

Fine metal work from the Early Bronze Age Maikop kurgan, Kuban region, northern Caucasus (Russia)

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Abstract: This paper deals with fine metal work from the primary burial of the large Early Bronze Age Maikop (Oshad) kurgan, northern Caucasus (Russia), discovered at the end of the 19th century. More precisely, it focuses on the technological aspects of the unique precious metal assemblage from Maikop, dated to the second half of the 4th millennium BC. The grave goods include thousands of gold and silver items, representing various functional categories, specific shapes and decorations. These artefacts comprise prestigious table ware and drinking tubes, as well as personal ornaments, among them series of appliqués to be sewn onto garments and a remarkable variety and quantity of beads, likely arranged in strings and worn as necklaces. The elaborate fine metalwork will be approached by tool mark analyses, form and function, and analogies to draw a picture of the know-how of Early Bronze Age goldsmiths in the Caucasus.

Keywords: Caucasus, Early Bronze Age, gold and silver working, Maikop culture, ornaments, Russia, vessels.

Résumé : Cet article traite des objets en métaux précieux provenant de la tombe primaire du grand kourgane de Maikop (Oshad) dans le nord du Caucase (Russie), datant de l'âge du Bronze ancien, découverte à la fin du XIX^e siècle. Plus précisément, il se concentre sur les aspects technologiques de l'ensemble de Maikop, daté de la seconde moitié du IV^e millénaire avant J.-C. Les biens funéraires consistent en des milliers d'objets en or et en argent, représentant diverses catégories fonctionnelles, des formes spécifiques et des décorations. Ces objets comprennent de la vaisselle de prestige et des tubes à boire, ainsi que des parures, notamment des séries d'appliqués à coudre sur les vêtements et de nombreuses perles de formes variées, très probablement disposées en chaînes et portées en collier. L'orfèvrerie sera abordée par l'analyse des traces d'outils, de la morphologie et de la fonction, et par des analogies afin de dresser un tableau du savoir-faire des orfèvres de l'âge du Bronze ancien dans le Caucase.

Mots clés : Caucase, âge du Bronze ancien, orfèvrerie, culture de Maikop, parure, Russie, vaisselle.

The Early Bronze Age Maikop barrow, located in the Kuban region, northern Caucasus (now part of the Republic of Adygea, Russia), is considered as one of the most outstanding archaeological discoveries in Eurasia and beyond. Revealed at the end of the 19th century, the Oshad kurgan is a large burial mound of more than 11 m in height and about 200 m in diameter. It was excavated by Nikolai Ivanovich Veselovskij (Veselovskij, 1897 [1997]); Piotrovskij, 1998 and 2020). The Maikop complex is today dated to the second half of the 4th millennium BC, and is eponymous with the Early Bronze Age Maikop Culture (Ivanova, 2007; Piotrovskij, 2020). The northern Caucasian Maikop Culture coexists with the Early Bronze Age Kura-Araxes Culture in the southern Caucasus and with the Mesopotamian Uruk period (Hansen, 2014). The material culture excavated in the

Maikop kurgan is particularly rich and is regarded as a unique cultural feature, unmatched in the Early Bronze Age in terms of artistic and symbolic characteristics, quantity and quality.

Thanks to the kind invitation by Jurij Ju. Piotrovskij, the author had the opportunity to examine a significant proportion of the precious metal objects from the Maikop kurgan in the Hermitage collections (Saint Petersburg, Russia), with a particular focus on the manufacturing details and comparisons. Surprisingly, the craftsmanship, techniques and manufacture of the gold and silver artefacts from this northern Caucasus area have, unlike those from other regions, received little scholarly attention.

Recent research, including a reappraisal of old archival data, has provided new insights. In particular, Veselovskij's original excavation reports, which feature early

sketches of the kurgan and a model of the detailed construction plan of the main tripartite funeral complex comprising three burial chambers (fig. 1), have been reviewed (Piotrovskij, 2020, p. 123, fig. 5, p. 126, fig. 8 and p. 133, fig. 10-11; Piotrovskij, 2021, p. 162, fig. 3, p. 166, fig. 6). These studies have also reviewed the chronology of the Maikop kurgan based on ^{14}C dating, examined its contextual setting and burial rituals, and updated the bibliographical outline (Piotrovskij, 2020 and 2021). The material culture is related to contemporaneous archaeological assemblages (Hansen, 2009, p. 31–33; and 2014; Ivanova, 2012; Piotrovskij, 2021). The precious metal objects, which are the main concern of this paper, are re-examined within their archaeological context and compared with similar finds, in particular in Eastern Europe and the Near East (Piotrovskij 1998, 2003, 2020 and 2021).

The main burial includes three individuals placed in

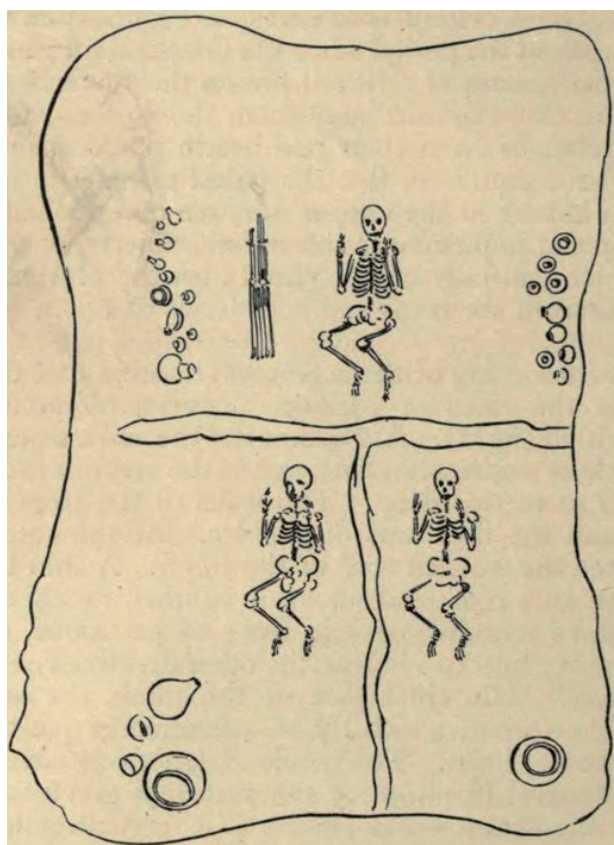


Fig. 1 – Plan of the Maikop burial (Rostovtzeff, 1922, fig. 1, via archive.org).

separate but adjacent chambers: the primary male (skeleton 1) in the large chamber, and two companions, presumably a man and a woman (skeletons 2 and 3) in two smaller compartments. The kurgan contained a significant quantity of metal finds, including about 3 kg of gold and 5 kg of silver, with items such as sheet vessels, personal ornaments comprising strings of innumerable beads and arrangements of figured gold appliqué, as well as solid cast figurines with related tubular sticks. Moreover, weapons, tools, vessels and cauldrons made of arseni-

cal copper, stone and pottery vessels, as well as a large number of carnelian and turquoise beads, were part of the Maikop grave goods. Notably, remnants of red pigment were found covering the interior of the grave, including



Fig 2 – a-d Massive silver and gold bull figurines originally fixed on hollow silver and gold rods, height c. 80 mm (© B. Armbruster)

the skeletons. Often interpreted as red ochre or cinnabar, it was shown quite early on that this substance is an inorganic compound known as red lead, a lead oxide with the formula Pb_3O_4 (Ivanova, 2012, p. 4–5).

