

Humanities meets Natural Science

The study of Roman Bronzes found in
Switzerland

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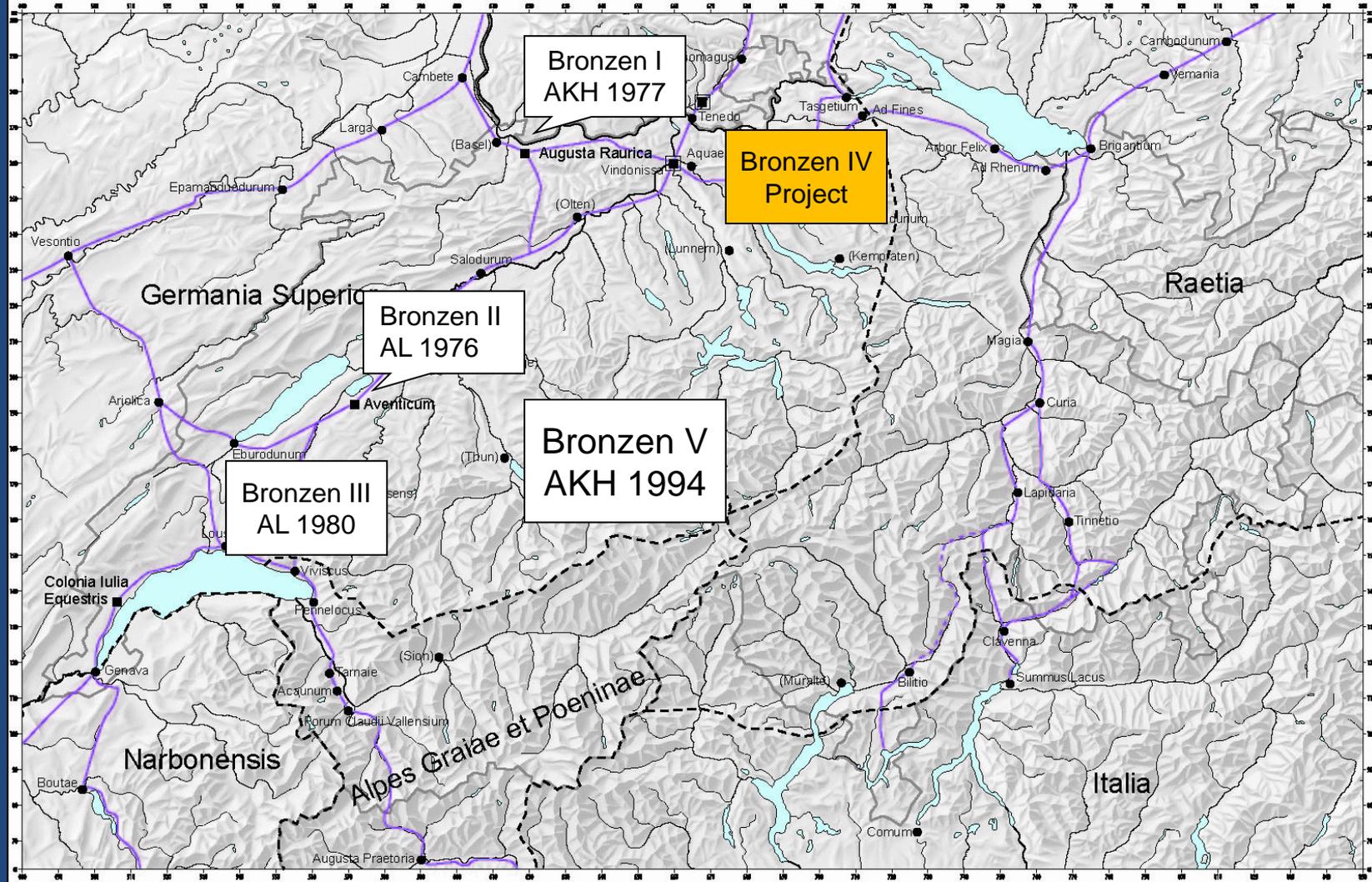
- Introduction
a research project about roman bronzes
- 3 Methods
archaeological methods, chemical methods,
radiographical Methods
- 3 Examples
examples for combining methods
- Conclusion

It started 40 years ago

- The idea came from Germany (RGZM, Heinz Menzel)
- Initiator in Switzerland was Prof. Hans Jucker (Universität Bern)
- **Intention:**

**A scientific Edition of all Roman figural
Bronzes found in Switzerland**

Le territoire de la Suisse actuelle au Haut-Empire



- Province**
- Colonie
 - Camp militaire
 - Agglomération secondaire
- Limite de province
- Voie romaine
- Sites mentionnés dans les textes du poster

1:1 000 000

0 10 20 30 40 50 60 70 80 90 100

1cm = 100km

The Roman Bronzes of Switzerland, 4 Central- Eastern- and Southern- Switzerland

➤ edition content: 373 pieces, lots of categories, for example:



Gods



Godesses



demigods

The edition is more than a classical template



Method 1: the classical way



- The bronzes:
- Will be inspected, described,
- Analysed, photographed,
- And put into their historical and archaeological framework

