

ĶIVUTKALNS BRONZE ARTEFACTS RECONSERVATION: FROM ICONIC DISPLAY TO AUTHENTIC CONSERVATION

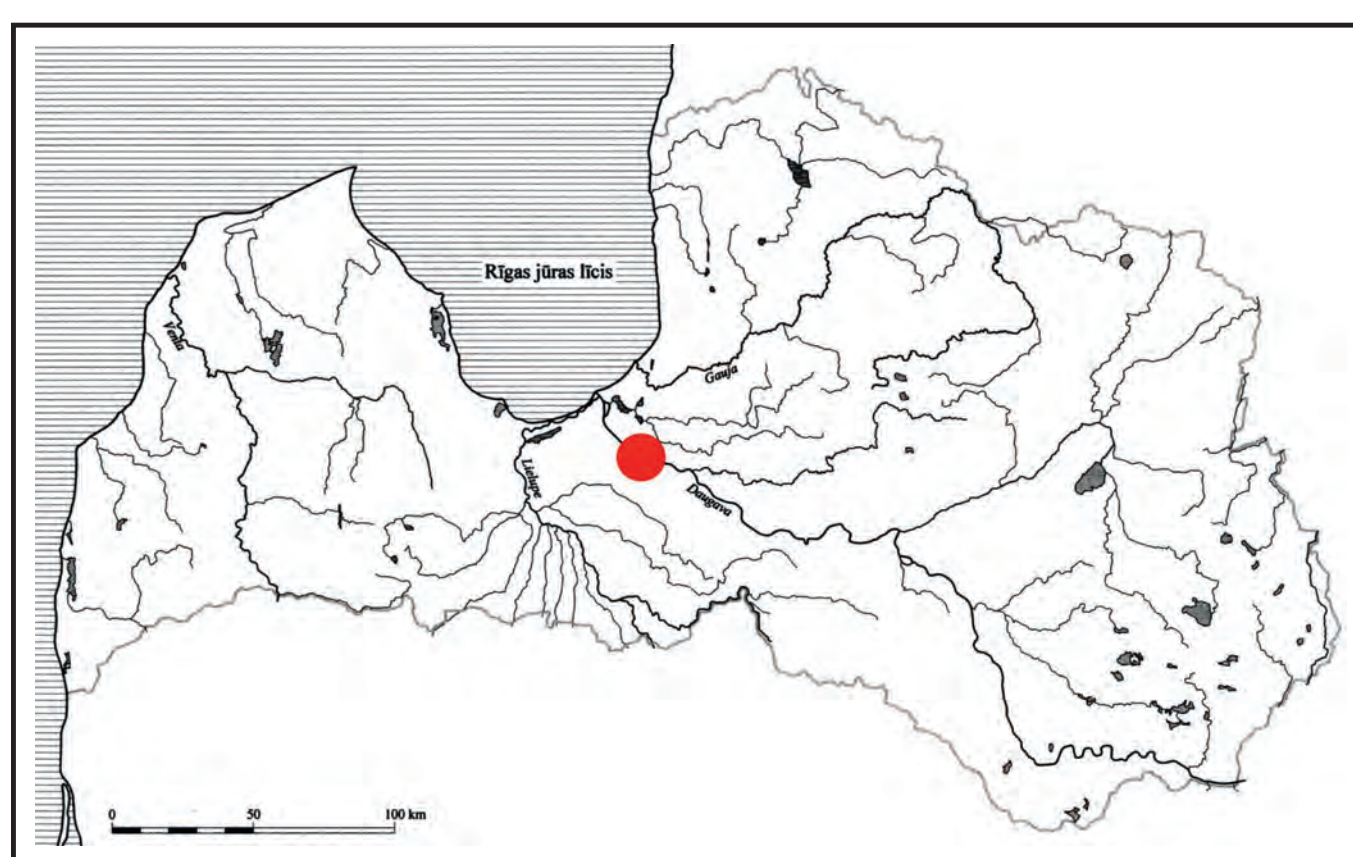
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Ķivutkalns 1st bronze hoard
7th – 6th cent. BC
Tutulus VI 120:1887, Ø 11,5 cm; h 5,3 cm
Twisted neck-ring VI 120:1888, Ø16,7 cm
Smooth neck-ring VI 120:1889, Ø14,8 cm

HISTORY

Ķivutkalns Late Bronze Age hillfort was located in the lower reaches of Daugava on Dole Island, today in the territory of Riga Hydroelectric Power Plant. It was fully explored in 1966-1967 under the leadership of Latvian archaeologist Jānis Graudonis. Two bronze hoards were found [1]. Many researchers have noted the uniqueness of Ķivutkalns 1st bronze hoard – tutulus and two neck-rings – in the context of the Latvian and Baltic Bronze Age.

