


Object Number	K653	Description	Wing-shaped mount in gold with garnet cloisonné decoration. Catalogue no. 565.
		Sample Description and location.	
		K653-1 measured insitu without removing sample from object. See preliminary microscopy report by Sonia O'Connor for analysis of this area.	

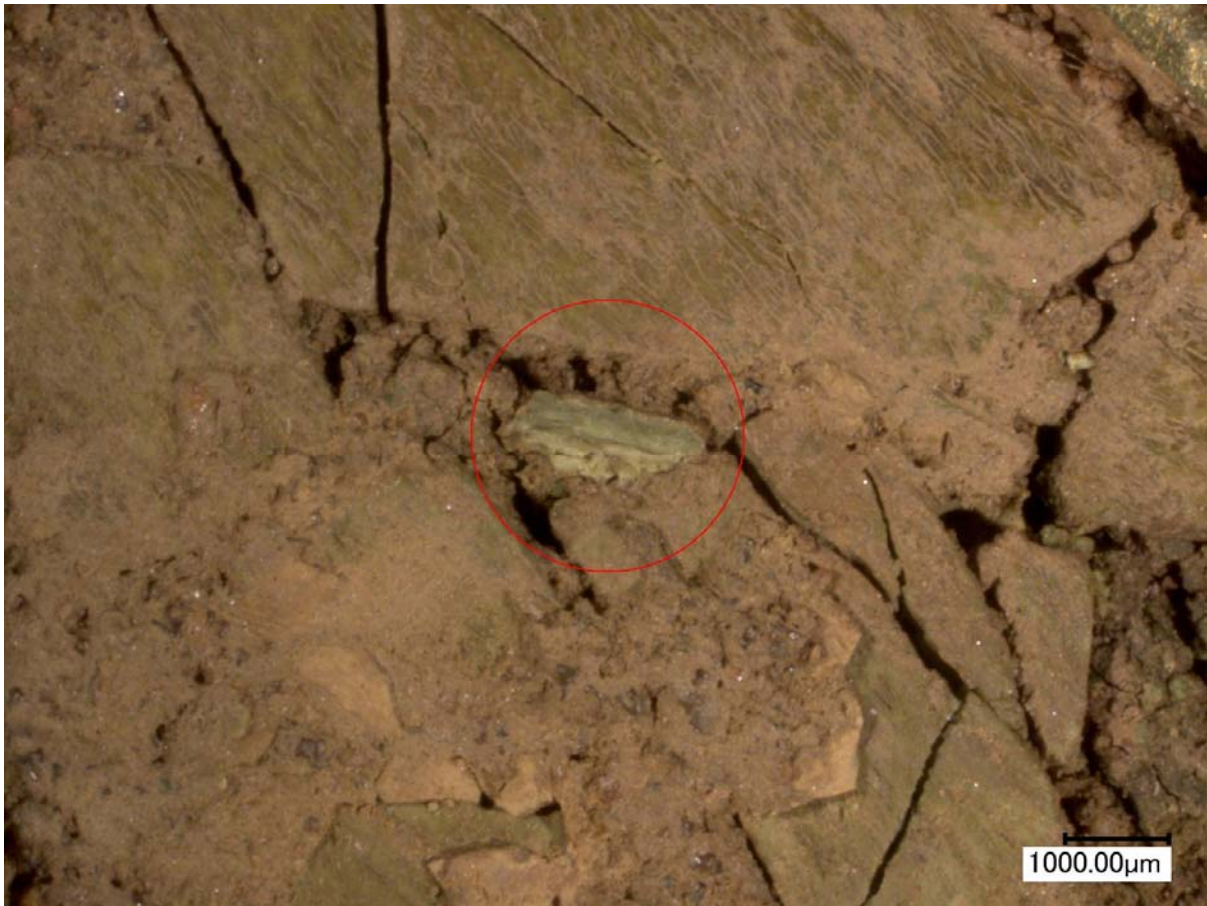


Figure 1. Sample K645-1 analysed in situ shown circled in red.