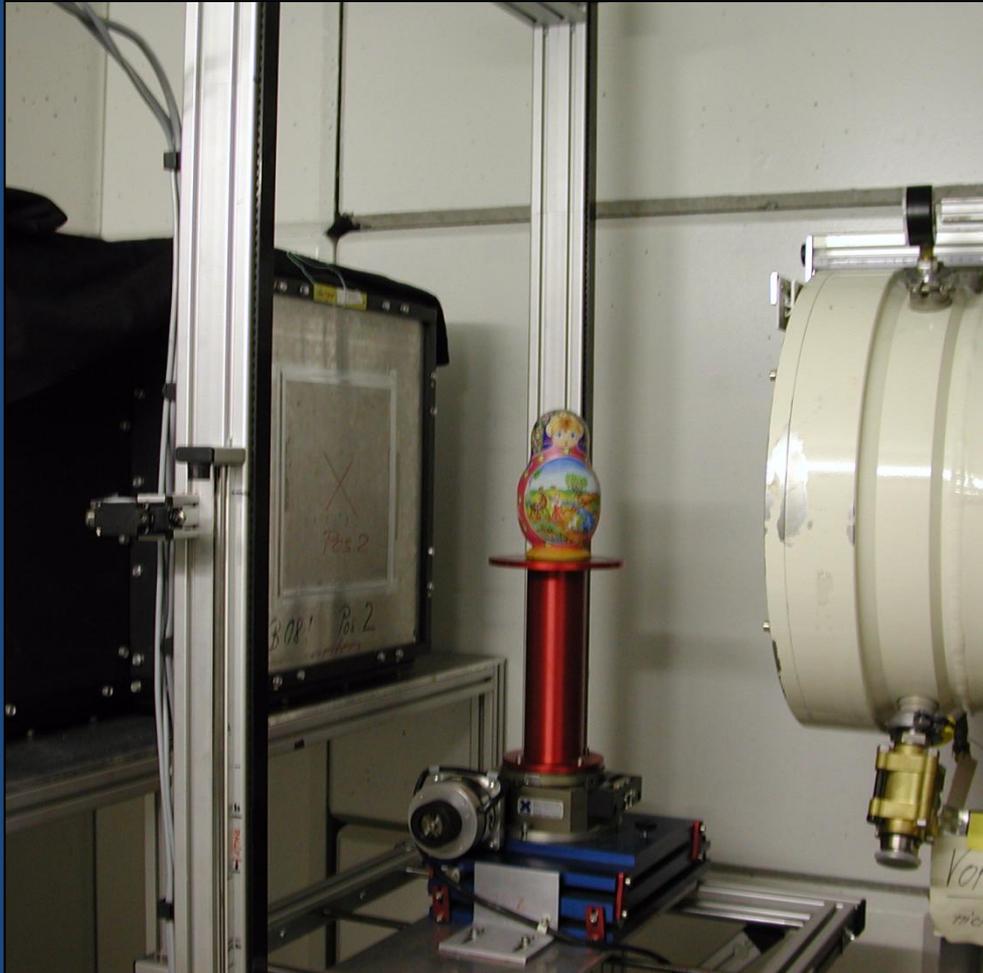
Method 2: Chemical Analysis workplace: Swiss National Museum

- XRF = X-ray fluorescence
- AAS = atom absorption spectroscopy
- Neutronen = neutron activation analysis
- **Attention: Chemical Analysis is most effective when minimalinvasiv**



The XRF-spectrometer in action

Method 3: N-Ray and X-Ray Workplace is the Paul Scherrer Institute



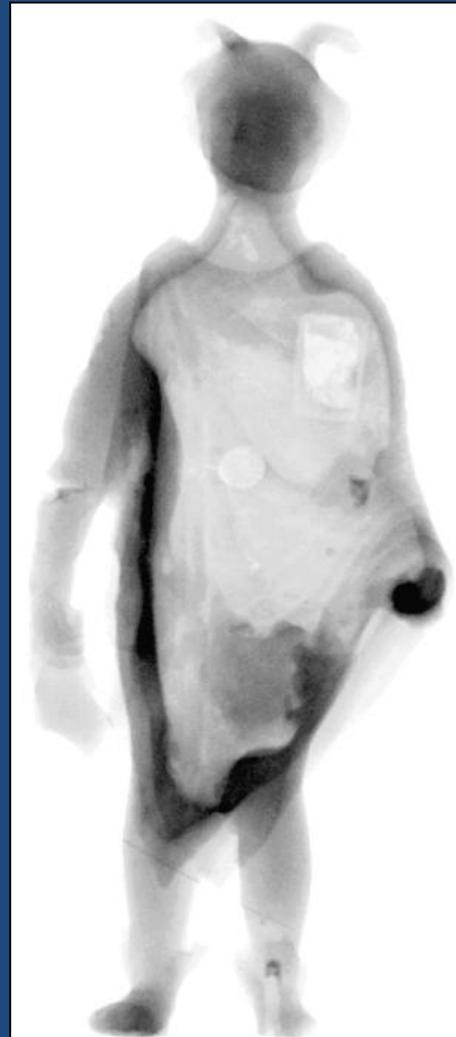
Arrangement for
Object-Analysis:
On the right side an
Outlet for N-Ray and
X-Ray. Analysed
Object in the middle.
Detector on the left
side

Why thermal neutrons and not x-ray?

