Constructing a Chronology for Westward Viking Age Expansion in the North Atlantic

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Introduction and aims
Evidence for movement of people from Scandinavia in the Viking period is found on archaeological sites across the North Atlantic, including the Northern and Western Isles and mainland Scotland. Traditional chronologies indicate an east to west migration through the 9th and into the 10th centuries. However, new scientific dating evidence from archaeological excavations suggests a more complex pattern of interaction over an extended period of time.

In recent years there has been a significant increase in the number of scientific dates from the region, the range of methods has extended beyond radiocarbon to include tephras, archaeomagnetism and luminescence, and there have been major advances in statistical and scientific understanding of the methods. All of these developments allow a more nuanced interpretation of the timing, duration and nature of westwards expansion.

This paper presents the initial stages of a project to collate, critically evaluate and reinterpret scientific dating evidence in a regional synthesis across the North Atlantic, with a view to understanding this crucial period in both Scotland and the wider context.

Data evaluation
The next stage is to evaluate the quality of these dates using current understanding of the archaeological record and the scientific basis of the methods. Quality assessment of the dates considers the material dated, precision and accuracy of laboratory measurements and likelihood of contamination. To evaluate the data it is also essential to understand the relationship between dates and archaeological context, incorporating close and unequivocal associations.

• Radiocarbon dating is the primary method employed, but there have been significant advances in measurement and calibration over the period it has been in use. The suitability of material dated is evaluated, radiocarbon determinations are recalibrated with the most essential datasets (Reimer et al., 2009) and appropriate corrections made for modern carbon contributions (e.g. Aucott et al., 2011).

• Tephrochronology is well-established in some regions (e.g. Dugmore et al., 2009) and checks are made to ascertain that the tephra layer identified has not been reworked and can be clearly linked to a dated eruption.

• Archaeomagnetic dating has mainly been used in Orkney and Shetland for dating the last use of fired structures (e.g. Outram & Batt, 2010). The reliability of material as a magnetic recorder is quantified and, where necessary, magnetic directions are recalibrated (Zanussi et al., 2007; Patrici-Carrascó et al., 2011).

• Optically stimulated luminescence is not used widely but has significant potential for dating sediments (e.g. Rhodes et al., 2003).

The final stage
Synthesis
Once reliable scientific dates within an established archaeological framework have been identified, it is possible to integrate the data on a site-based, regional and international scale (Bronk Ramsey, 2009). Within a site, Bayesian analysis can be used to integrate scientific dates within a stratigraphic sequence, producing more precise dates from existing datasets and highlighting anomalies.

Critical analysis of dating evidence from all methods across the entire region allows research questions concerning the nature and timing of migration to be addressed:

• The speed of expansion and evidence of first settlement in different regions.

• Evidence for waves of expansion, potentially supporting complex diaspora models rather than isolated settlements.

• Longevity of occupation and interaction between diaspora and indigenous populations.

Data collection
Interpreting evidence for migration and settlement requires a robust chronological framework, and so the initial aim is to collate scientific dates from all relevant archaeological contexts. Studies so far have focussed on individual sites or regions; this research brings together the dating evidence across the entire North Atlantic for the first time. Initial literature survey has identified over 190 sites with evidence of Scandinavian contact excavated in the region since 1956. Of these, over 90 have produced 700 chronometric dates, drawn from published literature, site reports, student theses and laboratory reports.

All relevant dates, with associated scientific and archaeological information, are collated into an Access relational database. The selection of data involves extensive discussions with archaeologists working in the region and the database will become a resource for other researchers.

The next stage

Conclusion and on-going work

The research project is currently at the data collation and evaluation stage and outcomes will be reported in the academic literature via the website. It is intended that the project will promote the scientifically informed use of a variety of dating methods on sites across the North Atlantic and a re-evaluation of existing data. A sound quantitative basis for addressing questions about migration and settlement will promote wider discussion of shared heritage across the North Atlantic, past and present.

Acknowledgements and references

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