

---

# LOCH DUNGEON

*H.J.B. Birks*

*OS Grid Reference: NX525846*

## Highlights

Pollen and plant macrofossils from the sediments of Loch Dungeon and the adjacent blanket peat provide a detailed record, supported by radiocarbon dating, of vegetational history and environmental changes in the uplands of south-west Scotland during the Holocene.

## Introduction

Loch Dungeon (NX 525846) lies within a complex corrie at an altitude of 305 m O.D. on the east side of the Rhinns of Kells. The pollen and plant macrofossils contained in the lake sediments and in the adjacent area of blanket peat provide a detailed record of the local and regional Holocene vegetational history of the Galloway Hills of south-west Scotland. Loch Dungeon is the site at which many of the Galloway regional pollen-assemblage zones were delimited and defined by Birks (1972a). Fossil pine stumps occur locally in the blanket peats of the Galloway Hills, forming the southernmost area of pine stumps in Scotland (Birks, 1975). Loch Dungeon is one of the few areas in the British Isles where pollen diagrams have been constructed from both a lake and nearby bog profiles.

## Description

Precipitous cliffs of Silurian shales, greywackes and grits of Meikle Millyea rise from the south-east shore of Loch Dungeon, and a subsidiary corrie on the south east flank of Corserine opens out on the north-west shore. A Loch Lomond Readvance glacier emerged from the corries and its terminus is marked by a large end moraine to the west of the loch (Figure 18.5) and by a shallow area within the loch itself (Cornish, 1981). The bottom of the loch is very rocky, with only about 1 m of organic sediment. In the outer, eastern basin, fine-grained organic sediments up to 4 m in thickness occur.

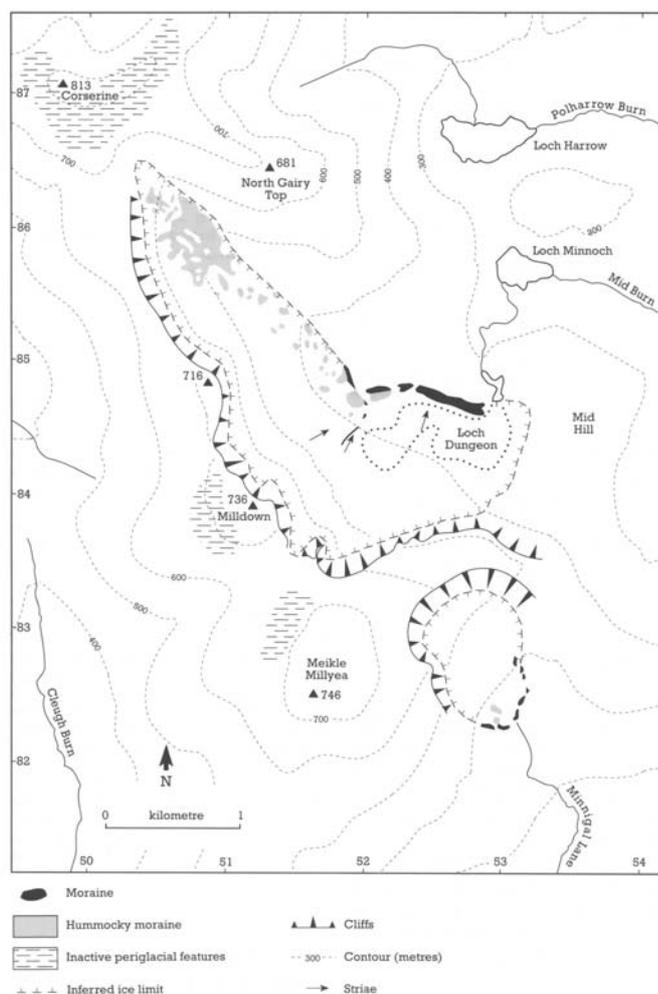


Figure 18.5: Geomorphology of the Loch Dungeon area (from Cornish, 1981).