20 cm
photo



neutron



X-ray

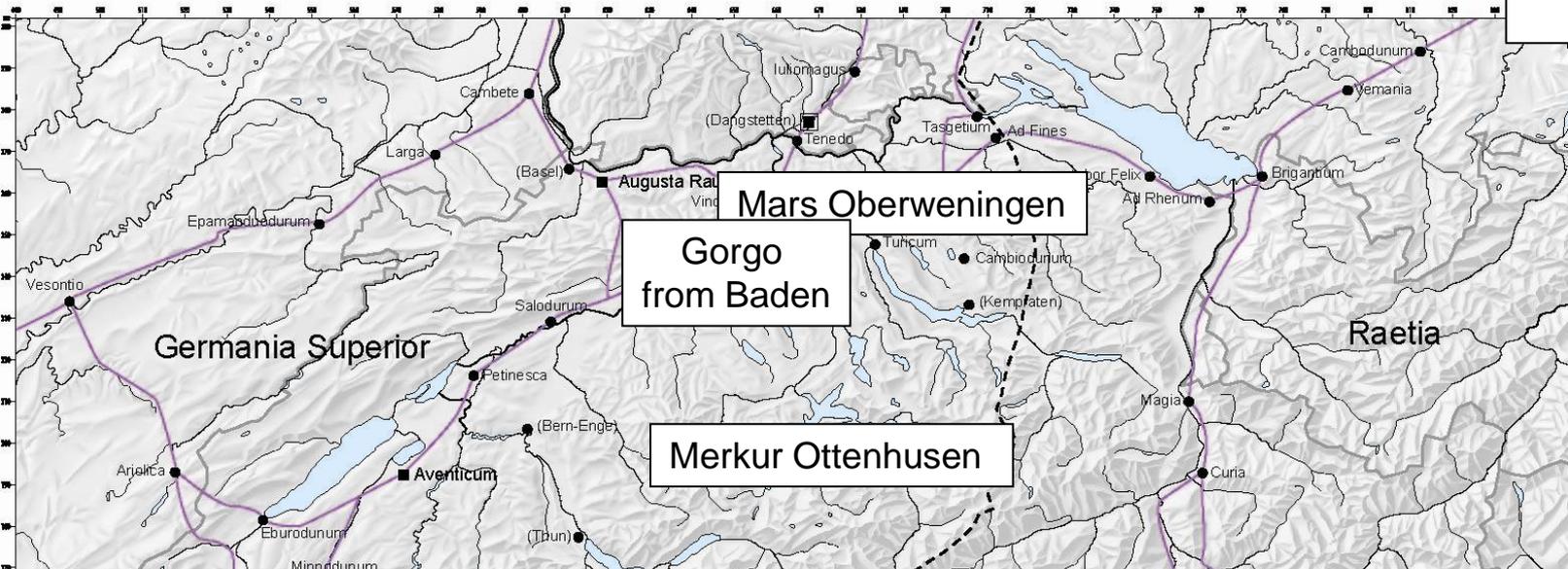


The attenuation of X-ray increases with higher mass numbers.
Copper Alloys are difficult to transmit because of high lead-content

Merkur Uster ZH

Three case studies

Le territoire de la Suisse actuelle au Haut-Empire



province
ine
tionnés
xtes du poster

vvaidsnut

Unterkllettgau



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Bildaufnahmedatum: 4. Mrz. 2000 47°30'09.32" N 8°24'16.12" E Höhe 540



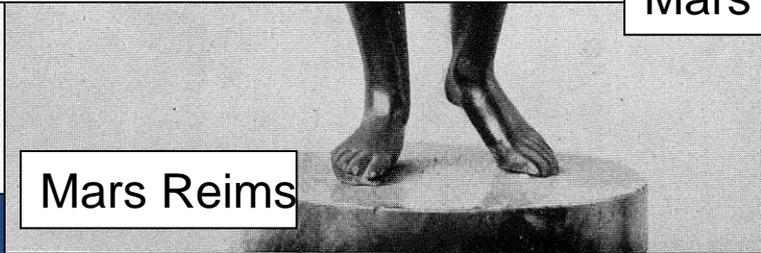
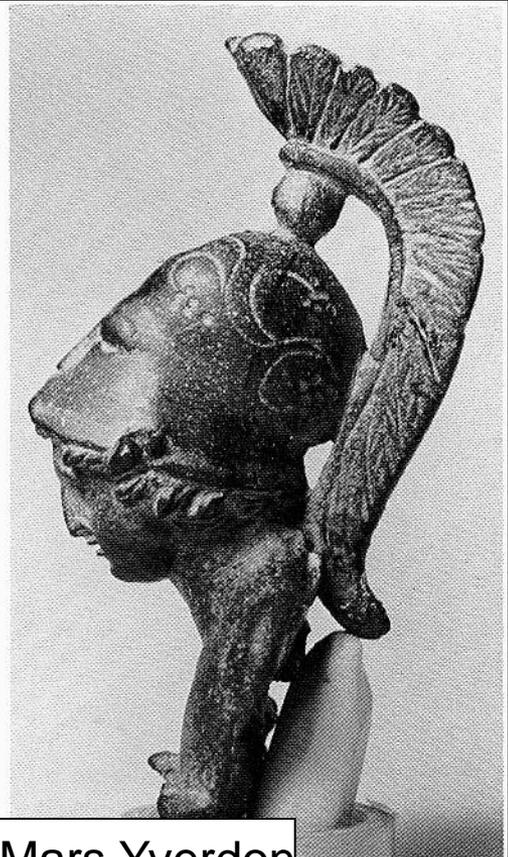
Minerva Avenches