In Chalcolithic and Bronze Age cultures gold and silver objects were symbols of holiness, belief and, by extension, power and prestige (Benzel, 2016). The sun- and moon-like colours, the pure and shiny qualities, and the unique material properties of silver and gold imbued these rare precious metals with sacred characteristics linked to eternity, ritual and the divine.

ANIMAL STYLE IN GOLD AND SILVER ARTEFACTS

The outstanding characteristic of the Maikop gold and silver assemblage is the local figurative animal style, which appears in various forms, both conceptually and through the choice of manufacturing techniques. On the one hand, it is embodied in individual animal representations, such as the three-dimensional bull figurines made of solid gold and silver (fig. 2a-b). These figures show highly naturalistic depictions, even in detailed anatomical features, such as the separation line on the hooves of cloven-hoofed animals (fig. 2c-d). On the other hand, zoomorphic representations are personified in hollow gold sheet appliques featuring lions and bulls in complete lateral view, created in low-relief plastic work (fig. 3). Finally, two silver vessels bear traced depictions of animal friezes (figs. 5a and 6-8). In this case, linear images conceived as drawings in a two-dimensional format are

realised on the convex surface of three-dimensional sheet metal bodies (fig. 4a).

The zoomorphic pictures mirror part of the local fauna at the time (Uerpmann and Uerpmann, 2010). Accordingly, the array of depiction panels encompasses various animal species (figs. 2-3 and 5a-7): predatory cats, including lions and cheetahs, bulls, wild goats, boars, horses, water birds and birds of prey (fig. 6-8). In addition, a bear standing on its hind legs is displayed with a tree resembling a palm and a landscape sketch featuring mountain ridges (fig. 8b-e). Maikop tableware, including these two decorated silver vessels with animal processions, was introduced early on, providing the first detailed graphic representation of the illustrative friezes (figs. 5a, 6 and 8) (Smirnov, 1909, pl. 2).

Recently, the significance of lion depictions in Maikop and beyond has been analysed for its symbolic meaning and set into its socio-historical context, related, amongst other things, to feline representations in Near Eastern art (Hansen, 2020a, p. 280–283 and 2020b). Emblematically, the lion, as a predator, represents strength, aristocratic status and power. It is particularly emphasised in Maikop through the multiplicity of 70 lion appliques (fig. 3) associated with the richly equipped individual (skeleton 1).

Furthermore, the solid bull figurines and the numerous bull-shaped sheet appliques from Maikop evoke the worship of the bull in Eurasia. The bull cult can be traced back to previous traditions, from Paleolithic to Neolithic depictions (Calegari, 1988; Francfort, 2021). Despite the large chronological gap, the Early Bronze Age Maikop animal style might have been a prototype for much later Iron Age zoomorphic images in Scythian, Samaritan or Celtic arts.



Fig. 3 – Lion shaped appliques worked using dies with perforations for sewing onto garments. Remains of red lead oxide covering the skeleton (© B. Armbruster)



Fig. 4 – Doubled sheet rosettes, sheet work, cut contours, relief, perforations pushed through with a conical point (© B. Armbruster).

