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Fragmentation of votive offerings in the sanctuary of Olympia

First results

Azzurra Scarci
Leibniz-Zentrum für Archäologie, Mainz, Germany
azzurra.scarci@leiza.de

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Abstract: A new project at the Leibniz-Zentrum für Archäologie in Mainz is investigating the phenomenon of fragmentation of copper alloy votive offerings in the sanctuary of Olympia. By using a variety of methodologies, thousands of fragments have already been analysed to to gain insight into the function and significance of this phenomenon, when and how the objects were destroyed, and the reasons why they were recovered in large numbers.

Keywords: Olympia, votive offerings, fragmentation, scrap metal, European Bronze Age hoards

Introduction

Since January 2022, the project "Fragmentation of Votive Offerings in the Sanctuary of Olympia – Research on the Background of a Ritual Practice", which is funded by the German Research Foundation for the three-year period 2022–2024 (GA: BA 3197/2-1), is ongoing at the Leibniz-Zentrum für Archäologie in Mainz in cooperation with the German Archaeological Institute in Athens. The research is carried out under the supervision of apl. Prof. Dr. Holger Baitinger.

The project aims to investigate the phenomenon of fragmentation of votive metal offerings in the sanctuary of Olympia by applying different research approaches. It focuses on identifying specific fragmentation and breakage patterns in selected groups of material, analysing them statistically according to their measurements and weights, and investigating the spatial distribution of the objects and their relationship to specific functional areas of the sanctuary (e.g. workshops, altars, temples). The use of different approaches will provide the understanding of the significance of this phenomenon, how and when these votive offerings were destroyed and the reasons why they were recovered in large numbers.

Background

The practice of breaking bronze objects dates back at the Early/Middle Bronze Age.[1] Copper-based objects, both complete and scrap, were deposited for different reasons and at different times in hoards across Europe. The meaning behind this phenomenon has been intensively researched and controversially debated. Four main interpretations seem to prevail through studies:[2]

1 For a short history of fragments in hoards see Hansen 2016.

2 The four interpretations have been well summarised by Rezi 2011, 303–307; Lago 2020, 173–177; Knight 2022, 4–9.

- *Fragmentation for recycling*. Fragmentation of objects for recycling/recasting is one of the rather widespread hypotheses. According to this hypothesis, fragmentation and deposition in hoards (meant as founders' hoards/storage) had a profane meaning. The hoarded metal was a ready stockpile to be recast and reused. However, this hypothesis remains unconvincing for many because it does not explain why so much material was fragmented (an operation requiring specific expertise), deposited/hidden and never recovered.
- *Ritual fragmentation.* According to this hypothesis, the presence of deliberately destroyed objects in certain places defines hoards as ritual deposits. The deliberate destruction of objects (e.g. by fragmenting, twisting and bending them) has been connected to ritual practices, or even to ecstatic sacrificial rites. The theory of *pars pro toto* has frequently been proposed as an explanation for the presence of fragmented objects in hoards here full stop it has been compared to the deliberate deposition of broken votive offerings at Greek sanctuaries from the Geometric period onwards.[3]
- *Pre-monetary fragmentation.* A further implication of the occurrence of broken objects in hoards across Europe is that they were utilised as a form of currency and exchange value in pre-monetary societies. This assertion is supported by recent metrological studies of weight and weighing systems in Central and Eastern Europe. Metal objects may therefore have been fragmented in order to achieve the desired weight.[4]
- *Fragmentation for social exchange* (enchainment theory). Chapman's (and later Chapman – Gaydarska's)[5] theory of enchainment refers to chain of personal relationships established by the exchange of objects. Many objects were deliberately broken in two or more pieces that were then exchanged, reused and finally deposited in graves, deposits or other contexts. The exchange involved people establishing social relationships. Matching fragments, which originatede from the same object but had different biographies, served to create and manage social identities and relationships of personhood in societies.[6]

Fig. 1. Votive offerings from the Geometric period (after Barringer 2021, Fig. 6).

