

JOHN WYMER BURSARY 2015

GEOCHEMICAL PROVENANCING USING INDUCTIVELY COUPLED PLASMA-MASS SPECTROMETRY AND PORTABLE X-RAY FLUORESCENCE: SAMPLE COLLECTION IN THE NORTH OF ENGLAND

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In early 2015 I received notification that I had been awarded a John Wymer Bursary. With the available funds, I was able to plan and execute a trip around Lincolnshire and Yorkshire to collect samples of flint. This work was undertaken in March 2015 and has proved invaluable to my PhD research: investigating the geochemical variation of flint in Britain and Ireland, with the ultimate aim of provenancing artefacts.

Provenancing of stone tools has been undertaken in a variety of ways during the history of archaeological research. The most common approach is that of macroscopic examination (colour, texture and overall appearance) which, for the majority of lithologies in Britain and Ireland, is sufficient to broadly determine the source – particularly when the material has a limited geological occurrence. On the basis of macroscopic characteristics, it is possible to identify some raw-material sources such as porcellanite with a high degree of confidence. However, where a raw material occurs over large areas, determining the source can be more difficult. This is the case with flint. Determining provenance of flint is reliant on identifying discriminating characteristics or qualities of the raw material that are sufficiently limited in occurrence as to be representative of a source region. Macroscopic characteristics of flint are not generally this discrete, but are used frequently to assign source.

A more robust investigation of provenancing was conducted using geochemical analysis of flint samples from across Britain and Ireland.

One of the main aims was to identify geochemically distinct areas. Therefore, sampling locations were identified and a large number of flint samples were collected. These samples were analysed to determine their chemical composition. This was undertaken during the course of my PhD research, using two different analytical methods: inductively coupled plasma-mass spectrometry (ICP-MS); and portable X-ray fluorescence (pXRF). ICP-MS is a wholly destructive method, but detects a wide array of elements at very low concentrations (parts per billion). Alternatively, pXRF detects a narrower range of elements, at higher concentrations, but is non-destructive. Flint samples were collected from the south of England and north of Ireland on previous excursions; however I was still lacking samples from the Chalk of Yorkshire and Lincolnshire. Identification of source areas was reliant on having samples from areas of flint-bearing Chalk geology, so the absence of flint samples from the north of England had the potential to be a major limitation for my research.

Thankfully, the John Wymer Bursary allowed me to book car hire and travel throughout Yorkshire and Lincolnshire collecting samples of flint from the Wolds and along the coast. These samples are invaluable as they have allowed me to provide a much fuller picture of the geochemical variability of flint within Britain. With the information gleaned from the ICP-MS and pXRF analyses, I hope to provide a dataset which can be used by other researchers to provenance flint artefacts.

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