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(From the Bronze Age to Late Antiquity)

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Obálka / Cover

Motív „Zázračného dažďa“ zo stĺpa Marka Aurélia v Ríme. V okienku: votívna stéla zobrazujúca Dioskúrov s „bohyňou“ (© Marmaris Museum, Turecko).

Motif of the „Miracle rain“ from the column of Marcus Aurelius in Rome. In the window: votive stele depicted Dioscuri with “goddess” (© Marmaris Museum, Turkey).

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Master and apprentice – some thoughts on Anatolian Chalcolithic and Early Bronze Age metalwork and the many dimensions of communicating skills and expertise[1]

Thomas Zimmermann

"Remember back to your early teachings.
All who gain power are afraid to lose it."

[Sheev Palpatine (Darth Sidious/ "The Emperor")
to Anakin Skywalker]

Keywords: Anatolia, Chalcolithic, Early Bronze Age, metalwork, metalsmiths, burials.

Abstract: *This contribution first challenges the traditional view of a linear, gradually advancing, and unbroken development of metalwork in Anatolia, with the simple mechanical treatment of solid copper as an indispensable precursor for complex extractive metallurgy. The present evidence rather testifies to a "second coming" of metalwork in the second half of the 4th millennium BC, after metallurgical activities remained largely idle after their inception around 5.000 BC. In the second part, phenomena like the absence of founder's burials in Bronze Age Anatolia are reviewed, to deliberate about the communication of skill and knowledge for smelting, casting and refining metal.*

Issues in metal production and consumption in prehistoric Anatolia certainly count amongst the better researched fields on the hot topic agenda of scholars that specialize in later Near Eastern prehistory (see *Pernicka 1990*; *Yalçın 2008*; *Muhly 2011*; *Lehner – Yener 2014*; *Rehren 2020*; *Pernicka 2020* for general overview). Many accounts have been published on a variety of technical aspects, often pointing to the unrivalled excellency of metal workmanship attested in some of the more iconic assemblages manufactured after 3.000 BC, following the beginning of the Anatolian Early Bronze Age. In that context, the (in)glorious "treasure" deposits from Troy (*Treister 2002*; *Sazcı 2007*; for recent discussion see *Bachhuber 2009*), better known as "Priam's treasure", or the funeral inventories from Alaca Höyük, commonly understood as assemblages associated with "Royal Burials" (cf. *Zimmermann 2008* for literature review; *Bachhuber 2011*; *2015*; *Yalçın – Yalçın 2018*) seem to be a convenient backdrop for a legacy of ever-improving expertise and know-how for casting, mending and other specialized treatments. Since its inception, metallurgy would progress on a linear trajectory, to reach its first apogee around 2.500 BC (cf. *Yalçın 2000*; in similar fashion *Yalçın 2003*; *2008*). The actual reality is, however, much more complicated, and will be subject to debate in this contribution. The discussion will mainly dwell on two separate issues (which might be nevertheless interlinked), with first challenging the impression of a steady progress towards 3rd millennium BC technical excellency. The second aspect relates to specific troubles in revealing the metalworker behind the metalwork in Early Bronze Age Anatolia, while the conclusion will contextualize the previous considerations and deliberate on the possible communication of metalworking skills in prehistoric communities.

[1] The manuscript was completed in March 2021; I am indebted to Klára Kuzmová for having patiently awaited the final submission of my contribution. I am likewise grateful to the anonymous reviewers for their immensely valuable suggestions.

Into the great void – the gain, loss and rediscovery of metalworking knowledge in prehistoric Anatolia

On of the most persistent misconceptions in the history of technology is probably the role of Anatolia as the sole cradle of metalwork on a supra-regional scale – a paradigm that was debunked already many decades ago, but recurrently exhumed since the times of Vere Gordon Childe's Marxist reading of the "Urban Revolution" until very recent times (*Childe 1951*, 116–120; *Rosenstock et al. 2016*, 59–61). This assumption owes its persistence partly to the observation that native copper nodules are already deliberately manipulated in Pre-Pottery Neolithic contexts in Central Anatolia and Upper Mesopotamia, which date back to at least the 9th millennium BC. Small knives, tubular and biconical beads and pendants are known from Çayönü (Southeast Turkey) (*Maddin et al. 1999*; *Özdoğan – Özdoğan 1999*) (Fig. 1), while tiny copper beads occur simultaneously at Aşıklı Höyük (Central Turkey; *Esin 1999*; *Yalçın – Pernicka 1999*). The aceramic levels of Nevalı Çori and (chronologically later) Çatalhöyük likewise yielded a few, but nevertheless comparable metal objects (*Hauptmann et al. 1993*, 543–544; *Birch et al. 2013*). All these tiny items were either cold-hammered or annealed, that means heated in (or in proximity of) a campfire to shape them more easily. Due to the lack of comparable evidence from regions other than the Near East, these assemblages were thus deterministically understood as the mandatory prelude that paves the way for "real" metallurgy – smelting the copper from the ore.

