

## Painters by the Yarmouk

### Investigating Craft Organisation through Painted Plaster Analysis at Gadara and Tall Zira'a (Northwest Jordan)

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#### Introduction

Between 1992 and 2019, two painted plaster assemblages were excavated at Gadara (Umm Qais) and Tall Zira'a (Northwest Jordan). Discovered in a domestic context and as levelling debris respectively, both contained pieces with the same stamped stone imitations (Kerner, 1997; Jansen, 2022). Both assemblages, albeit fragmentary, can be inscribed in the broader architectural painting styles prevalent in domestic wall painting throughout antiquity in the Levant. Since this sort of stone imitation has not been found anywhere else, a multi-method analytical approach was applied to test the possibility of the same group of craftspeople working at both sites. This exercise also revealed their pigment procurement strategies, application techniques, and organisation of these artisans.

#### Methods

Twenty-three pieces from Gadara (22) and Tall Zira'a (1) were analysed with the following methods:

- **pXRF and  $\mu$ XRF:** Spectroscopic and semi-quantitative elemental analysis
- **XRD:** Mineral phase identification
- **Reflected Light Microscopy:** Microstratigraphy
- **SEM-EDS:** Microstratigraphy and semi-quantitative elemental analysis
- **Photo-induced Luminescence (VIL):** Egyptian blue detection

#### Results

##### Same Wall, Two Palettes: Two Painters?

An overarching trend was observed throughout the assemblage, separating the pieces located on the upper and lower registers of the wall into two iconographically and technically distinct groups.

##### Group A: Plain Panels from the Orthostatic Zone

The pieces belonging to the lower register of the wall exhibited plain panels, primarily in red and yellow, with some features like frames in what seemed to be black. XRD identified the use of hematite and goethite, whereas VIL revealed the black features contained rests of Egyptian blue.

The red **hematite did not show any significant trace elements** in this group through  $\mu$ XRF. **Goethite, however, contained lower levels of Al, and high S** according to EDS measurements. These were classified as HEM 1 and GOETH 1 respectively (Fig. 2). These colours constitute **Palette A**, only found at Gadara.

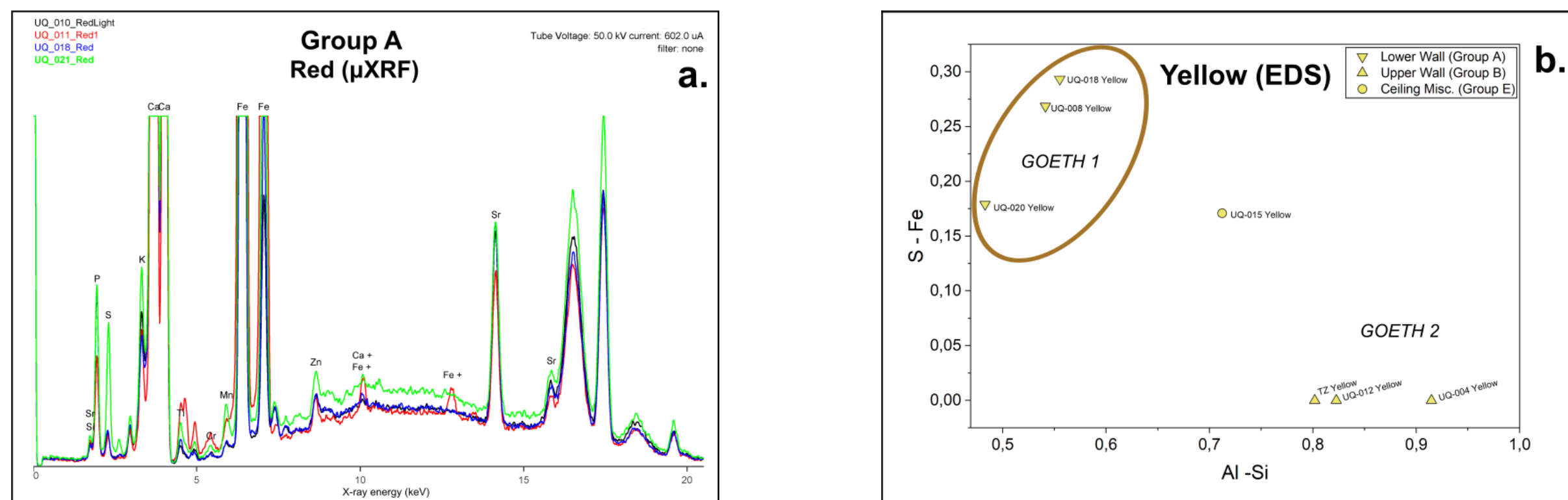


Fig. 2 Results of  $\mu$ XRF analysis on red pieces from Group A (a.), and EDS measurements on yellow pieces highlighting those belonging to this group (b.).

