ARCHAEOMICROBIOLOGY: METHOD DEVELOPMENT TO "FINGERPRINT" AUSTRALIAN CULTURAL OCHRE USING MICROBIAL DNA ANALYSIS

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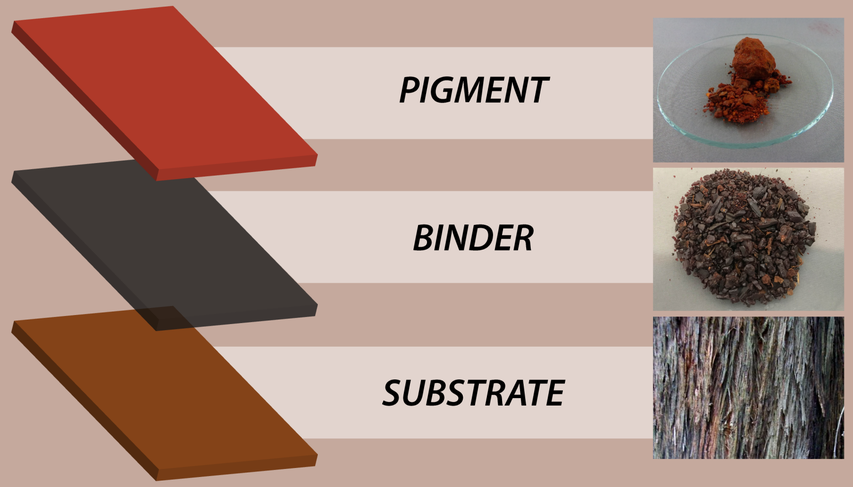
LAYERS OF TECHNOLOGY

Aboriginal Australian heritage materials are complex mixtures of natural mineral pigments such as ochre as well as organic materials that require appropriate characterisation methods to understand provenance and composition.



MINERAL PIGMENTS

Ochre is composed primarily of iron oxides and hydroxides: hematite [Fe2O3] and goethite [FeO(OH)x or a-FeOOH]. Past studies have demonstrated that an "elemental fingerprint" of ochre can be used to provenance ochre.

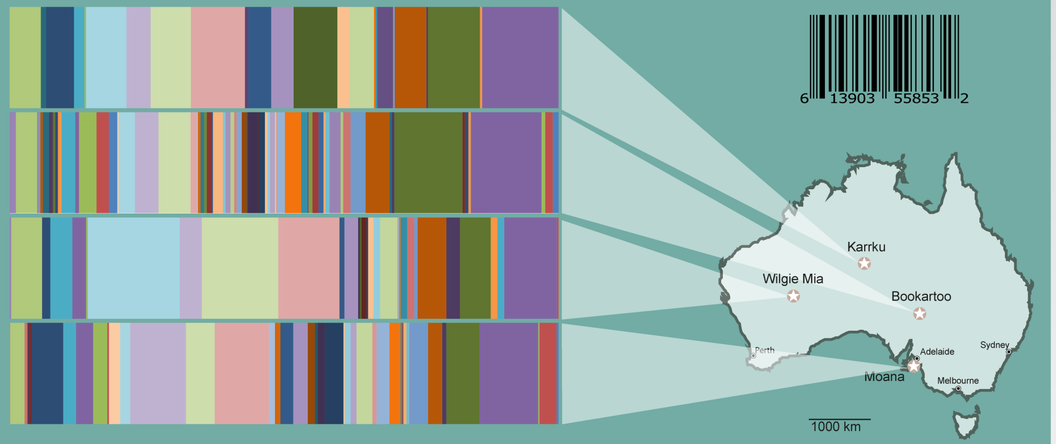
MINERAL	FORMULA	STRUCTURE	ASSOCIATED ELEMENTS
Hematite	Fe_2O_3		Transition Metals, REEs
Goethite	$FeO(OH)_x$ or a-FeOOH		Transition Metals, REEs
Kaolinite	$Al_2Si_2O_5(OH)_4$		Fe
Manganese Dioxide	MnO_2		
Charcoal	C		Ca (bone black)

METAGENOMIC COMMUNITY

Many different environmental components interact to form the metagenomic profile. Bacteria need to be isolated form the soil to generate a unique sample fingerprint that represents recent sample history.

RESULTS

The metagenomic profiles are "barcodes" of the types and amount of each type of bacteria. Metagenomic profiling generates a unique "fingerprint" that differentiates ochre sources. This novel approach is a successful application of powerful forensic science techniques for cultural heritage questions.



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