The tempting idea to consider cold-smelting and modest pyrotechnological applications like annealing as decisive steps towards extractive metallurgy loses, however, much of its attractiveness (and the label of being an easy, conservative mode of explanation for the Eurasian diffusion of copper metallurgy) when scrutinizing the applied working technologies, especially the annealing issue a little bit more in detail: While repeatedly hitting an object to alter its shape is a rather trivial observation that applies to flintstone flaking and early metalworking alike, the application of heat to shape raw material more easily is a phenomenon that is also well observed with the manufacturing of lithic artefacts (*Nadel 1989*; *Gurova et al. 2020*). Due to thermal treatment, like burying flint nodules in or beneath glowing charcoal overnight improves the workability of flint, and is confirmed through ample archaeological and ethnographical evidence (*Gurova et al. 2020*). This all rather renders the impression of prehistoric, or in our specific case earliest Neolithic communities treating copper nodules like any chunk of random lithic material, not realizing the very different physical qualities of copper or other metals. The relative abundance and easy accessibility of solid copper in the region that is nowadays Turkey might then be, apart from its varying bluish-greenish colour hues, the predominant reason why copper sneaked in as a working material as early as the Pre-Pottery Neolithic B phase in Western Asia. That said; the same reasoning might actually apply to the (few and chronologically later) Malachite and Azurite items from South East European and Balkan contexts (*Rosenstock et al. 2016*, 70–71).

It seems, until further notice, appropriate to disentangle the "experimental" phase of copperworking from the advent of extractive metallurgy in Anatolia on the basis of technological observations. The treatment of copper, and especially the underlying motivation on how to alter the material efficiently is simply too different for both periods to be connected. Needless to say, no communication of knowledge from the Pre-Pottery Neolithic passed -or had to pass- to enable mining, smelting, casting -all together profoundly different approaches to minerals and metals alike- as observed at the decisive stage of metalworking advances.

This breakthrough is obviously reached around 5.000 BC, with tools that were definitely cast, thus manufactured with advanced pyrotechnology to allow for the actual physical process of smelting. After some initial confusion about their actual stratigraphic position and chronological significance (*Schoop 1995*, 115), the axes and tools from Mersin-Yumuktepe, layer 16 are conventionally dated to around 5.000 BC, and generally presented as the earliest evidence