##### Group B: Stone Imitation Panels from the Upper Zone

The pieces belonging to the upper register exhibited stamped stone imitation panels, primarily in red and yellow framed with black lines. Hematite and goethite were identified through XRD, whereas SEM and optical microscopy on cross sections indicated the use of carbon black.

The **hematite showed considerable amounts of As**, adsorbed in iron oxide ores before being processed as pigments. At Tall Zira'a, with similar As levels, Zn was also relatively high. **Goethite contained higher levels of Al, and no S** in pieces from both sites. These were classified as HEM 2a and 2b (for Gadara and Tall Zira'a respectively) and GOETH 1 respectively (Fig. 3). These colours constitute **Palette B**, present at Gadara and Tall Zira'a.

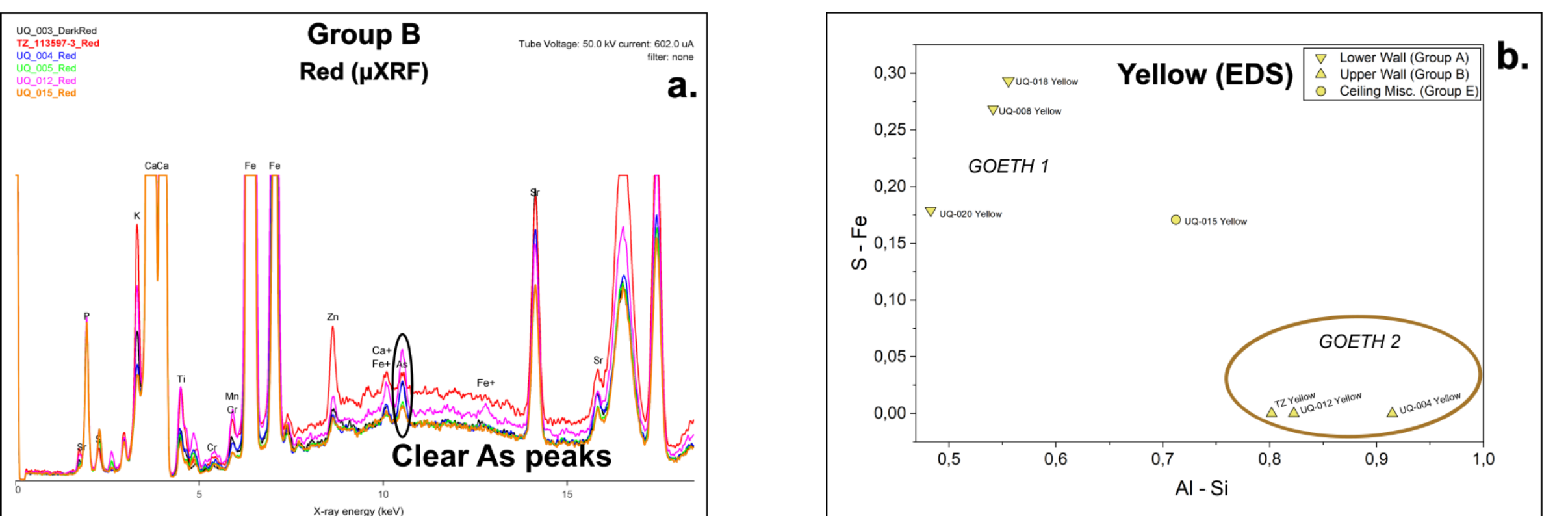


Fig. 3 Results of  $\mu$ XRF analysis on red pieces from Group B showing increased As levels (a.), and EDS measurements on yellow pieces highlighting those belonging to this group (b.).

