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The early days of ceramic lead-glazing in the Mediterranean : Unravelling technological practices in Asia Minor, Greece, and Italy



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1. ARCHAEOLOGICAL THEORY : a diffusion of lead glazing from East to West?

In the course of the 1st century BC, first emergence, in the Mediterranean world, of lead-glazed pottery in Cilicia, and start of regional workshops on the coast of Asia Minor.

- o No technological connection with previous glazing techniques and imitations of silverware.
- o Production of green-glazed pottery in the Parthian world (alkali glazes under the Seleucids) and in China (lead glazes since the 4th century BC, including Ca-enriched lead glazes).

In the late 1st century BC and during the 1st century AD, lead-glazed pottery industries thriving in Italy (including in Rome) and in the Rhône Valley.

In the 2nd century AD and down to the Low-Empire, specialized workshops developing in Britain, in the Rhine and Danubian regions, in Pannonia.

2. RESEARCH QUESTION : reconstructing technological aspects of an innovation

Mapping the production of lead-glazed pottery in the eastern Roman world.

Exploring the technology of late Hellenistic and early Roman lead-glazed pottery, in the broader context of earlier traditions of glazed pottery in the Mediterranean and in the Ancient East.

- o Clay selection techniques
- o Glaze ingredients and recipes
- o Colouring materials

3. METHODOLOGY: multidisciplinary analysis of fabrics and glazes

Petrography of ceramic fabrics : exploring pottery provenance and clay selection practices.

SEM-EDS analysis of fabrics and glazes : reconstructing glazing recipes and coloration techniques.

4. MATERIALS: lead-glazed wares from Lesbos, Athens, Corinth, Ostia

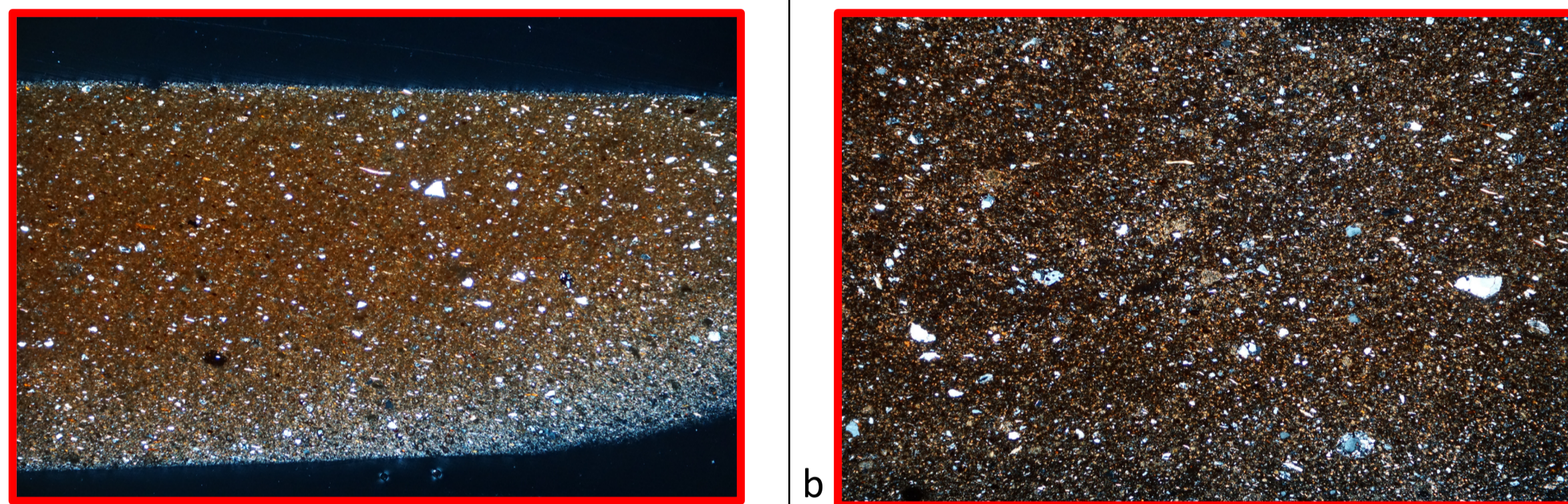
Sampling number and sites: total of 87 samples, from Ancient Mytilene on Lesbos (1st century BC), the Athenian Agora (1st century AD), and Ancient Ostia (late 1st – early 2nd century AD).