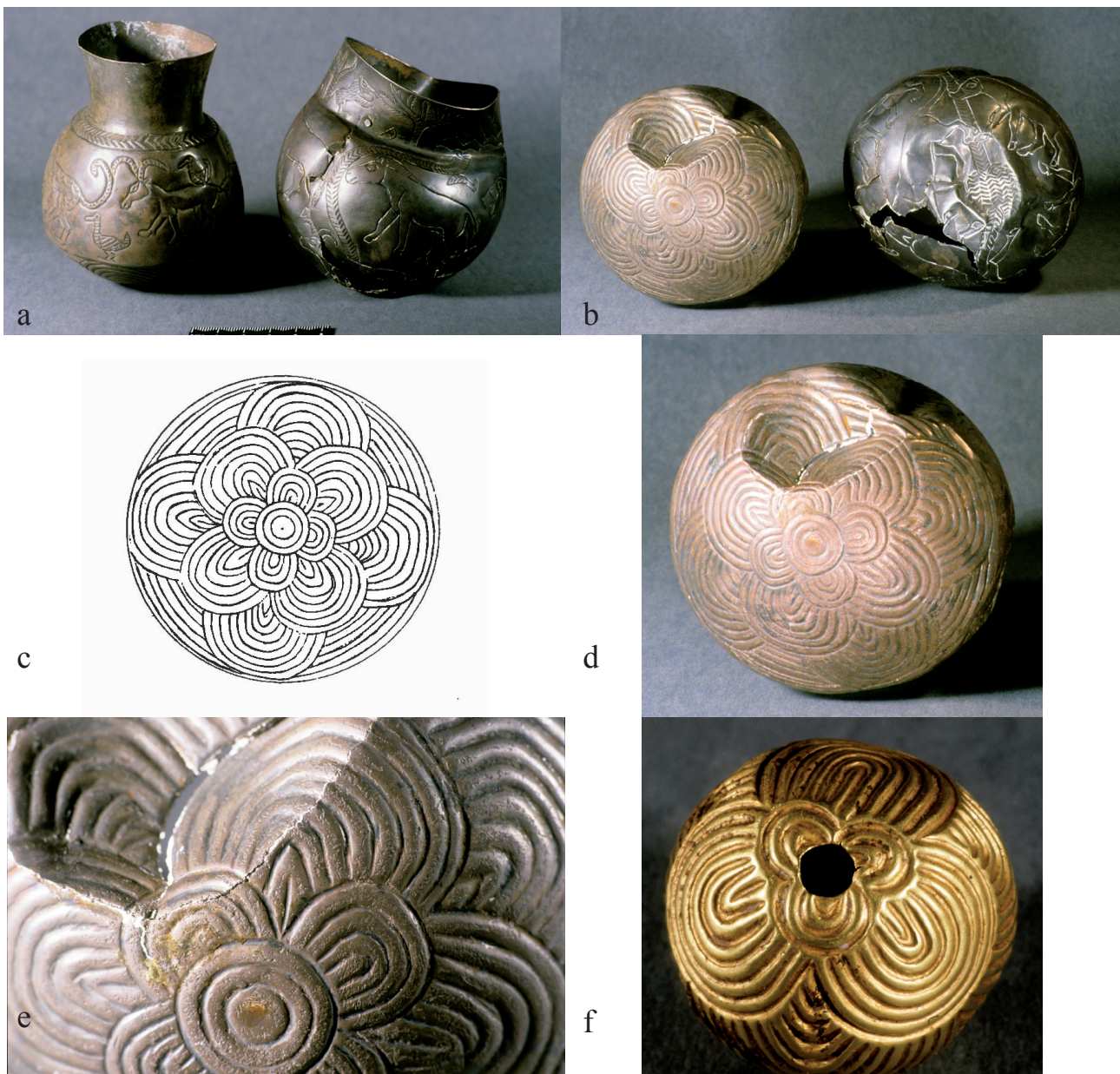


Fig. 5 – Silver sheet vessels with chased animal processions, one with landscape on the base, the other with rosette comparable with the much smaller rosette from a sheet bead (a-b, d-f: © B. Armbruster; c: drawing Smirnov, 1909, pl. 2, 10).

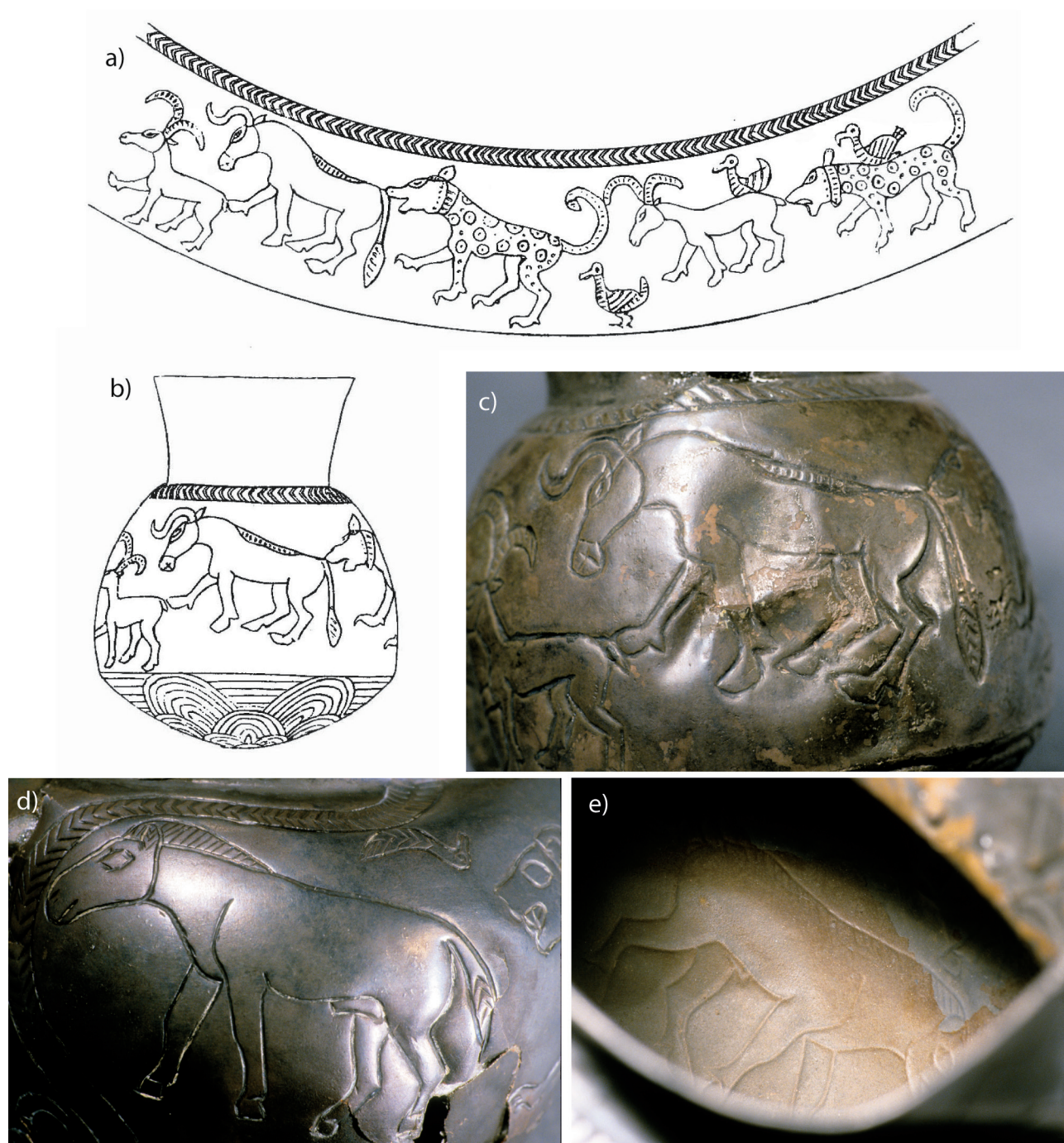
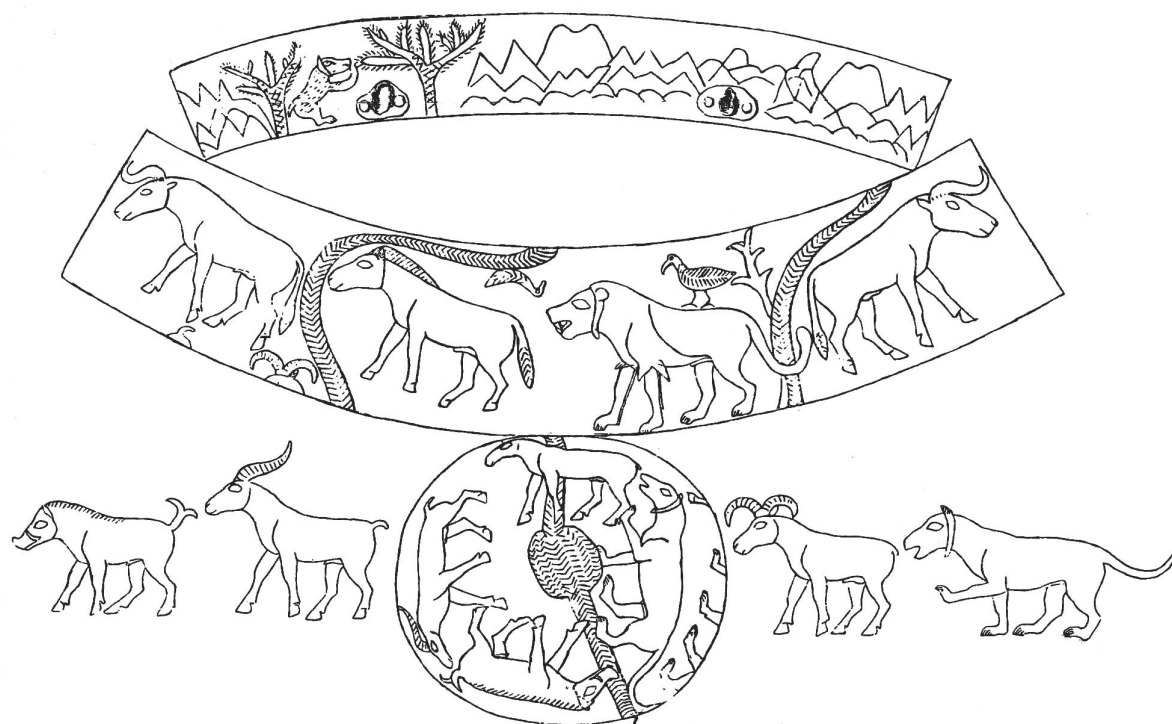


