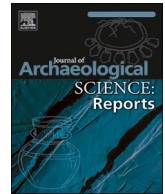




Contents lists available at ScienceDirect

## Journal of Archaeological Science: Reports

journal homepage: [www.elsevier.com/locate/jasrep](http://www.elsevier.com/locate/jasrep)

## Early medieval seascapes in Western Ireland and the geochemistry of ecclesiastical cross stones

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## A B S T R A C T

Select early medieval period (400–1100 CE) Irish people pursued lifestyles of ascetic devotion leading to the establishment of ecclesiastical communities on small islands along Ireland's western coastline. These communities were separated by rough ocean waters, unpredictable Atlantic storms and rocky coastlines. Nevertheless, contemporary textual evidence and shared patterns of architecture, technology, and artisanship, including carved cross stones indicate that these communities were nodes in regional networks of institutional affiliation, shared religious practice, and material procurement or exchange.

This study uses geochemical characterization of rock lithologies by hand-held, portable x-ray fluorescence (HHpXRF) in conjunction with routine petrographic analysis to assess the inter-island distribution of rock types used to produce early medieval cross stones in an effort to better define this integrated seascape. The cross stones were produced from a wide range of different geologic materials, including sedimentary limestones to high-grade metamorphic schists. The goal of this study was to determine what proportion of the cross stones were produced from materials locally available on each of the individual islands, and what proportion were produced from imported, non-local lithologies. This study demonstrates that in-field use of portable HHpXRF instrumentation provides semi-quantitative chemical data that can be used in conjunction with visually obtained petrographic data to broadly discriminate and identify different bedrock lithologies. Our results indicate that approximately 25% of the 41 cross stones analyzed were produced from non-local lithologies.

Results of this study suggest that early medieval inhabitants primarily used locally procured (on-island) material for cross stone production; non-locally obtained (off-island) rock was used less frequently. These results are consistent with other recent archaeological interpretations that highlight western Ireland *seascapes* as a connective network between members of early medieval communities who used open-water seafaring and raw material procurement/exchange as a means to maintain regional connections.

## 1. Introduction

During the early medieval period (400–1100 CE), people living within ecclesiastical settlements inhabited many of the small islands along Ireland's western coastline. Centered on churches and organized to serve monastic communities, such settlements also acted as places of worship, burial, and seasonal pilgrimage for men, women, and children who worked and dwelt alongside monks (Greene, 2008; Greene, 2009). The seascape setting both isolated and linked island ecclesiastical settlements, facilitating or foreclosing maritime travel depending on weather conditions. Contemporary textual evidence and shared patterns of architecture, technology, and artisanship, including carved

cross stones, suggest that these communities were nodes in regional networks of institutional affiliation, shared religious practice, craft-production, and material procurement or exchange (Greene 2008, 2009; Kuijt et al. 2010; Lash 2013; O'Carragáin, 2013).

This study uses geochemical characterization including hand-held, portable x-ray fluorescence (HHpXRF) in conjunction with visual petrographic analysis, to assess the regional distribution and sources of early medieval stone crosses in an effort to better define social interactions within this seascape. We examined 41 cross stones and the bedrock lithologies on each of the islands in our survey area. Using a two-step approach combining HHpXRF and petrographic analysis, we found that 25% of the stone crosses bearing ecclesiastical motifs were

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<http://dx.doi.org/10.1016/j.jasrep.2017.06.015>

Received 14 March 2017; Received in revised form 31 May 2017; Accepted 10 June 2017  
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made of materials non-local to the island where they were recovered. In contrast 75% of the cross stones were made of locally obtainable raw materials to the island where they were recovered.

We interpret these results to indicate that the transport of raw lithic material and crafted cross stones accompanied the movement of people and ideas between island ecclesiastical settlements in Connemara. This finding contributes to a growing body of literature that explores how the production and exchange of material culture forged identities and relations amid island ecclesiastical settlements within an integrated seascape of western Connemara.

## 2. The early medieval seascape of Western Ireland

The well-preserved stone building remains and the relative lack of post 18th century disturbance on Ireland's western islands creates unique conditions to study medieval ecclesiastical settlements. Yet, research is often complicated by the lack of natural ports, the expense of conducting fieldwork on remote islands, and the health and safety risks that come with conducting field research in isolation. The issues archaeologists face today would have been accentuated when living on these islands in the past. Sustaining a population over an extended period of time, even with off-island subsistence support, would have been difficult due to seasonally limited accessibility and often sub-optimal soil conditions (Feehan 2003:228; Greene 2008:233). In the past two decades, research on Inishmurray, Co. Sligo (O'Sullivan and Carragáin, 2008), Illaunloughan, Co. Kerry (Marshall and Walsh 2005), High Island (Marshall and Rourke 2000; Scally 2014), and Inishark and Inishbofin, Co. Galway (Kuijt et al. 2010) has contributed substantially to understandings of the ritual and economic practices of island ecclesiastical settlements.