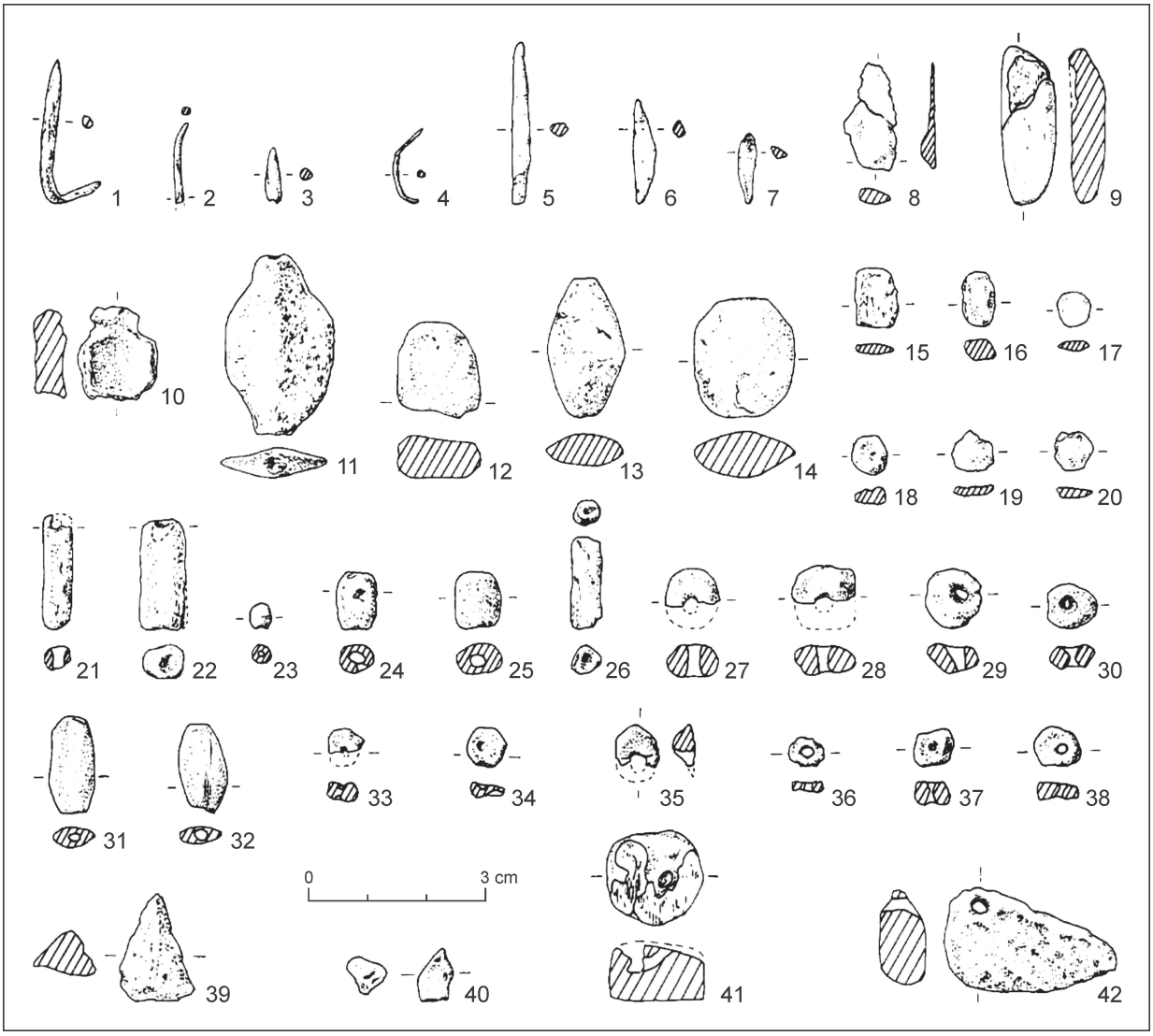

Fig. 1. *Selection of cold and hot-worked copper awls, beads and amorphous pieces from Pre-Pottery Neolithic Çayönü (after Özdoğan/Özdoğan 1999).*

for extractive metalwork in Anatolia (Fig. 2; *Garstang 1953*, 131–144; 132, Fig. 80B; 139, Fig. 85; Pl. XXI: a; *Schoop 1995*, 115–118; *Yalçın 2000*, 19, 22).

On a global or at least Eurasian scale, the beginning of extractive metalwork in Western Asia seems to fit the narrative of the "*ex oriente lux*" paradigm quite well. A closer inspection, however, deprives Anatolia also of its primacy for this particular – and decisive – technological advance. Recent archaeometrical studies of copper-based items from regions as diverse as Serbia and the Southern Levant confirmed their date being contemporary, or even earlier than the copper tools and pins from Yumuktepe: A pin (or awl) from Tell Tsaf (Israel) (*Garfinkel et al. 2014*) and copper beads from Vinča-Belovode (Serbia) (*Radivojevic et al. 2010*) confirm the successful application of cast metal production in the final quarter of the 6th millennium BC, thus predating the "casting cradle" at Mersin-Yumuktepe at most a few hundred years.

For the time being, it seems that we have to come to terms with the notion that there is no single, but multiple centers for early extractive metallurgy (*Rosenstock et al. 2016*, 104–106; *Rehren 2020*, 369), and that metalwork was nudged towards real smelting and casting several times independently in pre- and early history (*Rehren 2020*, 369).