Fig. 6 – a: Animal procession's graphic unwinding and b: drawing of rosette vessel, detail of linear chasing; c: bull; d: horse, incised lines outside (landscape vessel); e: tool marks inside (a-b: drawings Smirnov, 1909, ll. 2, 10; c-e © B. Armbruster).



Fig. 7 – Predatory cats, water birds and birds of prey (© B. Armbruster).



a



b



c



d



e

Fig. 8 – a: Unwinding landscape vessel; b-c: Zickzack – chased and traced depiction of three mountain ridges outside and inside; d-e: “bear with palm tree”, outside and inside (a: drawings Smirnov, 1909, pl. 2, 11; b-d: © B. Armbruster).

COMPARATIVE TECHNICAL CHARACTERISTICS AT THE INCEPTION OF GOLD METALLURGY

The Maikop precious metal collection has occasionally been mentioned in connection with other early fine metal arts and crafts, notably the earlier so-called “first gold of Mankind” from the Chalcolithic Varna necropolis (Bulgaria, mid-5th millennium BC; Ivanov, 1988), and the later Mesopotamian gold and silver work from the royal necropolis of Ur (Iraq, mid-3rd millennium BC; Zettler and Horne, 1998). However, while there are some similarities, the Maikop assemblage stands apart due to its own specific and unparalleled local metal production.

Technically, the Varna gold is largely based on casting, particularly lost-wax casting (for beads, thin two-dimensional plates and hollow three-dimensional objects such as arm rings), and on hammered rods for penannular or cylindrical beads (Leusch et al., 2015, p. 356–358). To a lesser extent, it includes thin sheet work manufactured by plastic shaping (e.g. appliquéés and sheet fittings for bows or sceptres; Leusch et al., 2015, figs. 8 and 14). In comparison, hammered, die-shaped and chased sheet work predominates in the Maikop fine metalwork.

The serial production of beads and appliquéés is a notable common feature in early fine metalworking. The beginning of serial fine metal production dates back to the Chalcolithic Varna necropolis, where large quantities of beads in various shapes and minor series of appliquéés appear in rich grave assemblages (Leusch et al., 2014, fig. 7; Leusch, 2019, p. 62–71). Bead series also occur in other Chalcolithic sites, such as Durankulac, Bulgaria (Avramova, 2002, diagram 24, p. 202; Leusch, 2019, p. 63–65). Chalcolithic and Early Bronze Age gold and silver bead necklaces share the serial manufacturing concept with contemporary and earlier strings made of organic materials such as shell and bone, or inorganic stones, which predate the rise of metallurgy (Bonsall et al., 2017; Baysal, 2019).

Regarding serial production, the three mentioned archaeological sites of Varna, Maikop and Ur share the creation of metal beads, occasionally combined with coloured stone beads. The open ring-shaped beads from Varna have been compared to similar beads from the Maikop kurgan. Another common feature is the depiction of bulls and lions, though in Ur these appear as figurines. The Mesopotamian zoomorphic repertoire is extended by ram statues. However, the ring-shaped beads are in fact penannular, thus open ring beads made from hammered gold rods with rectangular cross section. These rods were wound around a cylindrical core to create a cylindrical spiral, which each ring was then individually cut off (Echt et al., 1991, p. 650–651; Leusch et al., 2014, fig. 9). This technique differs from the Maikop annular ring beads, which are closed disc rings (fig. 9a and c). Piotrovskij mentions comparable closed-ring beads from various other find spots (Piotrovskij, 2020, p. 137). In addition, Maikop offers series of appliquéés, as personal ornaments sewn onto garments, which are similar

to those found in the Varna grave goods, though their production is less significant.

In contrast, both Maikop and Ur have a common ground in the production of sheet vessels in gold and silver. For other associated functional categories of gold and silver artefacts, however, Varna, Maikop and Ur differ significantly in terms of morphology and fine metalworking practices (Leusch et al., 2014; Leusch et al., 2015; Armbruster, 2016; Alarcon et al., 2018).

TECHNOLOGICAL ASPECTS OF MAIKOP FINE METAL WORKING

The object groups from Maikop show basic fine metal manufacturing techniques well known from early gold metallurgy. However, considering the chronological context, they are applied in a sophisticated way. Tool mark analyses and surface topography of the objects enable a technical interpretation of their manufacture, use, and damage or recycling, along with deductions about the technical skills, tools and materials required for their creation. The technical repertoire of the Maikop material covers heat-involving processes such as melting, alloying, ingot casting, lost-wax casting and annealing. Cold-working techniques primarily involve plastic shaping methods such as hammering sheet products, vessel sinking, die forming, doming, and chasing to shape and decorate beads, appliquéés, and vessels. Piercing with a conical point and cutting edges from sheet metal using a chisel are also part of plastic shaping. In these processes, the mechanical stress applied with the point or chisel exceeds the elasticity breaking point of the sheet metal, resulting in holes or severed edges. Joining techniques observed include riveting sheet metal (vessels; fig. 13d; 14b-c), plugging hollow figurines onto cylindrical rods, stitching elements together (rosettes; fig. 4) or onto a garment (appliquéés; fig. 3), and finally stringing bead necklaces (fig. 9-11).