Mars Reims



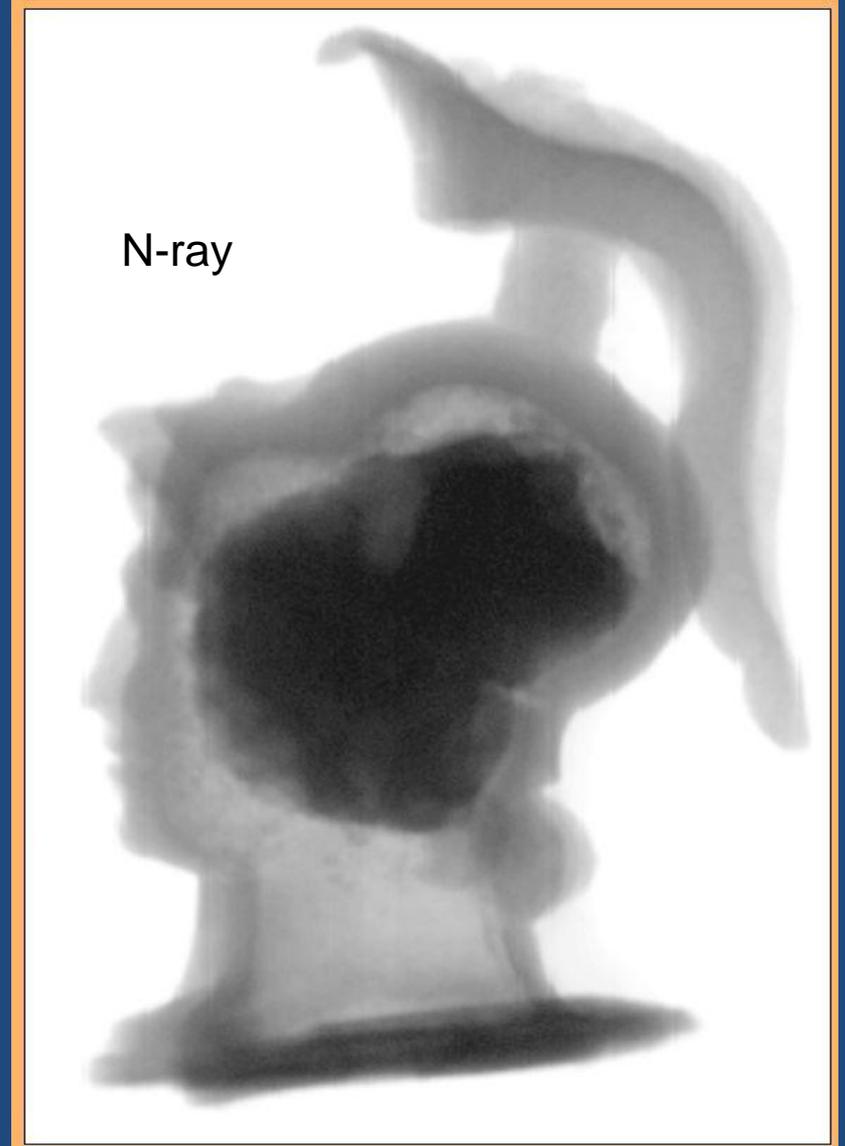
Mars Yverdon



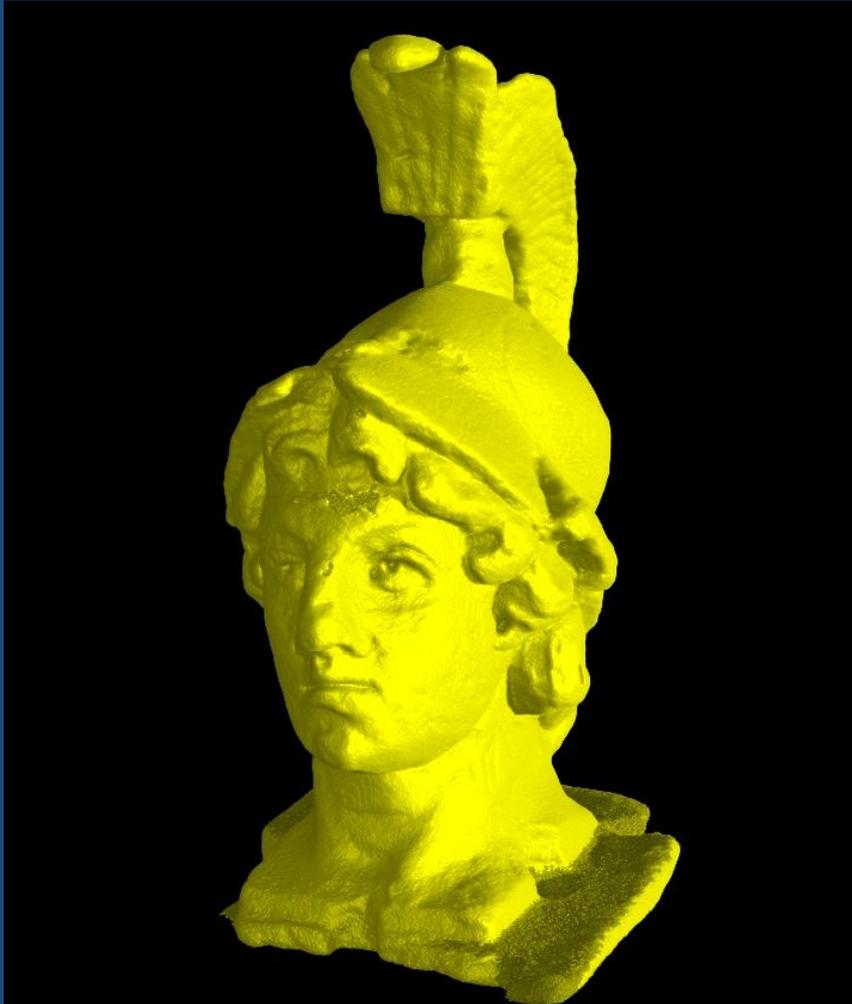
Conclusions of typology

- It is a head of the god Mars
- Parallels show a youthful armoured man with lance and sword
- The creation is stylistically assumed to be in central-Gaul
- The dating is assumed to be the second century AD
- **But: There is no known parallel to the cropped neck and the base-plate**

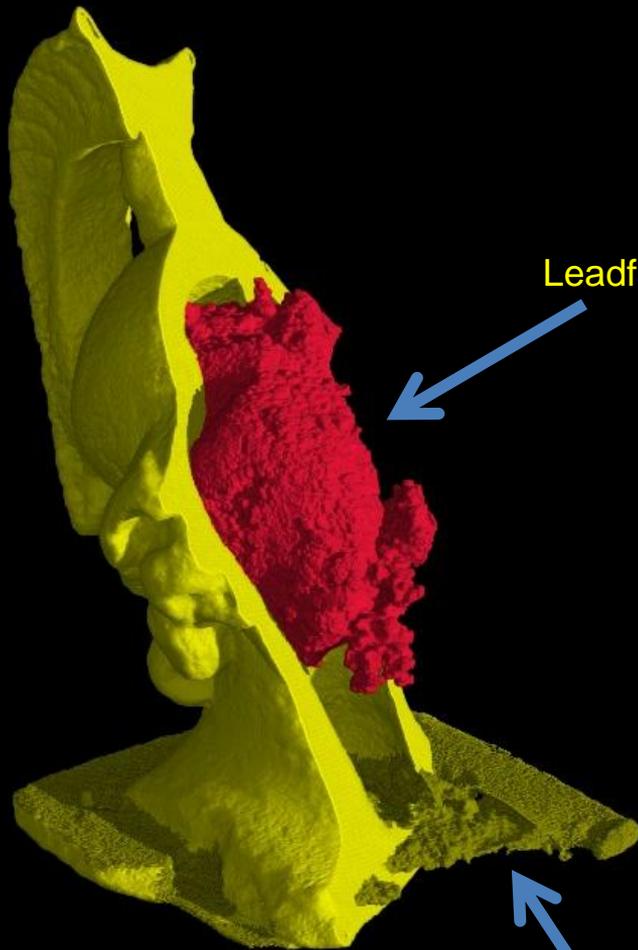
**Transmission Radiography at the PSI
to look for secondary changings of the head**