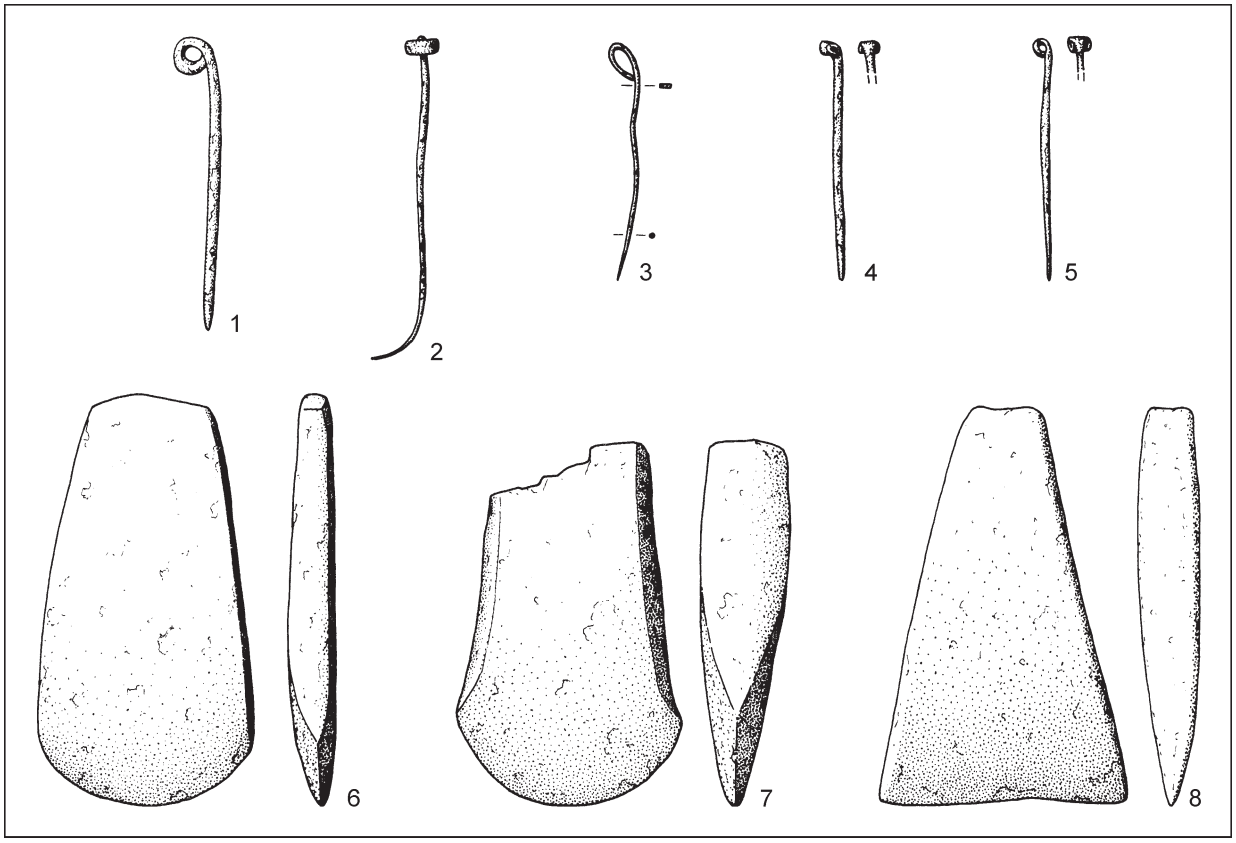

Fig. 2. *Selection of cast copper items Mersin-Yumuktepe (after Schoop 1995).*

Be this as it may; regions where mining, smelting and casting were finally part of a community's technical repertoire would be expected to enhance, refine, and disseminate this crucial knowledge further on. Quite the contrary, that is. Whereas Southeast Europe, and a few centuries later also central Europe, becomes a vibrant arena for metal production and consumption since the later 5th millennium BC, with copious amounts of copper, but also gold being manufactured and circulated (cf. maps in *Rosenstock et al. 2016*, 87, 90–91), Anatolia remains almost completely devoid of any substantial metal produce: Some smelting debris from the processing of copper and eventually lead (galena), roughly contemporary with Yumuktepe, is attested in Eastern Anatolian Tülintepe and Tepecik (*Esin 1986*; *Çukur/Kunç 1989*, 114–115). A crucible and a crude spiral pin from Orman Fıdanlığı (Eskişehir) can allegedly be dated to the late 5th/early 4th millennium BC (*Ay-Efe 2001*, 139; 154 Figs. 105–107; 157, Pl. 3d: e; *Schoop 2005*, 277–278). The exceptional site of Değirmentepe (Malatya), not a local settlement but an Ubaidian, Mesopotamian colony (*Esin 1989*) and eventually specializing in smelting copper ore, would eventually proof the rule; however it seems to be still unclear whether copper ore was processed in larger quantities, or processed at all, at the site, with the large kilns being alternatively interpreted as devices for firing pottery instead (*Yalçın 2000*, 22). Given the abundance of metal and mineral resources in Anatolia (recently *Fidan 2016*), the picture gets even more irritating, since heavy implements like hammer axes, chisels and daggers – showcase items of a flourishing copper industry in the advanced 5th and early 4th millennium BC – are completely absent in Anatolia in this particular period (*Rosenstock et al. 2016*, 92, Fig. 16–17).

It seems that after the technological foundations to allow for large scale production of metalwork were finally laid around 5.000 BC, the necessary steps to preserve, communicate, teach and enhance this specific knowledge were not taken. Metalwork remained awkwardly idle for over a millennium. The question to what exactly triggered this "great void" between roughly