How can we imagine the fine metalworking craft, workshop equipment and organisation in the 4th millennium BC? Regrettably, Early Bronze Age goldsmiths' workshop structures are absent in the archaeological record and fine metalworking tools are seldom found. Therefore, the means of gold and silver production are poorly studied for the region. However, a glimpse into the toolset of Bronze Age fine metalworkers in Western Europe, where a large range of instruments have been preserved, offers useful parallels (Armbruster, 2021, 32-71; Armbruster, 2023; Bouteille and Peake, 2023).

Moreover, ancient iconographic sources from Egyptian tombs, dating to the 3rd and 2nd millennium BC, provide interesting analogies that offer an in-depth insight into the Bronze Age metallurgist's studios, materials, equipment, tool handling and workshop organisation. Fine metal workshops, with craftsmen at work, are depicted in low-relief carvings or coloured wall paintings (Scheel, 1989; Garenne-Marot, 1985; Sales, 2016). In the tomb of

Rekhmire (near Thebes, Egypt, about 1500 BC), fine metalworkers are shown weighing materials with scales and weights, working with variously shaped lithic hammers, adjusted in each case to a specific purpose, and using large passive stone anvils for sheet production. Furthermore, stakes presumably in bronze are used for vessel shaping. The artisans are using furnaces with bellows or blow pipes, forceps, tongs or stones to hold workpieces, as well as punches and a stone hammer for chasing. Besides, ethnoarchaeological reasoning and experimental archaeology provide technical analogies to enhance our understanding of ancient fine metalworking (Armbruster, 2014).

Generally, several tools were essential for Early Bronze Age fine metalworking, including its pyrotechnical processes and cold plastic shaping. Before transforming raw precious metals into objects, measuring tools were required. Balance scales and weights were needed for weighing, and touchstones to assay the quality of gold alloys through a colorimetric test. In addition, metalwork was often prepared and checked through the use of tracers, such as a compass, and a preliminary sketch.

The toolset of Early Bronze Age goldsmiths consisted of various materials, including inorganic stone, copper alloys or technical ceramics, as well as organic materials like antler, bone and hard wood. Utensils made of refractory and tempered clay, such as blow pipes (bellows), fur-

nace linings, crucibles and casting moulds, were crucial for heat-intensive activities like alloying, melting, casting and annealing (Martín-Torres and Rehren, 2014). Stone was a suitable material for casting moulds and percussion tools (hammer and anvil; Ambruster, 2010; Boutoille, 2019), while copper alloys may have been used for tools such as chisels and punches, as well as hammers (Armbruster, 2023). Hard organic materials were likely used for holding the workpiece with tongs, pliers or tweezers. They may also have been employed likewise for dies and punches or other percussion tools (hammer and anvil) for softer plastic shaping.

Decorated silver or gold sheet products with chased motifs were ornamented after forming. This is the case for the decorated beads, appliquéés and vessels found at Maikop. During chasing these hollow sheet items were filled with a chaser's pitch, a mixture of brick dust, pitch, resin or wax, which could be easily liquefied by heat and hardened as it cooled (Corvin 2009).

Sheet work

Gold and silver sheet work is the most significant technical group in the Maikop collection, including smaller items such as beads, appliquéés and elements presumably belonging to a diadem. Moreover, a remarkable set



a



b



c



d

Fig. 9 – Large variety of gold and silver beads – disc-shaped, hollow hemispheric, cylindrical, olive-shaped, spherical with or without chased motifs (© B. Armbruster)

of precious tableware is a part of the sheet assemblage, consisting of larger objects. Ancient sheet production was performed by manual beating, in order to transform an ingot into a thin sheet, and then eventually by hammering to form the object. For this purpose, both active and passive percussion tools made from materials such as stone, copper alloy or organic materials like antler, horn, bone or wood might have been used. Extensive transformation by plastic shaping induces brittleness and hardening in the metal. Therefore, annealing while forming gold or silver was repeatedly required to prevent cracking. Gold annealing, conducted around 700 degrees Celsius, resets the hardened microstructure and restores elasticity, which allows further deformation. Once the sheet metal was prepared, the workpieces' outlines had to be cut out with chisels on a solid surface, or the sheet could be directly hammered into shape, for instance a disc form.

The manufacturing processes of hollow sheet products were three-fold in Maikop. Smaller items, such as the series of hollow appliqués with relief, were made from a single sheet using a negative female die (matrix) and an appropriate male stamp (patrix) or punch, corresponding to the desired shapes of ring, bull or lion (fig. 3). On the other hand, individual chasing was also applied to create relief or linear tracing. For this step, punches, chisels and a type of a chaser's pitch were required (Corvin 2009). In the case of Maikop, individually formed objects, the surface finish of serially shaped sheet reliefs, or the reworking of cast surfaces were carried out by chasing.

Chasing, including repoussé, embossing and tracing, is a form of plastic shaping of thin metal sheet through the creation of relief (Brepohl, 1987, p. 165–168, fig. 59.1; Fröhlich and Fröhlich, 1974, p. 80; Corvin, 2009). In addition to vessel ornamentation, it was also used for the tiniest sheet beads with relief. Chasing requires simple tools, comprising a wide range of punches and chisels made of copper alloy, antler, bone or hardwood. These tools are driven and pushed using a percussive instrument, a hammer of stone, metal or organic materials. While the shaping instruments work on the surface from one side of the sheet, the other side must be rested on a soft support, such as chaser's pitch. In the case of vessel decoration, the container must be filled with chaser's pitch and chasing is executed from the outside. This way of chasing exclusively in repoussé from the front side is depicted in graphic representations of artisans in Egyptian wall paintings (fig. 12b). The same technique is described in detail in ancient literary sources (Brepohl, 1987, p. 166, fig. 58.1; Armbruster, 2024, fig. 6b). For annealing, the chaser's pitch must be removed by heating.

Beads

The most numerous objects are beads, which reflect ingenious creative effort and a significant serial production in Maikop (fig. 9-10). Some beads clearly bear wear marks. Piotrovskij described the bead morphology with

14 variants and reconstructed their spatial distribution in the grave (Piotrovskij, 2020, p. 134, fig. 12; p. 140, fig. 14–15; Piotrovskij, 2021, p. 162, fig. 3). A total of 5,671 gold beads (weighing 1,036 g), 961 silver beads (weighing more than 63 g), 58 turquoise beads and 1,266 carnelian beads were found in relation with the main burial, something without direct parallels found in the Near East (Piotrovskij, 1998, p. 84–90; Piotrovskij, 2021, p. 161). Piotrovskij emphasises the uniqueness of Maikop's diverse bead production. However, he mentions some comparisons for closed, disc-shaped ring beads (Piotrovskij, 2020, p. 136–137).