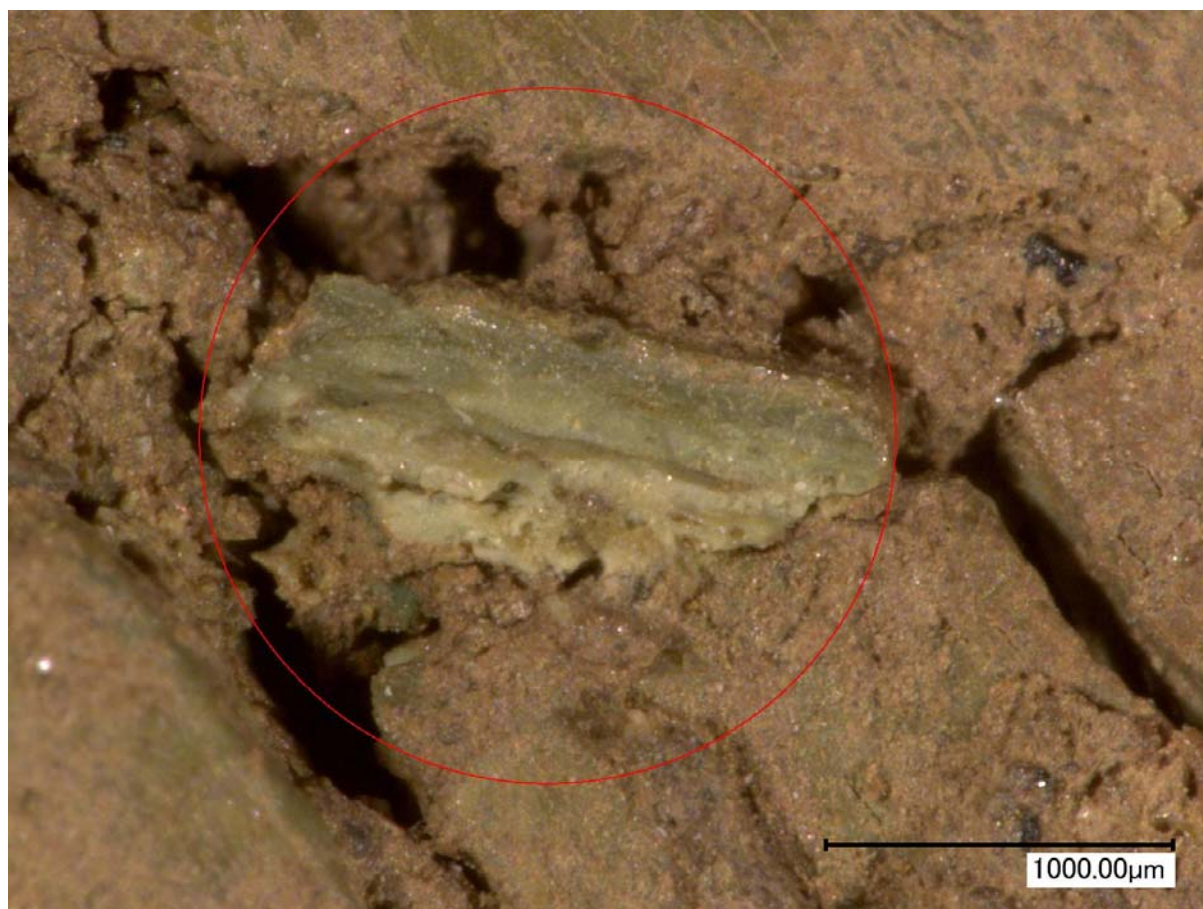


Figure 2. Detail of sample K653-1 in situ analysis area.



Figure 3. Detail showing FTIR analysis point for sub-sample K653-1-3

FTIR Analysis

Comments: Spectrum K653-1-3 (top, red) may relate to heavily deteriorated bone that has almost entirely lost the collagen protein component with what is possibly an ill-defined amide I band visible in the 1640cm⁻¹ region.

The most intense bands arise from the mineral component of the bone, in accordance to its larger proportion in the composite. Bands at 557 and 600 cm⁻¹ correspond mainly to PO₄³⁻ bending vibrations, despite some minor contribution from collagen (amide bands) in that region. Absorptions at 961 and 1012 cm⁻¹ correspond to the symmetric and asymmetric stretching of phosphate, respectively. It should also be also mentioned that acidic phosphate (HPO₄²⁻), a frequent anionic substitution in the crystal lattice of hydroxyapatite, usually originates a band at ca. 1110 cm⁻¹, which is normally overlapped with that from the PO₄³⁻ asymmetric stretching vibration (Figueiredo *et al.* 2012, Querido *et al.* 2013, Fleet *et al.*, 2004).

