

DRUMHOLLISTAN

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OS Grid Reference: NC920654

Highlights

Sections in the stream gully at Drumhollistan show the till succession on the north coast of Caithness and allow interpretation of the associated patterns of ice movement.

Introduction

Drumhollistan (NC 920654) is located on the north coast of Caithness, west of Reay, where stream erosion has dissected a drift plug in a cliff-top depression. The sections exposed are important in demonstrating the succession of Pleistocene deposits on the north coast of Caithness. They show a multiple till sequence locally overlain by head deposits, and complement the interests at Baile an t-Sratha and Leavad. The only account of the site is that by Omand (1973).

Description

The deposits are exposed along a narrow stream valley that deepens to over 30 m at its western end. The flanks of the valley are heavily dissected by gullies separated by narrow, intervening ridges. The deposits were recorded by Omand (1973) and comprise the following composite sequence:

4.	Head	up to 1 m
3.	Brown till with shell fragments near the base	up to 21 m
2.	Sand and gravel; boulders up to 0.75 m length in the lower 1.5 m, fining upwards	up to 3.5 m
1.	Grey till	> 3 m

The lower till (bed 1) is exposed only at the western end of the gully. It is lighter in colour than the upper till and the matrix appears gritty and sandy. No shells have been found in it. A stone count of 50 clasts by Omand (1973) revealed that 94% of the sample consisted of gneiss or migmatite, probably derived from the area to the south and west of the site. At the western end of the gully on the south side, the lower till is overlain by unbedded sand and gravel with a layer of sand at the top. The upper till (bed 3) in its lower part is a darker, chocolate-brown colour with a sandy/silty matrix. Of 50 clasts sampled by Omand, 76% were from the Old Red Sandstone group and probably derived from the area to the south-east of the site. The upper part of the till is weathered to a depth of 5–6 m and has a reddish, appearance. A few shell fragments were found in this till, but they are scarce and considerably comminuted in comparison with those at Dunbeath and other sites on the east coast of Caithness. On the north side of the gully the brown till (bed 3) rests directly on the grey till (bed 1). The lower layers of the former are bouldery with lenses of sand and gravel in the lower 3 m.

In the middle part of the gully on the south side, a layer of sand occurs at the base of the upper till. Possibly it corresponds with the sand and gravel at the western end of the section, but the continuity of the beds could not be traced because of slumping. Bands of the upper till are interbedded with the sands which here have a rusty, weathered appearance, and the two units interdigitate.

A stone layer occurs at the surface of the upper till beneath a cover of peat. On the northern side of the gully at the western end, up to 1 m of head locally covers the upper till.

An additional feature of the site is the fine example it provides of active gullying and incipient

earth pillar formation along the corrugated and dissected flanks of the main gully.

Interpretation

The general characteristics and distribution of the glacial deposits of Caithness, the theories proposed to explain them and the outstanding problems have already been discussed. The evidence at Drumhollistan appears to confirm two distinct ice movements on the north coast followed by a period or periods of weathering and head formation. The lower till, associated with a northerly ice movement occupies a similar stratigraphic position to the lower till at Dunbeath, but it is still open to question whether it represents an early local glaciation or was broadly contemporaneous with the shelly till as at Dunbeath (Hall and Whittington, 1989). The upper till is part of the widely recognized shelly till of Caithness deposited by ice moving north-west. The weathering of the upper part of the sequence at Drumhollistan is typical of many parts of Caithness (Jamieson, 1866; Peach and Horne, 1881c; Omand, 1973; Hall and Whittington, 1989), as is the overlying head (Omand, 1973; Fitty and Dry, 1977; Hall and Whittington, 1989).

In south-east Caithness, Hall and Whittington (1989) noted weathering and mottling of the tills, with decalcification to a depth of 2.7 m. They concluded that this was compatible with Holocene weathering. Although the weathering at Drumhollistan extends to a greater depth of 5–6 m, this could reflect local factors and is still compatible with depths of Holocene weathering in eastern England (Madgett and Catt, 1978; Eyles and Sladen, 1981). At present there is no evidence that the weathering in Caithness might reflect a long period of ice-free conditions during the Devensian. The head deposits at Drumhollistan are undated, but in south-east Caithness comparable deposits have been ascribed to the Loch Lomond Stadial (Hall and Whittington, 1989). Again, there is no evidence that they might relate to periglacial episodes earlier in the Devensian, although this cannot be completely ruled out without further work.