Beads in gold, silver, turquoise and carnelian were found in all three burials. Nevertheless, the spatial distribution shows a concentration around skeleton 1, in the largest of the three burial chambers (Piotrovskij, 2021, p. 162, fig. 3). Piotrovskij also mentions other parallels, such as the Russian find complex from Staromyshastovsky (Krasnodar region), where over 2,500 beads were found in a lidded silver vessel (Piotrovskij, 2021, p. 163; Korenevskiy, 2016, p. 202 fig. 1,7).

The morphological variety of gold beads is notable, including solid discoid flat beads, hollow discoid sheet beads, hollow hemispherical beads, hollow hemispherical beads mechanically closed with a disc, cylindrical sheet beads, cylindrical beads with enclosed sides, olive- or barrel-shaped beads with chased ornamentation, unornamented spherical beads in various sizes, and spherical beads with notched or chased motifs (figs. 10 and 11; Piotrovskij 1998, p. 85 and 89; Piotrovskij 2020, p. 134, 4–10; p. 140–141, fig. 14 and 15.4). Silver beads are mostly small perforated discs strung together. The numerous disc-shaped beads in gold or silver are actually closed discoid rings, most likely cut from sheets and perforated using a conical point or circular cutter (fig. 9a).

The manufacturing techniques for jointless hollow globular beads made from thin sheets have been investigated and convincingly demonstrated through experimental archaeology, conducted by V. A. Trifonov and N. I. Shishlina for beads from an Early Bronze Age site in the Maikop region (Trifonov and Shishlina, 2019). The authors were able to demonstrate conclusively a purely plastic shaping process from one single piece of gold sheet, starting from a perforated disc and using a doming block, ball punches of various sizes and a percussive instrument to shape a sphere (Trifonov and Shishlina, 2019, fig. 4). They emphasised the necessity of repeated annealing during the process to maintain the malleability of the material. Similar techniques of hammering and chasing are likely used for hollow olive- or barrel-shaped, or even cylindrical, beads with closed sides (fig. 10-11). Detailed X-ray and SEM imaging, as well as metal analysis, may provide further insights into the bead manufacturing process.

Hollow hemispherical beads were more simply made by doming small sheet discs, as evidenced by the folds on the edges of the deepened hemispheres (fig. 9b).

The five larger and individually manufactured beads were laid close to skeleton 1, near the chest or abdomen.



a



b



c



d



e

Fig. 10 – Examples from the large variety of gold beads with chased motifs (© B. Armbruster)

They include three beads with elongated fluting, one large spherical bead with a deeply chased rosette pattern, and one elongated bead with swollen decoration in the centre (fig. 5f; fig. 11a-e; Piotrovskij, 1998, p. 90; Piotrovskij, 2020, p. 134, nos. 1–3). Optical observation revealed that all these beads are jointless, presumably made from a single piece of sheet metal and bearing elaborated decoration, as described above.

The homogeneity of the bead series suggests that initial blanks of identical measurements were cut using the same tool or template. These preconditions made it possible to achieve such uniformity. The elegant appearance

and sophisticated design are largely due to this successful homogenisation and standardisation.

Appliqués

The gold appliqués were found on the body of the main individual (skeleton 1), covering their attire. The inventory, morphology and spatial distribution of these ornamental trimmings in the burial have been recently documented (Piotrovskij, 2021, p. 161–162, fig. 3). The hollow appliqués consist of 33 large lions in lateral view stepping right, 37 smaller lions stepping left (fig. 3), 23 smaller



Fig. 11 – Beads worked individually from one single sheet by sinking and chased, b-c: details of the chased decoration (© B. Armbruster)

appliqués shaped like bulls in lateral view facing right, and 40 ring-shaped elements (Piotrovskij, 1998, p. 90).

These hollow sheet appliqués, all manufactured in series, were shaped in relief using negative dies or swage blocks and positive punches. These tools might have been created in hard organic materials. The appliqués were partially reworked by chasing relief details from the front side. The contours were then carefully cut with a chisel after die shaping, leaving sharp and/or rough edges.

It appears the appliqués were sewn onto garments, as they each bear between 3 and 7 small holes for attachment. The perforations were made by pushing a conical point through the sheet from the reverse, creating a small sharp ridge on the front. While the zoomorphic appliqués are quite naturalistic, 10 stylised rosettes feature more abstract floral designs (fig. 4a-b).

The floral-shaped appliqués are constructed from two superimposed sheets, each with five petals (fig. 4a). The petals were cut from a hammered sheet disc, while the

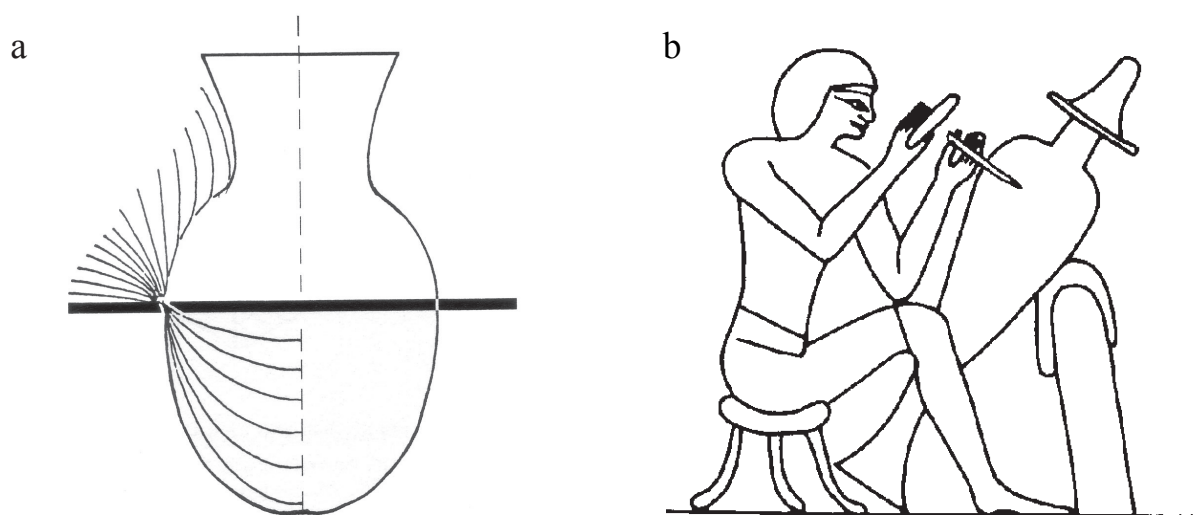


Fig. 12 – a: Complex operational chain of the plastic shaping process – from the cast plate to the hollow sheet body with narrow neck (Fröhlich and Fröhlich, 1974, p. 80); b: Egyptian goldsmith decorating a metal vessel with a metal punch and a stone hammer (Scheel, 1989).

central boss on the upper petal sheet was created with a ball punch. The upper and the lower sheets were pierced four and five times, respectively (fig. 4a-b).