tomography investigation



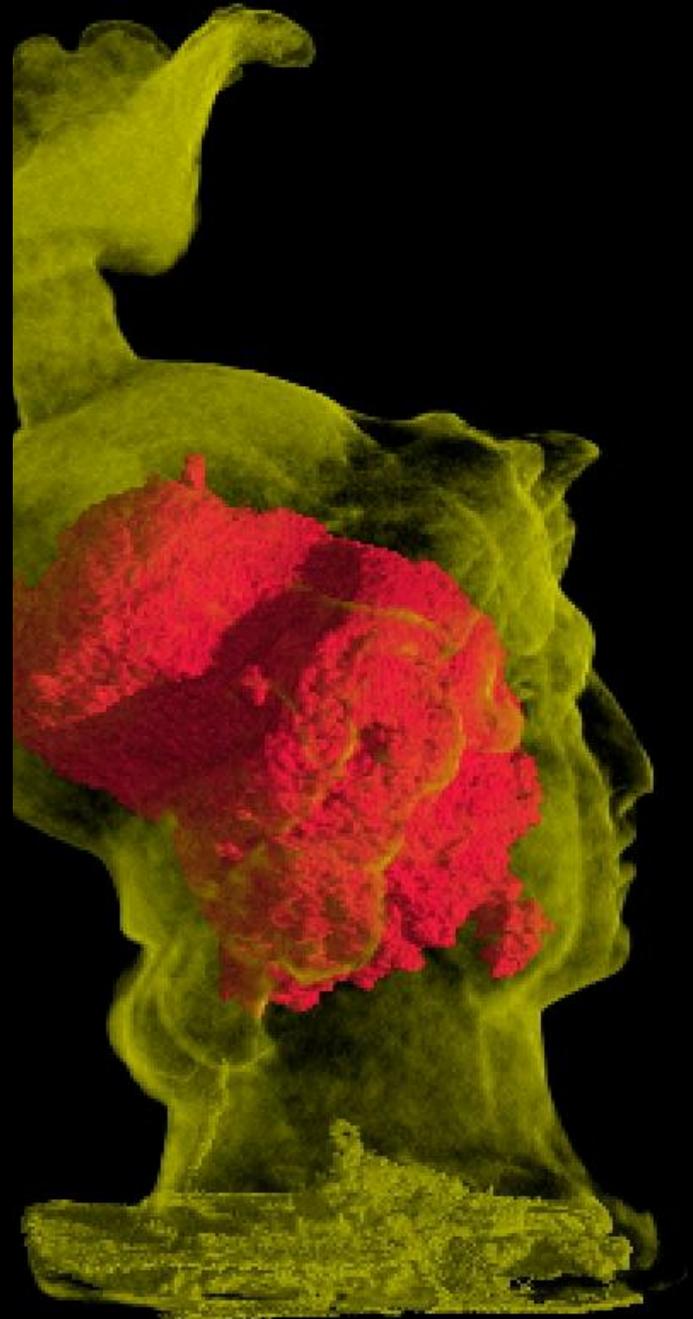
Seperate casted
Base-plate



Leadfilling(?)



Seperate casted
Base-plate



Conclusion: Different phases of manufacture and using

- Phase 1: Initially, a bronze casting took place using a melting procedure via a wax core. Possibly an entire bust was produced initially, as a larger sculpture, from the head via the neck to shoulders and arms. Using as a cult-object?
- Phase 2: the head was separated from its basement, filled partly with lead and placed on a stabilizing plate. These modifications are unusual and considerably complex from the casting technique point of view.
- Phase 3: Fixing with nails on a (wooden base); using as decoration on a roman coach?