Workshop products identified by petrography : Lesbos, Attica, Corinthia, Rome-Ostia.

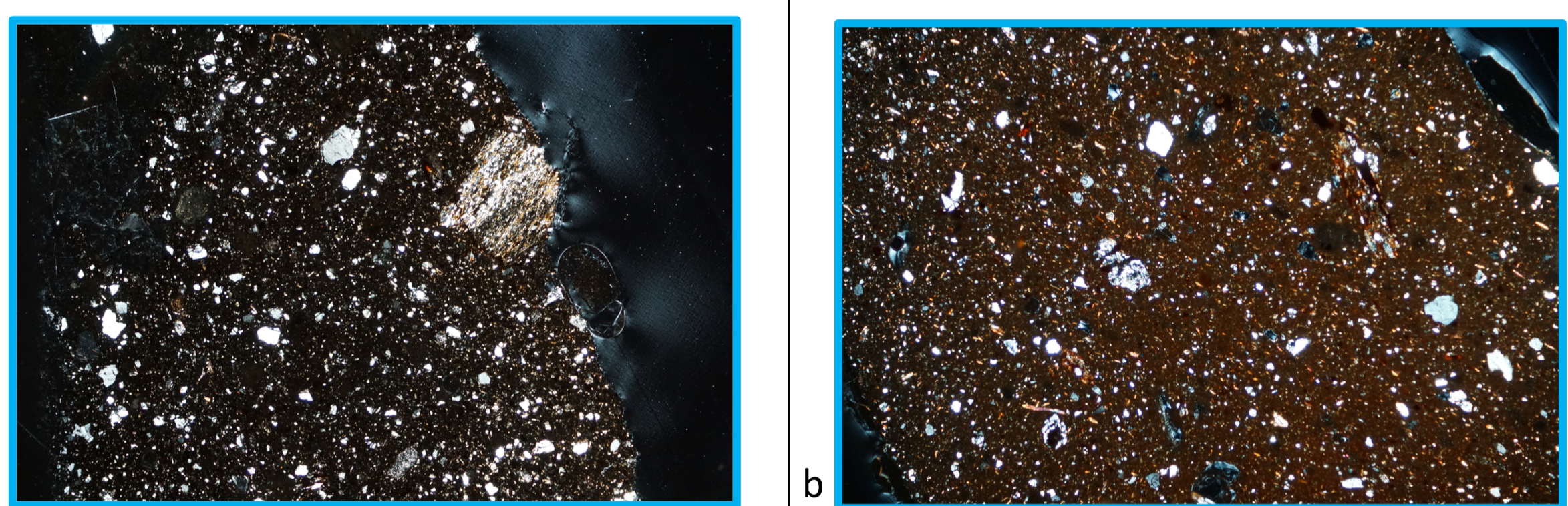


FABRIC ANALYSIS : fabric composition and provenance

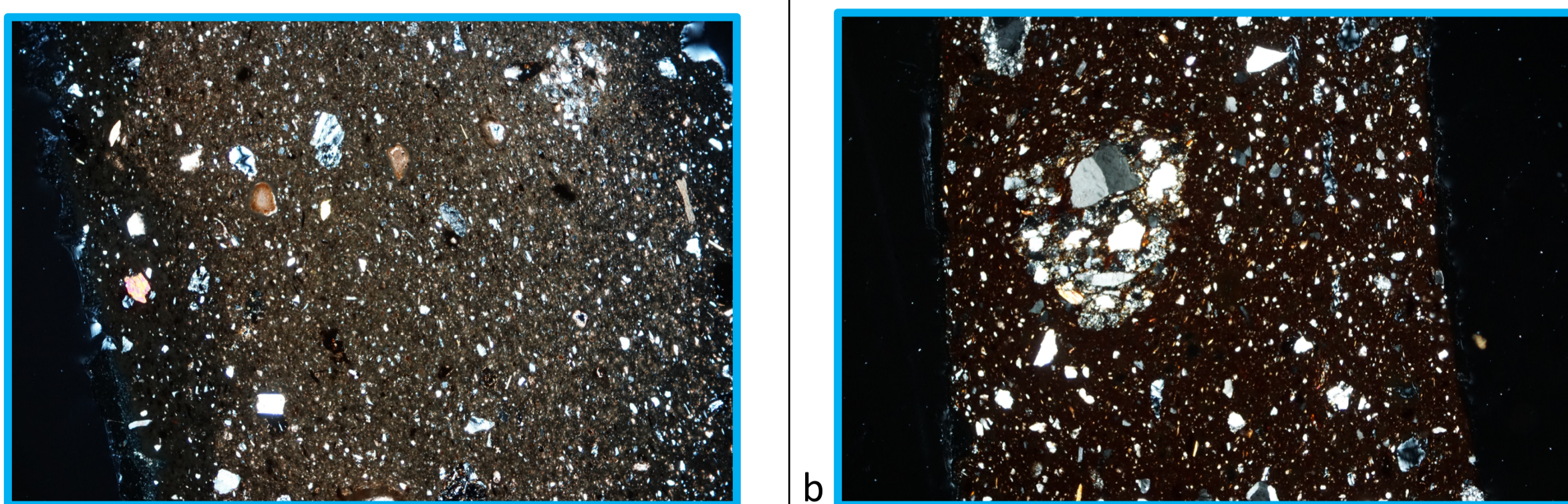
Lesbos : red (a) to grey (b) micaceous fabric with quartz, phyllite, serpentinite