3 Hansen 2016.

4 Ialongo – Lago 2021 with further literature.

5 Chapman 2000; Chapman – Gaydarska 2007.

6 On this topic see also Brück 2016.

Scrap metal has been found not only in European Bronze and Iron Age hoards but also in Greek and Western Greek sanctuaries since the Geometric period.[7] In most cases, these were votive offerings or cult equipment intentionally manipulated and broken into fragments. The presence of scrap metal in Greek sanctuaries has been interpreted according to the same theories as those applied to the aforementioned hoards.

Among the sanctuaries that have yielded a large number of bronze fragments is that of Olympia, which was one of the most important in the Greek world, whose archaeological excavations began in 1875.[8]

The evidence of fragmented bronze votive offerings from the sanctuary of Olympia was first identified by A. Furtwängler during the excavation in the 'black layer' around the Pelopion at the end of the 19th century. The 'black layer' was spread in the north-western portion of the Altis and was the result of from the dismantling of the ash altar dedicated to Zeus, which occurred around 700 B.C. It contained ashes, bones, pottery and numerous bronze votive offerings from the late 11th century B.C. (Protogeometric period) to the early 6th century B.C. Among the bronzes were fragments of tripods, which A. Furtwängler had already recognised as a material class with a high fragmentation rate.[9]

In the following decades, other scholars also emphasised the phenomenon of the deliberate destruction of bronze votive offerings.[10] Among the various hypotheses put forth, that of H. Kyrieleis is worthy of particular attention. He interpreted the deliberately damaged votive offerings that were found during his investigation in the Pelopion area as intentionally preserved parts (*pars pro toto*) of votive offerings that were intended for recasting. The preserved fragments were then re-dedicated according to a policy of the sanctuary administration.[11]

Fig. 2. Cast griffin heads from Archaic cauldrons (Br 2575, B 4278) (after Heilmeyer et al. 2012, Kat. 2/125 –Kat. 2/126).

Fig. 3. Sicilian spearheads (B 358, B 1025, B 1704) (Photo: A. Scarci).

7 Baitinger 2021, 8, 20–21.

8 On the excavation story, see Senff 2022.

9 Furtwängler 1890, 2; Baitinger 2021, 5, 2. On the 'black layer' see Kyrieleis 2006, 27–55 and Barringer 2021, 21–22, 67.

10 Mallwitz 1972, 87; Heilmeyer 1979, 163; Baitinger 2001, 89–90; Frielinghaus 2006; Bocher 2013; Schweizer 2019, 300.

11 Kyrieleis 2006, 95–97; Baitinger 2021, 6; Bocher 2013, 357.

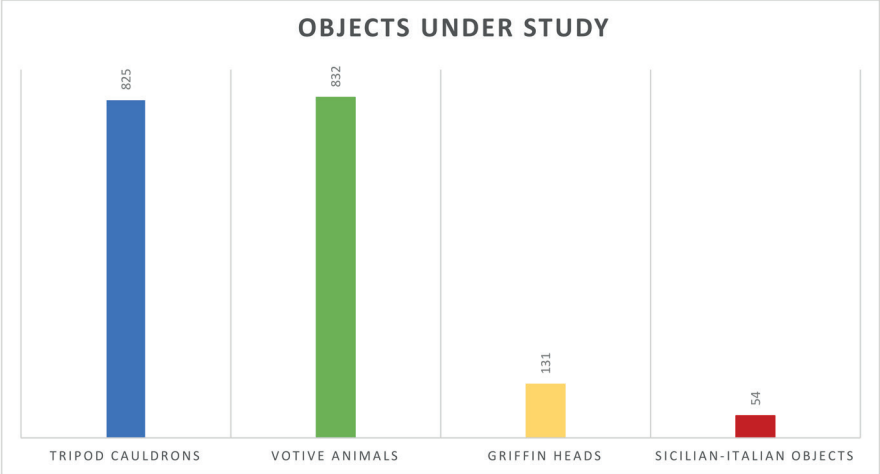

Fig. 4. Objects under study (Graphic: A. Scarci).

Aims and objectives of the project

The project represents the first systematic attempt to investigate the phenomenon of fragmentation in a Greek sanctuary using an approach that takes advantage of material, statistical and spatial analysis. Statistical analysis will allow the processing of large amounts of data in search of common fragmentation patterns, while spatial analysis will provide a better understanding of the distribution of the fragmentation phenomenon and the identification of cluster areas within the sanctuary boundaries.