Drumhollistan has not been investigated in detail, and (as is also the case for Baile an t-Sratha) several intriguing questions remain unanswered about the deposits, their wider relationships with other sites and the implications they carry for the Pleistocene history of Caithness. These concern:

1. the age(s) of the lower and upper tills and whether or not they are broadly contemporaneous;
2. the significance of the sand and gravel layer between the till beds and whether it is part of a single, complex melt-out sequence (*cf.* Nigg Bay, Boyne Quarry and Hewan Bank) or represents a significant break in glacial sedimentation;
3. the age and degree of the weathering in the upper till;
4. the age of the overlying head;
5. the relationships of the tills at Drumhollistan to the local till exposed at the surface along the Sandside Burn at Reay, 4 km to the east (Omand, 1973).

Drumhollistan is an important reference site for the succession of Pleistocene deposits on the north coast of Caithness. It demonstrates the western extent of the shelly till and the northern extent of local till, together with evidence for subsequent head formation and weathering. Comparable sites to Drumhollistan on the south-east coast of Caithness that show shelly till superimposed on local till, occur at Dunbeath (Baile an t-Sratha), Leavad and Latheronwheel (Omand, 1973; Hall and Whittington, 1989).

Baile an t-Sratha is notable for better exposure of local till and better preservation of shells in the upper till, whereas at Leavad the main interest is a large erratic of soft strata incorporated in the shelly till. Exposures at Latheronwheel are poor and have not been recorded in detail. Together, therefore, Drumhollistan, Baile an t-Sratha and Leavad demonstrate key aspects of the Pleistocene deposits of Caithness.

The contemporary erosion and gullying of the till are also of interest and are representative of a type of phenomenon that is known from a number of localities in Scotland, for example at

Rosemarkie Dens (Miller, 1858; Geikie, 1901), Fochabers (Hinxman and Wilson, 1902; Geikie, 1903) and in the Nairn valley near Clava. The narrow ridges illustrate an incipient form of earth pillar formation, although the absence of large boulders has inhibited the development of classic earth pillars (*cf.* Whalley, 1976b).

Conclusions

The deposits at Drumhollistan demonstrate the glacial history of the north coast of Caithness. They show two (ice-deposited) tills, locally separated by a layer of sand and gravel. The value of the site is as a reference locality for establishing the glacial succession and pattern of ice movements in this area. There are different interpretations of the age of these deposits and whether they were formed during the Early or Late Devensian (approximately 65,000 and 18,000 years ago, respectively).

Reference list

- Eyles, N. and Sladen, J.A. (1981) Stratigraphy and geotechnical properties of weathered lodgement till in Northumberland, England. *Quarterly Journal of Engineering Geology*, **14**, 129–41.
- Futty, D.W. and Dry, F.T. (1977) The soils of the country round Wick. Memoir of the Soil Survey of Great Britain.
- Geikie, A. (1901) *The Scenery of Scotland Viewed in Connection with its Physical Geology* 3rd edn. London, Macmillan and Co. 540pp.
- Geikie, A. (1903) *Textbook of Geology*. Vol. 1. London, Macmillan, 702pp.
- Hall, A.M. and Whittington, G. (1989) Late Devensian glaciation of southern Caithness. *Scottish Journal of Geology*, **25**, 307–24.
- Hinxman, L.W. and Wilson, J.S.G. (1902) The geology of Lower Strathspey. (Explanation of Sheet 85). Memoirs of the Geological Survey of Scotland. Glasgow, HMSO, 91pp.
- Jamieson, T.F. (1866) On the glacial phenomena of Caithness. *Quarterly Journal of the Geological Society*, **11**, 261–81.
- Madgett, P.A. and Catt, J.A. (1978) Petrography, stratigraphy and weathering of Late Pleistocene tills in East Yorkshire, Lincolnshire and North Norfolk. *Proceedings of the Yorkshire Geological Society*, **42**, 55–108.
- Miller, H. (1858) *The Cruise of the Betsy, or, A Summer Ramble Among the Fossiliferous Deposits of the Hebrides. With Rambles of a Geologist, or, Ten Thousand Miles Over the Fossiliferous Deposits of Scotland*. Edinburgh, Thomas Constable and Co., 486pp.
- Omand, D. (1973) The glaciation of Caithness. Unpublished MSc thesis, University of Strathclyde.
- Peach, B.N. and Horne, J. (1881c) The glaciation of Caithness. *Proceedings of the Royal Society of Edinburgh*, **6**, 316–352.
- Whalley, W.B. (1976b) Some aspects of the structure and development of earth pillars and corrugated lateral moraine surfaces. *Studia Geomorphologica Carpatho-Balcanica*, **10**, 49–62.