

## RECOVERY OF TYRIAN PURPLE FROM ANTHROPOGENIC SEDIMENTS FROM A BRONZE AGE SYRIAN ROYAL TOMB

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The only intact Bronze Age royal tomb to have been discovered in Syria is located at the site of Tell Mishrifeh, formerly the ancient city of Qatna. The tomb is rock cut into a limestone cliff-face and was completely sealed in an undisturbed state following the destruction of the overlying royal palace complex by an invading Hittite army in 1340 BC after *ca* 400 years of continual use (Pfälzner, 2004). The sediments of the tomb floor contained within are purely anthropogenic in nature, having derived from burial activities which took place and the degradation of funerary objects placed within the tomb during its period of use. Our current study is aimed at examining the sediments as a sink of chemical information relating to past ritualistic human activity using a suite of biomolecular and bulk elemental analytical techniques. In several samples, lipid extraction unexpectedly yielded brightly coloured purple extracts, the solubility of which in organic solvents suggested the presence of an organic dye, the most contemporaneous being Tyrian purple.

Negative ion high resolution mass spectrometry of solvent extracts revealed a cluster of ions in the ratio 1:2:1 centred at 418.8853 Da, corresponding to 6,6'-dibromoindigo (**4**), the characteristic coloured component of Tyrian purple (Friedländer, 1909). HPLC-UV/Vis (Figure 1a) revealed a range of brominated and non-brominated indigo and indirubin derivatives (**1-5**) known to be components of Tyrian purple (Karapanagiotis *et al.*, 2006). Preparative HPLC has been used in conjunction with NMR to probe the benzene ring Br substitution patterns of 6-monobromoindigo (**3**) (Figure 1b) and 6,6'-dibromoindirubin (**5**) isolated from the archaeological material.

Tyrian purple was produced on a vast scale from the secretions of the hypobranchial gland of several species of marine mollusc found throughout the Mediterranean. Its association with wealth and royalty throughout its 3000 years of use due to its high intrinsic value is well documented, with at times, the wearing of garments dyed purple being restricted to royalty and priests. The distribution of the dye across the tomb floor is constrained to specific loci and is found in association with the placement of exotic and precious burial

artefacts along with human bones and is likely to have been used to dye textiles which were used in burial or ritualistic ceremonies.

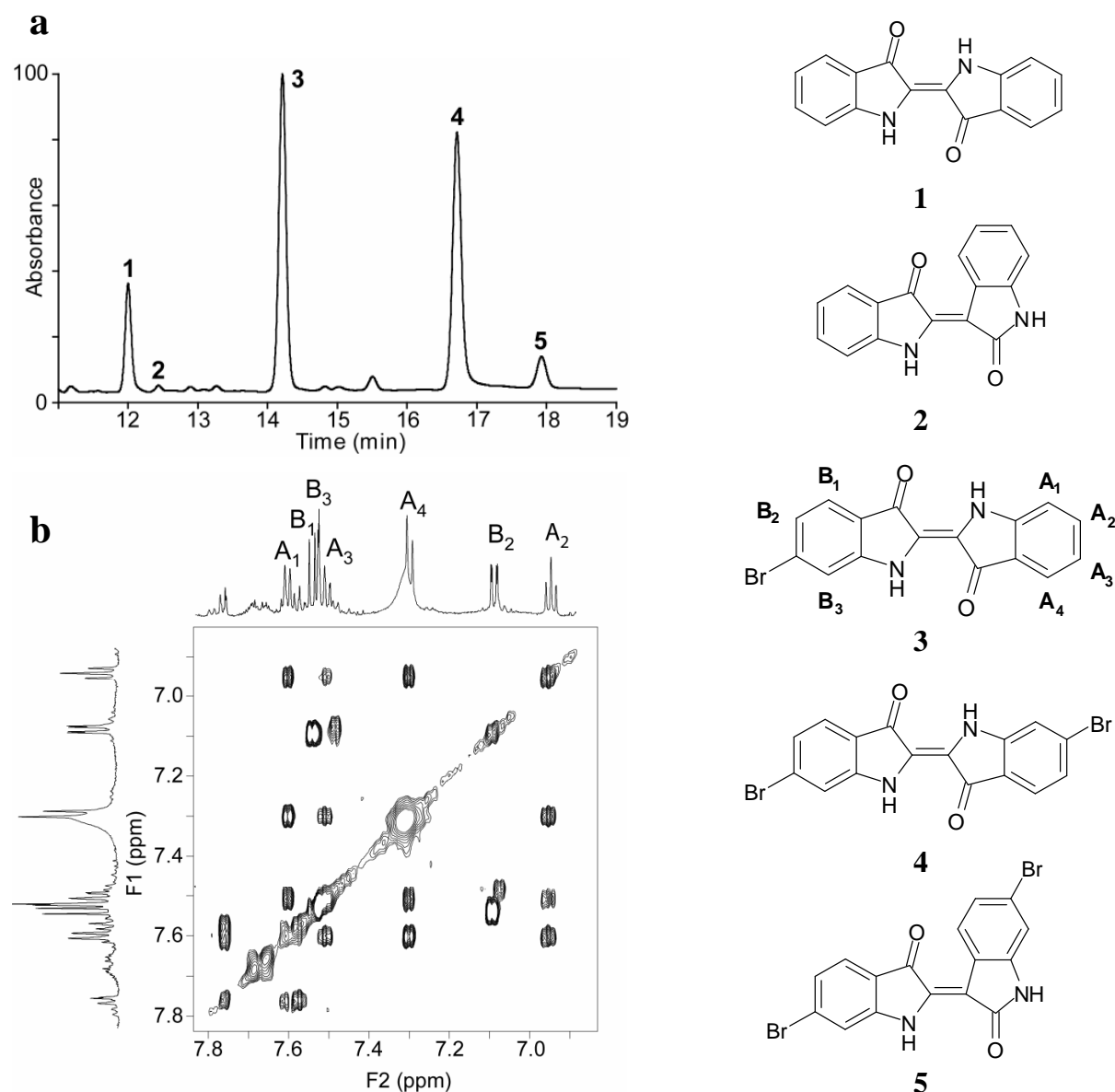


Figure 1. (a) Partial HPLC-UV/Vis chromatogram of DMF extract from sediment sample QS28. (b) 2D ZQ filtered TOCSY NMR spectrum of 6-monobromoindigo (**3**) and assignment of the aromatic substitution pattern. Numbered compounds are as follows; (**1**) indigo, (**2**) indirubin, (**3**) 6-monobromoindigo, (**4**) 6,6'-dibromindigo, (**5**) 6,6'-dibromoindirubin.

## REFERENCES

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