

## UNCOMMON CORROSION FEATURES ON BRONZE AGE OBJECTS

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Natural deterioration phenomena have widely been studied on tin-bronzes as well as reaction mechanisms in order to investigate the interaction between metal and environment and to define conservation and restoration procedures [1,2]. Corrosion processes occur on the surface of every metallic object exposed to different environmental conditions determining the formation of a wide range of corrosive patinas which differ in composition, colour, morphologies and penetration mechanism depending upon the parameters involved in the alteration process.

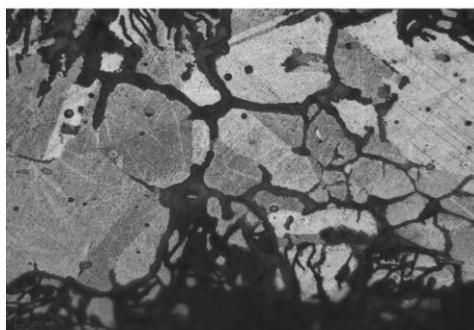
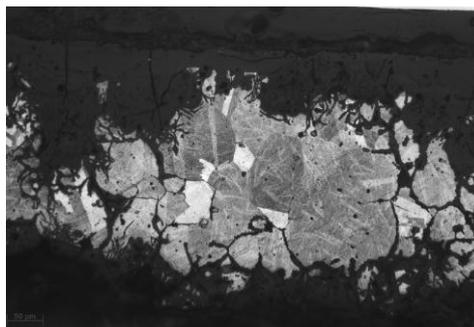


Figure 1. Tentacle like corrosion features

In our case a specific and seldom documented penetrating corrosion caused by microorganisms and called by the authors 'tentacle-like' by its morphology in cross sections was noted on several Tin-Bronze objects dated Bronze Age recovered from different archaeological sites across Europe, and not corresponding to any of the mentioned corrosion types for bronzes [3]. This 'tentacle like' corrosion does not follow any microstructural features as grain or twinning boundaries, or slip bands due to cold deformation but penetrates directly into the crystal without any regard for the short-circuit of diffusion. The morphology as well as the composition differ so much from classical models that it is not possible to simply classify the 'tentacle-like' corrosion as a variety of known corrosion mechanisms for archaeological bronze objects. Light Optical Microscopy in Bright Field and Dark Field (LOM-BF, LOM-DF), Scanning Electron Microscopy equipped with X-ray microanalysis (SEM-EDXS) and microRaman spectroscopy ( $\mu$ -RS) were performed in order to gain

information on this peculiar type of corrosion. Moreover in order to explain this type of corrosion a series of different external parameters influencing burial conditions (e.g. nature of deposition soil, pH, presence or absence of water and/or reactive species, biological activities, etc...) are taken into consideration. It is assumed that microorganisms played a major role in the corrosion process.

### References

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