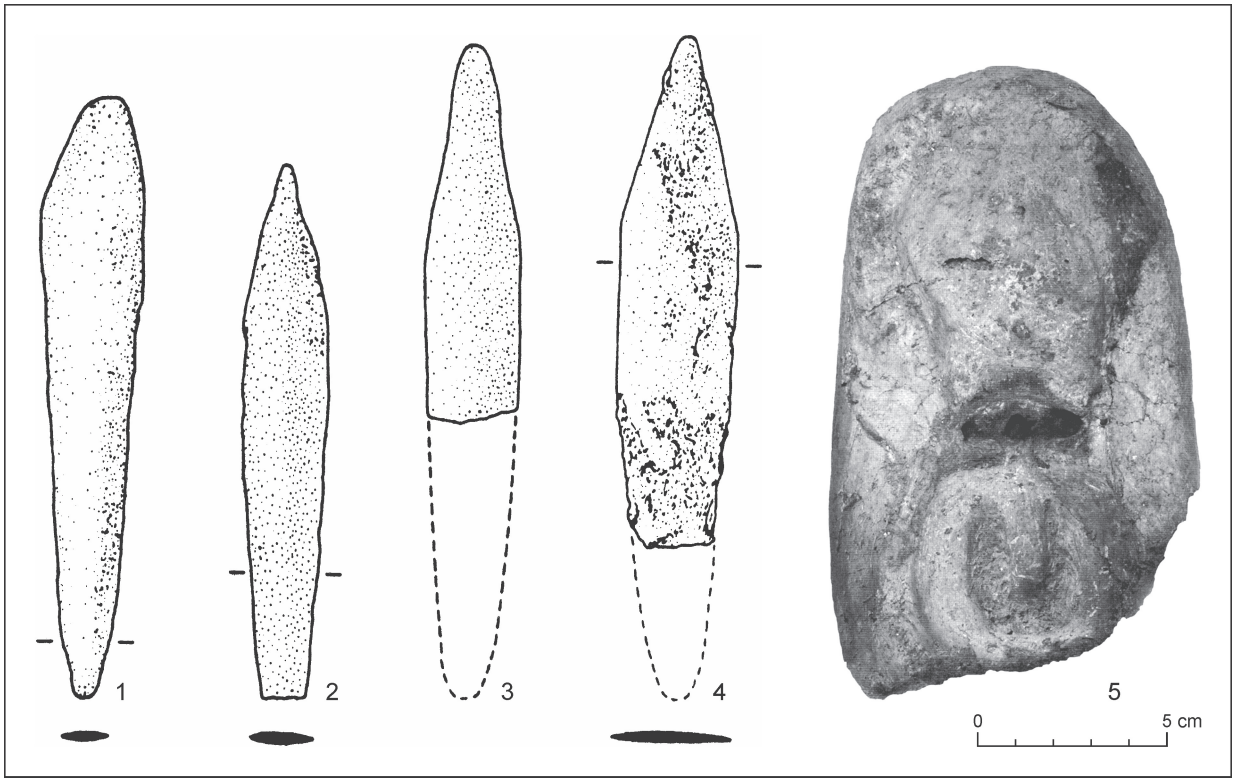

Fig. 3. *1–4 – Arsenical copper daggers from Ilıpınar; 5 – a mould for a ring-shaped idol from Çamlıbel Tarlası (after Roodenberg 2001 and Schoop 2011).*

5.000 and 3.500 BC would be currently akin to fortunetelling. What we do know instead is that after about 3.500 BC, metalworking activities are somehow reinvigorated and gain substantial traction in different parts of Anatolia.

One such hot spot for metalworking on a previously unseen scale is İkiztepe on the Turkish Black Sea coast (*Alkım et al. 1988*; *2003*), a multiperiod site that underwent profound redating in the past years (*Schoop 2005*, 307–314; *Welton 2014*, 396–397; *2017*, 143). Its extensive cemeteries, which yielded the main bulk of metal objects from this site, were conventionally dated by the excavators to the late 3rd millennium BC, a chronological assessment that was, however, repeatedly challenged (*Parzinger 1993*, 237–238; *Thissen 1993*, 215–218; *Zimmermann 2007*). Recent radiometric analysis of the fossil remains confirmed a date in the second half of the 4th (!) millennium BC, therefore pushing the chronological context of the cemetery's core area back about 1.000 years (*Welton 2014*, 396–397; *2017*, 143). The items, especially heavy implements like "chisels" show partly striking similarities with earlier assemblages from the Western Black Sea littoral and the Eastern Balkans, however any immediate interrelation was considered unlikely due to a seemingly large chronological gap (*Lichter 2008*, 188) – a gap that is now much reduced (Fig. 3).

Comparably early material with more sublime, but still visible and tangible Balkan connections is likewise known from the Late Chalcolithic cemetery of Ilıpınar in Western Turkey, dated again to the mid 4th millennium BC (*Roodenberg 2001*, 354). The typology of several arsenical copper daggers from the graveyard seems to clearly betray their Balkan/South East European ancestry, reminiscent of types retrieved from contexts belonging to Tiszapolgár and Bodrogkeresztúr cultural entities (*Zimmermann 2006*, 254–257). Other harbingers of our metallurgical revival in the following 3rd millennium BC are the so-called ring-shaped idols which occur along the Aegean and Black Sea coast and its hinterland, and, dated even earlier, in shape of a casting mould excavated in Çamlıbel Tarlası in central Turkey (Fig. 3; *Schoop 2011*, 59, Fig. 9, 62, 65).

