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Metallurgical findings from a Viking Age chieftain's farm in Iceland

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ABSTRACT

The metalworking, metal import, and use of metal in medieval Iceland is still little understood. When the Scandinavian settlers colonized Iceland in the 9th c. AD, the island was found to contain no useful metal deposits save for bog iron, and the deforestation that followed the settlement resulted in a scarcity of wood. Only in the last decades have archaeological excavations begun to unravel how the first Icelanders dealt with this lack of resources. This paper presents the metallurgical findings from a Viking Age chieftain's farmstead at Hrísbrú in the Mosfell valley, located just outside Iceland's present-day capital Reykjavik. The excavated metal objects had all been crafted with good workmanship employing technology similar to that used in mainland Scandinavia. However, most excavated metal finds show evidence of re-use, which together with the second-grade metal in some of the objects indicates a shortage of raw material that prompted the Icelandic colonizers to improvise and make do with whatever material was at hand.

Even though this chieftain's farm was materially poorer than contemporaneous high-status farms in mainland Scandinavia, it was wealthy by Icelandic standards. The analytical results show that some excavated objects were imported trade goods deriving from both neighboring and far-away localities, proving that the farm was part of the extensive trade network of the Viking world. Most likely, this farm represents the upper limit to what a Viking Age farm in Iceland could afford in terms of material objects and trade goods.

1. Introduction

While the history of metalworking in mainland Europe goes back to the earliest times, metalworking in Iceland only began when the island was colonized by the Scandinavian settlers in the 9th century. The settlers found Iceland to be a land of volcanic rock, containing no useful metal deposits save for bog iron. All other metals, particularly copper, silver, and gold, had to be imported. The deforestation process that followed the settlement eliminated most of Iceland's native forest of dwarf birch (*Betula* L.) and willow (*Salix* sp.) (Samset, 1991, 27), and it has been argued that iron production was a driving force behind this tree-cutting (Smith, 1995). However, the scope and nature of the metalworking, the metal import, and the metallurgical technology in the early days of Iceland's history still remain to be fully understood.

This paper presents the analysis of metal finds excavated from an Icelandic chieftain's farm, dating to the earliest days of the Icelandic settlement. By comparing the material culture of this farm with contemporaneous Icelandic and Scandinavian sites, an example is provided of how a relatively wealthy Icelandic farm managed to compromise between the Scandinavian customary use of metals and Iceland's lack of metals and other material resources.

2. The Hrísbrú site

At the Hrísbrú site, located in the Mosfell valley just a few kilometers outside Iceland's capital Reykjavik, the Mosfell Archaeological Project has excavated a 10–11th century farmstead (Fig. 1). The Mosfell valley runs from the bay Leirvogur in the west to the highlands of the Mosfell heath in the east. The excavated site is located along the slope of the northern side of the valley, at a strategic position from which it is possible to view both the central valley area and the coastline to the west (Byock et al., 2005). So far, a traditional Viking Age (ca. AD 790–1100) longhouse, a farm

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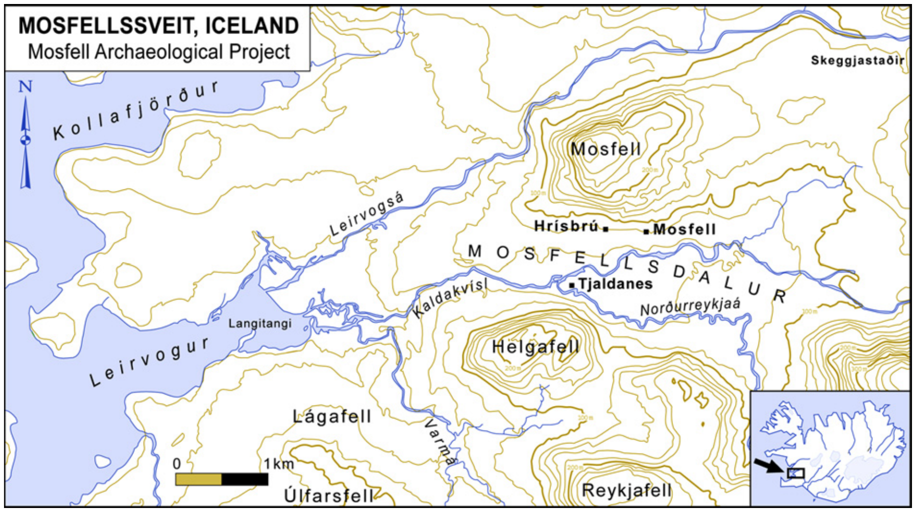

Fig. 1. Map showing the Mosfell Valley and the Hrísbrú excavation site in Southwest Iceland.

church with an associated cemetery, and a pagan cremation site have been unearthed.

