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## **Prehistoric precious metal vessels – a brief synthesis**

by

Barbara ARMBRUSTER, Toulouse

### **Summary**

In the light of the new find from Ebreichsdorf (in this volume), this contribution reconsiders Bronze Age precious metal vessels from Northern, Western and Central Europe. In this article the focus is on gold vessels, only one short mentioning of silver vessels. These luxury and ceremonial objects appear in various shapes and dimensions during the Bronze Age. On the basis of case studies from Spain to Scandinavia, this paper offers an overview of numerous aspects of the precious metal vessels. The find circumstances provide insight into a few burial and numerous hoard contexts. The technical aspects of production concern the tools and the chaîne opératoire, from the ingot to the decorated finished product. This includes, in addition to the shaping by casting or plastic deformation of the body of the vessel, the execution of the decorative patterns as well as techniques for attaching handles. This part of the history of technology is supported by information from experimental archaeology, ethnoarchaeology, textual sources and Medieval and Renaissance representations relating to the manufacture of metal vessels.

Keywords: Bronze Age, fine metal technology, vessels, goldwork, Western Europe

### **Zusammenfassung**

Vor dem Hintergrund des neuen Fundes aus Ebreichsdorf (in diesem Band) werden in diesem Beitrag die bronzezeitlichen Goldgefäße aus Nord-, West- und Mitteleuropa neu untersucht. Diese Luxus- und Zeremonialobjekte treten in der Bronzezeit in verschiedenen Formen und Dimensionen auf. Fallstudien von Spanien bis Skandinavien bieten einen Überblick über zahlreiche Aspekte der Edelmetallgefäße. Die Fundumstände geben Einblick in einige wenige Bestattungs- und zahlreiche Hortkontexte. Die technischen Aspekte der Herstellung betreffen die Werkzeugausstattung und den Herstellungsprozess vom Barren bis zum verzierten Fertigprodukt. Dazu gehören neben der Formgebung durch Gießen oder plastische Verformung des Gefäßkörpers auch die Ausführung der dekorativen Muster sowie Verbundtechniken zur Anbringung von Henkeln. Dieser Teil der Technikgeschichte wird durch Informationen aus der experimentellen Archäologie, der Ethnoarchäologie, mittelalterlichen und renaissancezeitlichen Schriftquellen und ikonographischen Darstellungen zur Herstellung von Metallgefäßen unterstützt.

Stichworte: Bronzezeit, Feinschmiedetechniken, Gefäße, Goldschmiedekunst, West-, Nord- und Mitteleuropa

## Introduction

This paper presents a short synthesis on prehistoric gold and silver vessels and the fine metal working techniques applied in the manufacturing. It is based on case studies from Northern, Western and Central Europe.

Gold vessels occur in a variety of forms, profiles and dimensions, as well as with different decoration that uses similar repeating elements (PINGEL 1998; ARMBRUSTER 2021, 138–147). Some are made of one single piece of metal sheet, whereas others are composed of several elements. In the Bronze Age, these vessels for liquid or dry materials appear in the shape of beakers, bowls, cups, jugs and handled cups. They were rarely used as funerary urns. The history of research on gold vessels in the study area goes back to the 19<sup>th</sup> century (ARMBRUSTER 2012, 371).

The geographical distribution of Bronze Age gold vessels clearly shows a concentration in Southern Scandinavia and Northern Germany (fig. 1), where about 60 specimens were found in Denmark, Northern Germany and Southern Sweden, although there is no evidence of gold extraction in the North (ARMBRUSTER 2012).

## Shapes, contexts and associations

Rarely known from funerary context in the Bell Beaker period and the Early Bronze Age, the large majority of gold vessels comes from Middle and Late Bronze Age hoards, often associated with other gold items.

