Abhandlung

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The first casting mould for a ‘Syrian Bottle’ from Lipnik, Bulgaria

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Zusammenfassung: Folgender Beitrag behandelt die vorerst einzige bekannte Gussform für sogenannte ‘Syrische Flaschen’, einen ursprünglich in Mesopotamien beheimateten Gefäßtypus des mittleren 3. Jahrtausends v. Chr., der in den folgenden Jahrhunderten sowohl als Import als auch lokale Kopie aus einschlägigen Fundzusammenhängen Anatoliens, der Ägäis und Südosteuropas bekannt ist. Einige dieser ‘syrischen’ Flaschen wurden aus Metall gefertigt, wobei die goldene kugelförmige Flasche aus dem troianischen “Schatzfund A” die wohl bekannteste Variante repräsentiert. Die hier vorgestellte Gussform diente ebenso zur Anfertigung bauchiger Flaschen vom troianischen Typus, Nassguss sand hätte möglicherweise als Hilfsmittel für die Herstellung gedient – die Form wurde jedoch offenkundig nie zum Guss verwendet. Eine kritische Autopsie technischer Details wie Gusskanälen oder Passstiftlöchern belegt, dass sich vergleichbare anatolische Gussformen für Gebrauchsgerät in das früheste zweite und wohl auch späte 3. vorchristliche Jahrtausend datieren lassen. Die Gussform aus Lipnik kann daher als bislang einzigartiges, lokal gefertigtes Sachzeugnis für den Guss von Flaschen “syrischen” Typs im Rahmen der einschlägig bekannten interregionalen Kontakte zwischen Mesopotamien, