Enigmatic Finds from Zevenbergen

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Introduction

In 2007, more than 1000 small bronze objects were found in a large burial mount near Oss, the Netherlands (Fig. 1). After an innovative excavation, all fragile fragments were treated and conserved. However, where these clamps were used for, is still largely unknown. Therefore, one of the main questions of this PhD-research is:

"What was the function of the clamps from Zevenbergen?"

Fig. 1: Bronze clamps from Zevenbergen (Early Iron Age, ± 600 BC).

Experimental

In total, approximately 50 clamps are available for non-destructive analysis and 5 for destructive analysis. To characterise the shape and dimensions of the clamps, digital photography and optical microscopy have been performed.

Results & Discussion

In order to compare colours and to roughly measure the dimensions of the clamps, digital photographs have been taken with a ruler and a colour calibration card (Fig. 2).

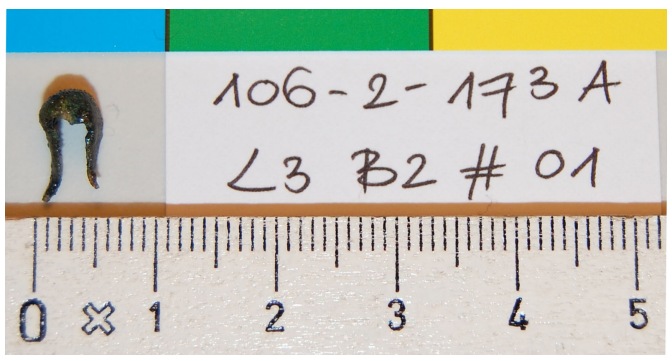

Fig. 2: Example of a clamp, measured and identified with a digital camera.

The majority of clamps has a diameter of ± 5 mm, and a leg thickness of ± 0.7 mm. Their overall appearance is dark brown, with various green, red and white products.

Some clamps (partly) show a white-silvery colour (Fig. 3A), which seems to be caused by a high tin concentration (preliminary X-Ray Fluorescence results). More research might indicate whether tin is added intentionally or if this product is a corrosion product caused by the burial environment.

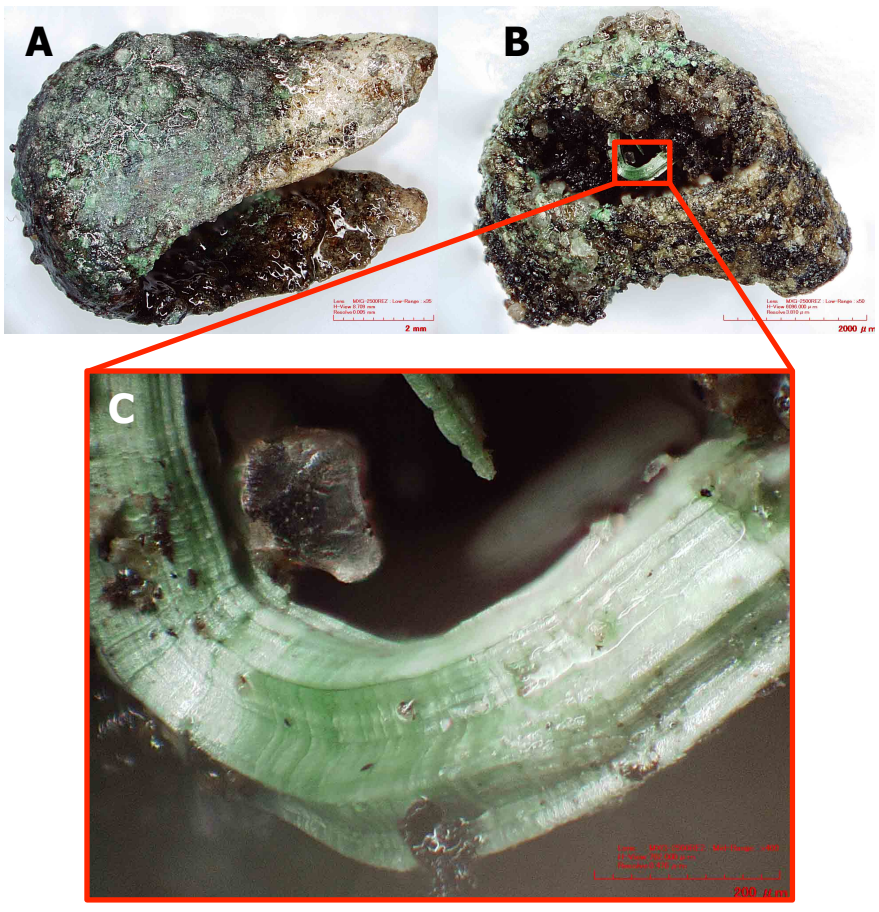

Fig. 3: A: Clamp with white colour at the legs. B: Clamp with bent legs, showing the corrosion product 'curly malachite'. C: Detail from B. Optical Microscopy.

On two samples (one shown in Fig. 3B), the rarely encountered corrosion product 'curly malachite' is found. This morphology is supposed to grow in empty space, but it is not yet known in what kind of circumstances this takes places.

Ongoing Research

Since the research question cannot be answered without more data, more analyses will be done to clarify the composition of the metal and corrosion products and the microstructure:

- Micro-Tomography
- X-Ray Fluorescence
- Scanning Electron Microscopy
- X-Ray Diffraction
- Raman Spectroscopy

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