The earliest gold vessels appear to be beakers with embossed and chased decoration, combining bosses and ribbed patterns on the vessel's body, and a concentric circle at the bottom (fig. 2a). They are attributed to the Bell Beaker period and Early Bronze Age (NEEDHAM et al. 2006). During this period, some handled beakers occur in Britain, Germany and Italy, in particular

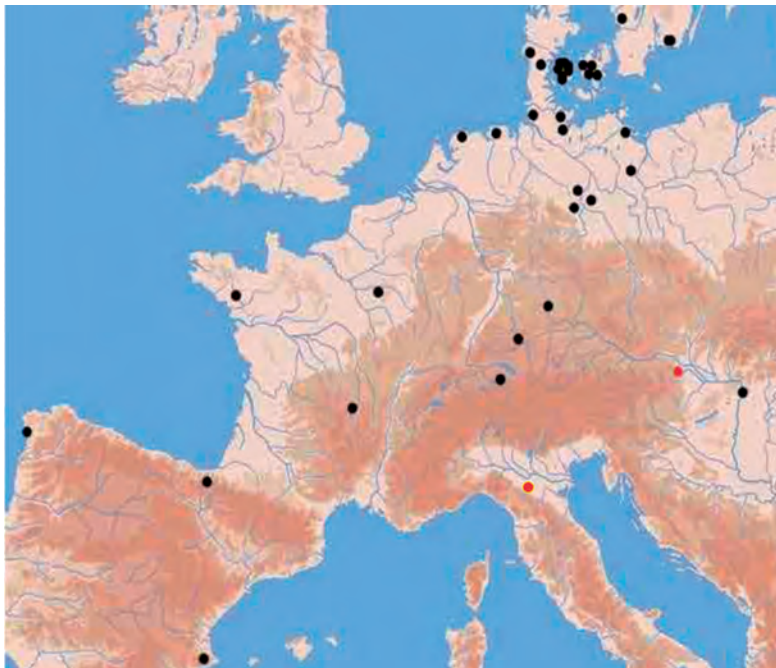


Fig. 1: Distribution map of prehistoric gold vessels (modified after PINGEL 1998).

the British pieces from Rillaton (Cornwall) and Ringlemere (Kent), the German Fritzdorf (Rhineland) and the Italian Montevecchio (Emilia), attesting to mechanical joining of the ribbon-shaped handle by riveting and using washers to strengthen the connection for practical reasons (fig. 2a–e) (SMIRKE 1837; USLAR 1955; NEEDHAM et al. 2006; BERNABÒ BREA et al. 2014). Some bear a simple decoration whereas others are completely covered with horizontal ribs. The cup from the Northern

German Gönnebek tumulus is considered as the oldest vessel from the North, dating to the Montelius period III, found in a rare example of a funerary context (ARMBRUSTER 2012, 400–402, figs. 39–40; 418–419, fig. 50). The shape and decoration of the Gönnebek vessel (Fig. 2e) have a close parallel in the smaller of two cups from the Langendorf hoard, also in Northern Germany. They are so similar that they probably both come from the same workshop.



Fig. 2: Early Bronze Age gold vessels; a) Gölenkamp; b) Rillaton (Cornwall, UK); c) Fritzdorf (Wachtberg, D); d) detail of riveting with washers; e) Gönnebek (Segeberg, D) (© B. Armbruster); f) X-ray image showing hammering marks (© Archäologisches Landesmuseum Schleswig).



Fig. 3: Cups and jugs from the Spanish Villena hoard; a) 5 cups with embossed decoration, concentric circles, radial star motifs, garlands and covered with round bosses; b) detail of bosses (inside); c) detail of bosses with rectified outline (outside); d) gold and silver jugs; detail of the chased decoration seen from the bottom side (© B. Armbruster).

