

Isotopic composition of lead white pigments on qeros: Implications for the chronology and production of Andean ritual drinking vessels during the colonial era

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Additional File 5: Isotopic comparison of central Andean ores, 17th-19th European lead white paints, and lead white pigments from colonial qeros.

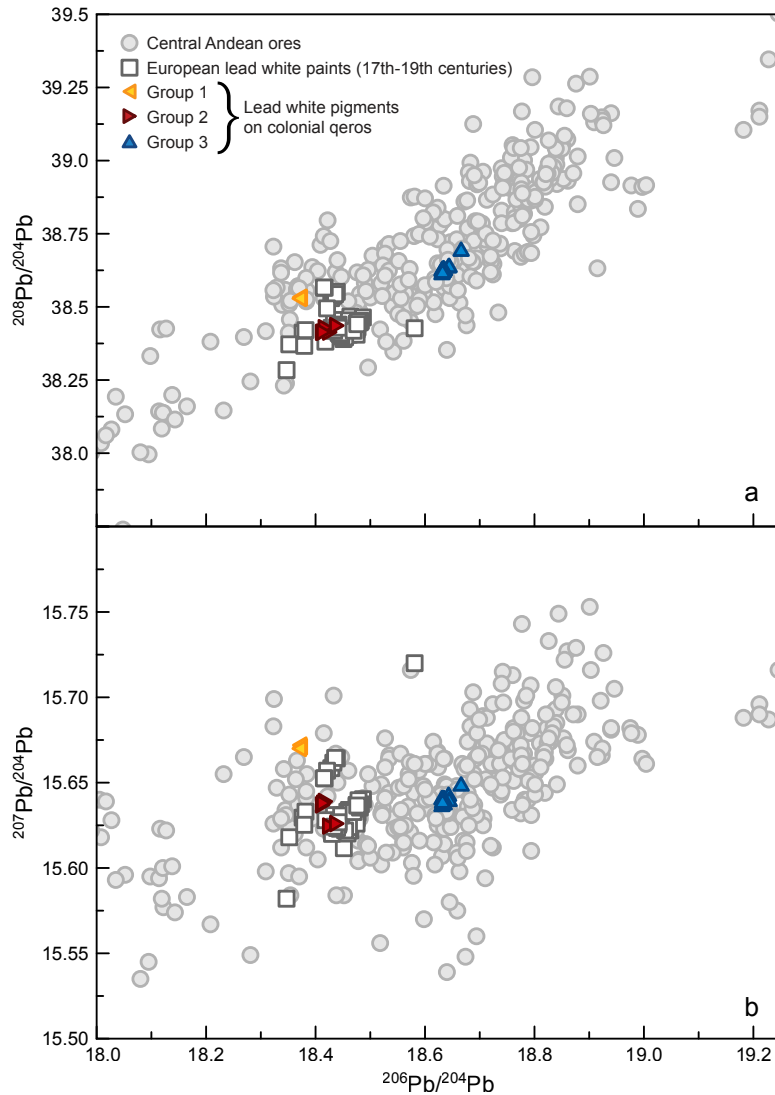


Fig. S4. Lead isotope compositions of central Andean ores, 17th-19th European lead white paints, and lead white pigments from colonial qeros in this study (Groups 1-3). Qero pigments from Groups 1 and 2 align with European paints in all dimensions of Pb isotope space. Pigments from Group 3 do not match the European lead white paints and have Pb isotopic ratios that are quite typical of central Andean ore deposits. These plots further support our conclusion that the lead white pigments from Groups 1 and 2 derive from Europe, while the pigments in Group 3 most likely have an Andean origin. Ore data was compiled from refs [1–5]. Data on European lead white paints is from refs [6–8]. Symbols are larger than errors.

References

1. Macfarlane AW, Lechtman HN. Andean ores, bronze artifacts, and lead isotopes: constraints on metal sources in their geological context. *Journal of Archaeological Method and Theory*. 2016;23:1–72.
2. Gunnesch KA, Baumann A, Gunnesch M. Lead isotope variations across the central Peruvian Andes. *Economic Geology*. 1990;85:1384–401.
3. Macfarlane AW, Marcet P, LeHuray AP, Petersen U. Lead isotope provinces of the Central Andes inferred from ores and crustal rocks. *Economic Geology*. 1990;85:1857–80.
4. Mukasa SB, Vidal C CE, Injoque-Espinoza J. Pb isotope bearing on the metallogenesis of sulfide ore deposits in central and southern Peru. *Economic Geology*. 1990;85:1438–46.
5. Kontak DJ, Cumming GL, Krstic D, Clark AH, Farrar E. Isotopic composition of lead in ore deposits of the Cordillera Oriental, southeastern Peru. *Economic Geology*. 1990;85:1584–603.
6. Hendriks L, Kradofer S, Lombardo T, Hubert V, Küffner M, Khandekar N, et al. Dual isotope system analysis of lead white in artworks. *Analyst*. 2020;145:1310–8.
7. van Loon A, Vandivere A, Delaney JK, Dooley KA, De Meyer S, Vanmeert F, et al. Beauty is skin deep: the skin tones of Vermeer's *Girl with a Pearl Earring*. *Heritage Science*. 2019;7.
8. Fortunato G, Ritter A, Fabian D. Old Masters' lead white pigments: investigations of paintings from the 16th to the 17th century using high precision lead isotope abundance ratios. *Analyst*. 2005;130:898–906.