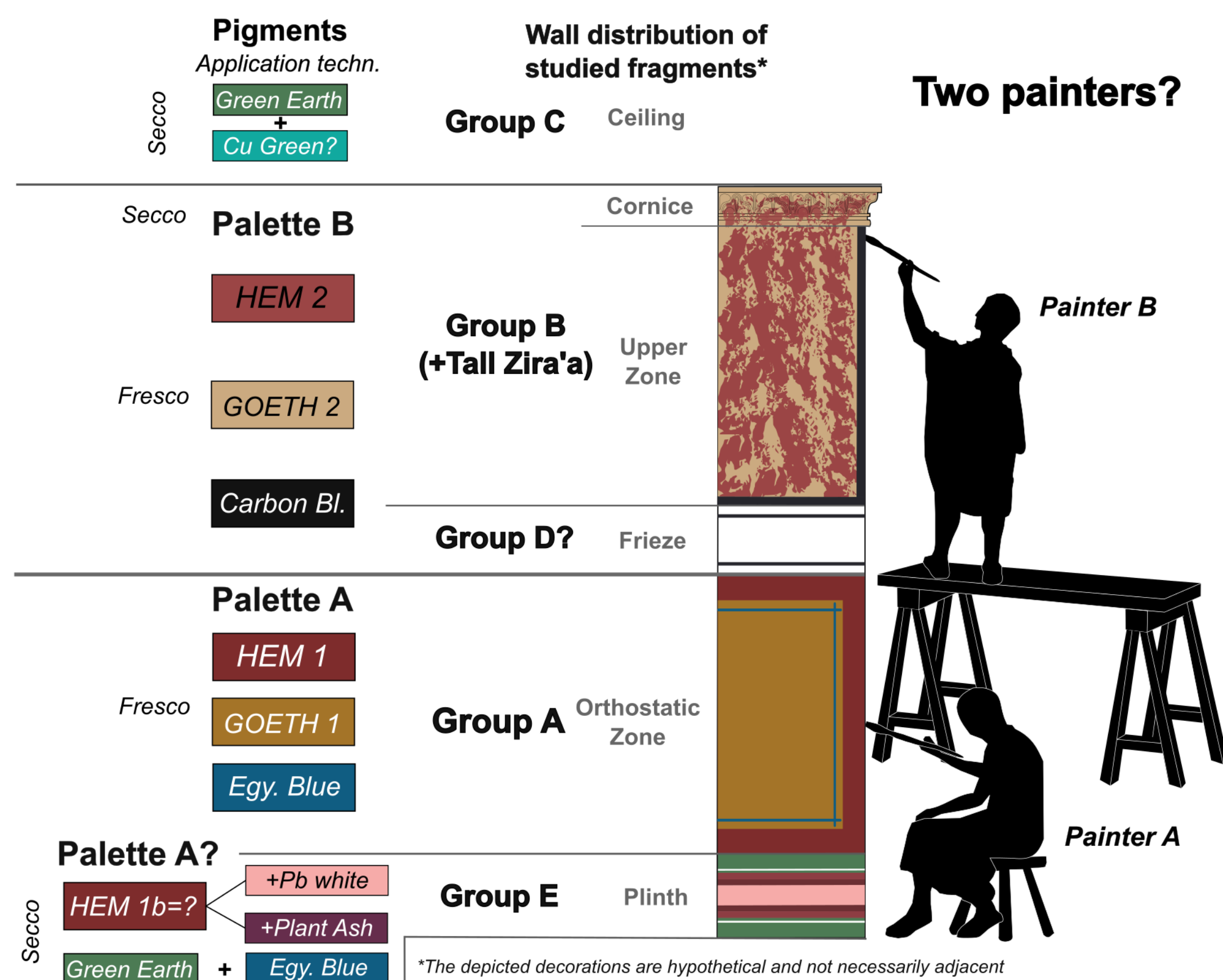
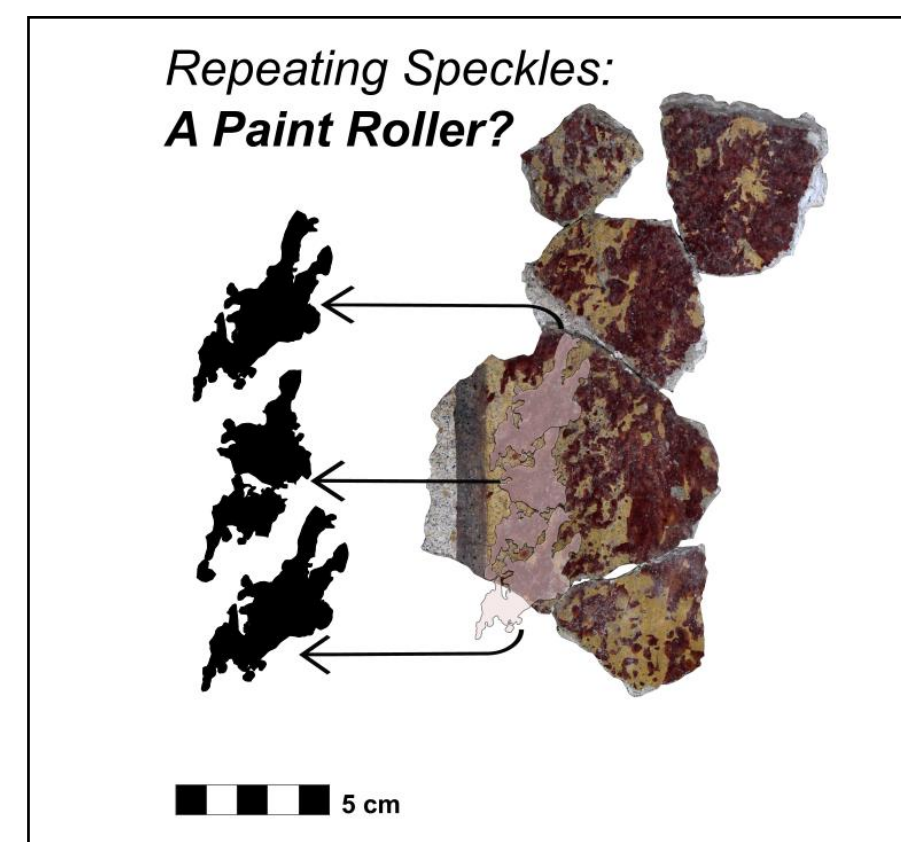


