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Preliminary analysis of metal artefacts from the archaeological site of Spina (VI-III sec. a.C.)

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The city of Spina, a fundamental commercial junction between the Etruscan and Greek worlds in the north Adriatic area, was founded around 530 B.C. [1] and remained active until the 3rd century B.C.[2,3], when changed environmental and geopolitical conditions sanctioned the decline of its function as a commercial port. The first evidence of Spina's presence in the Po Delta came to light by chance during land reclamation works in the Comacchio Valleys in 1922. During these efforts, an ancient tomb was discovered, marking the beginning of a series of finds. Continued reclamation activities subsequently led to the identification of the Valle Trebba and Valle Pega necropolises. Over the years, archaeological investigations have significantly deepened our understanding of Spina, uncovering numerous artifacts that highlight its history and its strategic importance in ancient trade networks. In 2023, the University of Ferrara, in partnership with the Consorzio Futuro in Ricerca (CFR) and under the MiC - Sabap Bologna concession, carried out an archaeological excavation led by Caterina Cornelio with Luigi Malnati, supported by the Petra Company.

The study of this material, in particular the metal slag, is of fundamental importance for understanding the technological level reached by the Etruscans and answering questions about their activities in the Po Valley [4,5,6]. In this paper, we present the preliminary results of analyses using non-destructive techniques, including portable ED-X-ray fluorescence (pXRF) and SEM-EDS, conducted on the slag and metal alloys recovered during the 2023 excavation. The pXRF analyses allowed us to obtain statistical data on the types of artefacts and metal alloys and on this basis, samples were then chosen on which to carry out in-depth observations and SEM-EDS microanalysis. This study examined approximately 120 artefacts, including metal slag, fragments of fibulae (iron and bronze), nails, and lead items, mostly under 10 cm in length and in varying states of preservation. Decorative items, like fibulae, were often heavily degraded and found only as fragments. Preliminary analysis shows most metal slag comprises ferrous alloys, with some bronze alloys primarily containing copper and lead.

References

- [1] Reusser, C. (2021). Le fasi costruttive della città di Spina: risultati delle campagne di scavo condotte dall'Università di Zurigo nell'area urbana. *Studi Etruschi*, 84, 101-141., 84:101-141. ISBN: 03917762StEtr84
- [2] Trevisanello, C. (2022). Spina 100. Dal mito alla scoperta. In *Spina 100. Dal mito alla scoperta. A un secolo dal ritrovamento della città etrusca di Spina nell'antico delta del Po* (pp. 66-74). Teseo Editore.
- [3] De Santis, P., Govi, E., Nizzo, V., Sassatelli, G., & Trocchi, T. (Eds.). (2023). *Spina etrusca: un grande porto nel Mediterraneo*. ARA edizioni..
- [4] Hostetter, E. (1986). *Bronzes from Spina I: The Figural Classes: Tripod, Kraters, Basin, Cista, Protome, Utensil Stands, Candelabra, and Votive Statuettes*. Verlag Philipp von Zabern GmbH.
- [5] Hostetter, E. (2001). *Bronzes from Spina II: Instrumentum Domesticum*. Verlag Philipp von Zabern GmbH.
- [6] Mommersteeg, P. W. (2011). *Metallurgy and the development of Etruscan civilisation* (Doctoral dissertation, UCL (University College London)).