thickness except in pockets, and much of the area is drift-free, or rather thinly drift-covered.

The grey boulder clay may be examined in several pits along the road leading to Auchteraw. One of the best sections is that in the pit about 200 yards west of the junction of the Auchteraw road and General Wade's old road to Glen Moriston.

The full section here reads:-

Coarse water-worn gravel, red-stained in top 2ft. (Upper Drift)	4 to 6 ft,
Irregular thickness of laminated sand and silt, in places distorted by pressure (Varved clay)	2ins. to 2ft.
Very stony till, gritty matrix with irregular patches of pure sand (Lower Drift)	6ft. (seen)

Other good sections of the Lower Drift are visible in pits half a mile farther west at the crossing of two closely adjacent unnamed streams, and also in a stream section near the mouth of the Auchteraw Burn.

Varved Clay:- The basal drift is overlain several sections by a thin, irregular, laminated deposit of sand and silt, a varved clay laid down in water during an ice retreat. This deposit is visible in the pit section described above, and also at several points on the road side towards Allt na Criche. Its importance lies in the fact that it is a rather impermeable layer and as it may be present throughout the valley area at Auchteraw this impermeability may be factor of some importance in drainage questions. It is, however, never thick and should be easily pierced whenever encountered.

Readvance Moraine:- Under this heading is included an upper drift that overlies the grey boulder clay over a wide area in the Auchteraw part of the forest. The fact that this moraine overlies varved clays which could have been formed only in the wake of a retreating ice-sheet indicates clearly that the upper drift must have formed after a readvance of the ice. The limit of this drift (and readvance) is clearly marked on the hill side, often by an upstanding ridge (lateral moraine). This ridge is particularly prominent at the junction of the Wade's Road and the Auchteraw Road, and from this point it is traceable westward, gradually rising up the hillside to about the 900-foot level above Auchteraw Wood, where it also forms a rampart-like ridge. The limit of the vigorous plantations above Auchteraw practically coincides with the moraine margin.

The deposits of the readvance moraine are hummocky in form and differ decidedly from the lower drift in being of a gravelly nature, providing/

providing an open-textured and free-draining soil, often red or fawn-coloured in its upper-layers.

Within its bounds it is however not evenly distributed, being thickest on the slopes above Auchteraw, but apparently thin over much of the area between Torr Dhuin, Lon Mor and Invervigar Burn.

In character these moraine deposits are similar to the Red Boulder Clay of Port Clair, the red soil of Fraser.^x

^x Fraser, J., "Port Clair", Forestry, vol. ix, p. 111, 1935

Out-wash Gravels and Kettle Moraine:- The deposits on the valley floor between Auchteraw and the river are very largely parts of the Readvance Moraine, but owing to their situation it is more convenient to treat them separately.

At the head of the valley, where it is constricted by the rock of Torr Dhuin, a lobe of ice apparently became separated in the retreat of the glacier, and melted in situ, giving rise to the extremely hummocky moraine with deep hollows (kettle-moraine) that occupies the ground between the fields and the river west of Auchteraw.

Fringing the kettle-moraine flatter areas often of sand rather than gravel, extending as far as the nurseries, constitute the out-wash plain, and are simply glacial material washed, resorted, and terraced by the melt-waters of the glacier, assisted of course by the heavily loaded side-streams.

The materials of these outwash-plains are gravelly and free-draining on the whole, to the depth of several feet. Occasionally layers of silt near the surface may hold up water locally.

Loch Ness High Level Terrace:- As the upper limit of this terrace is about 100 feet O.D. its deposits are not of much account in Inchnacardoch Forest where the planted ground is, for the most part, above this level. The lower fringe of the plantations at Allt na Criche adjacent to Port Clair, are on this terrace.

River Alluvium:- A narrow alluvial terrace borders the River Oich for a part of its course. The material of this terrace in no wise differs from that of the kettle-moraine and out-wash plain, and does not require detailed comment from a geological point of view.

The dispositions of the two main drifts and their relations to the rock surface are illustrated in the diagrammatic attached sketch (Fig. 2).

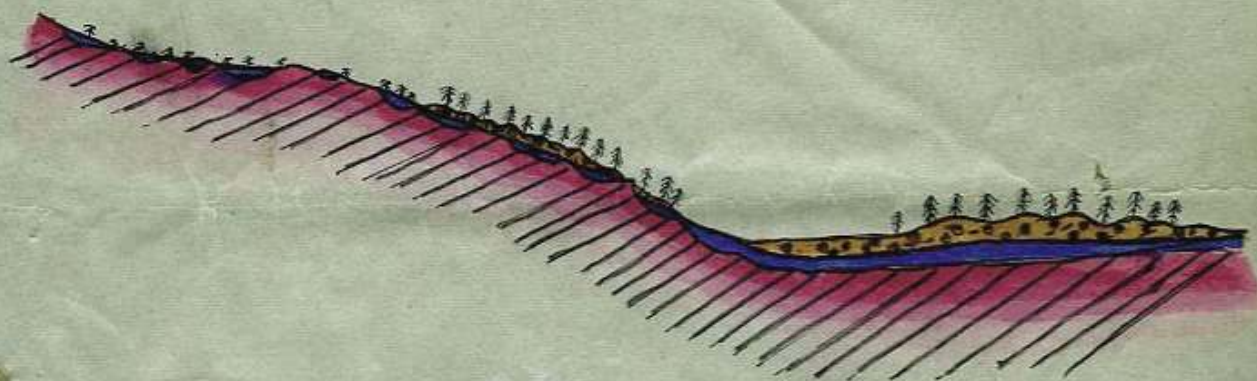


Fig 2.



Diagrammatic section across Inchnacardoch Forest in the neighbourhood of Auchteraw to show rock and drift relations (varved clay omitted).

Dr J.B. Simpson.

see Inchnacardoch final file. Vide Geol. Survey. Keltie R.
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11/2/39.