Fig. 1. Graphical Abstract: Summary of main results of this study.

##### A Unique Stamped Decoration: A Paint Roller?

Pieces from Group B exhibited a unique stamped pattern in red over yellow background that was not applied with a brush, but stamped on the wall. SEM images lacking carbonation layers indicated they were applied *al fresco*. The reconstruction of some fragments of this feature revealed the presence of identical speckles repeating vertically, which may respond to the use of a rolling device (Fig. 4.).

Fig. 4. Pieces of Group B exhibiting identical repeating speckles



##### Other Groups, Other Colours

Different pieces with diverse colours were identified in Gadara's assemblage, associated with the ceiling (Group C) and a plinth (Group E). Group D, which included an incomplete inscription and lines in black and white, was associated chemically with Group B, suggesting it was part of a frieze in the middle of the wall.

- **Green:** Pieces from the ceiling and plinth contained rests of green paint. These are all **green earths** (celadonite or glauconite) **mixed with a Cu-based compound** (following XRD and XRF data). VIL revealed a mixture with Egyptian blue in the plinth, and a non-fluorescent material in the ceiling.
- **Pink and purple:** These colours, all belonging to the plinth, had a **base of hematite**. Pinks were **mixed with a Pb-based material** (lead white, perhaps cerussite) and purples were **mixed with ash**. The latter was identified in the cross sections through the presence of charred material, calcium oxalates and faecal spherulites, all associated with ash from domestic contexts (Canti and Brochier, 2017).

##### Plaster: Binders and Aggregates

The plasters at both sites were manufactured with **local raw materials**. The calcite-based binders were quarried from oil shale formations. Both exhibited unburnt lumps of calcite with foraminifera whose tests (shells) were filled with bitumen. This characteristic of the Muwaqqar, Umm Rijam, and Wadi Shallala formations, all present in the sites' area (e.g. Al-Tamimi et al., 2021). The aggregates were mainly alkali basalt, extracted from the nearby Harrat Ash Sham Desert.

#### Conclusion

The presence of two distinctive palettes associated with fixed decorative features repeating at Gadara and Tall Zira'a suggests the presence of two artisans. They were referred to as Painters A and B. It is possible that they acted quite independently, given the recurrent use of different sources of the same type of pigments, which cannot respond to practical reasons if they were used in the same wall. In any case, both used accessible and local materials in the case of plasters and developed new application techniques to carry out their work efficiently.

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