The palaeoenvironmental record of the Southern Uplands peats was first investigated by Lewis (1905) and later by Samuelsson (1910). The Loch Dungeon peat sequence is from the area of blanket peat on the flat top of the spur running from Meikle Millyea to Mid Hill at an altitude of 396 m O.D. The peat is presently severely hagged and subject to sheet erosion. A sequence 2.65 m thick was analysed by Birks (1975). The stratigraphy consists of humified *Eriophorum*-*Calluna* peat overlying a black humus soil rich in carbonised fragments around or just above pine stumps at a depth of 1.45 m. The basal 1.2 m consist of *Phragmites*-*Carex* wood peat. The pine stump layer is radiocarbon-dated to 7165 + 180 BP (Q-876) and the humus layer to 6787 + 200 BP (Q-877).

## Interpretation

The pollen sequence from Loch Dungeon extends from the Lateglacial/Holocene boundary to the last 100 years. It is divided into six local pollen zones which are correlated with five regional (Galloway) pollen-assemblage zones (Figure 18.6A) (Birks, 1972a). Three of these regional zones are best represented at Loch Dungeon. The pollen records the colonisation of open, pioneer species-rich herbaceous assemblages following the melting of local corrie glacier ice at the end of the Loch Lomond Stadial at about 10,000 BP. These were rapidly replaced by fern-rich juniper and birch scrub with abundant tall herbs during the transition to the milder climate of the Holocene. In the early Holocene *Betula* and *Corylus avellana* expanded to form extensive woods with willow, aspen, and rowan. At about 8500 BP, *Ulmus* and *Quercus* expanded and at about 7400 BP, *Alnus* expanded. By middle Holocene times the area must have been extensively covered by forest consisting primarily of elm, oak, alder, birch, and hazel. The tree-line of birch, aspen, and rowan probably reached to the summits of most of the hills. Within Galloway, *Pinus* appears to have been restricted to upland areas, free from competition with other trees, and to dried peat surfaces, as at Loch Dungeon. Pine arrived in

Galloway at about 7500 BP, possibly from northern Ireland rather than from the Scottish Highlands or from northern England (Birks, 1989). It was largely eliminated by increased wetness and bog growth at about 7000 BP and became rare in the area, becoming extinct at about 5000 BP (Birks, 1975). There was a well-marked decline in elm pollen values at 5000 BP, associated with the expansion of grasses, sedges and *Calluna vulgaris* following forest clearance in the Neolithic, Bronze Age, Iron Age, and later. Soil erosion and the inwashing of terrestrial material appears to have begun at about 5000 BP. Deforestation was virtually complete by the last century. Changes within the loch from a clear water oligotrophic loch to a humus-coloured dystrophic loch occurred in the last 200 years due to the inwashing of humified blanket peat following the onset of widespread peat erosion within the loch's catchment (see Round Loch of Glenhead).

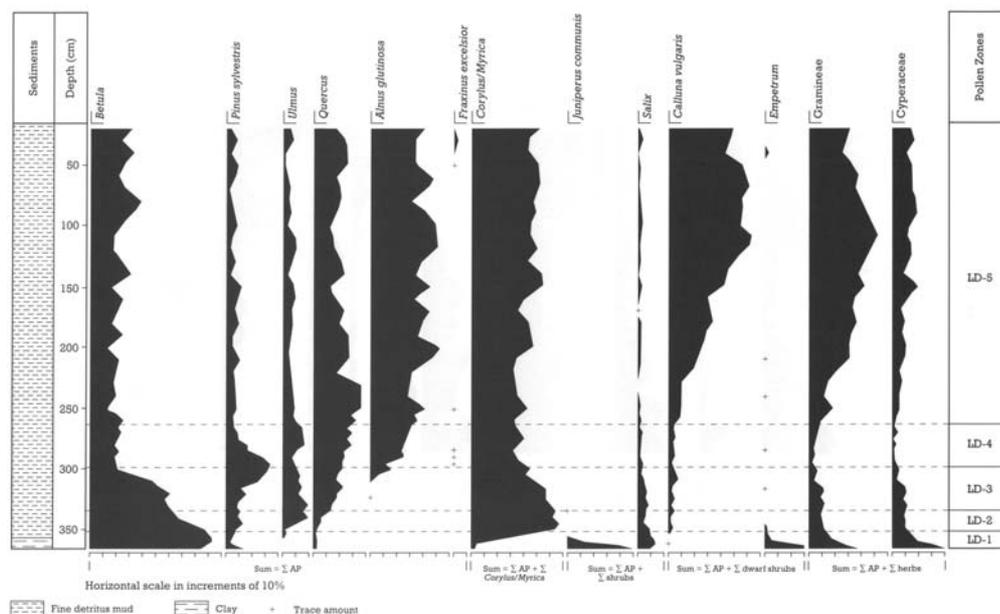


Figure 18.6: Loch Dungeon: (A) relative pollen diagram from the loch showing selected taxa as percentages of the pollen sums indicated (from Birks, 1972a).