Height: 30.5 cm



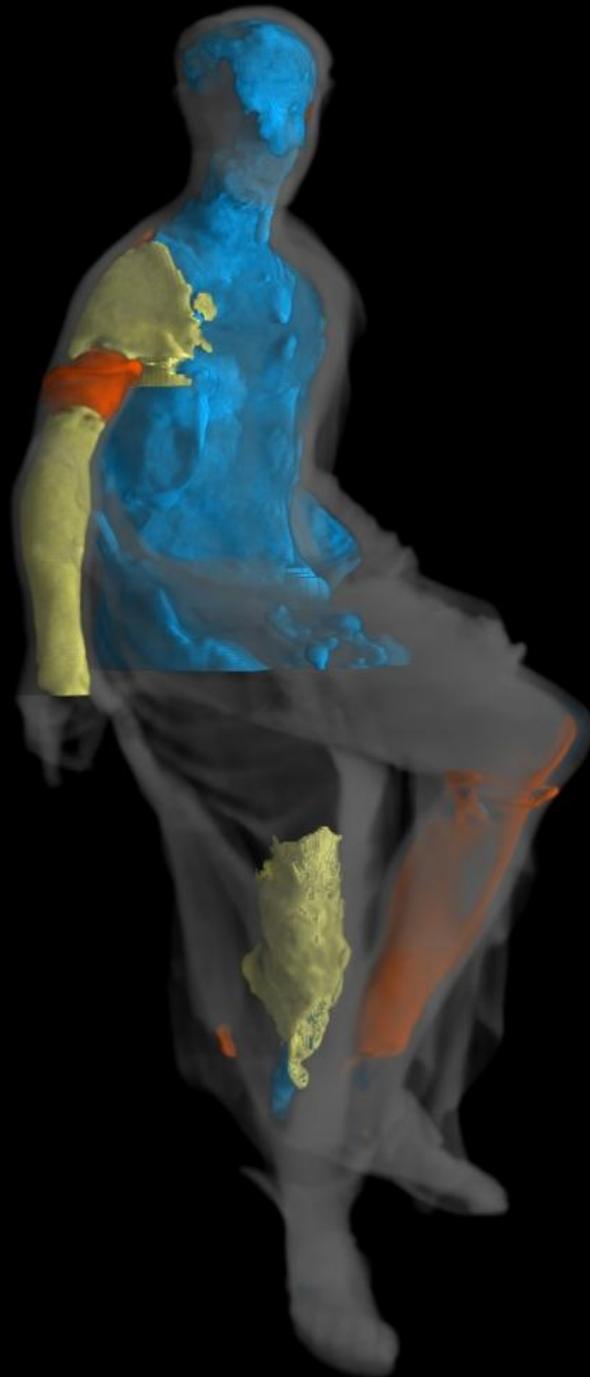
Parallel



Merkur from Augusta Raurica

Conclusion of typology

- Winged shoes, turtle and lizard clearly show that we have a representation the god Merkur
- The head is very individual formed, perhaps it is the head of the customer
- The creation is stylistically assumed to be in zentral-Gaul
- The dating is asumed to be the end of first century AD



Conclusions of tomography

- The Statue of Merkur and his sittingplace have been casted by using a melting procedure via a wax-core
- The right arm seems once to be broken and fixed by using a bonding
- The left leg has a different filling as the rest of the statue.
- Perhaps it has been used to give them a more heavy weight for a good balance of the sitting Merkur

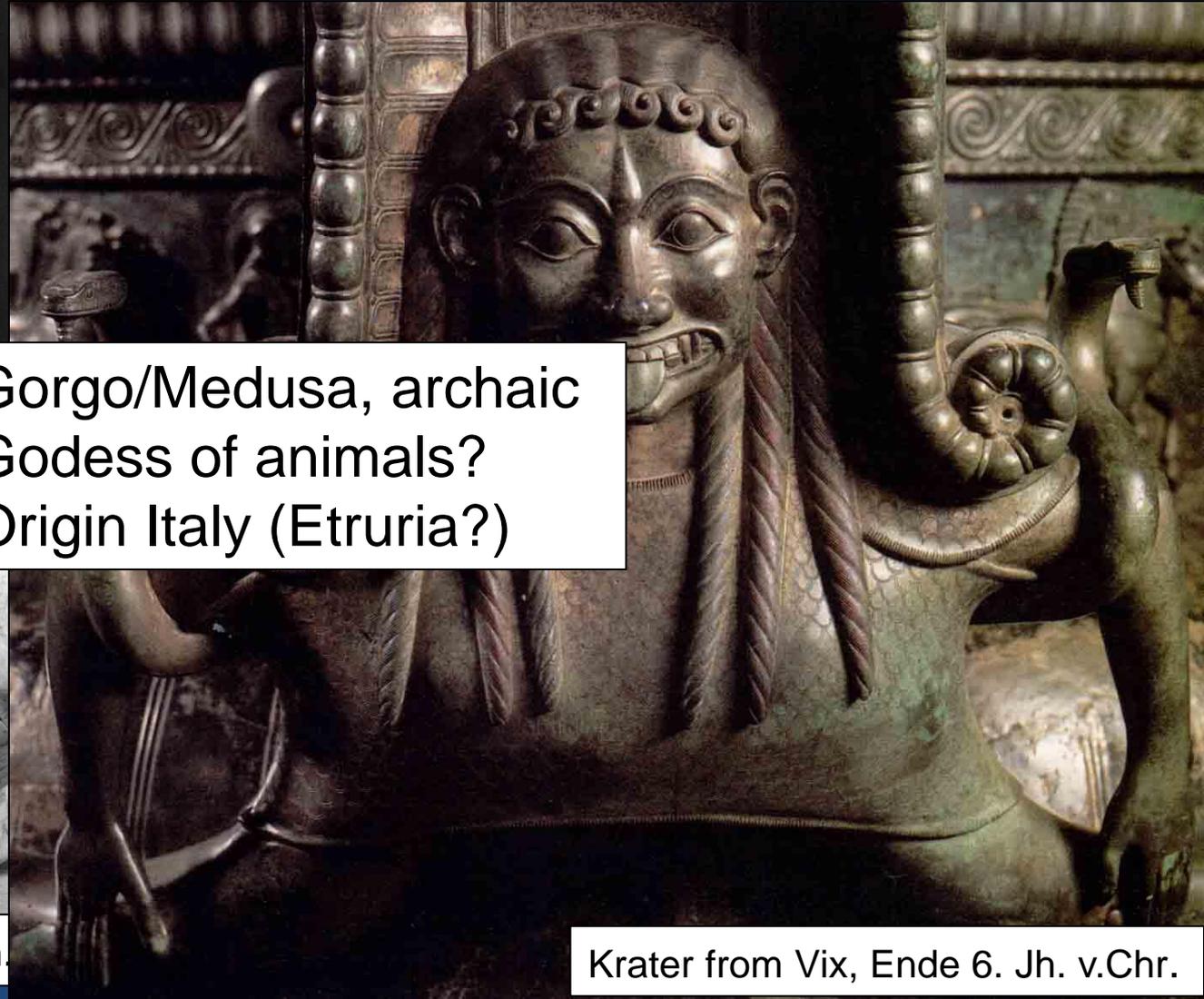
Height: 17.5 cm



Parallels 1: Archaic Mediterranean



- Gorgo/Medusa, archaic
- Goddess of animals?
- Origin Italy (Etruria?)