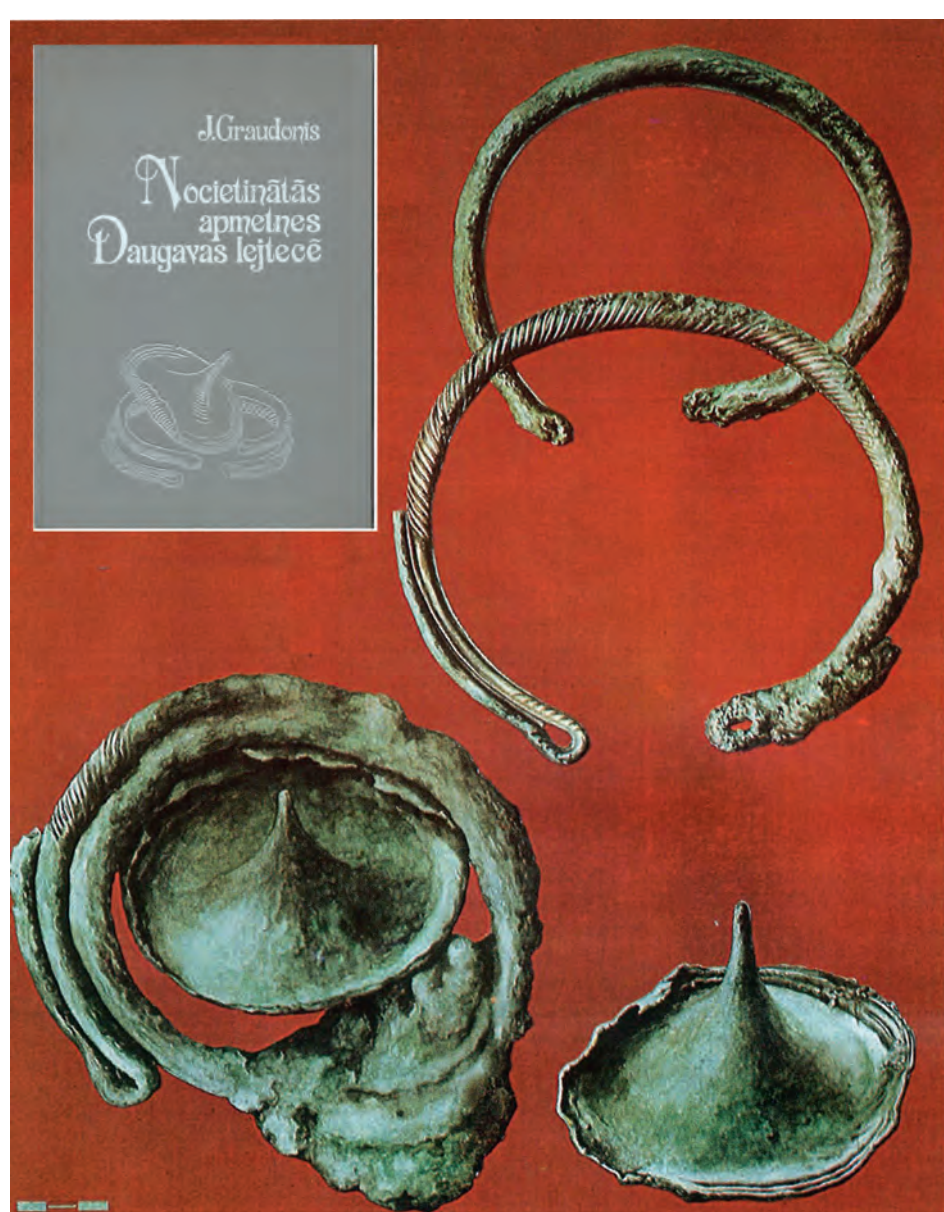


Location of Ķivutkalns



Hoard in situ [2]

Soon after excavation these artefacts were first conserved – glued and consolidated without removing soil and corrosion products – at the Institute of Latvian History of the Latvian Academy of Sciences. Some fragments were analyzed by Dzintra Hoferte [3]. Illustration by Vladislavs Urtāns and Ilze Siliņa (colored) (1970-80's) became iconic and widely published in academic and popular literature [4].



Iconic images of Ķivutkalns 1st hoard

RECONSERVATION

In 2023 – 2024, preparing for a new exposition at Riga Castle, the artefacts from Ķivutkalns 1st hoard were reconserved and researched at the Latvian National Museum of History.