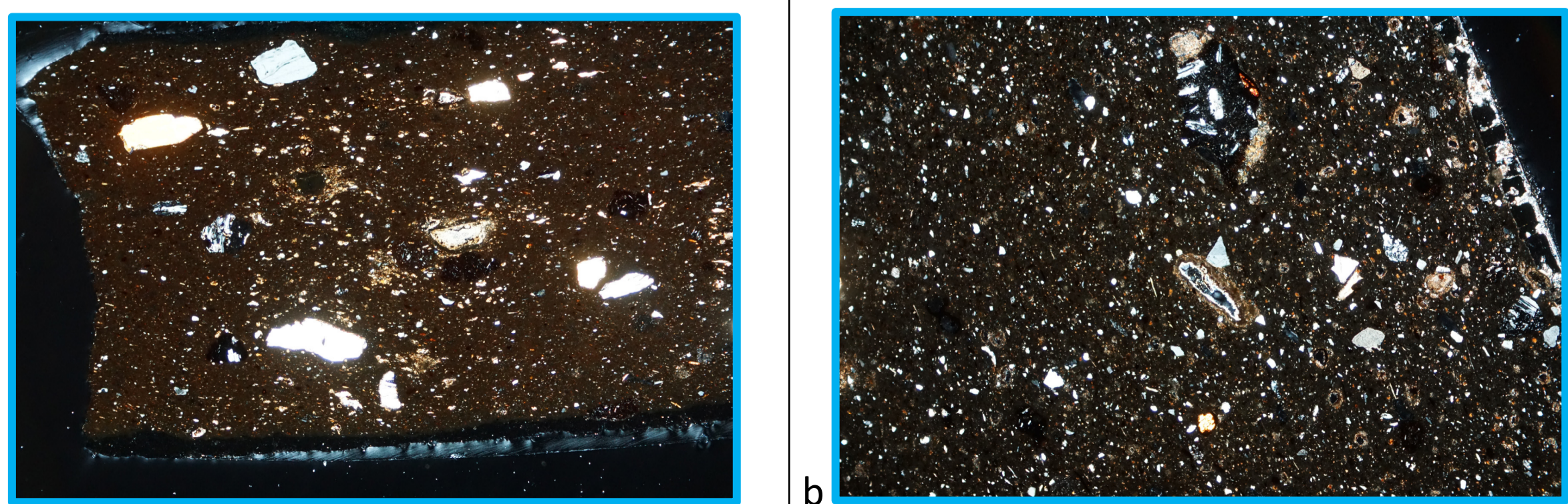
Attica : greenish ocher (a) and brownish red (b) fabrics, with white- and coloured-micaschists, quartz and quartzite



Corinthia : brownish ocher fabrics with sedimentary rocks (chert, mudstone, sandstone) and few basalt (a,b), with (b) also containing low-metamorphic rocks



