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AMS 14C dating of lead carbonate, a new chronological tool for archaeology: example from the Grandmont Abbey cemetery, France

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Absolute dating of lead carbonates - cerussite (PbCO_3) and hydrocerussite ($2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2$) - by the radiocarbon method have been developed recently. Lead white cosmetics, pigments and paints have been successfully dated (Beck et al., 2018- 2020; Hendriks et al., 2019; Messenger et al., 2021, 2022). The dating was made possible by the lead white synthesis method, which uses horse manure as a source of CO_2 to form carbonates. It was thus demonstrated that carbon of organic origin had been incorporated during this synthesis, as also observed by Strydom et al. (2016) in the corrosion products of a lead coffin.

In this study, a similar approach is being attempted on lead carbonates formed by in situ corrosion of lead bottles found in burials in the cemetery of the Grandmont Abbey (France). Since 2013, a multidisciplinary team from the University of Picardie has been carrying out research on the site of the Grandmont Order's motherhouse. Lead was used extensively in the architecture of the abbey church, thanks in particular to the patronage of Henry II Plantagenet in the second half of the 12th century, who supplied large quantities of lead from England. When the monastery was founded around 1124, lead was chosen to make eulogy bottles, which were placed in contact with the body in the graves. Lead carbonates were taken during the restoration of bottles for radiocarbon dating. Samples were prepared by thermal decomposition and measured using the AMS ARTEMIS/LMC14. The consistency of the results obtained on both lead carbonates and bones (rarely preserved) suggests that the formation of lead carbonates is indeed the product of corrosion of the metal by an organic substance, linked to the decomposition of the bodies. Thus, 14C dating of lead corrosion gives access to the date of burial, and opens up new perspectives in cases where the bones are no longer present or poorly preserved.

Student Submission

No

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