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Integrated geoarchaeological methods for the determination of site activity areas: a study of a Viking Age house in Reykjavik, Iceland

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ABSTRACT

For over a decade, geoarchaeological methods such as multi-element analysis and soil micromorphology have been used to identify and interpret activity areas on archaeological sites. However, these techniques, along with others such as magnetic susceptibility, loss on ignition, and microrefuse, artefact and bone distribution analyses are rarely integrated in the study of a single site, even though they provide very different and potentially complementary data. This paper presents a comparative study of a wide range of geoarchaeological methods that were applied to the floors sediments of a Viking Age house at the site of Aðalstræti 16, in central Reykjavík, Iceland, along with more traditional artefact and bone distribution analyses, and a spatial study of floor layer boundaries and features in the building. In this study, the spatial distributions of artefacts and bones could only be understood in the light of the pH distributions, and on their own they provided limited insight into the use of space in the building. Each of the sediment analyses provided unique and valuable information about possible activity areas, with soil micromorphology proving to have the greatest interpretive power on its own. However, the interpretation potential of the geochemical methods was dramatically enhanced if they were integrated into a multi-method dataset.

1. Introduction

The understanding of the spatial organisation of activity areas is of prime importance to the archaeological interpretation of settlement sites. It provides information about how individuals, households and communities organised the wide range of social and economic practices that constituted daily life, how they perceived and managed different types of waste products, and what living conditions were like in and around their dwellings and work places. To identify activity areas archaeologists not only use features such as hearths, cooking pits, storage pits and middens, and the spatial distributions of artefacts and bones, but increasingly they are making use of the most minute residues of human and animal activities: microrefuse (bones and artefacts under 1–2 mm in size), plant phytoliths, organic residues and associated elements and isotopes that accumulated on presumed occupation surfaces (e.g. Sampietro and Vattuone, 2005; Shahack-Gross et al., 2008; Smith et al., 2001; Sullivan and Kealhofer, 2004; Terry et al., 2004; Vizcaíno and Cañabate, 1999; Vyncke et al., 2011). Samples for these micro-residue studies are normally in the form of loose bulk samples in which the occupation deposits are homogenised, even though it has long been recognised that occupation surfaces are usually palimpsests, comprising the residues of multiple, superimposed events (Malinsky-Buller et al., 2011).

The interpretation of artefact, microrefuse, and geochemical distributions on archaeological sites is dependent on a clear understanding of the complex depositional and post-depositional processes that created and subsequently impacted the occupation deposits under study (Carr, 1984; LaMotta and Schiffer, 1999; Wandsnider, 1996). Human actions frequently result in the deposition and/or removal of particular artefacts and residues, especially objects over 1–2 cm in size, which are commonly kicked aside, removed during cleaning, or dumped or cached during site abandonment (Lange and Rydberg, 1972; Stevenson, 1982; Tani, 1995; Wilk and Schiffer, 1979). There is also a wide range of natural processes that alter the composition of occupation deposits over time as they become subject to the same physical, chemical, and biological processes affecting local landforms and soils (e.g. Johnson and Hansen, 1974; Rolfsen, 1980; Schiffer, 1996; Stein, 1983). It is therefore essential to develop a framework for

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interpreting activity areas that incorporates an assessment of cultural and natural processes that may have affected the formation of occupation surfaces. The ability of soil micromorphology to resolve minute lenses representing super-imposed events and to identify post-depositional processes has been well attested (e.g. Macphail and Crowther, 2007; Matthews et al., 1997; Milek, 2012; Milek and French, 2007; Shahack-Gross et al., 2005; Shillito et al., 2011), but the method continues to be underused in comparison to geochemical methods.

In order to assess the relative contributions that artefact and bone distributions and different geoarchaeological analyses can make to the interpretation of site activity areas, an interdisciplinary study was conducted on a house dated to the late 9th and 10th century AD, which was excavated in central Reykjavik at Aðalstræti 16 (formerly 14–18) (Fig. 1). The house was well preserved, and its turf walls, internal features (hearth, post holes), and 25 distinct floor layers located in different parts of the house were readily identified in the field (Figs. 2 and 3; Roberts et al., 2003; Snæsdóttir, 2004). The distributions of artefacts and bone fragments, organic matter and carbonates (loss on ignition), pH, soluble salt content (electrical conductivity), magnetic susceptibility, and multiple elements (ICP–AES), were compared to each other and to the results of soil micromorphology, in order to evaluate the relative contribution that each technique made individually, and as part of an integrated dataset, to the interpretation of the use of space in the Viking Age house.