Latium : greenish ocher fabrics, with granitic and basaltic inclusions (a) or with microfossils, granite and gneiss (b)



SEM-EDS analysis : Non-calcareous fabrics (< 2 wt% CaO); Calcareous fabrics (8 – 15 wt% CaO)

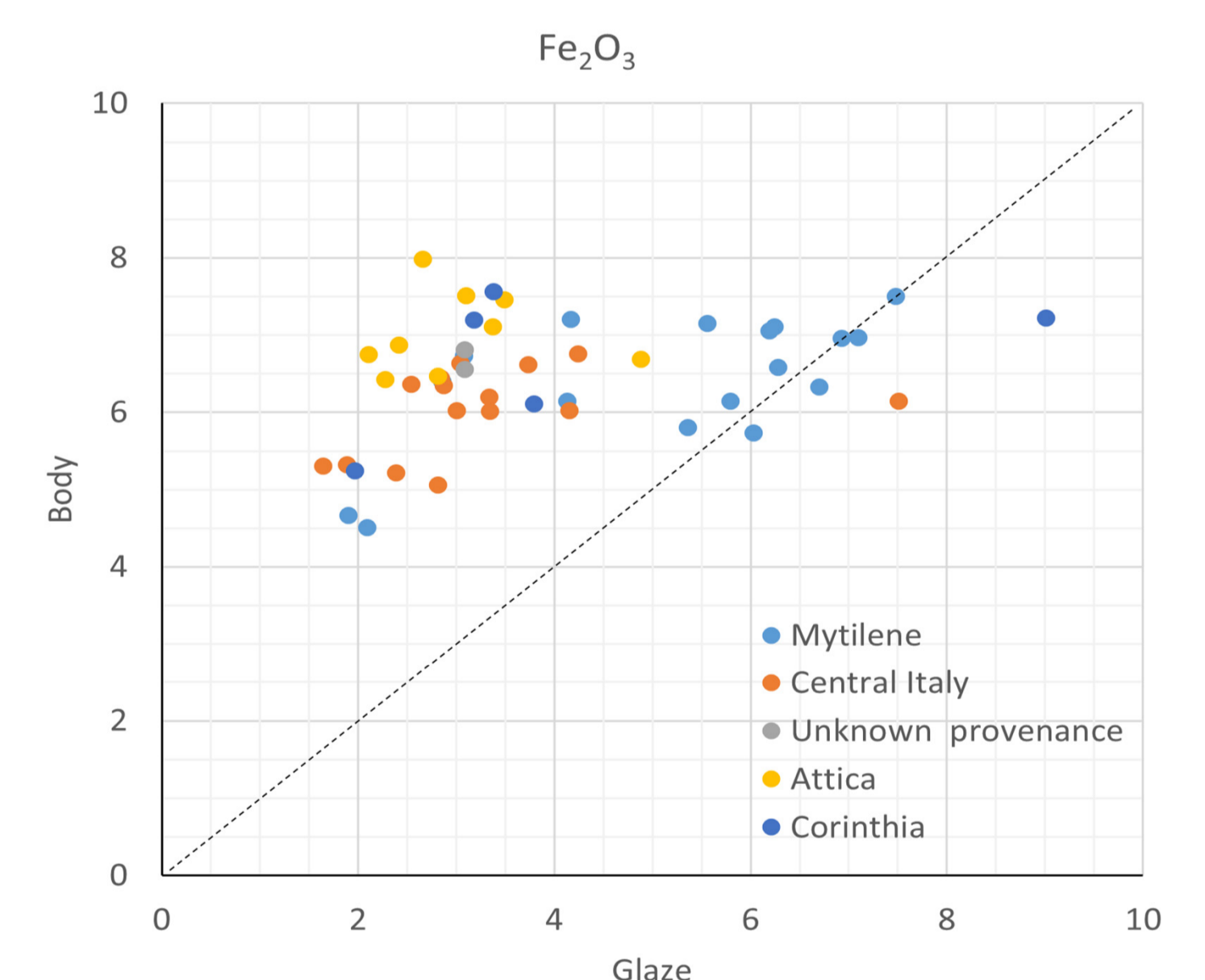
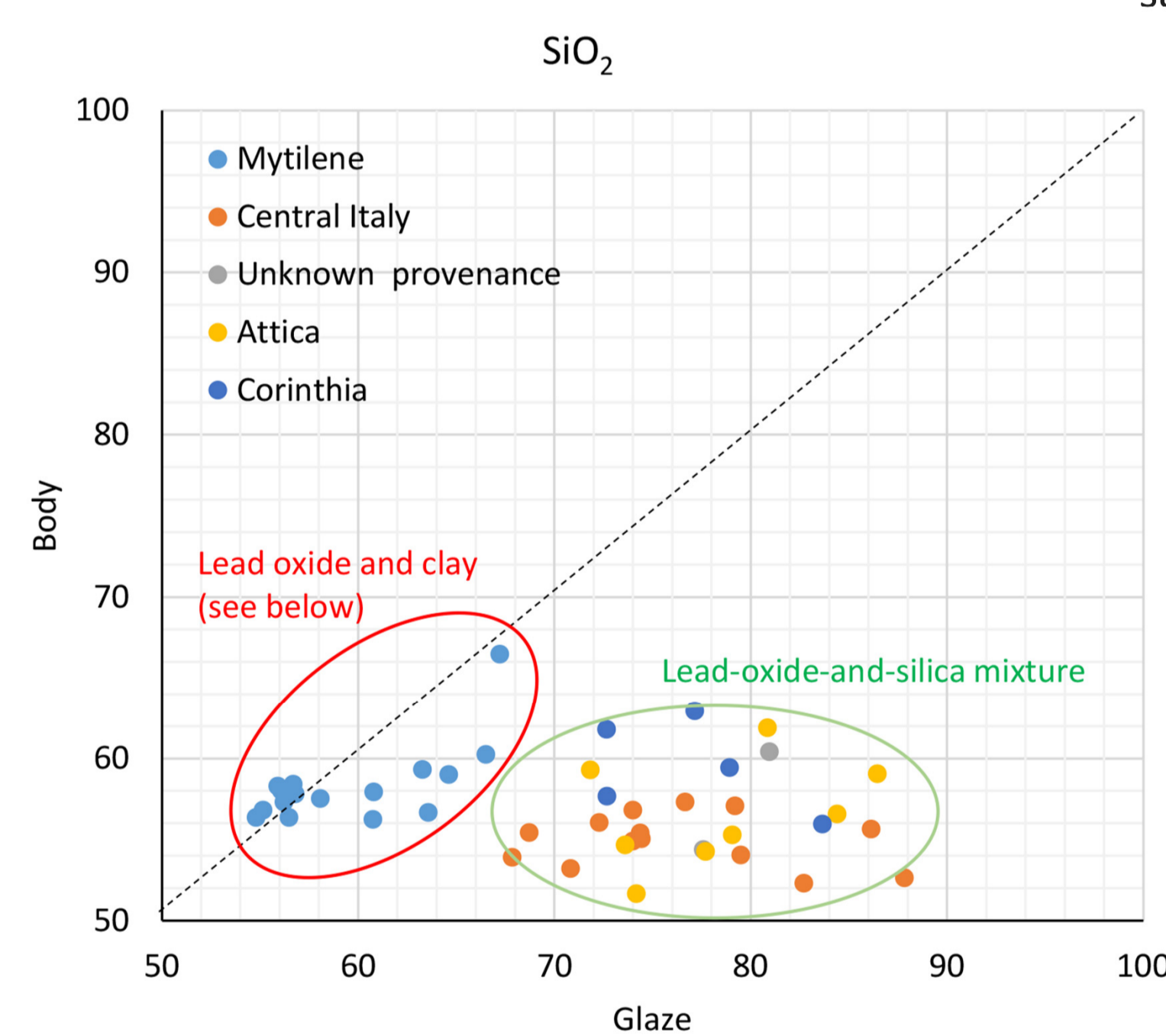
GLAZE ANALYSIS : composition, ingredients and recipes