Viking Age Scandinavia was a stratified society with a chiefly elite (Byock, 2001, 66–69; Roesdahl, 1999), and Vésteinsson (2004, 74–75) has grouped Icelandic houses into low, middle, and high status by reference to three parameters, i.e. house size, artifacts/prestige goods, and historical records indicating status. At Hrísbrú, the longhouse measures an impressive 28 m from end to end, which makes it one of the largest Viking Age longhouses so far excavated in Iceland. The excavation yielded more imported glass beads than any other archaeological farmstead in Iceland (see below), and there are several medieval Icelandic sagas mentioning chieftains living at the old Mosfell farm, which was located at the site of modern-day Hrísbrú (Byock et al., 2005; Grímsson, 1886). Thus, there is ample evidence for Hrísbrú being one of the more important high-status households in Iceland during the 10–11th centuries.

Although the Hrísbrú farmstead has been continually inhabited from the Icelandic settlement up to the modern period, the habitation sites have changed over time, and the excavated Viking Age structures are located no more than 50 m from the present-day farmhouse. The longhouse dates from the original settlement of Iceland in the late 9th to early 10th century, and the small accompanying church was built around AD 1000. Both the longhouse and the church are very well preserved as no subsequent structures or occupation has disturbed the site since it was abandoned in the 11th or early 12th century, save for a small agricultural building located on top of the knoll where the church is located. The floor of the longhouse was buried approximately 1 m below the surface of what is now a meadow, where the soil covering the longhouse has been deposited through domestic trash dumping inside the cavity of the house, followed by aeolian soil deposition from the nearby eroding mountains. This aeolian soil is slightly acidic (pH 6–7) and generally sandy, allowing rainwater to seep through and access any buried objects. The average rainfall in the valley is about 100 mm/month, and the average temperature in the valley ranges from −2 °C in the winter to +14 °C in the summer, creating yearly freeze–thaw cycles (personal communication from Guðrún Gísladóttir at the Icelandic Meteorological Office, 2008). The preservation conditions at the site are therefore unfavorable, and most excavated objects are severely deteriorated due to the exposure to a combination of oxygen and moisture. On the upside, it appears that the meadow in which the structures are situated has been used exclusively for grazing, never for growing crops. Consequently, the buried material has not been disturbed by plowing, and the stratigraphy of the soil is mostly intact up to the topsoil, even though the meadow has been mechanically leveled in modern times. For example, above the longhouse, a volcanic ash layer from the Katla eruption in AD 1500 was found in situ some 20 cm below the current surface level.

In all excavation areas, i.e. the longhouse, the church, the surrounding graves, and the cremation site, metal artifacts were encountered. Although the artifacts were heavily corroded, some contained enough remaining metal to allow extraction of useful metallurgical information.

3. Materials and methods

X-ray fluorescence (XRF) spectroscopy was carried out on all metal samples in order to characterize their elemental composition. The XRF spectra were recorded with a tungsten filter at 45 kV/11 mA, and with no filter at 35 kV/10 mA, using a Jordan-Valley Excalibur benchtop XRF (model EX-2600U).

X-ray diffraction (XRD) spectra were recorded of corrosion products and bead colorants using a Rigaku R-Axis Spider unit employing an image plate in Weissenberg geometry to collect Debye-Scherrer-rings. Minute amounts of material were scraped off the samples and placed on the end of a rotating glass spindle, and XRD spectra were recorded at 50 kV/40 mA for between 600 and 1500 s. After baseline-correction, the spectra were searched and matched against reference spectra from the International Centre for Diffraction Data (ICDD) using the JADE v8.2 software from Materials Data Inc.

Fourier transform infrared (FTIR) spectra were recorded with a Perkin–Elmer Spectrum One instrument equipped with a solid state Attenuated Total Reflectance (ATR) sample stage. Spectra of corrosion products were recorded in the 4000–550 cm^{-1} region with a resolution of 4.0 cm^{-1} and matched against the UCLA/Getty Conservation Program's IR database, as well as the spectral database of the Infrared and Raman Users Group (IRUG).

Small samples were cut from some of the metal finds with a jeweler's saw, mounted in Buehler transparent Epoxide resin, and oriented to expose the cross-sections. The samples were then ground and polished in steps ending with the Buehler Metadi 1 micron diamond suspension. The polished cross-sections were etched in 2% ferric chloride for copper and 2% nital for iron in order to make visible the grain structure in the samples (Scott, 1991). The etched surfaces were examined under reflected as well as polarized light in a metallographic stereomicroscope at 50×–400× magnification.