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## Symposium: Provenance Studies

Leon Jacobson

### *Identification of archaeological obsidian sources in southern Puna (Argentina)*

P. Escola, H. Yacobaccio, M. Glascock and F. Pereyra

Over the past two decades, the desert highlands of NW Argentina have been characterised by the presence of intensive prehistoric exchange networks. Nevertheless, archaeologist, following diverse lines of evidence, keep obsidian sources and exchanges studies out of current research. The results provided in the present work represent the first step toward obsidian sourcing research in southern Puna. At least six obsidian sources have localised in Catamarca and Salta provinces. Obsidian appears as small domes and lava flows associated with pumice, tephra and rhyolite, and like boulders in neighbouring alluvial fans and talus cones. The geological context, geographical localisation and petrographical characterisation are presented and discussed. In addition, chemical analyses by NAA and K/Ar datation were done. This study established an initial database for future obsidian provenance works in Andean highlands.

### *Lead and tin ingots from Domu De S'orku (south-western Sardinia, Italy)*

G.M. Ingo, D Salvi, G, Chiozzini, G. Bultrini and T. De Caro

Along the coast of the Montevecchio mine basin (south-western Sardinia, Italy), an unfortunate ship, with a large number of lead and tin ingots have been found. No marks have observed on the ingots nor have other materials been found that allow us to date the shipwreck, besides several lead slabs decorated with parallel notches. Finds of tin metal are striking rare in Sardinia or elsewhere and the tin ingots known to us, have been found only in few sites such as Port-Vendres (France), along the coast of Palestine, in Sardinia near Capo Bellavista and now at Domus' E Sorku. In order to localise the metal ore resources exploited for producing the lead and tin ingots, lead isotope analysis has been carried out for the metal artefacts to compare with the data of lead and tin ore deposits. Unfortunately, the data for these latter are not complete in literature, and some important tin deposits of Spain and Sardinia are not yet studied. With this aim in mind, the tin ore deposits of Sardinia have been sampled and lead isotope ratios determined. The tin deposits of Sardinia are both located on the south-western part of the island at Villacidro and at Punta Santa Vittoria and they are not far from the Montevecchio basin where lead and silver production in Punic and Roman period has been already established. The lead isotope analysis for the metals ingots has shown that the lead and tin ingots have been not obtain by smelting lead and tin ores from United Kingdom, and could be produced in Sardinia. A more precise location will be proposed when the tin deposits of Spain and Portugal have been accurately studied.

### *Isotopic and mineralogical source tracing of 18th-century French marble sculptures*

Shelley Sturman and Nikolaas J. van der Merwe

Techniques developed for the quarry source identification of marble sculptures of classical antiquity were used to determine whether four French sculptures of the late-18th century form a set. These sculptures are known as the Allegories of the Arts and Sciences. It is known that Abbé Terray, contrôleur-général des finances (1769-74) of France, commissioned such a set of sculptures in 1774, apparently with Clodion in charge of their execution. Receipts and correspondence of 1774-75 between Clodion and an Italian colleague suggest that the highest quality marble from Carrara was purchased for the four works. The National Gallery and the National Trust of Great Britain provided small samples of marble powder (<5 mg). Results obtained from microscopy, X-ray diffraction, and carbon and oxygen isotope ratio analysis are consistent with the characteristics of Carrara marble. The isotope ratios are essentially identical within machine error, confirming that the four sculptures were probably made from the same block of marble. This corroborates the period literature and casts light on the artist commissions, quarry practice, and 18th century Franco-Italian trade.

### *Archaeometric study on the Four Heads Capital (The Cloisters Collection) stored at the Metropolitan Museum, New York*

P. Tucci, P. Morbidelli

The sculpture (XIII cent.) is in "pugliese" style and its origin and execution date are unknown. The capitel is 35.4 cm high and its shape is like an overturned bell. In 1928 it appeared in the Art Exhibition of Paris. Later, in 1965, Vera Ostioia noticed a great resemblance with another capitel discovered in 1920 during the restoration of the Cathedral of Troia (Puglia, Italia). In 1977 both capitels were exposed in Stuttgart.

After this exposition, numerous authors have studied the capitel of the Metropolitan Museum; some supporting its authenticity, others considering it to be a copy.

A contribution to the resolution of the problem can come from archaeometric analyses. With this aim we have made a mineralogical, petrographical, geochemical and palaeontological study based on:

- thin sections;
- X-ray diffraction;
- chemical analyses (X-ray fluorescence);
- $^{87}\text{Sr}/^{86}\text{Sr}$ .

The capitel fragment has been analyzed in order to:

- characterise and classify the material;
- reconstruct the ancient depositional rocks environment;
- ascribe this material to a formation;
- make an hypothesis on the ancient quarry.