The choice to investigate this phenomenon in the sanctuary of Olympia rather than at another sanctuary is based on the recognition of Olympia's unique potential. Indeed, the sanctuary has yielded more than 30,000 bronze objects, most of which have already been published. This means that fragmentation patterns can be developed even within individual groups of materials. Moreover, the findspot of each item is known quite precisely, which provides a better insight into the significance of fragmentation through the spatial distribution. The analysis of matching fragments scattered throughout the sanctuary will also be particularly fascinating.

The three-year project does not allow a complete analysis of the more than 30.000 bronze objects found in the sanctuary of Olympia. For that reason, three groups of materials were selected, which fulfil the main criteria of being made of copper alloy and having a high fragmentation rate:

- *Votive offerings from the Geometric period* (bronze tripod cauldrons and votive animals). The tripod cauldrons were chosen because, as A. Furtwängler had already pointed out, their components (legs and handles) were in a highly fragmented state. The votive animals were selected in comparison with the tripod cauldrons in order to verify the existence of similar fragmentation techniques in the Geometric period or to determine whether there were any differences (Fig. 1).
- *Votive offerings from the Archaic period* (cast griffin cauldrons). The group of cast griffin heads, which usually lack ears, tongue or beak, was chosen to extend the research from a diachronic perspective, to see whether other fragmentation patterns occur in the sanctuary of Olympia in the Archaic period than in the Geometric period (Fig. 2).
- *Sicilian–Italic bronzes* (spearheads, cauldron handles and axes). Although fewer in number, these fragments are of particular interest because they allow a direct comparison with the Sicilian-Italic bronzes from Iron Age hoards. By analysing these objects in comparison with

those from Sicilian-Italic hoards, it will be possible to determine whether these objects were brought to Olympia already as fragments or manipulated objects or as whole objects (Fig. 3).

The current number of objects under study is more than 1800, most of which are stored in the Archaeological Museum of Olympia, partly in the National Museum in Athens and in the Antikensammlung in Berlin, where the so-called 'duplicates' are kept (Fig. 4). These groups of material include not only objects in fragments, but also complete objects that have been undergone intentional manipulation (e.g. bending/folding, twisting, etc.) or attempted manipulation (e.g. notches, blow marks, etc.).

The project was split into four phases:

- *Phase 1* (already completed). A four-month phase, conducted at the Leibniz-Zentrum für Archäologie in Mainz, aimed to collate raw data pertaining to the material classes selected for the study. The objects are mostly already published in the *Olympische Forschungen* serie and in the excavation reports *Berichte über die Ausgrabungen in Olympia*. However, the information is not homogeneous, as it was published according to different methods and for different purposes. The objective of this phase was therefore to filter the already published information about the objects for the second phase, namely, the material analysis.

Fig. 5. Several flattenings on a fragment of a massive tripod leg (B 6347) (Photo: A. Scarci).

Fig. 6. Numerous and consecutives U-shaped notches on a bronze spearhead (B 4903) (Photo: A. Scarci).

- *Phase 2* (already completed). The second phase consisted of material analysis. This seven-month phase was carried out mainly at the Archaeological Museum of Olympia, with two short periods spent in Athens and Berlin. During this phase, the analysis was conducted with the support of the conservator Gerhard Stawinoga, an expert in the field of copper-alloy objects and metalwork wear analysis.

  The expertise of a conservator was required to distinguish between traces related to deliberate fragmentation and those resulting from other processes, including production, reworking, post-depositional anthropogenic processes, post-recovery processes (cleaning and restoration), corrosion or modern damage.

  The traces of destruction and manipulation on the objects were analysed using a stereo-microscope and ordinary magnification lenses (10× and 20×), as the traces were sometimes clearly visible to the naked eye. Each trace was then photographed under macroscopy.

Information such as size, weight, number of breakages, type of traces and their location, and other notes on the state of preservation of the object were recorded in Excel tables. Some of this information will be used for statistical analysis planned in the third phase. Where necessary, further data on the object was verified in the inventory books.

