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# Muckle Head and Selwick

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## Highlights

Coastal sections at Muckle Head and Selwick provide a rare example in Scotland of raised beach deposits which are overlain by till. These deposits pre-date at least the last glaciation on Orkney, and are important for interpreting the history of sea-level changes and glaciation in the northern isles.

## Introduction

Muckle Head [HY 213 053] and Selwick [HY 225 055] are coastal sections located on the north of Hoy. They provide important exposures in raised beach deposits overlain by till. The raised beach deposits pre-date at least the last glaciation and indicate a former sea level slightly above that at present. They are important not only for interpreting the Pleistocene history of Orkney, but also in the wider context of those parts of Scotland which were peripheral to the centres of glaciation. The only published description of the sites is in Wilson *et al.* (1935).

## Description

Wilson *et al.* (1935) recorded a raised beach at Muckle Head and Selwick at between 20 ft (6 m) and 40 ft (12 m) above present sea level and resting on a clear rock notch or platform. They described the beach as being up to 5 m in thickness and consisting of a coarse, rounded gravel with numerous rounded boulders. The beach deposits, which at both localities were cemented by calcite, contained no erratic clasts. Wilson *et al.* (1935) did not specifically record the beach deposits as being overlain by till (and a cross-section of the Selwick beach and rock platform does not show any glacial deposits) but they concluded that the beach was probably 'pre-Glacial' in age, on the grounds of the lack of erratic material.

Recently, the best exposure has been that at Muckle Head (Figure 4.2) (D. G. Sutherland, unpublished data). There, approximately 3.5 m of beach sediments rest in the angle of a rock notch at the back of a ramp cut in conformity with the bedding of the Old Red Sandstone flagstones. The beach consists of a fining upwards sequence of rounded cobbles and pebbles at the base to pebbles at the top, with large subangular flagstone boulders scattered throughout. Immediately overlying the beach is a head deposit, about 1.5 m thick, consisting of angular to very angular platy clasts derived from the immediately adjacent bedrock. Resting on this head deposit is approximately 1 m of brown till with a well-developed clayey-sand matrix. The upper 0.3 m of this till has been periglacially disturbed and subject to solifluction, and the section is capped by 0.15–0.3 m of structureless sand with occasional gravel clasts scattered throughout.

The Selwick deposit is less accessible and the stratigraphy less clear than at Muckle Head. Also the beach does not show the fining upward sequence noted at Muckle Head, being composed of rounded cobbles and pebbles, with a scatter of angular boulders throughout. There was no clear contact observed with the overlying deposits, but exposures in slumps revealed a yellow-brown till.

## Interpretation

It is apparent from the local stratigraphy that the beach pre-dates the last glaciation of Orkney. The age of this glaciation remains to be established, however. The stratigraphic sequence at Muckle Head can be interpreted as evidence for a period of high sea level, followed, when sea level had fallen, by cold periglacial conditions and then invasion of the area by ice. Subsequent to ice retreat there was a further period of periglaciality. The simplest chronological interpretation would be that this sequence of events represents the last interglacial–glacial cycle, but until direct dating evidence is available such a conclusion is speculative.

There are relatively few localities in Scotland where raised beach sediments can be observed to be overlain by till. Similar stratigraphic sequences are relatively common in the southern British Isles, where amino acid dating has established that there are several generations of beach deposits, each apparently being correlated with a separate interglacial period (Bowen *et al.*, 1986). In Scotland, beach deposits overlain by till are only known in those areas peripheral to the centres of glaciation, such as in the north of Lewis (see North-west Coast of Lewis), on the islands of Barra (Peacock, 1980a, 1984a; Selby, 1987) and North Rona (Galley, 1959), and at two localities in the north of Hoy, at Muckle Head and Selwick. In none of these areas have marine shells been recovered from *in situ* beach sediments and hence there has been no opportunity to date the beaches other than with reference to the local stratigraphic sequence. It is therefore not known whether the various exposures of beach deposits are contemporaneous or not.

The raised beach deposits in the north of Hoy are two of the very few similar deposits in Scotland that record a period (or periods) of sea level only slightly above that of the present, but prior to at least the last glaciation. The Muckle Head section, in particular, demonstrates a sequence of sediments which apparently were deposited during a period of climatic cooling and glacial expansion, but the age of these sediments remains to be established. The site is an important element not only in the Pleistocene history of Orkney, but also as part of a pattern of interrelated sea level and glacial events in those areas of Scotland that were peripheral to the areas of build-up of the Scottish ice-sheets.

## **Conclusion**

Muckle Head and Selwick are important in showing raised beach deposits overlain by ice-deposited sediment (till), a succession which indicates that sea level was slightly above that of the present during a period, as yet undated, before the last glaciation. This area of North Hoy is one of only a few locations in Scotland, all located near the periphery of ice-sheet glaciation, where such successions occur. It is therefore critical not only in establishing the history of sea-level change and glaciation in Orkney, but also in helping to reconstruct their wider regional patterns.

## **References**



*(Figure 4.2) Section at Muckle Head, Orkney. The raised beach gravel, which rests on a rock platform, incorporates large flagstone blocks and is overlain in turn by a head deposit and till. (Photo: D. G. Sutherland.)*