The Late Bronze Age Villena hoard, Spain, is the largest vessel assemblage, containing 11 gold bowls and cups bearing an embossed decoration with ball punches creating bosses, which were arranged in non-figurative motifs, such as concentric circles, radial star patterns and garlands. Furthermore, two gold and three silver jugs belong to the group of vessels (fig. 3a–d). The associated finds encompass 28 bracelets, other decorative gold items and two iron objects. The total weight of the gold objects amounts to about 9 kg, and the silver jugs more than 600 g (SCHÜLE 1976; ARMBRUSTER 2000, 157–163; ARMBRUSTER 2021, 144–147). The largest gold bowl discovered up to now derives from Zürich-Altstetten (Switzerland) and was previously attributed to the Iron Age, but has now been dated to the Late Bronze Age (NAGY 1992). Its decoration bears zoomorphic, sun and moon motifs surrounded by bosses, and it is considered to be related to the Villena hoard.

Assemblages of several vessels at one findspot are quite frequent in the later Bronze Age period: At the top, the Villena hoard comprising 16 items, followed by the Danish Mariesminde hoard that comprises 11 golden handled cups found in a bronze situla, representing the largest vessel assemblage from Scandinavia (fig. 4a–c) (JØRGENSEN – PETERSEN 1998, 100, fig. 73; ARMBRUSTER 2012, 374–376; 418–422, fig. 51). The latter's total gold weight is more than 1 kg. The mixed metal hoard from Unterglauheim, Dillingen, Germany, also offers a combination of bronze and gold vessels (WIRTH 2003). Similar to the Mariesminde situla, its bronze situla was decorated with the sun boat and contained two bronze cauldrons and two gold cups, the latter used as incineration urn. This assemblage is an example of a hoard deposition combined with a funerary context. After the Mariesminde assemblage, the German Eberswalde hoard with its eight objects is another significant vessel ensemble of the North, and stands out with a remarkable quantity and variety of associated gold finds (SCHUCHART 1914). The star or sun depiction on one cup is close to the recently discovered vessel from Ebreichdorf, Austria (BORN et al. 2015, fig. 9,1; SIP 2022).

Like the Villena assemblage, the association of cups and jugs is evident by the Bavarian hoard from Heroldingen, consisting of four gold cups and a biconical jug with a cylindrical neck. The cups and the jug show a clear link to the Nordic vessel production by shape, decoration and technological aspects. This could also be seen as a link to Ebreichsdorf finds.

The heaviest gold hoard known from Western Europe, which dates in the Middle Bronze Age, was found in Caldas de Reyes (Galicia, Spain) (ARMBRUSTER 2021, 139–140, fig. 143). When discovered, the total weight of gold was about 28 kg of which only half remain. Three extraordinary handled cups were associated with heavy annular ornaments, a comb and some sheet fragments. As an exception, the three heavy gold vessels are cast in the lost wax technique and decorated with traced lines, including one with a solar motif on the bottom. Their remarkable weight is due to the manufacturing technique and they are unique in the area of study.

## Function

Various functions can be attributed to the gold vessels, encompassing social, practical and symbolic issues. The vessels might have been used for consumption and feasting, in ritual context for libation, for offering or just for display in a sanctuary. They might have been employed as gifts in a political setting or as objects of exchange. In all cases, they carry a symbolic meaning of power, prestige, status and belief. The display of Bronze Age gold vessels in an exhibition at the Archaeological Museum Schleswig, Germany, presented a golden chalice and a paten as an analogy to ritual vessels used in modern religious ceremonies in the same showcase (BLEILE 2006, 56). Other than in the Eastern Mediterranean or the Near East, the



Fig. 4: a-c) Bronze situla and handled gold cups from the Mariessminde hoard; c) detail of the sun boat on the situla; d-e) gold vessels from the Borgbjerg hoard; e) sun wheel motif, seen from the bottom side of the beaker (© B. Armbruster).

handling of metal vessels is barely transmitted by iconography. A rare case is the handle of the bronze knife from Itzehoe, Northern Germany, which shows a ritual scenario with an adorned woman holding a bowl (JØRGENSEN – PETERSEN 1998, 98, fig. 71).