- *Phase 3* (ongoing). In the third phase, the data collected during the material analysis will be reviewed and subjected to a range of statistical analyses These will encompass not only weight and lenght but will also involve the computation of the index of deposited metal.[12] This will facilitate the identification of fragmentation patterns.
- *Phase 4.* The fourth phase will include spatial and contextual analyses in order to create a georeferenced mapping of the fragmentation phenomenon in the sanctuary of Olympia, including the distribution of matching fragments.

Preliminary results of material analysis

A microscopic investigation of the artefacts under study has revealed the presence of destruction indicators left by tools.[13] These indicators are mostly attested on all groups of materials, albeit in varying sizes:

Flattening with material displacement. It occurs in the case of an edge-vs-flat collision. The edge consequently deforms plastically under the stress of the impact. The material gets displaced producing flattening. This may be caused by a tool such as a hammer (not just of metal). In the case of Olympia, the flattening is often the outcome of using the surface as a support. Usually, the opposite side of the flattening shows blow marks or notches (Fig. 5).

Notches. They are the results of an edge-vs-edge collision. Notches are deeper than wide and can present either a V or a U shape (vertical or curved). As with other plastic deformations, they suffer a material displacement. They may be caused by the edge of a tool, such as a chisel, or by a bladed weapon (e.g. spear, sword or dagger) (Fig. 6).

Indentations with material displacement. Considered in the same way as notches, indentations are wider than shallow and have a rounded profile. They are caused by the impact of tools with a rounded shape (Fig. 7).

Blow marks. They affect the flat side of an artefact and are not located along the edges as notches or indentations. As the collision occurs over a larger surface area, the force of the impact is distributed more evenly (Fig. 8). This is also a reason why material displacement is less frequent. Rounded or oval blow marks can be attributed to the tips, while the edges of a blade (of a tool or a weapon) probably cause elongated blows.

Bending (also said curvature). It is a form of plastic deformation that occurs when a material is subjected to stress, with ductility responding to the force applied during bending. In the case of the sanctuary of Olympia bending is achieved by both cold mechanical force and, presumably heat (Fig. 9).

Fig. 7. Shallow indentation with material displacement on a massive tripod leg (B 2451) (Photo: A. Scarci).

Breakage (also said fracture). Breakage occurs when the stress on the material exceeds its

12 Gabillot 2004, 194.

13 Concerning terminology see Horn 2013; Gentile – van Gijn 2019; Knight 2021.

Fig. 8. Blow mark on the midrib of a Sicilian-Italic spearhead (Br 5405), just before the breaking point (Photo: A. Scarci).

Fig. 9. Mechanical bending on a tripod leg-plate (B 4264) (Photo: A. Scarci).

Fig. 10. Cast griffin head fragments (Photo: A. Scarci).

ductility. This results in the separation or loss of material, and consequently the breaking of an object into two or more pieces. If an object is broken into more than two pieces, it may be intentional; if a broken object does not suffer the detachment of pieces, it is called fissure not fracture. Distinguishing between an object that has been intentionally broken and one that has been broken accidentally can be challenging. However, the presence of marks associated with the breakage, such as tool marks or bending, can provide valuable insight in confirming that the damage is anthropogenic in origin (Fig. 10).

The analysis of the direction of bending (inwards or outwards), the position of notches/indentations, blows, flattening and breaking points is crucial to understand the rationale behind the destruction and dismantling of the objects in Olympia.

The fragmentation of the legs and handles of the tripod cauldrons, as well as the griffin heads, not only indicates that the objects were deliberately fragmented, but also provides evidence that they were initially dismantled from the cauldron. tThis is the initial step required to destroy complex artefacts. These cauldron parts were dismantled according to recurring patterns, which were identified through the material analysis. The majority of the observed damage is in the form of bending and loosening marks, which were caused by the application of force in multiple directions using a range of tools and mechanical movements. For instance, the fastening plates of the tripod legs and handles display evidence of bending and fracturing (Fig. 9, Figs 11–12). The cast griffin heads, on the other hand, show dismantling marks on the fastening ring (Fig. 13).

