

Ancient Monuments Laboratory
Report 72/93

A NOTE ON THE FABRIC OF SOME
ROMAN MOULDS FROM SILCHESTER,
HAMPSHIRE

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Summary

A number of fragments of moulds for casting copper alloy horse-trappings were submitted for a petrological fabric examination. Thin sectioning showed that the moulds were made in one piece from the same clay, which contains a high temper content of even-sized quartz-grains, suggesting a precaution taken against undue shrinking during firing.

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Introduction

A petrological fabric study was made of the Silchester assemblage of fragments of ceramic refractory material. This group consists of debris that came from what appears to be piece moulds which were used for casting horse-trappings, with a number of the moulds clearly showing on the inner segment the various channels which received the molten metal. Many of the fragments in the collection tend to be fairly small.

The material was initially studied with the aid of a binocular microscope [x20]. As far as it could be determined from this examination, there seemed to be no obvious fabric variation in any of the pieces, including both inner and outer segments. All appear to contain the same textural range of plentiful quartz grains. In addition, impressions of grass or perhaps chopped chaff, or their carbonized remains, can sometimes be seen in the clay of the moulds, together with sparse small pieces of flint in one or two pieces. The majority of fragments display a light reddish-grey to reddish-

yellow surface colour [Munsell 5YR 5/2 to 5YR 7/6], often with patchy grey areas. The inner sections are uniformly dark grey in colour [7.5 N3/1], no doubt due to the reducing conditions brought about by contact with the molten metal.

For a more detailed examination of the fabric, ten mould fragments, including some with clear outer and inner sections, were randomly selected for sampling by thin sectioning and study under the petrological microscope. The friable nature of the material meant that the small sample pieces had to be artificially hardened before they could be attached to a glass slide and ground down to an appropriate thickness for viewing. To achieve this, each sample was impregnated in a vacuum oven with a solution of Epo-thin [a low viscosity epoxy resin and hardener]. After this, a thin section was made from each of the stabilized chips.

The thin section examination of the ten samples confirmed the visual hand-specimen study, which suggested a homogeneous fabric for all of the mould fragments. Under the microscope, the composition and texture of the non-plastic inclusions throughout the moulds appeared very similar to each other, with little sign of significant mineralogical variation. The fabric of all the sample pieces is characterized by a high density of discrete well-sorted subangular quartz grains of a size-range generally not exceeding 0.40mm, set in a baked clay matrix. The large amount and even grain size of quartz present implies that at least some of it was added as a form of tempering to better control the distribution of heat and

prevent undue shrinkage during firing. It is possible that the added quartz grains may have been sieved by the potter to achieve a finer size-range in order to counteract to some extent the rate of thermal expansion of quartz when exposed to high temperatures [Bronitsky and Hamer, 1986]. The quartz : matrix ratio is in excess of 50%, with the grains well mixed and evenly distributed throughout the clay matrix. This suggests that time had been spent on clay preparation, no doubt with the intention of ensuring good refractory qualities to enable the moulds to stand up to the operating conditions involved. Also scattered amongst the clay matrix are some iron oxides and thin voids commensurate with the shape of the ?grass/chaff impressions noted in the hand-specimen, together with, on occasions, the actual carbonized remains themselves.

The above examination has shown that the Silchester moulds were made in one piece from the same clays, together with the likely addition of more quartz sand for refractory purposes, and also containing an element of ?vegetable tempering. Unfortunately, the common nature of the quartz inclusions in the moulds makes it difficult to try to pin-point a likely source of manufacture with any degree of certainty. Silchester lies in an area of Eocene and recent deposits, mostly Plateau and Pebble Gravel, London Clay and Lower Bagshot Beds [Geological Survey 1" Map of England Sheet no. 268; see also Corney, 1984]. A fairly local production for the moulds is quite feasible, since suitable clay and sands for local brick manufacture, for example, have long been made from the clays and sands of the area [White, 1909]. This may have been

sufficiently strong for the high temperatures required for metal casting, though without a programme of local clay testing it is difficult to be absolutely sure.

Bibliography

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