The reconservation process included:

- removing outdated conservation materials - gluings and fillings (acrylic lacquers; beeswax) and reassembling of fragments;
- mechanical removing of corrosion products and soil residues;
- connecting and gluing fragments with Paraloid B72 (30-40% in ethanol) and epoxy resins without filling of empty areas;
- consolidation with Paraloid B72 (3-4% in ethanol) and protective coating application using microcrystalline wax (10% Cosmoloid H80 in white spirit).



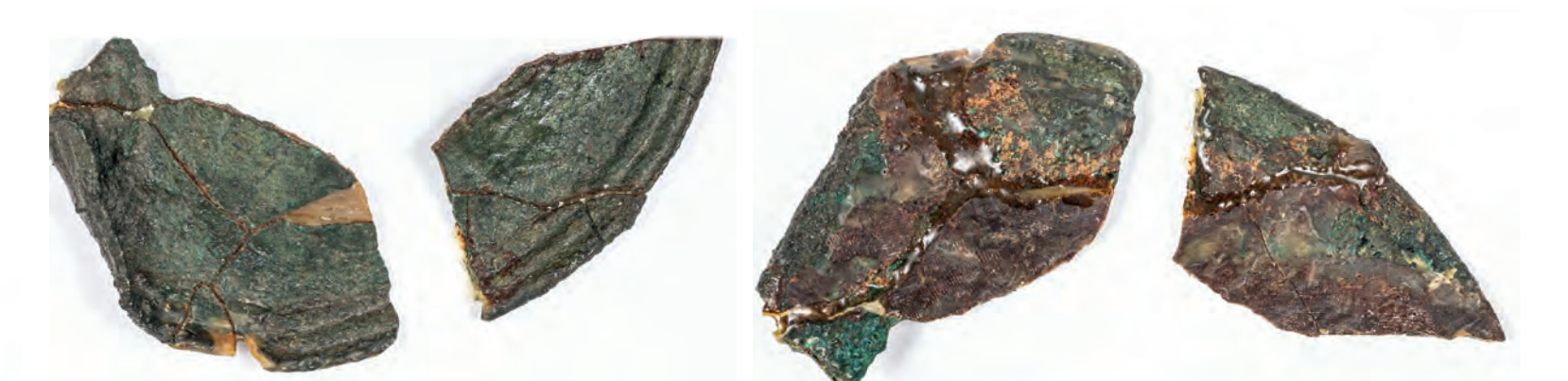
Tutulus before and after reconservation



Twisted neck-ring before and after reconservation



Smooth neck-ring before and after reconservation



Tutulus fragments with traces of old gluing and filling



Neck-ring fragments with traces of old gluing and filling



Neck-ring fragments with traces of old gluing and filling



Neck-ring fragments with a corroded core

Table 1.
Average elemental composition determined by (μ-XRF) analysis (%)

Object	Sn	Sb	Pb	Ag	As	Cu
Smooth neck-ring	6,2	1,2	1,7	0,4	0,4	balance
Twisted neck-ring	1,0	2,2	4,1	0,6	0,7	balance
Tutulus	14,3	0,5	1,2	0,2	0,3	balance

MATERIAL ANALYSES

During the conservation, fragments were analyzed using μ-XRF spectrometer ARTAX-800 (Bruker), calibrated with certified standards.

The first observation is that fragments are made of tin bronze with noticeable amounts of antimony (Sb), lead (Pb), arsenic (As), and silver (Ag). Analysis was done in corrosion-free areas with the exposed bronze.