On the one hand, the decorative programme inherent in gold vessels offers patterns including concentric circles, cruciform, wheel-shaped and radiating motifs, all interpreted as symbolic depictions of the sun. On the other hand, the representation of figurative images, such as horse heads or water birds, is also somehow sun related (KAUL 2003). Solar symbols are most evident on ancient gold work since the “sun discs” from the Early and Middle Bronze



Fig. 5: a–b) Vessels with narrow neck; a) Ville-Neuve Saint Vistre (Marne, F) with embossed decoration detail; c) Heroldingen-Huisheim (Donau-Ries, D); d–e) Kohave (Southern Zealand, DK) with star motif decoration detail (© B. Armbruster).



Age. These motifs are essential attributes of Bronze Age gold work, indicating the worship of the sun. The embossed decoration is realised by chasing and punching with punches and chisels with limited variations in shape, including ball and pointed punches, tracers, corded motifs and concentric circles. Nevertheless, they also appear on other gold ornament categories. Symbolic patterns often appear on the bottom side of the vessel. But curiously, the elaborated bottom only becomes visually perceivable when the vessel is raised in a horizontal position. This kind of schematic or stylised solar representation leads back to the bottoms of Chalcolithic and Bell Beaker pottery in Western Europe.

Particularly interesting is the narrative of the sun wheel on the collar of the bronze amphora from the Mariesminde hoard, Denmark (ARMBRUSTER 2012, 374–376, figs. 4–7). Depicted on the bronze sheet in two dimensions, the sun is represented with spokes, concentric circles and oblique rays, and carried on the sun boat with water bird proteomes (fig. 4a–c). This motif is translated into a three-dimensional version on the beakers from the Danish Borgbjerg gold hoard (fig. 4d–e). The spoked wheel is located on the beaker's bottom, while the oblique sun rays are situated on the inferior part of the biconical vessel's body. The full iconographic pattern is only visible when the beaker is lifted horizontally for dinking or libation. The two Borgbjerg beakers were associated with two large bowls and two cups with horse-headed handles. As for the handled cups from Borgbjerg and Mariesminde, the heavy handles are made of solid bronze, covered with gold wire and sheet to hide the bronze core. The handles are fixed by gold-plated bronze rivets and a bridge. The considerable weight of the solid bronze handles makes the beakers unbalanced.

Sun symbols are furthermore inherent in goldsmith's tools, such as decorative punches bearing concentric circles from the French G n lard and Larnaud metal worker's tool assemblages (ARMBRUSTER 2023, 15–16, figs. 11–12). Concentric circle punch marks appear from Spain to Scandinavia. Microscopic tool mark analyses allow for the identification of tools and techniques applied in vessel manufacturing. In some cases, hypotheses of direct relations between objects or even the identification of specific workshops can be established, as proposed by Partrick Nagy for the large bowl from Z rich-Altstetten, and several Spanish vessels, in gold from the Villena hoard, and in silver from Cuevas de Vinrom  (NAGY 1992; ARMBRUSTER 2021).

### Manufacturing techniques

Except for the handled cups from the Caladas de Reyes assemblage, which were cast in the lost wax process, all Bronze Age gold vessels from the study area are made of sheet metal. Tool marks on gold vessels often display traces of hammering as well as a traced, chased and punched ornamentation (fig. 3b–c). When the work piece has been polished before chasing, the hammering mark disappear on the surface. In this case, X-ray images can reveal these traces (fig. 2f).

Bronze Age metal working tools for shaping techniques, such as hammers, anvils, punches and chisels were made from stone and bronze (ARMBRUSTER 2023). During this period, bronze substituted the lithic implements step by step, as metal is recyclable and easier to work than stone. Organic materials such as antler, bone or hard wood might also have been employed, but did not survive. The use and the handling of stone tools in fine metal working is depicted on the wall paintings of several Egyptian tombs contemporary to the European Bronze Age (mid-3<sup>rd</sup> to mid 2<sup>nd</sup> millennium BCE). Goldsmiths are shown working with active hammer stones and passive lithic anvils (fig. 6a–b).

