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A palynological and geoarchaeological investigation into Bronze Age farming at Belderg Beg, Co. Mayo, Ireland

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ABSTRACT

This contribution describes the results and interpretations of geoarchaeological and palynological analyses of a soil profile near to a ^{14}C dated Bronze Age roundhouse in a sub-peat field system at Belderg Beg, north Mayo in western Ireland, which displayed field-scale evidence of tillage in the form of cultivation ridges. This evidence of arable cultivation was supported by the presence of quernstones in the roundhouse, but there was no supporting evidence from other forms of socio-economic analysis. Soil micromorphological analysis was employed to define how the ridges were created and with what tools; pollen analysis was used to characterise the surface vegetation and test the purpose of the ridges. The results unequivocally showed that a phase of ard cultivation was followed after a brief hiatus by ridge-and-furrow tillage. There were tentative indications of possible amendment of the earlier, ard-worked soil, and more definitive evidence of midden material addition to the ridged soil. An AMS radiocarbon assay on the base of peat overlying the ridges indicated that tillage occurred in the Mid to Late Bronze Age.

1. Introduction

Soil micromorphology is a valuable tool in identifying plough agriculture in palaeosols (Gebhardt, 1992; Lewis, 2002; Macphail et al., 1990). To date, there have been no published major archaeological applications of soil micromorphology in Ireland known to the authors. Whilst prehistoric[1] agriculture in Ireland is well documented from pollen records (Molloy and O'Connell, 1995; O'Connell and Molloy 2001) and the presence of sub-peat field systems (Caulfield, 1978, 1983; Molloy and O'Connell, 1995), little is known of agricultural techniques such as tool use or amendment strategies, or the pedogenic processes such as soil quality or erosion, which faced prehistoric farmers. In contrast, intensive investigations employing soil micromorphology alongside other techniques, have successfully identified the evolution of prehistoric agricultural practices, including progressively complex manuring systems, in the Northern Isles of Scotland (Guttman et al., 2006), and comparable evidence, including Neolithic midden cultivation, is emerging in the Western Isles (Guttman, 2005). There are some indications that prehistoric agriculture progressed along similar lines in parts of Ireland and the Northern Isles, as stone-built field systems dating to the Neolithic and Bronze Age are known in both areas, e.g. Céide Fields, north Mayo (Caulfield 1978, 1983; Molloy and O'Connell, 1995; O'Connell and Molloy, 2001) and Scord of Brouster, Shetland (Whittle et al., 1986). Soil micromorphological investigation of buried prehistoric agricultural soils in Ireland was undertaken, in order to further compare the agricultural practices of the two areas and investigate any potential similarity of agricultural evolution.

The archaeological site at Belderg Beg (Irish National Grid Reference F983407) is situated on a gently sloping hill which has an east-facing aspect, at c. 50 m OD in the townland of Belderg Beg (Fig. 1). The solid geology is of metamorphosed sandstones (quartzites and psammitic schists), with Caledonian igneous metadolerite intrusions around Belderrig harbour (Long et al., 1992). Belderg Beg is 7 km from Céide Fields. The archaeological remains at Belderg Beg were preserved by blanket peat until their discovery and partial excavation in the 1970s by Professor Seamas Caulfield (1971, 1972, 1973, 1974, 1975, 1978, 1983).

The archaeological site consists of a palimpsest of field walls with associated settlement remains (Fig. 1). The interpretations of Caulfield (1978) and Caulfield et al. (1998) were based on

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[1] The Neolithic of Ireland is conventionally divided into three stages (e.g. Cooney and Grogan, 1999): Early (4000–3500 cal. BC), Middle (3500–2800 cal. BC) and Late (2800–2300 cal. BC). Irish Bronze Age chronology is divided into the Early (2300–1700 cal. BC), Middle (1700–1200 cal. BC) and Late (1200–600 cal. BC).