The adjacent blanket peat profile (Figure 18.6B) (Birks, 1975) extends from the early Holocene to about 4000 BP and it records the local vegetational development. Initially base-rich, sedge-dominated communities with *Phragmites communis* and *Salix* were present. With peat accumulation and infilling of waterlogged hollows, herb-rich fen communities developed at about 8000 BP, and its litter formed the black humus layer. The cause of death of the pines is uncertain. It is possible that increased wetness due to a small climatic change may have eliminated pine locally. Alternatively the mire may have become completely ombrotrophic and dominated by *Calluna vulgaris* and *Eriophorum vaginatum*, with *Calluna vulgaris* developing at about 6800 BP.

Loch Dungeon and its associated peat profile are of considerable importance because of their wealth of palaeobotanical and palaeoecological data. They provide one of the most detailed and stratigraphically complete pollen profiles from south-west Scotland, and are thus important in the reconstruction and understanding of the vegetational history of this part of Scotland. It is an area whose vegetational history has affinities with the western Scottish Highlands (Birks, 1977), the English Lake District (Birks, 1972a), and northern Ireland (Birks, 1989). Loch Dungeon is also important because it is one of the few areas in the British Isles where pollen sequences are available from a lake and a nearby bog. Insights into both regional and local vegetational history are thus possible. Comparison of the two pollen sequences highlights the advantages and disadvantages of the two types of sites as repositories of Holocene vegetational history (Birks, 1972a). Loch Dungeon, with its adjacent blanket peat is thus a site of very considerable interest to Quaternary palaeoecologists. It also provides an important contrast with the nearby Round Loch of Glenhead (see below) situated on the Craginaw granite (Jones *et al.*, 1989), particularly in terms of recent lake changes.

---

## Conclusions

Loch Dungeon is an important reference site for studies of vegetation history in south-west Scotland during the Holocene (last 10,000 years). It is particularly notable for the length and detail of its record, and the combination of evidence available from the sediments of both the loch and an adjacent peat bog. The pollen record indicates past vegetational changes in the area, with the development of successive woodland types, including the expansion and decline of pine. Loch Dungeon is an important component of the network of sites showing the major regional variations in Holocene vegetational history.

## Reference list

- Birks, H.H. (1972a) Studies in the vegetational history of Scotland II. Two pollen diagrams from the Galloway Hills, Kirkcudbrightshire. *Journal of Ecology*, **60**, 182–217.
- Birks, H.H. (1975) Studies in the vegetational history of Scotland IV. Pine stumps in Scottish blanket peats. *Philosophical Transactions of the Royal Society of London* **B 270**, 181–226.
- Birks, H.J.B. (1977) The Flandrian forest history of Scotland: a preliminary synthesis. In *British Quaternary Studies: Recent Advances* (ed. F.W. Shotton). Oxford, Clarendon Press, 119–35.
- Birks, H.J.B. (1989) Holocene isochrone maps and patterns of tree-spreading in the British Isles. *Journal of Biogeography*, **16**, 503–40.
- Cornish, R. (1981) Glaciers of the Loch Lomond Stadial in the western Southern Uplands of Scotland. *Proceedings of the Geologists' Association*, **92**, 105–14.
- Jones, V.J., Stevenson, A.C. and Battarbee, R.W. (1989) The acidification of lakes in Galloway, south west Scotland: a diatom and pollen study of the post-glacial history of the Round Loch of Glenhead. *Journal of Ecology*, **77**, 1–23.
- Lewis, F.J. (1905) The plant remains in the Scottish peat mosses. Part I. The Scottish Southern Uplands. *Transactions of the Royal Society of Edinburgh* **41**, 699–723.
- Samuelsson, G. (1910) Scottish peat mosses. A contribution to the knowledge of the late-Quaternary vegetation and climate of north western Europe. *Bulletin of the Geological Institution of the University of Upsala*, **10**, 197–260.