Once the artefacts were dismantled, further manipulations as fragmentation were carried out. At this stage of the project, it is not yet possible to precisely define when the dismantling of the tripod legs and handles and the griffin heads from their cauldrons occurred (already in the Geometric Period for the tripod cauldrons? In the Archaic Period or even

later?). The application of statistical and spatial analyses will facilitate a more precise definition.

In contrast, forty-four Sicilian-Italic spearheads (comprising fourteen complete examples or almost complete and thirty fragments),[14] some of them with two typical holes at the bottom of the blade (Fig. 3), exhibit a distinct destruction pattern from tripod and griffin cauldrons. These spearheads find comparison with those from the Bronze Age and Iron Age in the Southern Italian and Sicilian hoards.[15]

Such spearheads are quite rare in the sanctuaries and in the settlements of southern Italy,[16] making the finds at Olympia significant. Whether the spearheads arrived at Olympia whole or as fragments, potentially as scrap metal or with a pre-monetary value or a votive meaning, remains an open question. The material analysis has confirmed that there are similarities between the specimens from the Sicilian hoards and those found in Olympia. As previously observed by R. M. Albanese Procelli, the spearheads from the hoard of Mendolito di Adrano in eastern Sicily have unsharpened and thick edges, as well as blow marks on the midrib just close to the breaking point.[17] In the view of R. M. Albanese Procelli and H. Baitinger, the thick edges and the short socket indicate that these spearheads were not intended for use but were instead tokens used for votive purposes.[18] The spearheads from the sanctuary of Olympia show the same characteristics as those the hoard of Mendolito di Adrano. The majority displays unsharpened and thick edges, and in some cases there are blow marks on the midrib just before the breaking point (Fig. 8). Further usewears as notches were identified on the edges of the blades. However, it is challenging to distinguish whether these marks are the consequence

Fig. 11. Outward bending of a tripod handle plate (B 5033) (Photos: A. Scarci).

Fig. 12. Loosening marks on the bracket and the fastening plate of a tripod handle (B 5672) (Photos: A. Scarci).

14 Baitinger 2013, 219–225.

15 Albanese Procelli 1993.

16 For the finds from sanctuaries, see: Scarci 2019; de Cesare 2022, 140, Fig. 2; de Cesare et al. 2022, 173, Fig. 6.3; Tarditi 2022, 75, Fig. 14. For those from settlements, see: Baitinger 2016, 31–33, Pl. 4 with literature; Graells I Fabregat – Scarci 2021, 83–85, with literature.

17 Albanese Procelli 1993, 178, 207.

18 Albanese Procelli 1993, 178, 180; Baitinger 2013, 219.

of combat or if they were the result of deliberate destruction, given that both tools and weapons were used to destroy an object.

Fig. 13. Loosening marks on the fastening ring of a cast griffin head (Br 2575) (Photo: A. Scarci).

The similarity in the fragmentation pattern of the spearheads from the hoard of Mendolito di Adrano and Olympia does not indicate the existence of a 'distinct Sicilian way' of destroying spearheads.[19] Rather, it suggests the presence of a range of skills among craftspeople, including both indigenous people and Greeks. In only two cases is the method of destruction not comparable to that observed in Sicilian and southern Italian hoards. These two spearheads have undergone a transformation whereby the blade has been converted into a type of saw due to the presence of multiple consecutive notches. This particular treatment is currently only documented in Olympia (Fig. 6).[20]

Conclusion

The material analysis has revealed the existence of a precise and quite rational method for dismantling some of the most prestigious bronze votive offerings (tripod cauldrons and griffin cauldrons) from the Geometric and Archaic Period in the sanctuary of Olympia. In the case of the spearheads from southern Italy and Sicily, metalwork wear analysis has revealed similarities in fragmentation with the specimens from the Sicilian hoards. The integration of statistical and spatial analysis will facilitate a more comprehensive understanding of on this complex phenomenon.

A comparison with similar fragmented objects from other sanctuaries in Greece and southern Italy, as well as from Bronze and Iron Age hoards in Europe, will also be of great importance for a more in-depth comprehension of this phenomenon.

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19 Hansen 2016, 199.

20 Baitinger 2013, 223, Figs 102–103.

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