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REVEALING THE TECHNOLOGY OF HISTORICAL EUROPEAN BRONZE CASTING BY EXAMINING THE IRON SKELETON OF ARTWORKS

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Bronze sculptures technical study has been a particularly active field in the last decades, contributing to issues of authentication, dating, and our understanding of the Modern period bronze statuary technical landscape. Nonetheless, it is essential to develop new analytical procedures that will enable us to tackle these often-elusive questions more fully by providing deeper understanding of the materials and methods used in the production of bronze artefacts.

Although iron-based structural reinforcements (such as armatures or core pins) are systematically used for bronzes casting, and potentially contain important data related to the chaîne-opératoire of bronze artefacts, they have barely been investigated. More specifically, they can reveal the technical choices made by foundry-men: what materials were used? how were they shaped? as well as informing our knowledge of chronological and geographical practices or patterns of production.

By performing an in-depth analytical study of those overlooked materials, this research provides new insights into the historical and technological aspects of bronze statuary in the European 15th to 19th centuries. A multi-scalar and multi-modal procedure (Dillmann et al., 2007; Dissier et al., 2014; Leroy et al., 2017) based on a combination of chemical and metallographic characterization of iron products is carried out.

The results, combined with other technical data (including, when available: radiography, metal analysis, core analysis, as well as stylistic analysis and other art-historical evidence), offer a new perspective on the objects context of production. Direct correlation can be drawn between technical constraints of bronze casting and characteristics of the iron materials, revealing the technical choices made by craftsmen. In addition, the obtained results contribute to a better understanding of the iron technologies used in the making of non-ferrous items and, their integration into a global iron production and circulation system.

References

- [1] DILLMANN, P., L'HERITIER, M., 2007. Slag inclusion analyses for studying ferrous alloys employed in French medieval buildings: supply of materials and diffusion of smelting processes. *J. Archaeol. Sci.* 34, 1810–1823.
- [2] DISSIER, A., DILLMANN, P., BOURGAIN, C., L'HERITIER, M., VEGA, E., BAUVAIS, S., LEROY, M., 2014. Iron reinforcements in Beauvais and Metz Cathedrals: from bloomery or finery? The use of logistic regression for differentiating smelting processes. *J. Archaeol. Sci.* 42, 315–333.
- [3] LEROY, S., COHEN, S.X., VERNA, C., GRATUZE, B., TÉREYGEOL, F., FLUZIN, P., BERTRAND, L., DILLMANN, P., 2012. The medieval iron market in Ariège (France). Multidisciplinary analytical approach and multivariate analyses. *J. Archaeol. Sci.* 39, 1080–1093