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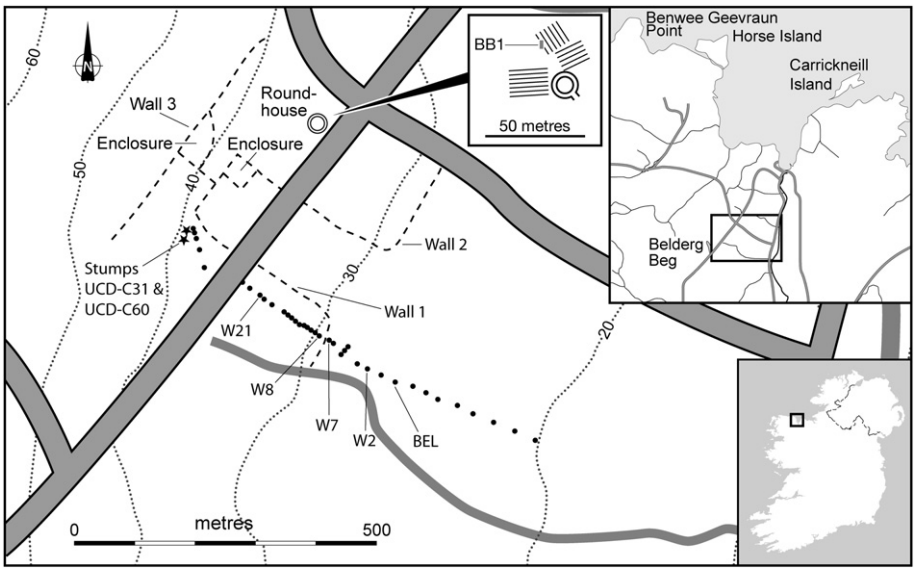

Fig. 1. Site plan. Inset shows map of North Mayo showing site location.

stratigraphic correlation and radiocarbon dates and the following description of the archaeology is based on those interpretations. The earliest archaeological remains at Belderg were considered to be Walls 1, 2 and 4 and Enclosures 5 and 6. In their excavated sections, the walls were found to be constructed on mineral soil. A pine stump rooted in the soil 5 m from Wall 1 (Fig. 1) and dated to 3370–3020 cal. BC (4510 ± 50 BP: UCD-C31, Caulfield et al., 1998) was considered a *terminus ante quem* for wall construction.

The roundhouse was constructed of stone and earth, with timber supports. It contained a central hearth with charcoal spreads, but the only artefacts recovered were saddle querns, rubbers and a polished stone disc (Caulfield 1973), which influenced the interpretation of the structure as a granary (Caulfield, 1988). A structural timber within the house was radiocarbon dated to 1690–1210 cal. BC at 95% (3170 ± 85 BP: SI-1473, Caulfield, 1978).

Evidence for prehistoric agriculture was first discovered in an area close to the roundhouse in 1972 (Fig. 2). Initially, relict ridges were discovered to overlie ard-marks, and both features were assigned a Neolithic date (Caulfield, 1972). In later excavations, the ard-marked area was discovered to extend beyond the confines of the ridges, and the ridges were in a soil distinct from the ard-marked horizon, implying that the two were not related (Caulfield, 1973, 1974). Based on their stratigraphic relationship with the roundhouse, the ridges were thought to be associated with the Bronze Age (Caulfield, 1975). The ard-marked layer was tentatively interpreted as representing the Neolithic ground surface, based on its greater spatial distribution and similarity to the mineral soil associated with the Neolithic walls (S. Caulfield, personal communication).

Geoarchaeological and palaeoenvironmental analyses in the vicinity of the roundhouse were developed to investigate further the age, nature and former exploitation of the soil, the ard-marks and cultivation ridges, to test the hypotheses that (1) the ard-marked soil horizon was cultivated during the Neolithic and (2) the ridges relate to Bronze Age activity, and to elucidate the relationship of these with other archaeological remains in the region. In a wider context the work had the intention of understanding natural and climatic factors in soil formation and whether deteriorating soil conditions were a factor in the abandonment of agriculture in the region.

2. Methodology

2.1. Field methods

A trench section from the 1970s excavations was cleaned back by 30 cm and the stratigraphy was described, drawn and photographed. Sediments were described according to common terminology and characterised by Munsell colour (1992). Particle sizes and organic content were estimated by judgement.

Two complete undisturbed sections from the soil profile were sampled using 8 × 5 × 5 cm Kubiena tins: one for soil pollen analysis and radiocarbon dating, the other for soil micromorphological analysis. The Kubiena tins were labelled *in situ* with orientation and provenance details. Once removed, the tins were sealed and wrapped in heavy-duty plastic film and aluminium foil. Bulk soil samples were taken of all identified contexts, except for the recent turf-growth, and double-bagged. All samples were retained in a cold-store at a constant 4 °C.

2.2. Laboratory methods

For soil micromorphology, thin sections were produced by the Micromorphology Laboratory, School of Biological and

Fig. 2. Area of ridge-and-furrow viewed to the east, with roundhouse visible in centre-right of image (photo: Lucy Verrill).