# AMS $^{14}$C DATING OF LIME MORTAR

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There has long since been great interest in possibity of radiocarbon analysis directly on mortar to date the construction time of buildings where no other type of material is available for dating or can be safely associated with the time of construction. Mortar has great potential as dating material not only because of its ample availability and clear association with the construction to be dated but also because the carbonate formed from the burnt limestone (CaO) in the hardening process represents a sampling of the contemporaneous atmospheric CO2 content.

However, mortar is a very complex material consisting of not only mortar carbonate but also unburnt fossil limestone inclusions and other carbon bearing minerals and organic components. Attempts to apply conventional $^{14}$C dating has thus proven very difficult. Likewise, the seemingly obvious solution of utilizing AMS to selectively date the organic fraction has often led to exceedingly high ages (Tubbs & Kinder 1990). Van Strydonck et al. (1992) used both carbonate and organic fractions and found very scattered results. The method of mortar dating and the possible sources of error have been discussed extensively in the literature (see Delibrias et al. 1964, Delibrias and Labeyrie 1964, 1965, Stuiver and Smith 1965, Baxter and Walton 1970a, 1970b, Folk and Valastro 1976, 1979, Malone et al. 1980, van Strydonk et al. 1983, 1986, 1989, Willaime et al. 1983, Sonninen et al. 1985, 1989, Gustavsson et al. 1990, Ringbom et al. 1996).

Because of the urgent need for reliable mortar dating, we have continued work to develop a technique to isolate the pure mortar carbonate fraction from the rest of the crude mortar components as reported elsewhere in these proceedings (Lindroos and von Konow 1997). So far, a large series (>100) of mortar samples on different chemical fractions from a number of different (medieval) buildings have been measured at the AMS $^{14}$C dating facility at Aarhus. The results have shown promising internal consistency. A detailed report of results on medieval churches from Åland, Finland (Ringbom and Remmer 1995) and the Newport Tower, Rhode Island, USA has been given in Heinemeier et al. 1997.

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