Validating a Novel Lipid Extraction Method for Historic Parchments

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Parchment is a biological material formed from processed animal skins. Its manufacture has adopted various societal and geographical nuances (Saxl, 1954; Ryder, 1960) but common to all methods is the depilation of untanned skins by repeated exposure to an alkaline liming solution; scraping, and drying under tension (Reed, 1975). As the primary medium for the documentation of litigation, art and sociocultural information for over 2,000 years, parchment is ubiquitous and, unlike many archaeological materials, often dated to the year of its production (Bower *et al.*, 2010). Historic parchment, therefore, represents a highly valuable record of natural and anthropogenic heritage but, due to this, presents a considerable analytical challenge thus limiting many studies to non-invasive analyses.

Previous work has recognised biomolecules within well-dated parchment to provide an untapped record of its production and the animal's diet and environment; until now, however, studies have employed destructive sampling protocols that require sacrificial parchments (Ghioni *et al.*, 2005; Brock and Pollard, 2011; Doherty *et al.*, 2021). To overcome this, we developed a vacuum-aided extraction technique to enable the non-destructive sampling of lipids from historic manuscripts. It was demonstrated that using this method, parchment lipids could be non-destructively recovered from nine manuscripts dated 1765-1825 CE in quantities suitable for stable isotope analysis (SIA).

In this paper, we describe the process of validating this novel lipid extraction technique through the use of an artificial ageing experiment on three sample parchments. We report the results of ATR-FTIR and SEM analyses which confirm the vacuum-aided extraction as causing no immediate or long-term changes to the integrity of parchment following sampling. We now look

to sample previously unattainable collections that will enable the probing of historic animal husbandry techniques and climatic events by SIA.

References

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