Biological apatites present in bone, dentin and enamel contain different amounts of carbonate, principally from CO₃ replacement of PO₄ ions (S'lo'sarczyka *et al.* 2005). Bands at around 870 cm⁻¹ (bending) and 1400-1450 cm⁻¹ (stretching) arise from carbonate substitutions in the crystal lattice of hydroxyapatite (Ibrahim *et al.* 2011, Figueiredo *et al.* 2012). The predominantly collagen protein component of the bone, where it is present at all in archeological material, is indicated by carbonyl stretching at about 1650cm⁻¹ (amide I), C-N and N-H vibrations at around 1550cm⁻¹ (amide II), and to a broad N-H stretching band centred around 3350cm⁻¹, with the latter often partially obscured by a broad H₂O band between 3700-2500 cm⁻¹ (Figueiredo *et al.* 2012, Querido *et al.* 2013). The higher ratio of mineral to protein in bone means that the protein peaks described above are often quite subtle in relation to the intense mineral related bands.

Representative Spectrum

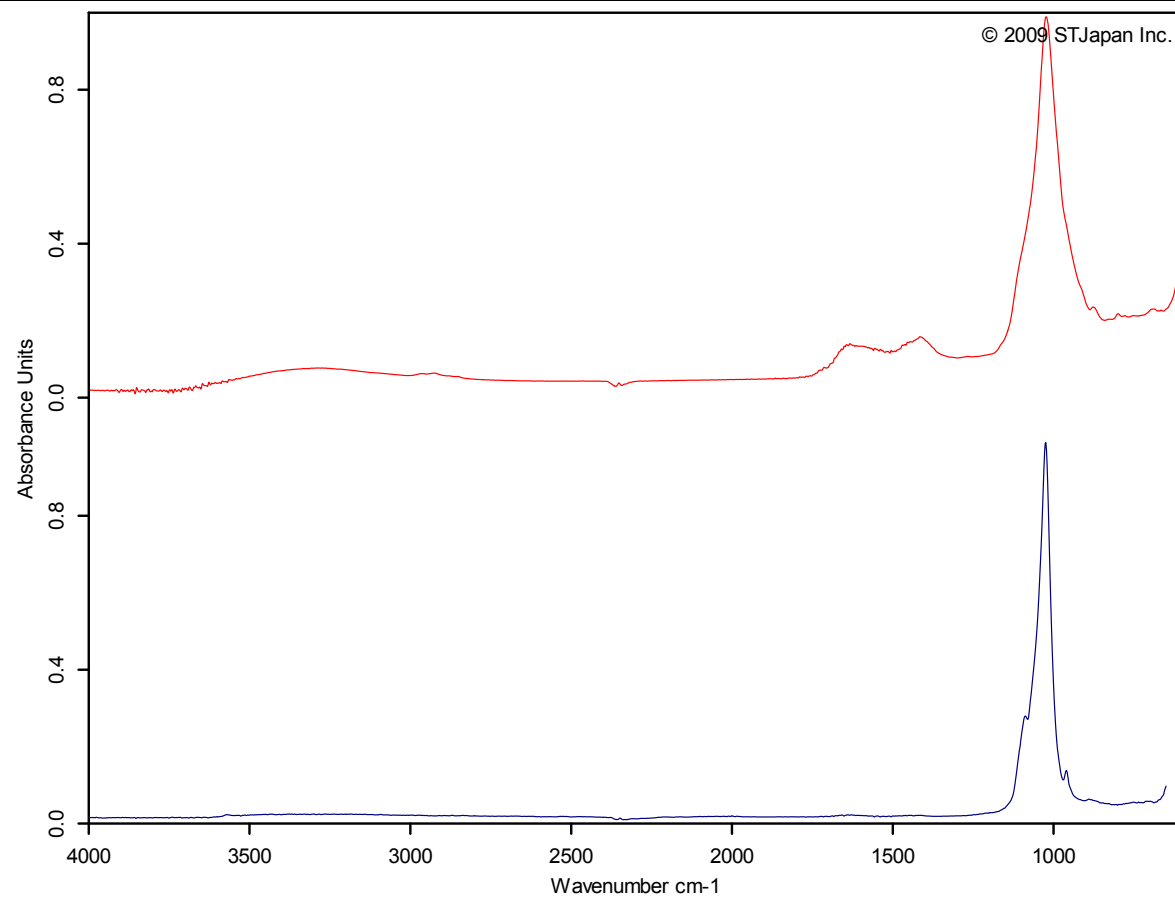


Figure 4. Top (red) spectrum for K653-1-3. Bottom (blue) Bone phosphate reference sample, ST Japan 2009.