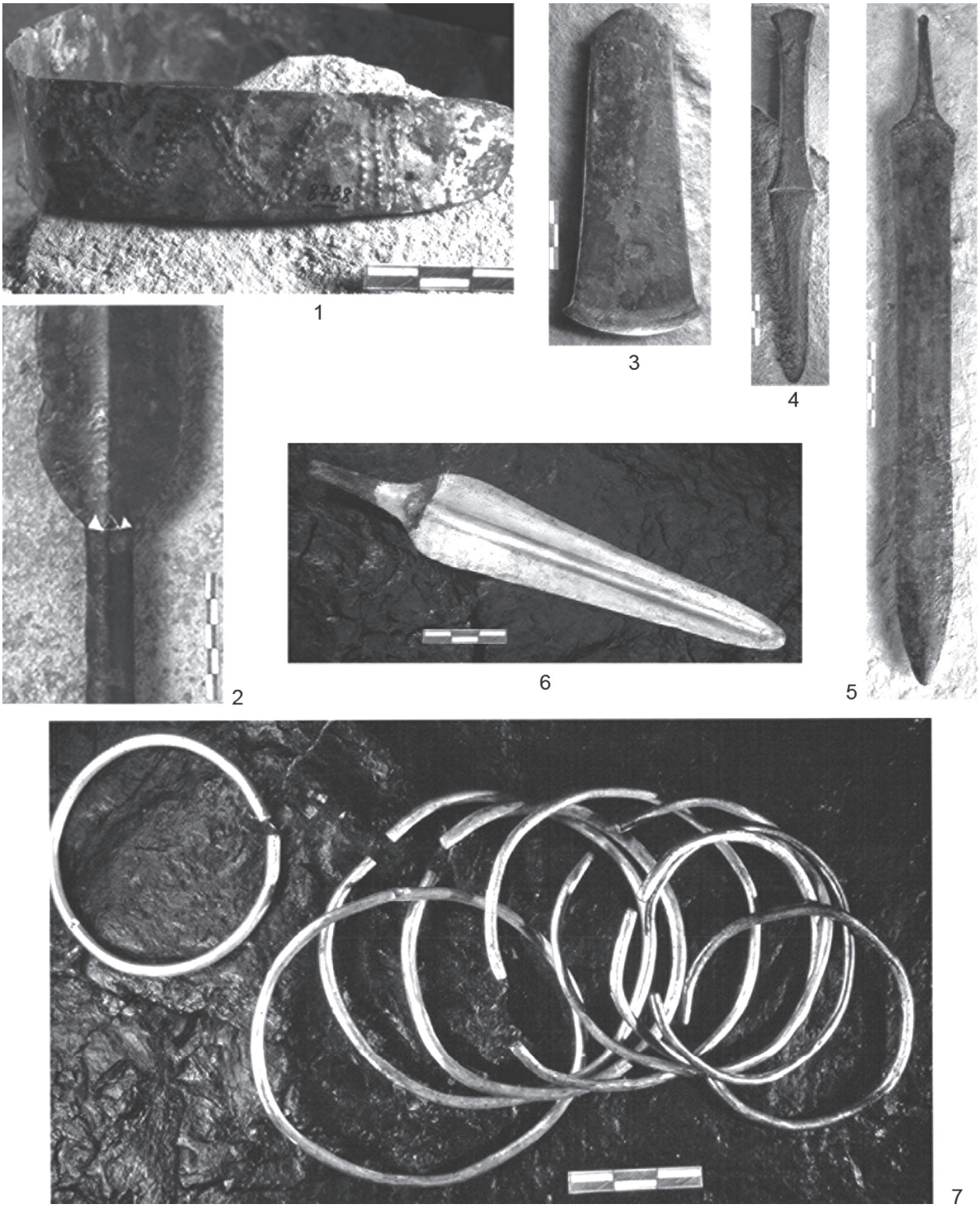

Fig. 4. *Metal objects from the "Royal Tomb" at Arslantepe. Scale not indicated (after Frangipane 2007–2008).*

Much further to the east, we also witness a sudden boom in metal consumption towards the end of the 4th millennium BC, coinciding with the application of advanced casting techniques that appear rather exotic, given the attested metallurgical idleness of Anatolia after 5.000 BC. The cache of early swords, spearheads and spiral appliques (cf. *Palmieri 1981*, 107; *Caneva – Palmieri 1983*; *Frangipane 2019*, 85), and especially the "Royal Tomb" of Arslantepe, with its