Tableware

Description

The morphology of the precious metal vessels and their spatial distribution has been outlined by Piotrovskij (Piotrovskij, 2021, p. 166, fig. 6). The morphology of several silver and arsenical copper containers from the Maikop kurgan can be compared with ceramics found in the grave, suggesting local production of metal vessels (Piotrovskij, 2020, p. 164–165).

The Maikop assemblage includes two golden containers: a bottle-shaped specimen with an ovoid body, an elongated neck and an embossed rib at the base of the neck (fig. 13a and c); and a small slightly conical bowl (Piotrovskij, 1998, p. 90, nos. 283–284). Three silver vessels are decorated, of which two bear the already mentioned animal friezes. The plain undecorated silver vessels include: a small hemispherical cup, a shallow bowl, a slightly conical cup and several larger pitchers—or vase-shaped containers with globular bodies and narrow necks (Piotrovskij, 2020, p. 153–165; Piotrovskij, 2021, p. 166, fig. 6).

Of the 14 silver vessels, two are enhanced with gold sheet elements attached by riveting, creating a bicoloured effect. One of these is a bicoloured bottle-shaped vessel with an ovoid body, elongated neck and a small omphalos at the base, morphologically similar to the gold bottle. It differs in the collar decoration, featuring a gold sheet ribbon around the neck, situated at its transition to the body and fixed by three gold rivets (fig. 13b and d). The other bicoloured container is smaller, ovoid in shape and with two lateral golden grip plates with suspension system. The grip plates are chased, oval in shape, perforated with two lateral holes

for rivets and a vertical one for suspending the hanging vessel (fig. 14a-b). One of the plain silver vessels, with a globular body and a high cylindrical neck, bears two quadrangular silver suspension grip plates, fixed laterally with four rivets each (fig. 14c and e). Both gold grip plates are chased in relief and perforated vertically once for the suspension and on both sides for attachment with four rivets.

Making and decorating Early Bronze Age precious sheet vessels

The gold and silver sheet vessels from Maikop were all realised by the plastic shaping process of sinking, which corresponds to the detailed descriptions of preindustrial vessel manufacturing by the German monk Theophilus, 12th century AD, and the Italian goldsmith Benvenuto, 16th century AD (Fröhlich and Fröhlich, 1974, p. 80; Brepohl, 1987, p. 165–168, fig. 59.1). The sinking process involves various steps of forming a cast disc-shaped plate using an active hammer and a passive anvil or stake (Armbruster, 2024, p. 22 fig. 7). Sinking differs significantly from modern vessels' manufacture by raising, which is based on shaping of a large and thin sheet of metal (Untracht, 1975, p. 247–252). As with the smaller hammered and chased objects, the successive plastic transformation of a cast disc-shaped blank into a hollow, three-dimensional sheet body, requires frequent annealing (fig. 12a).

The decoration techniques of the Maikop tableware include chasing, which creates a visual relief effect that plays with light and shadow, as well as the bicoloured application of riveted gold sheet elements on silver, creating a bichrome effect. Chasing has been applied in various ways to the precious metal vessels. On the one hand, a single relief rib has been created on the neck of the gold bottle (fig. 13c), while a more complex fluted relief ornament covers the entire body of a fragmented flask-shaped silver container (Piotrovskij, 2020, p. 158 fig. 29, 4). On the other hand, drawing-like incisions have cre-



Fig. 13 – Two bottle-shaped vessels with ovoid body, narrow cylindrical neck, decorative collar and small omphalos bottom, Left: height 136 mm, gold bottle with chased rib; right: height 199 mm, bicoloured silver bottle with gold ribbon collar applied by riveting (© B. Armbruster)

ated animal friezes and a landscape depiction on two silver vessels, one of which also features a rosette motif (fig. 5b right, 8a) while the other displays a landscape at the bottom (fig. 5a left, c-e).

Linear and relief chasing on both vessels and beads was executed using punches and tracers of various shapes, which were struck with a percussion tool such as a handheld cushion stone or a shafted hammer. The hollow space of a sheet container must be filled with chaser's pitch during the chasing process.

Bull figurines Sceptres versus drinking tubes

Four solid bull figurines, two in gold and two in silver in fully plastic design, are provided with a large vertical perforation. This recess was intended for putting the animal on a tubular silver or gold rod (fig. 2; Aruz and Wallenfels 2003; Trifonov et al. 2022, fig. 2-6). Their height is about 80

mm. The small bulls display astonishing anatomical details including specific elaboration of the tail over the backbone and hair at the horns, with special attention to legs, ankles, feet and the characteristic claws of artiodactyls (fig. 2a-d).

The three-dimensional animal figures were cast in the round using the lost-wax technique over a cylindrical core whereby the large tubular perforation was left out during the casting process. The ornamentation was partially completed in the wax model and achieved by casting. However, after polishing the cast surface, parts of the decoration were realised by tracing lines using a tracer punch and a percussive instrument. The finely incised depictions of cattle hair and the separation lines on the bull's hooves are particularly remarkable (fig. 2c-d; Piotrovskij, 2013a, p. 313, fig. 20.15-20.26)

The reconstruction of the primary burial, based on excavation field sketches and an ancient photograph, reveals the position of eight silver tubes, approxi-



Fig. 14 – Ovoid and globular silver vessels, two with riveted gold or silver sheet attachments (© B. Armbruster)

mately one metre long, half of which have gold terminals (Veselovskij, 1897 [1997]; Piotrovskij, 2020, p. 133, fig. 10 and 11; p. 143, fig. 17; Trifonov et al., 2022, figs. 2–6). Previously interpreted as ceremonial sceptres, these tubes were provided with perforated silver tips (Piotrovskij, 2013a, p. 313, fig. 20.17). Four of them were also equipped with bull figurines attached at the top. Today, these objects have been reconsidered and are seen as precious metal drinking tubes. This allows for a comparison with the golden drinking straw and a silver drinking tube found in the royal cemetery of Ur, Mesopotamia, as well as with an illustration on a cylinder seal from Ur representing a

drinking ritual with people sitting around a high vessel and drinking through straws (Trifonov et al., 2022, fig. 7, nos. 1–3).

