Evaluation of handheld X-ray fluorescence spectroscopy results of Roman copper alloy brooches by using archaeological typology

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INTRODUCTION

- This study is part of the research on the northern periphery of the Late Roman Empire that studied the developments between the 3rd and 5th century AD.
- The crossbow brooch is a well-known artifact, frequently found in Late Roman archaeology and art-historical sources.
- Not much was known about its production organization, nor its connection to the changes in the Roman world.
- The aim was to investigate the composition of these brooches to explore how this could inform us on changes in metal production that reflect the larger socio-cultural changes in the Late Roman world.

MATERIALS

- The crossbow brooch has its origin in the 3rd century as a military item, gaining status with the rise of the military elites in the 4th century, and becomes a symbol of Roman power and state authority in the 5th century.
- A total of 187 brooches were collected from 12 different sites in Belgium and the Netherlands.
- The sample population covers the complete typological and stylistic variability between ca. AD 250 and 450 in this region.

TYPOLOGY AS A VARIABLE

- Typological information can be used to move beyond a black box approach of the compositional data.
- Ideally provenance and dating are used to make significant groupings; but often with old finds or museum collections, these are uncertain.
- Typology is an archaeological tool that contains information about both regionality and chronology.
- A typology is a collection of variables that reflects differences in the material. The distinction between types means that at least one variable is significantly different.
- A single typological variable represents a number of related variables that have a significant meaning about the material.
- Typological models reflect aspects from both the production and consumption of that material. Using typology to clarify the artifacts enables the analyst to include a number of variables that are most likely to represent conscious or unconscious choices by the producers.

DISCUSSION

- The socio-historical changes linked to the typological model provides explanations for the compositional data.
  - Type 1 and 3 are local and regional productions, possibly batch-produced and intended for the general military class (soldiers and officers).
  - Type 2 broaches increase in number and variation as the brooch type becomes more frequent and is initiated in non-military productions with larger regional distributions.
  - Type 3A is a (state) controlled large-scale production supplying the entire Roman army. Despite its larger numbers it is this type an outlier to the rest of the typological population by the clearly different role of Zn. It has been suggested that brass production was a monopoly of the Roman state.
  - Despite the shift to military elites and high status officials, type 5 and 6 do not appear to have altered in composition, notwithstanding the increased use of gilding and exquisite decoration.

CONCLUSION

- Using typology to interpret compositional data:
  - Investigates diachronic change and persistence.
  - Explores regional diversity and similarities.
  - Adds socio-historical information from archaeological, iconographical and historical sources.
  - Ideal method when it is not possible to obtain exact compositional data.
  - Focus on patterns and trends.
  - Supported by additional layers of information which are object or context related.

- For the Late Roman crossbow brooches, the compositional analysis informed on:
  - Production organization.
  - Changes in the producer-consumer relations.
  - Production choices as the result of changes in the Late Roman society.

RESULTS

- General compositional results:
  - All brooches are made from copper alloys.
  - Majority have precious metal decoration (gilding or silvering).
  - One silver alloy brooch was found.
  - The continuous variation in Zn, Pb makes it useless to try to allocate modern alloy labels and fails to derive distinct groupings based on the XRF data alone.
  - Trends and patterns visible with the typological separation (use of lead peak intensities and silver content).

REFERENCES

2. S. Lyckel, ‘Detailling Analysis of Early Roman Copper Alloy Brooches for Metal eligibility and Archaeological Typology’ (MSc Research Project, Ghent University, 2017).