The manufacturing process of Bronze Age sheet metal vessels by shaping corresponds to the preindustrial descriptions by the Italian Benvenuto Cellini in the 16<sup>th</sup> century CE (FRÖHLICH – FRÖHLICH 1974; ARMBRUSTER 2003). The “*chaîne opératoire*” consists of various steps

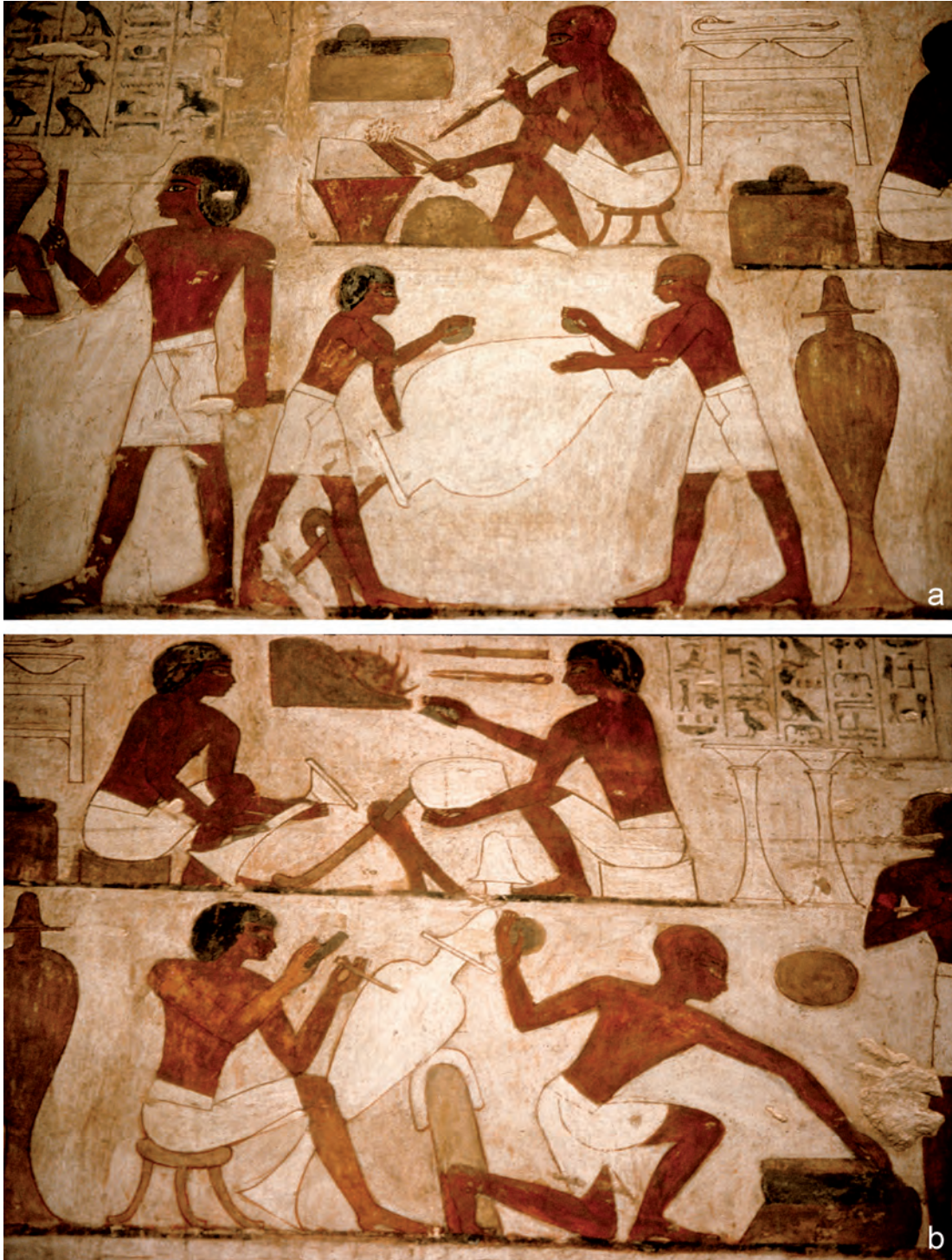


Fig. 6: Sheet vessel manufacturing; Egyptian wall painting of goldsmiths making metal vessels, using stone hammers and snarling irons in bronze for hammering and a punch for chasing, tomb of Rekhmara, Thebes (© B. Armbruster).