Glaze recipes: lead oxide and clay, or lead oxide and silica

Glaze colourants: Fe³⁺ and Cu²⁺ for all

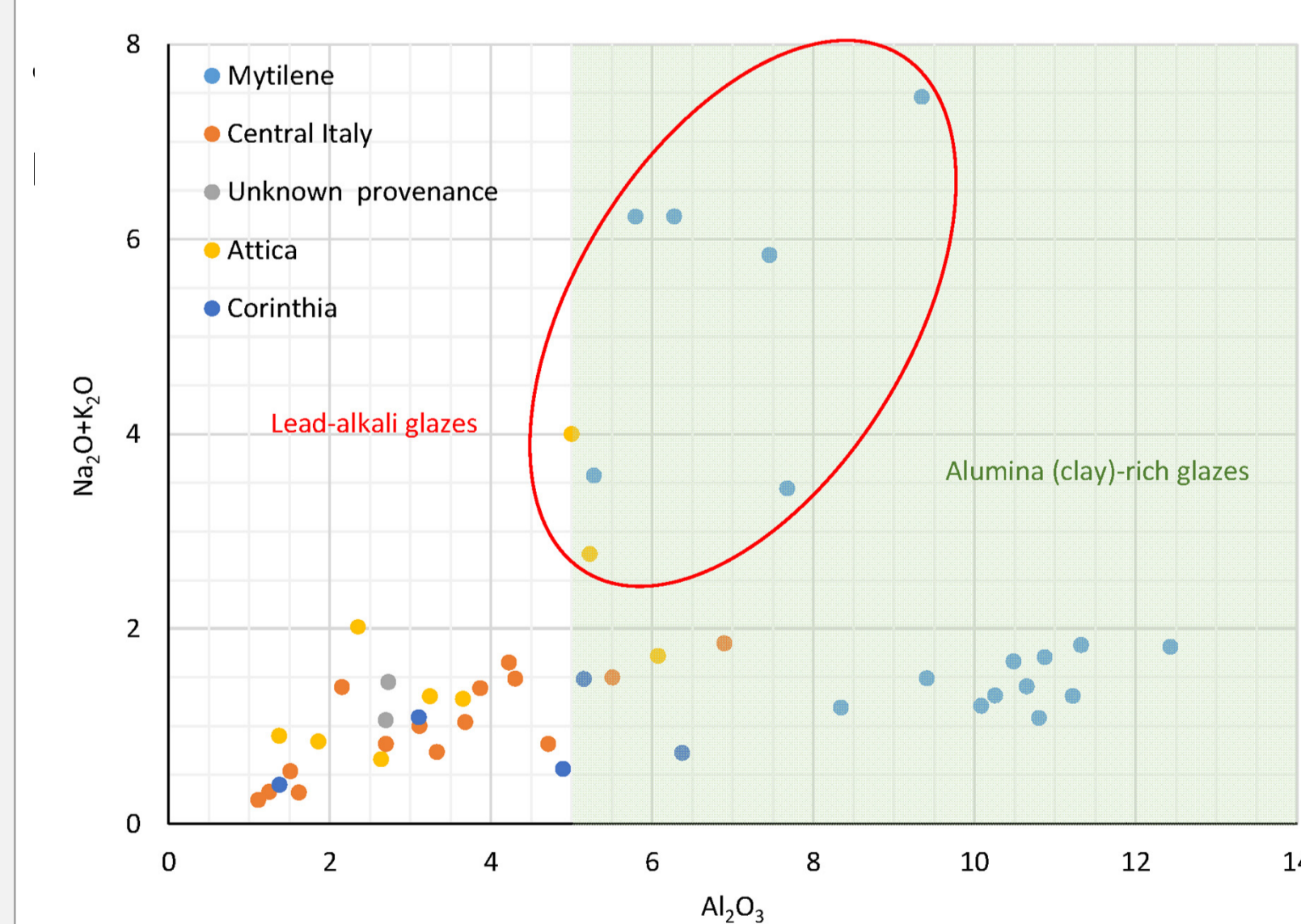
samples except those from Mytilene, as

copper was detected in 5 out of 18 sherds.



