

Report on Luminescence testing of mortar samples at St. Peter's Church, Wearmouth and St. Paul's Church, Jarrow, Co Durham.

By Ian Bailiff

During December 2011 samples of mortar were obtained from the two earliest, main construction phases of the standing buildings at Monkwearmouth and Jarrow, with the aim of applying single grain OSL dating procedures to quartz coarse grains extracted from the mortar (Figs 1a and b). The mortar samples were extracted as solid cores using either a ~25 mm or ~35 mm diameter water lubricated core drill (Fig 3a). The positioning and direction of the drilling was adjusted to also enable a small quantity of masonry to be sampled within the cores for petrological analysis by Dr John Senior, the geological consultant to the project.

At St Peter's church, Wearmouth, cores were obtained from a) the interior wall of the west elevation (Fig 2) at positions corresponding to locations 1.1 and 2.1 in the project design and b) the exterior wall of the west elevation of the tower at positions corresponding to location 2.2 and, due to health and safety considerations in terms of accessing location 2.3, an equivalent position on the north elevation was selected. Each core cavity was backfilled with lime mortar (Fig 3b). Once cut, the cores were promptly stored under dark conditions in black plastic bags.

At St Paul's, Jarrow, three locations were drilled for mortar cores (Figs 4 and 5). However intact mortar was only found to be present in the outer layers (to c. 2 cm depth) comprising modern mortar and at greater depths the core drill entered a void containing disaggregated mortar (Fig 6). Hence no mortar associated with the construction phase was recovered from these locations.

The cores obtained from St Peter's church were examined in the laboratory and the inner parts were found to contain intact mortar. A section of the latter was cut under subdued red lighting conditions, removing the outer layer that had been briefly exposed to daylight during the sampling procedure. The dried material was crushed and sieved to obtain different fractions within the overall size range 90-355 μm . A proportion of the sieved material obtained was immersed in dilute HCl (15%) until the reaction ceased to remove the carbonate fraction. Following this treatment a negligible quantity of crystalline residue was obtained indicating that no sand appears to have been added when preparing the mortar.

In the absence of quartz coarse grains within the cores sampled at St Peter's church and the lack of intact mortar associated with the construction phase of St Paul's church, the tests were terminated.



Figure 2

St Peter's, Wearmouth: Internal elevation of west wall of nave, showing the locations of the two drilled cores. These areas of coring are now backfilled.

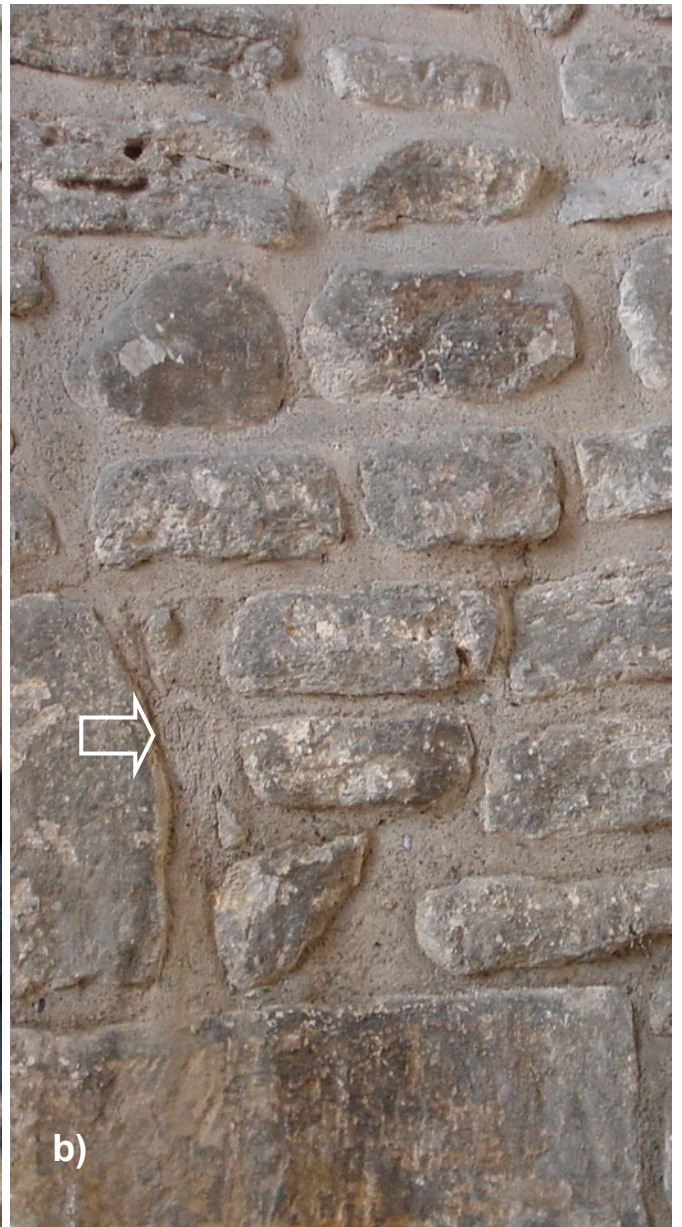


Figure 3

(a) Core drilling in progress; (b) the core hole backfilled with lime mortar.



Figure 4

St Paul's Jarrow, Coring location 1:2: Dr John Senior holding a core comprising the outer modern mortar, the drilling of which revealed the presence of disaggregated material at greater depth, as found at the two other locations shown in Figs 3 and 4.



Figure 5

St Paul's Jarrow: positions of core drilling on South wall corresponding to location 2.5 in the project design.



Figure 6

St Paul's Jarrow: close-up of drilled cavity revealing the presence of disaggregated material at greater depth.