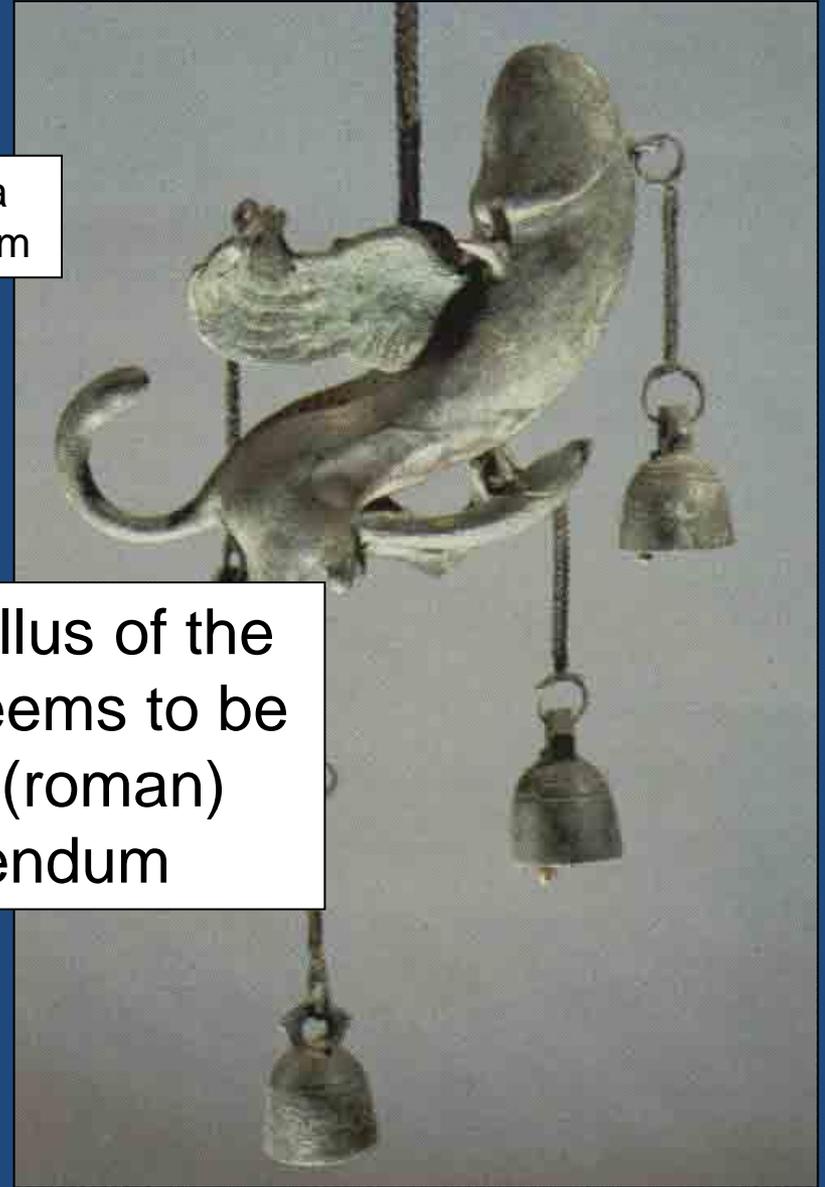
Ceramics from Syrakus, 6. Jh.

Krater from Vix, Ende 6. Jh. v.Chr.

Parallels 2: roman



Tinntinabula
Herculaneum



The Phallus of the
Gorgo seems to be
a later (roman)
Addendum

Chemical analysis (AAS)

	Phallus	Figur
Cu	75.57%	90.9%
Sn	7.85%	6.01%
Pb	16.2%	2.66%
Zn	---	0.04
Ni	traces	traces
AS	0.06%	0.1%