of transforming a cast blank into a hollow sheet body by sinking, frequently interrupted by annealing (fig. 7). This kind of vessel production is still used today in non-industrial contexts, as exemplified by traditional artisans in Laos (ANONYMOUS 1999). The complex work comprises the hammering of a blank, the shaping over a snarling iron, the tracing of the decoration outline with a compass, then the chasing and punching of the motifs.

The ornamentation is frequently outlined in a regular and precise delineation. In the case of the Villena cups, concentric circles, star motifs or garlands are so accurate that they might have been pre-traced to prepare the outline of the decoration on the surface available (fig. 3a). The bosses were realised from the inside by a ball punch, but rectified thereafter with a hollow ring-shaped punch from the outside as shown by the tool marks surrounding the bosses' base (fig. 3b–c).

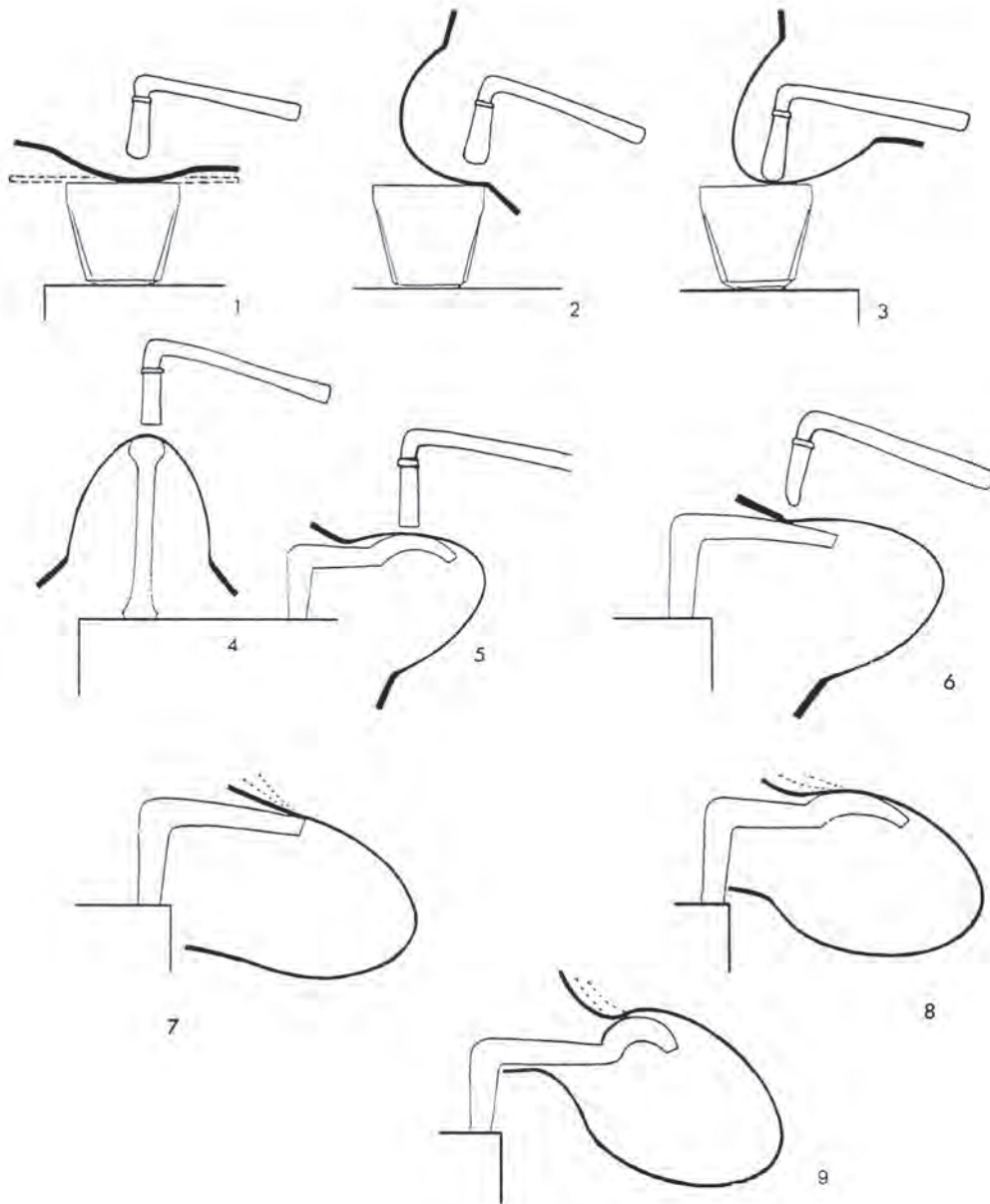


Fig. 7: Operational chain (*chaîne opératoire*) of sheet vessel production. Steps of shaping with anvils and hammers (after FRÖHLICH – FRÖHLICH 1974).

Decorating narrow-necked vessels, as those from the French Middle Bronze Age Ville-neuve-Saint-Vistre hoard or the jugs of the Late Bronze Age Villena assemblage had to be performed entirely from the outside. Practically speaking, the narrow orifice of the jugs does not allow chasing and punching from the inside. This particular technique has already been depicted in an Egyptian tomb from the mid 2<sup>nd</sup> millennium BCE (fig. 6b) and much later described by the German monk Theophilus in his treatise from the 12<sup>th</sup> century CE (BRE-POHL 1987). Technical knowledge in geometry is attested in Late Bronze Age Iberia, when goldsmiths divided the space of a jug's circumference in six parts by using a compass (ARMBRUSTER 2021, 146, fig. 153). The gold and silver jugs from the Villena hoard (Spain) (fig. 3c) were decorated by chasing while the vessel was filled with chaser's pitch. The same technical approach is evident for the vessels with a narrow neck, five jugs, with a biconical body from Denmark and Southern Germany, that are made from one single sheet and decorated with the well-known ornamental canon (fig. 5). As some beakers, cups or jugs cannot stand upright because of the shape of their curved bottom or heavy handles, they must have been held by hand or placed on a support construction.

