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Organic residue analysis of Red Lustrous Wheelmade Ware:

An examination of the contents of Red Lustrous Wheelmade Ware vessels traded across the eastern Mediterranean during the Late Bronze Age

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Keywords: organic residues, Red Lustrous Wheelmade Ware, gas chromatography-mass spectrometry, compound specific stable isotope analysis, fats and oils, trade, Late Bronze Age, eastern Mediterranean, beeswax, high performance liquid chromatography

Abstract

Red Lustrous Wheelmade Ware (RLWm ware) transport and storage vessels have been excavated from Late Bronze Age (LBA) sites across the eastern Mediterranean. These distinctive vessels were traded for the valuable commodity they contained so far unidentified. Seventy-three sherds (61 RLWm ware, 12 in local fabrics) and two visible residues were analysed for organic residues using standard lipid extraction techniques. Seven residues from a previous study were re-examined. Gas chromatography-mass spectrometry identified four materials – beeswax, bitumen, fat/oil and resin. Beeswax, found only in vessels from Hittite sites in Turkey, was probably used as a post-firing treatment. Fat/oil, present in some sherds from every site, represents the contents of the vessels and showed many of the characteristics of degraded plant oil. Two examples contained a plant sterol and three yielded ricinoleic acid, a biomarker for castor oil. Gas-chromatography compound-specific isotope ratio mass spectrometry of selected residues excluded dairy products, ruminant animal fats and fish oils as source materials for the fats/oils, while comparison with a small database of modern oils created during this study does not exclude plant oils. Selected samples analysed by high performance liquid chromatography-tandem mass spectrometry did not reveal wine residues. Data on the elemental composition of the fabric collected during another study was re-analysed and compared with data from a further published study, confirming the remarkable consistency of RLWm ware fabric. Volume calculations were also attempted to give an estimate of the capacity of the main vessel forms.