2. Study area

Aðalstræti 16 is situated 1.95–2.15 m above sea level, at the base of a moderately steep slope that rises to the west. The climate in Reykjavik is cool and wet, with an annual mean temperature of 5 °C (−0.4 °C in January, 11.2 °C in July) and an average of 805 mm of rainfall per year (þórarinsson, 1987, 8). The site was well drained,

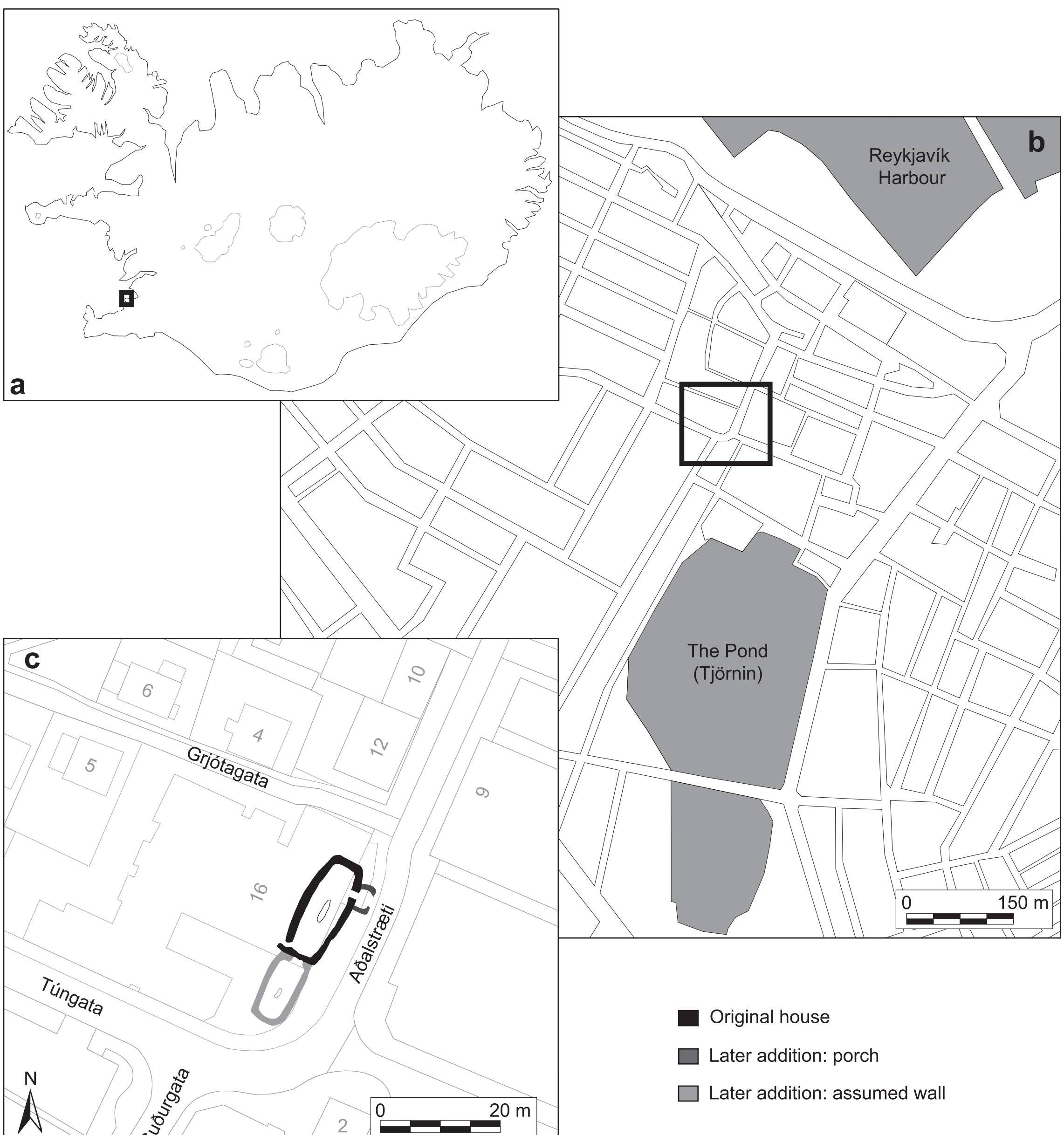

Fig. 1. The location of the Viking Age house (a) in Iceland, (b) in Reykjavík, and (c) on Aðalstræti (drawing by Óskar G. Sveinbjarnarson).