# PIN HR-17773 - TIN BRONZE - LATE BRONZE AGE - SWITZERLAND

**Artefact name** Pin HR-17773

**Authors** Naima. Gutknecht (HE-Arc CR, Neuchâtel, Neuchâtel, Switzerland) & Rémy. Léopold (HE-Arc CR, Neuchâtel, Neuchâtel, Switzerland) & Domon Beuret. Emmanuelle (Laténium, Neuchâtel, Neuchâtel, Switzerland)

**Url** /artefacts/1090/

## The object




*Credit Laténium, C.Cevey.*

Fig. 1: Pin with decorated head and round section,




*Credit HE-Arc CR, L.Rémy.*

Fig. 2: Brown-yellow corrosion products (detail) around the head of the pin,




*Credit HE-Arc CR, L.Rémy.*

Fig. 3: Brown-yellow corrosion products (detail) on the middle part of the pin,


This work is licensed under CC BY-NC-ND 4.0




Fig. 4: Brown-yellow and green corrosion products (detail) in an area close to the tip of the pin,

*Credit HE-Arc CR, L.Rémy.*

## Description and visual observation

| | |
|---|---|
| **Description of the artefact** | Pin with decorated head and round section. It has brown-yellow green and corrosion products (Figs. 1-4). Dimensions: L = 6.2cm; WT = 2.6g. |
| **Type of artefact** | Jewellery |
| **Origin** | Hauterive - Champréveyres, Neuchâtel, Neuchâtel, Switzerland |
| **Recovering date** | Excavation 1983-1985, object from layer 1 |
| **Chronology category** | Late Bronze Age |
| **chronology tpq** | 1050 B.C. |
| **chronology taq** | 800 B.C. |
| **Chronology comment** | Hallstatt A2/B |
| **Burial conditions / environment** | Lake |
| **Artefact location** | Laténium, Neuchâtel, Neuchâtel |
| **Owner** | Laténium, Neuchâtel, Neuchâtel |
| **Inv. number** | HR-17773 |
| **Recorded conservation data** | The object has been kept in wooden storage, no intervention documented. |

### Complementary information

The object was analyzed in 1987 by Schweizer. Documentation of the strata in binocular mode of the object was performed in 2022.

## Study area(s)




Fig. 5: Sides A and B (opposite sides) of the pin showing the XRF analysis areas (red circles),

*Credit HE-Arc CR, L.Rémy.*

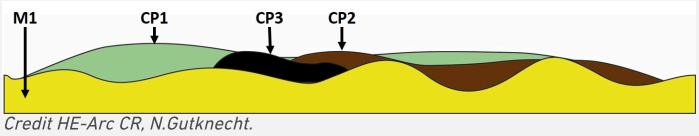

This work is licensed under CC BY-NC-ND 4.0

## Binocular observation and representation of the corrosion structure

The schematic representation below gives an overview of the corrosion structure encountered on the pin from a first visual macroscopic observation.

| Strata | Type of stratum | Principal characteristics |
|---|---|---|
| CP1 | Corrosion product | Light green, thin, discontinuous, non compact, very soft |
| CP2 | Corrosion product | Brown, thin, discontinuous, compact, hard |
| CP3 | Corrosion product | Black, thin, discontinuous, compact, hard |
| M1 | Metal | Yellow, thick, metallic, soft |

Table 1: Description of the principal characteristics of the strata as observed under binocular and described according to Bertholon's method.




*Credit HE-Arc CR, N.Gutknecht.*

Fig. 6: Stratigraphic representation of the corrosion structure of the pin by macroscopic and binocular observation using the Micorr application with reference to Fig. 7,

## MiCorr stratigraphy(ies) – Bi




Fig. 7: Stratigraphic representation of the corrosion structure of the pin observed macroscopically under binocular microscope using the MiCorr application with reference to the whole Fig. 6. The characteristics of the strata, such as the discontinuity, are accessible by clicking on the drawing that redirects you to the search tool by stratigraphy representation, Credit HE-Arc CR, N.Gutknecht.

## Sample(s)

**Description of sample** No sample has been taken. The observation and analysis were performed directly on the object.

**Alloy** Tin Bronze

**Technology** None

**Lab number of sample** 85-27

**Sample location** None

**Responsible institution** None

**Date and aim of sampling**

### Complementary information

None.