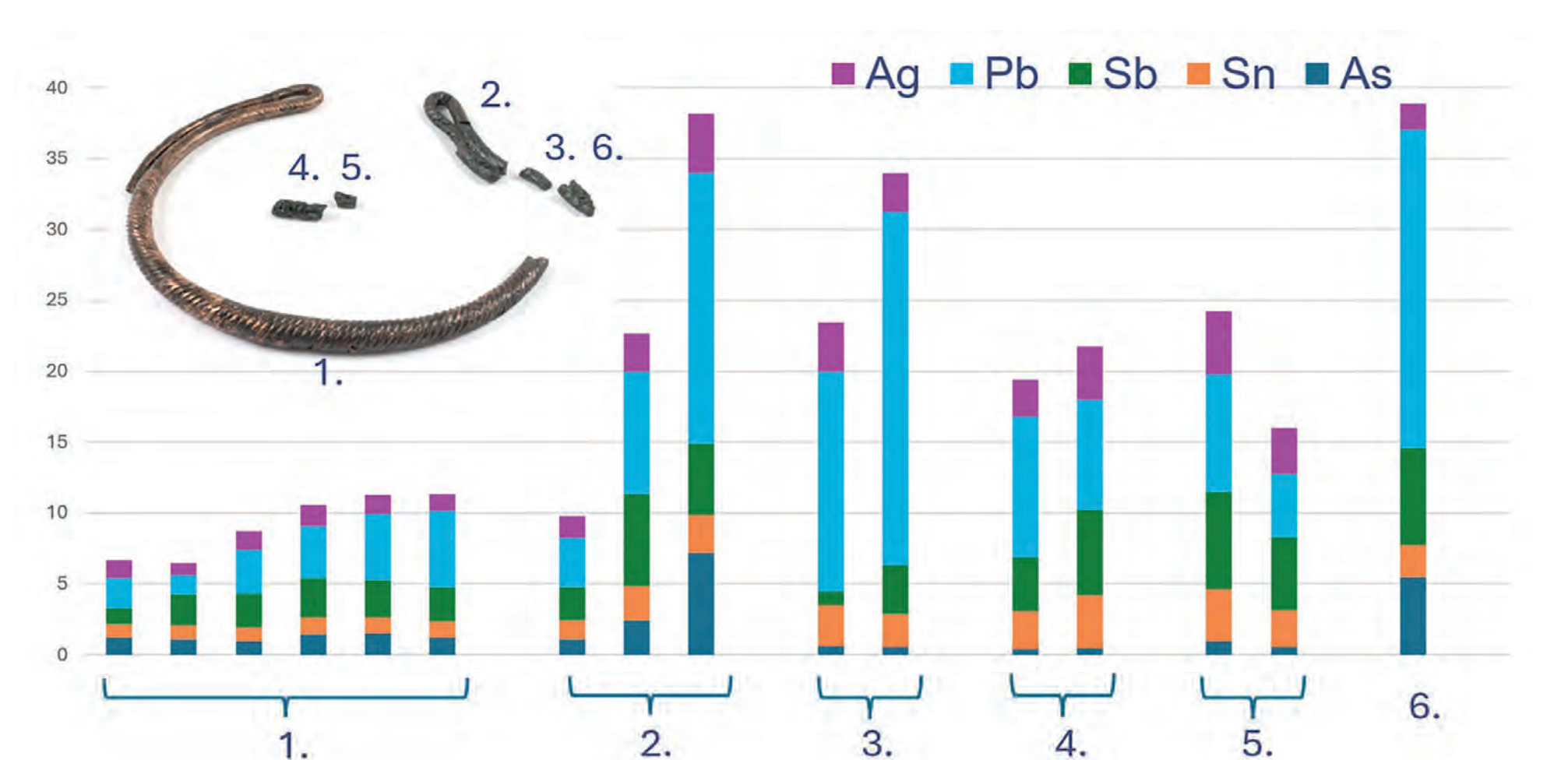
In heavily corroded zones, calcium (Ca), phosphorus (P), sulfur (S), silicon (Si), and manganese (Mn) were found. Zinc (Zn) was detected only in trace amounts.

The alloy compositions are typical of Bronze Age objects. The presence of several tin-bronze types indicates the use of raw materials from different sources.

Corrosion caused selective copper loss (decoppering), leading to relative enrichment of Pb, Ag, Sn, and Sb. In some fragments, these elements quantity increased up to four times.

A feature of the tutulus corrosion is decoppering, which created a tin-rich surface layer; in some spots, it looks like a tin coating. Tin in these areas can reach 30% of the composition.

Table 2.
Changes in elemental composition caused by corrosion (μ-XRF data)



CONCLUSIONS

Earlier restoration decisions were re-evaluated according to current conservation ethics. The artefacts are now presented without full reconstruction, with an emphasis on authenticity and transparency. Although the iconic appearance has changed, the objects now better reflect their material history and current condition.

Ķivutkalns 1st bronze hoard now is exhibited at reconstructed Riga Castle.

Foto: Landa Lagzdiņa, Jānis Puķītis

REFERENCES

- [1] Latvian archeology. 2025. Riga: Latvian Association of Archaeologists. 711 p.
- [2] University of Latvia Faculty of Humanities Institute of Latvian History the Repository of Archaeological Material
- [3] Graudonis J.1989. Nocietinātās apmetnes Daugavas lejtecē [Fortified settlements in lower reaches of the Daugava]. Riga: Zinātne. 88, 89 p.
- [4] Urtāns, V. 1977. Senākie depozīti Latvijā (līdz 1200.g.) [Oldest hoards in Latvia]. Riga: Zinātne. 285 p.; Graudonis J.1989. etc