"signature" copper-silver alloys and a wide array of metal weapons, vessels and jewellery types (*Frangipane 2001*; *Frangipane et al. 2001*; *Frangipane 2007–2008*), represents together with the more recently researched assemblages from Başur Höyük (*Hassett – Sağlamtimur 2018*) further east in the Upper Tigris valley a new and unprecedented stage of metallurgical skillfulness – a skillfulness eventually triggered by mobile Transcaucasian communities that rekindled the flame of metallurgical craftsmanship, but also disrupted the fine-tuned balance between local and Mesopotamian powers, with violence and human sacrifice in the wake (Fig. 4; *Hassett – Sağlamtimur 2018*).

These examples presented here in brevity are sure enough only single jigsaw pieces belonging to a bigger complex puzzle, but the plot thickens that external impetus from the Balkans a/o the Caucasus, and not internal dynamics, was nudging Anatolia towards a "second coming" of extracting, smelting, casting and refining metal produce in the Anatolian Early Bronze Age. And with its technologies now fully established to allow for complex treatments like plating and granulation, different conundrums appear on the agenda.

The immortal metal smith or: where are the founder's burials?

There is little doubt that advanced metalworking is very much present and alive even the remote corners of Early Bronze Age Anatolia in the 3rd millennium BC. The outstanding gold, silver and bronze assemblages from Troia and Alaca Höyük have been recurrently in the spotlight for many decades as the pinnacle of prehistoric metallurgy in Western Asia (*Tolstikov – Trejster 1996*), however there is ample evidence for considerable metallurgical expertise also exercised in more modest environments than the alleged aforementioned centers of early elites (cf. *Geniş – Zimmermann 2014*). Metallurgical workshops, certainly the pièce de resistance for any excavation of domestic sites, are -although not in abundance- occasionally documented for the 3rd millennium BC in Anatolia. Within the Anatolian Early Bronze Age, well preserved workshop inventories are known from either the advanced or late 3rd millennium (cf. the inventories from EBA III Tarsus-Gözlükule, Arslantepe (Malatya) Troia III (*Müller-Karpe 1994*, 37–38, 41, 43–49; *Nessel 2014*, 210–211) and Kastamonu-Kınık (*Genç 2020*), or from the very beginning of the 3rd millennium BC (Çukuriçi Höyük, cf. *Mehofer 2016*). Given the abundance of metal items retrieved from domestic and especially funeral assemblages, the currently known hotspots for metallurgical activities do merely represent the proverbial tip of the iceberg. Another, but this time geography-related "big void", with no diagnostic remains of Early Bronze Age workshops attested for central Turkey, sure enough owes to the current state of research, and not necessarily to the absence of any founding and casting in the Anatolian highlands (see also *Nessel 2014*, 208).

Another absent feature in the world of smelting and casting is, however, even more intriguing: burials containing metalworking tools or other specific casting equipment are a well-known feature in the funeral culture of prehistoric Europe. In sharp contrast, founders or metalworker's graves seem – until further notice – to be entirely absent in Early Bronze Age Anatolia (recently *Zimmermann 2020*). Inventories like some of the "royal" burials from Alaca were recently suspected to contain also metalworking tools (*Yalçın 2016*), but a rigid inspection of the related materials cast some serious doubt on such an assumption (*Zimmermann 2009*). Other tentative funeral assemblages from Troia containing raw materials for goldsmiths, like the notorious "treasures" that might have been in some cases overseen inhumations or even cremations, are unfortunately too insufficiently documented to allow for such an interpretation (*Zimmermann 2020*).

The fact remains that currently no burial assemblage from Early Bronze Age Anatolia contains casting equipment or semi-finished items that would permit to associate the buried individual with the world of smelting, casting, punching or otherwise refining metal objects. So, how to read all this in the scope of our initial concerns?

Our concise review of metal production and consumption in Anatolia until the end of the 3rd millennium showed that there seems to be no unbroken, linear tradition in communicating metalworking technologies over several centuries, probably not even several generations. Metalwork, performed on a scale that meets the (largely true) cliché of a "metals-make-the-world-go-round" Bronze Age is only visible in Anatolia since the 3rd millennium BC, with an externally triggered revival of extractive metalwork after about 3.500 BC. Since then, and especially from about 3.000 BC onwards, conventional casting applications and more "exotic" traditions like silver-copper alloys, together with more specialized techniques like plating and granulation are distributed over a wider area, stretching from the Western shores of Asia Minor to the highlands of central Anatolia and beyond. The conspicuous absence of individuals adorned by the bereaved as metalworkers might then indeed testify to either a very different approach to the human self and its versatile faculties and social connotations, or, the bequeathing of valuable metalworking toolkits and related objects over countless generations, never destined to end up as history-laden grave gifts for the casting masters. Or, as a third hypothesis: were local metalsmiths who created bulk produce like heavy implements and basic jewellery items just too insignificant to be blessed with paraphernalia of their profession after their death, while highly skilled and meticulously trained experts that created iconic items like the gold jewellery from the Troy treasures, or the theriomorphic standarts from Alaca Höyük were drifting in and out of the Anatolian landscape from unknown origins, only hired on demand?

