BAILE AN T-SRATHA

J.E. Gordon

OS Grid Reference: ND142307

Highlights

The stream sections at Baile an t-Sratha demonstrate the stratigraphical relationship between the main glacial deposits recognised in south-east Caithness. Local till derived from inland is overlain by shelly till deposited by ice moving across the sea floor and then onshore towards the north-west. These deposits provide important evidence for interpreting the successive patterns of ice movement.

Introduction

Baile an t-Sratha (ND 142307) is a stream section in the valley of the Dunbeath Water; it is a key locality demonstrating the two main till units of Caithness, the local inland till characteristic of the western part of the county, and the shelly till characteristic of the eastern part (Peach and Horne, 1881c; Omand, 1973; Hall and Whittington, 1989). It is particularly important since it occurs in the zone of overlap of the two tills and illustrates their stratigraphic relations and contact. The deposits in the valley of the Dunbeath Water are described by Hall and Whittington (1989).

The valley of the Dunbeath Water has long been a notable locality for glacial deposits. Dick (see Smiles, 1878), Jamieson (1866) and Peach and Horne (1881c) all referred to fine examples of shelly till, although they did not describe exposures. More recently, Omand (1973) noted that Dunbeath was one of only four places in Caithness where he found shelly till overlying a local till.

Description

The site indicated by Omand's (1973) grid reference is slumped and vegetated at present, and the best section in 1980 was at Baile an t-Sratha. There, the Allt an Learanaich, a tributary of the Dunbeath Water, has excavated sections up to 40 m high in a till infill on the south side of the valley. The exposures show two superimposed till units (Hall and Whittington, 1989: Balantrath and Balcraggie sites):

3. Grey, shelly till, weathered near the surface to a maximum depth of 2.7 m; clast lithologies dominated by Devonian sandstones, but also including distinctive pebbles of Mesozoic sedimentary rocks.

2. Brown to dark reddish-brown till of local provenance; Devonian sandstones dominant.

1. Devonian mudstone bedrock with striations orientated W–E.

Interpretation

Hall and Whittington (1989) interpreted the lower till (the Balantrath Till member in their lithostratigraphy), as a lodgement till emplaced by inland ice moving down the valley. Locally the contact with the overlying shelly till (their Forse Till member) is planar, sharp and erosional. Elsewhere at the contact, glaciotectonic folding was noted, and the presence of local structures and interlaminated brown and grey muds and diamicts is inferred by Hall and Whittington to indicate that the two respective ice masses were contemporaneous, and that the shelly till was deposited as the inland ice receded. According to them several features indicate that the shelly till is the product of land-based ice and not a glaciomarine deposit; first it rests on striated bedrock; second, it contains locally eroded bedrock and reworked local till; and third, it reaches an elevation of 110 m OD, which appears to be too high for glaciomarine deposition, even allowing for glacio-isostatic depression (*cf.* Sutherland, 1981a).

The lower till at Baile an t-Sratha is part of a suite of local till units, occurring west of a line from Reay to Berriedale and described by Jamieson (1866), Peach and Horne (1881c) and Crampton and Carruthers (1914). Currently, good sections occur in the valleys of the Dunbeath Water, Langwell Water and Berriedale Water, and also at the coast near Reay and Berriedale (for details see Omand, 1973; Hall and Whittington, 1989). The upper till at Baile an t-Sratha is part of the classic shelly till unit of Caithness occurring east of a line from Reay to Berriedale, with many exposures along the east coast and in stream valleys (Omand, 1973; Hall and Whittington, 1989). The age of the tills is currently a matter of debate (see above).

The significance of Baile an t-Sratha is that it provides one of the best current exposures clearly showing local and shelly tills, their respective characteristics and their stratigraphic relationships in the zone of interaction of the two ice streams that converged in Caithness. As such it is an important reference locality demonstrating a key part of the glacial succession in Caithness. Similar sections showing the superimposition of the two till units occur at Latheronwheel, Watten and Drumhollistan (Omand, 1973), but the stratigraphic relationships are most clearly seen at Baile an t-Sratha. In a wider context the multiple till sequence at Baile an t-Sratha is similar in several respects to those, for example, at Mill Bay, Boyne Quarry, Nigg Bay and Nith Bridge where the interaction of ice masses from separate sources also produced distinctive, superimposed tills. Further study of such sites will contribute important field evidence to test and constrain reconstructions and mathematical models of regional ice-sheet dynamics and the factors controlling changes in ice-sheet flow patterns.

Conclusions

Baile an t-Sratha demonstrates the succession of glacial (ice-deposited) sediments in south-east Caithness: a local till derived from inland is overlain by a distinctive shelly till deposited by ice moving onshore and towards the north-west. The importance of the site lies in its value as a reference locality for establishing the relationships between the two tills and the respective patterns of ice movement that they indicate. There is currently debate about the age of the deposits and whether they were formed during the Early or Late Devensian (approximately 65,000 and 18,000 years ago, respectively).

Reference list

Crampton, C.B. and Carruthers, R.G. (1914) *The Geology of Caithness*. (Sheets 110 and 116, with parts of 109, 115 and 117). Memoirs of the Geological Survey of Scotland. Edinburgh, HMSO, 194pp.

Hall, A.M. and Whittington, G. (1989) Late Devensian glaciation of southern Caithness. *Scottish Journal of Geology*, **25**, 307–24.

Jamieson, T.F. (1866) On the glacial phenomena of Caithness. *Quarterly Journal of the Geological Society*, **11**, 261–81.

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.

Smiles, S. (1878) *Robert Dick. Baker, of Thurso, Geologist and Botanist*. London, John Murray, 436pp.

Sutherland, D.G. (1981a) The high-level marine shell beds of Scotland and the build-up of the last Scottish ice sheet. *Boreas*, **10**, 247–54.