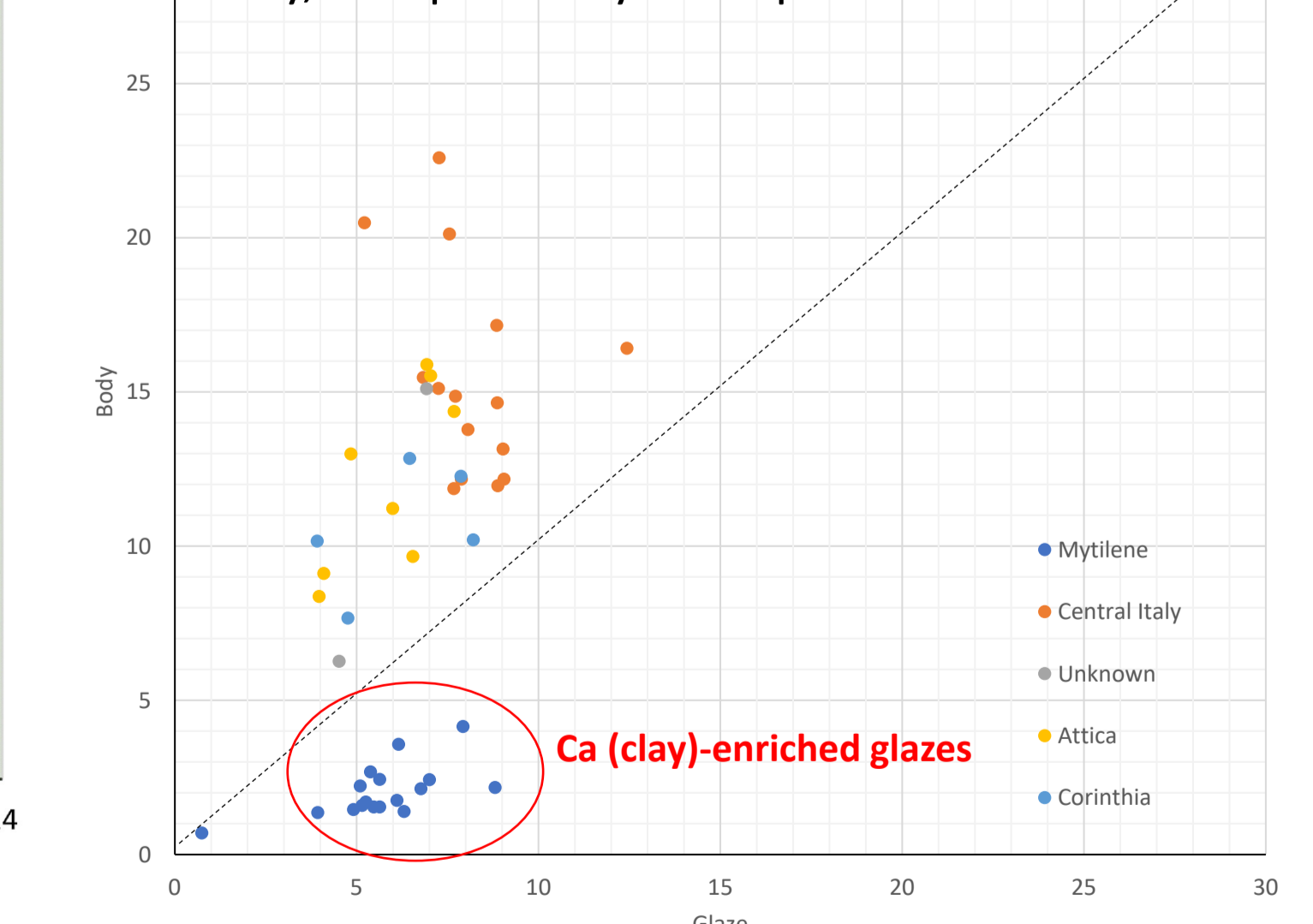
Alkali and alumina contents of the glazes:

- o Less than 2 wt% alkali for most glazes: high-Pb glazes



Calcium contents of the glazes vs fabrics:

All glazes contain less calcium than the fabric body, except for Mytilene products



CONCLUSION

Most glazes were produced by using a lead-oxide-and-silica mixture applied on a calcareous clay body. The only exception is the Mytilene production, which is also the earliest and easternmost production in our sample set. These glazes were formed by the reaction of a lead-oxide powder with the red clay body. They were enriched in alkali (mostly sodium) and calcium. These techniques display some similarities with developments in glaze technology identified in the Middle and Far East, therefore suggesting possible contacts.