The present evidence may be still insufficient to better define the metalworker and the modes of trading skill and expertise in 3rd millennium BC Anatolia, but further research especially in the still barely researched buffer zone between the Western Anatolian hinterland and the central Anatolian plateau might shed some more light on metal masters and their apprentices in Early Bronze Age Anatolia.

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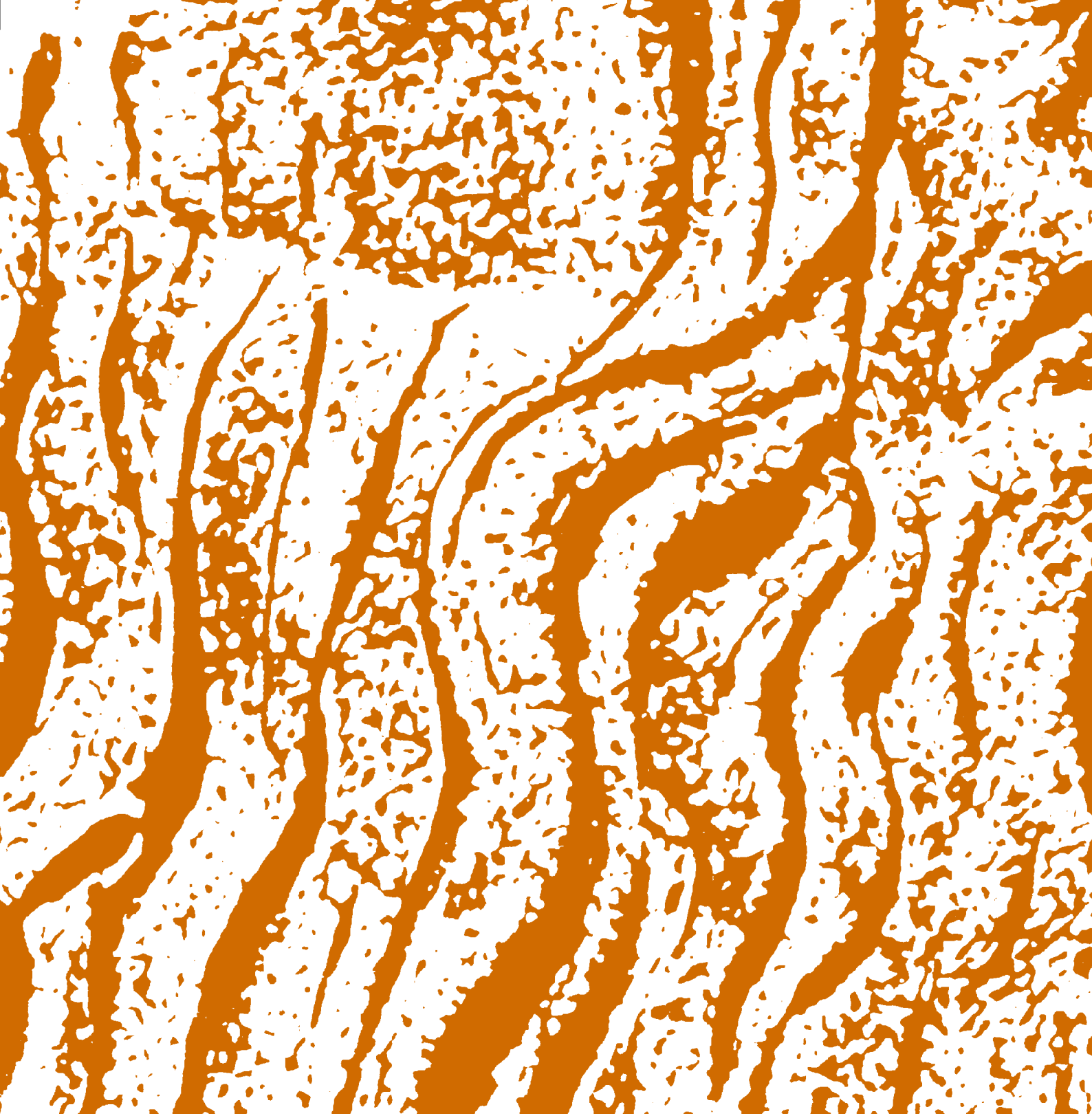

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