typical
roman
alloy

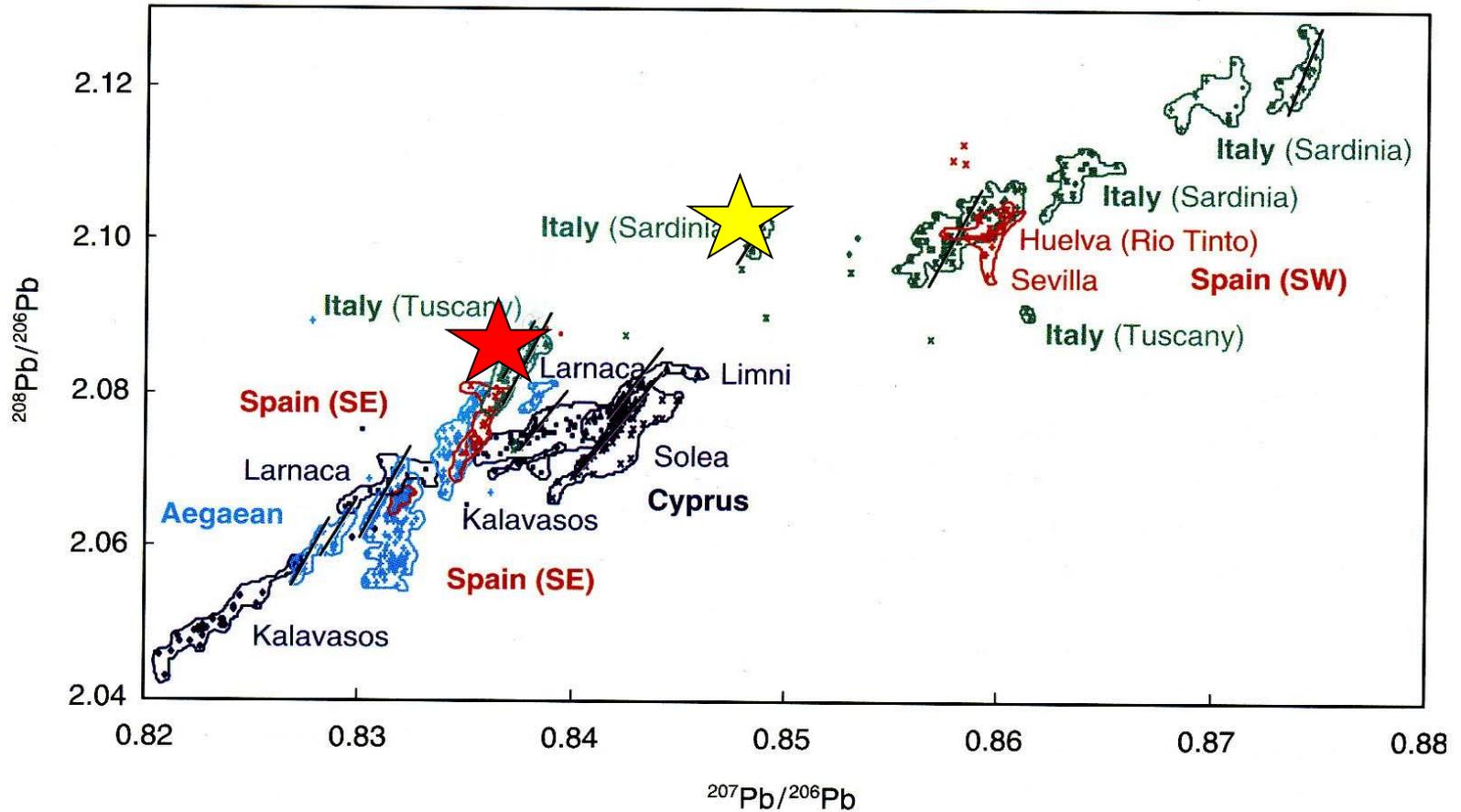
typical
greek
alloy

➤ Two different
copper alloys

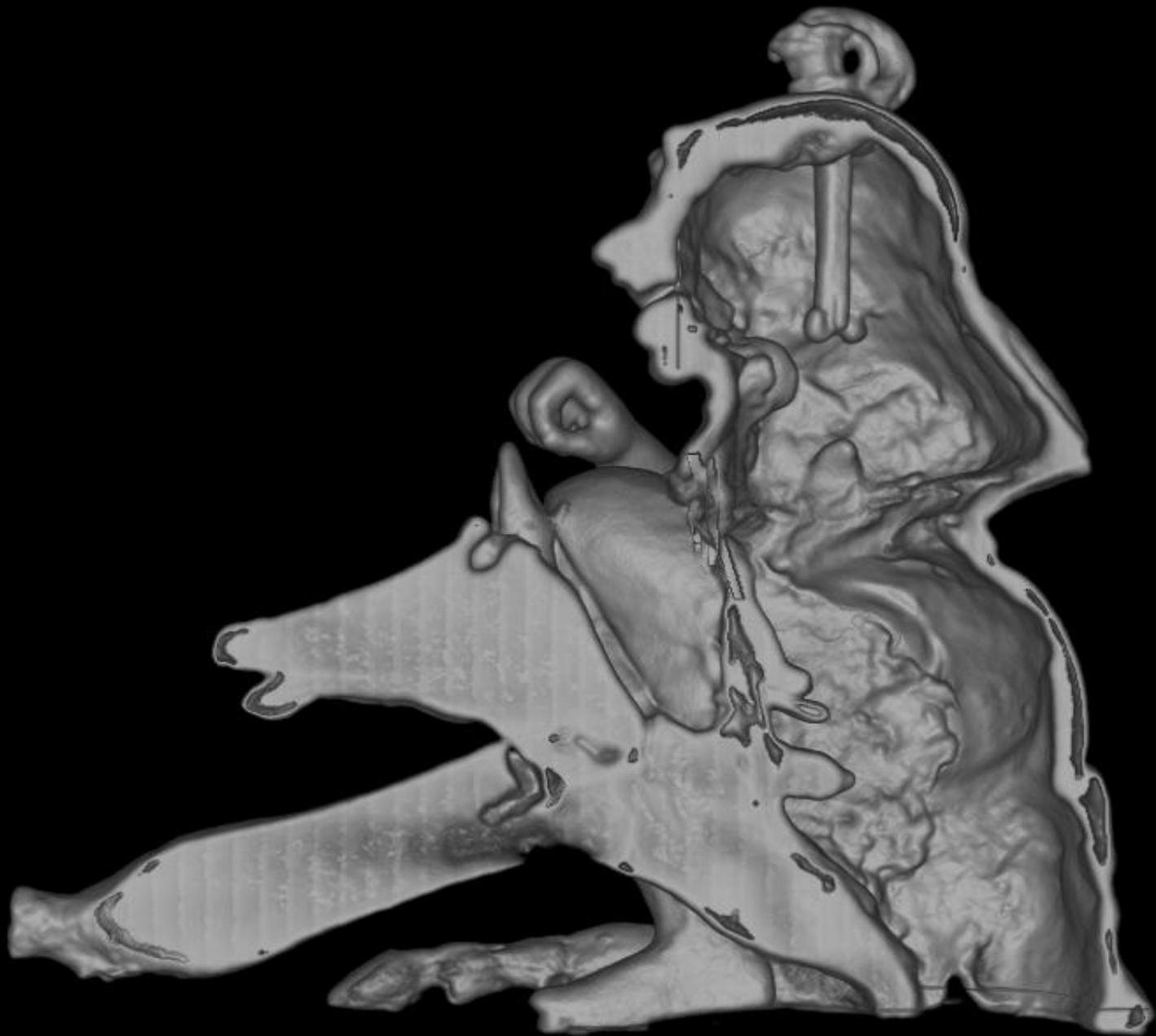
➤ The Phallus
is a roman Addendum

➤ Hook and ring are
also roman addendas

Lead Isotope Analysis



Lead isotope data from Roman Copper and Lead Ores



Results for Gorgo

- Creation in Italy 6./5th century BC.
- Modifications after 400 years in roman Switzerland (Baden)
- Transport from the Mediterranean to Switzerland and there lost for the next 2000 years

Thank you for attention

Special thanks to:

- Schweizerisches Nationalmuseum Zürich (Marie Wöhrle and team)
- Paul Scherrer Institut, Villigen (Eberhard Lehmann and team)