## Analyses and results

*Analyses performed:*

**Non-invasive approach**

XRF with handheld portable X-ray fluorescence spectrometer (NITON XL5). General Metal mode, acquisition time 60s (filters: Li20/Lo20/M20).

## Non invasive analysis

XRF analysis of the pin was carried out on three representative areas of the surface (Fig. 5). Points 1 and 3 were done on yellow areas which seem to be close to the remaining metal, while point 2 was performed on the brown corrosion layer (CP2) where all strata (soil, corrosion products, and metal) are analyzed at the same time.

Table 2 shows that the metal is presumably a tin bronze alloy with possibly some lead. The other elements detected are: Si, S, Fe and P.

| Elements (mass %) | Cu | Sn | Si | S | Pb | Fe | P | |
|---|---|---|---|---|---|---|---|---|


This work is licensed under CC BY-NC-ND 4.0

| | % | +/- 2σ | % | +/- 2σ | % | +/- 2σ | % | +/- 2σ | % | +/- 2σ | % | +/- 2σ | % | +/- 2σ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 82.0 | 0.1 | 14.0 | 0.06 | 1.5 | 0.07 | 0.6 | 0.02 | 0.5 | 0.02 | 0.4 | 0.02 | 0.3 | 0.03 | 99.3 |
| 2 | 81.0 | 0.1 | 14.0 | 0.05 | 0.6 | 0.06 | 1.5 | 0.03 | 0.5 | 0.02 | 1.5 | 0.02 | 0.3 | 0.02 | 99.4 |
| 3 | 81.5 | 0.14 | 14.1 | 0.06 | 1.6 | 0.08 | 0.7 | 0.03 | 0.6 | 0.02 | 0.5 | 0.02 | 0.7 | 0.04 | 99.7 |

Table 2: Chemical composition of the surface of the pin at three representative areas shown in Fig. 5. Method of analysis: XRF.

## Metal

None.

**Microstructure** None

**First metal element** Cu

**Other metal elements** Sn

### Complementary information

None.

## Corrosion layers

None.

**Corrosion form** None

**Corrosion type** None

### Complementary information

In the article "Bronze objects from Lake sites: from patina to bibliography" (Schweizer 1994), the corrosion products of the pin 17773 (LAB MAH 85-27) were studied through XRD. The results show that the pin contains copper carbonate (malachite) and copper sulfate (posnjakite), both of these minerals are green.

## MiCorr stratigraphy(ies) – CS

## Synthesis of the binocular / cross-section examination of the corrosion structure

The corrosion structure has only been documented in binocular mode (Fig. 7).

## Conclusion

The pin is made from a tin bronze, possibly containing some lead and is covered with brown and green corrosion products. The corrosion products identified by Schweizer seem to indicate that they developed in terrestrial environment.

## References

**References on object and sample**

*Object files in MiCorr*


1. MiCorr_Pin or needle fragment HR-3031
2. MiCorr_Tang fragment of a knife HR-6567
3. MiCorr_Tang fragment of a knife HR-6246



This work is licensed under CC BY-NC-ND 4.0

4. MiCorr_Pin HR-18152
5. MiCorr_Pin HR-3071
6. MiCorr_PIN HR-18603
7. MiCorr_Pin HR-3389

*References object*

8. Rychner-Faraggi A-M. (1993) Hauterive – Champréveyres 9. Métal et parure au Bronze final. Archéologie neuchâteloise, 17 (Neuchâtel).
9. Hochuli, S. et al. (1988) SPM III Bronzezeit , Verlag Schweizerische Gesellschaft für Ur- und Frühgschichte Basel, 76-77, 379.

*References sample*

10. Empa Report 137 695/1991, P.O. Boll.
11. Rapport d'examen, Lab. Musées d'Art et d'Histoire, Geneva GE, 87-194 à 87-197.
12. Schweizer, F. (1994) Bronze objects from Lake sites: from patina to bibliography. In: Ancient and historic metals, conservation and scientific research (eds. Scott, D.A., Podany, J. and Considine B.B.), The Getty Conservation Institute, 33-50.

**References on analytic methods and interpretation**

13. Robbiola, L., Blengino, J-M., Fiaud, C. (1998) Morphology and mechanisms of formation of natural patinas on archaeological Cu-Sn alloys, Corrosion Science, 40, 12, 2083-2111.


This work is licensed under CC BY-NC-ND 4.0