Besides decorative purposes, punched and chased motifs of sheet metal vessels also have a consolidating function. Furthermore, a compressed edge can be achieved by hammering the rim in order to strengthen the orifice of the vessel.

### Conclusion and outlook

During the Early Bronze Age in Western, Northern and Central Europe, goldsmiths started to develop the skills to produce embossed sheet metal work and three dimensional, hollow and voluminous sheet metal bodies of light weight. The gold vessel technology appeared first with beakers on the continent and reached a high craft level already during the Early Bronze Age in Britain, Germany and Italy with handled beakers. Masters of their art, the artisans refined their skills and advanced in elaborate design and technology through time.

The largest number of gold vessels is known from the Later Nordic Bronze Age, with about 60 specimens including some hoards with multiple vessels. It is remarkable that there is no evidence of local gold extraction in the North during the Bronze Age. The Spanish Villena hoard represents a major assemblage of Bronze Age precious metal vessels at one single find spot, containing 16 vessels.

Bronze Age fine metal working tools used for shaping techniques were made from stone or bronze and from organic materials. Except for metal tongs and instruments in organic materials, a large variety of specialised tools in stone and bronze is quite well known from the archaeological evidence in Europe, including the Atlantic and the Nordic Bronze Age.

Future diachronic and interdisciplinary studies should imply archaeometry with modern analytical and imagery methods, and compare Nordic, Western and Central European gold vessels with those from Eastern Europe, the Mediterranean and the Near East.

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