DARK STONE IMPLEMENTS RELATED TO GOLD

Finally, two dark stone implements, both provided with gold fittings, should be mentioned (Piotrovskij, 2020, p. 149, fig. 22, 2; p. 151, fig. 24, 1; p. 158, fig. 29, 1). One of these, an elongated dark-green stone tool, is described

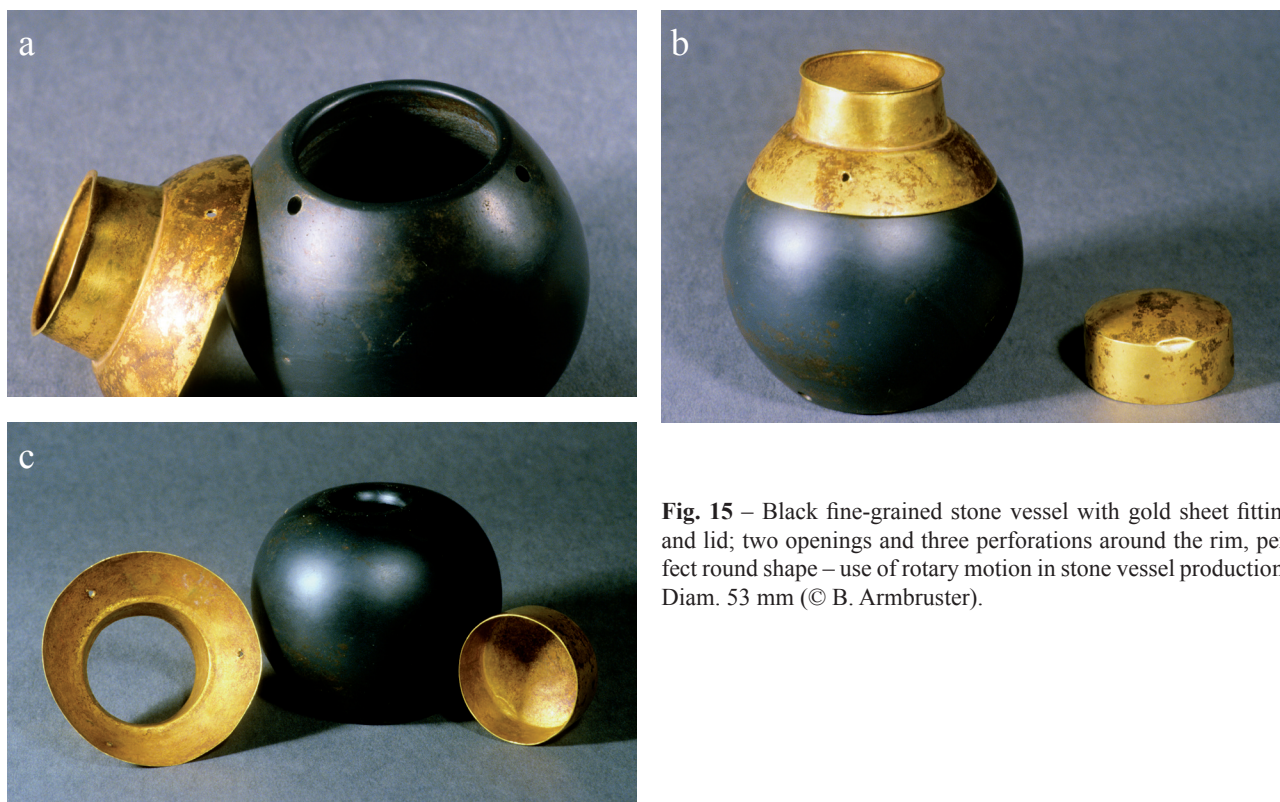


Fig. 15 – Black fine-grained stone vessel with gold sheet fitting and lid; two openings and three perforations around the rim, perfect round shape – use of rotary motion in stone vessel production? Diam. 53 mm (© B. Armbruster).

as a grinding stone with a gold-decorated base (Piotrovskij, 2020, p. 146). However, this narrow and oblong stone plate may actually be a touch stone, an assaying instrument used by goldsmiths (Moore and Oddy, 1985).

The other enigmatic object is a hollow sphere about 53 mm in diameter, made from fine-grained black stone. The hollow stone body is thin-walled and features two openings of different diameters along with three smaller perforations evenly spaced around the rim of the largest hole (fig. 15a). The flawless globular shape, both inside and out, suggests that rotary motion was employed for the creation of this hollow and thin-walled artefact. Its surface is polished to a satin finish, which is evenly executed across the entire piece.

The stone sphere is associated with two gold sheet fittings. One of these is shaped like a cylinder, worked in one piece with an adjacent curved disc that fits perfectly in curvature, with three corresponding perforations matching the upper part of the globular stone body and its opening (fig. 15b-c). The second fitting, a small cylindrical cup, fits snugly as a capsule-shaped seal to the previously described cylinder. Initially, these three pieces were interpreted as components of a lidded stone vessel, but later studies suggested they might form part of a sceptre, resembling battle maces crafted from less prestigious materials (Piotrovskij, 2013b, p. 311, fig. 20.7; Piotrovskij, 2020, p. 158 fig. 29, 1).

FINAL REMARKS

The significant gold and silver found as grave goods in the large Maikop kurgan offer insights into apparently

highly developed local production know-how, a sophisticated art and craft tradition of the 4th millennium BC, in aesthetic, symbolic and technical terms. Moreover, the pieces testify to a high level of fine metalworking technology and expertise, with evidence of serial production in the Early Bronze Age Caucasus. The ancient goldsmiths were skilled in conceiving and manufacturing a large variety of sheet work, including beads, appliques, drinking tubes and vessels, as well as solid cast figurines.

The unparalleled accumulation of wealth in the large Maikop kurgan is outstanding in its extent within early sedentary societies and suggests elaborate burial customs and rituals. Furthermore, it supports the existence of extensive economic and cultural exchanges, facilitating access to considerable quantities of precious materials, including gold, silver, arsenical copper, turquoise and carnelian.

Future detailed material analyses, including trace element and isotopic studies, could help characterise the specifics of these materials and explore their provenance. Archaeometric and comparative studies will further contribute to exploring the contact zones of the Maikop burial mound's occupants and their broader community.

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