The current study area is focused on a series of islands off the coast of Connemara, extending from south county Galway to south Mayo. The islands of this archipelago range in size and in accessibility. The largest (> 100 km<sup>2</sup>), Inishmore, includes a sheltered harbor, offering relatively easy access to and from the mainland. Others islands are small (< 100 km<sup>2</sup>), have no natural harbors and/or require long boat trips from the mainland (e.g. Inishark, High Island, and Caher). All islands vary in terms of size, distance from the mainland, and ease of access (e.g. Inishbofin is easily accessible and an average sized island). Interweaving archaeological research with textual and documentary history suggests how the early medieval inhabitants of these islands related to each other materially and ideologically.

Contemporary literary sources depict Ireland on the western edge of the Christian world, and its western islands as ideal locations to pursue ascetic lifestyles of spiritual and penitential devotion (O'Carragáin, 2013: 22–5; O'Loughlin, 1997:15; Stokes 1891:658). As such, islands epitomized 19th- and early 20th-century views of the early Irish church as composed primarily of communities of monastic men, dedicated to ascetic withdrawal and with little interaction with the outside world (e.g. Greene 2009: 234–236). More recent scholarship recognizes that ecclesiastical communities were linked through maritime travel, material exchange, pilgrimage, and institutional affiliation (Etchingham 1999; O'Carragáin, 2013). Island and mainland ecclesiastical settlements share similar patterns of settlement layout, agricultural crops and mill technology, church architecture and iconography, and even, to a limited degree, access to ceramic wares produced within and outside Ireland (Doyle 2009: 60; Greene 2008: 240–241; O'Carragáin, 2013: 145–78). Sea-travel, although highly weather contingent, clearly provided a means of people from different islands connecting to each other and staying linked with cultural currents on the mainland.

Stones shaped as, or incised with, crosses served a variety of functions at ecclesiastical sites, including gravemarkers, boundary markers, and foci of veneration atop pilgrimage stations. The inclusion of stylistically datable decorative motifs, as well as the association with scientifically datable contexts, provides chronological control for stone crosses at ecclesiastical settlements. The most thorough description and

documentation of the raw materials used to produce cross stones on islands off the western coast of Ireland comes from studies conducted on High Island (Marshall and Rourke 2000; Maddern 2014). Building and expanding upon this past work, our study assesses the use of local and imported lithic materials at ecclesiastical settlements on five islands along the Connemara coast.

## 3. Survey and methodology

A primary goal of the study was to determine if any of the stone crosses stylistically attributable to the early medieval period were made from local, or non-local, bedrock materials on each of the five islands in our study area. An off-island origin would indicate that these heavy materials were transported significant distances from where the rock was originally quarried. In order to make this determination a detailed understanding of the geology of each of the islands, or more specifically, the lithologies present on each of the islands, was necessary within the study area. A reconnaissance geological survey of each island was conducted by our research team, which included a geologist with specialty in rock and mineral identification. Samples of the dominant lithologies or rock formations from each island were collected for petrographic and HHPXRF analysis. HHPXRF was conducted primarily in-field, along with a preliminary visual rock description and identification. All HHPXRF analysis of the cross stones was conducted non-destructively, on surfaces cleared of debris and lichen using a synthetic bristle brush, without any damage or alteration to the underlying cross stone. HHPXRF was also conducted in the field on bedrock outcrops on each surveyed island using conditions as similar as possible to those used on the cross stones (i.e. selection of flat, weathered surfaces, clear of visible debris). In addition, we collected ~1 kg samples of all of the primary bedrock lithologies on each island for later petrographic analysis.

### 3.1. Geologic setting & local bedrock identification

Rock lithologies exposed along the coast of western Ireland extending from south Galway to south Mayo and islands off the coast belong to four major groups (Fig. 1). The oldest rocks in the region belong to the Dalradian Supergroup and consist largely of Neoproterozoic to Cambrian age sedimentary rocks that were metamorphosed during the Ordovician Grampian Orogeny (~470–460 Ma) (Dewey 2005; Leake, 2014). These rocks are exposed on Inishbofin, Inishark, and High Island and consist of a variety of clastic sedimentary rocks that were deformed and metamorphosed to varying degrees, with metamorphic grade generally increasing from north to south.

High-grade metamorphic rocks of the Dalradian Supergroup are exposed on High Island (Figs. 1 and 2). Here the rocks are amphibolite facies, medium-grained, biotite-garnet-staurolite schists. While the proportions of the various mineral phases vary between samples, the unit is relatively homogenous across the entire island. On Inishark and Inishbofin the two dominant rock units are the Ben Levy Formation and the Balynakill Schist (Figs. 1 and 2). The Balynakill Schist is a pelitic (metamorphosed mudstone) unit that consists of greenschist facies phyllites and fine-grained schists. These rocks are strongly foliated and contain abundant muscovite, chlorite, and quartz; some contain distinct chloritoid porphyroblasts (Fig. 2). The Ben Levy Formation consists largely of psammites (metamorphosed sandstones), and as such, are rocks rich in quartz and feldspar, along with minor muscovite and chlorite (Fig. 2). As with all metasedimentary rocks, there is considerable variation in mineralogy and bulk chemical composition within both the Ben Levy and Balynakill formations, and there are many outcrops on both islands of rocks of intermediate, semi-pelitic composition, as well as minor thin layers of amphibolite and quartz-pebble grits (Leake 2014).

Moving north from Inishbofin and Inishark, low-grade metasedimentary rocks of the South Mayo Trough (SMT), Sheeffry, and Derrylea

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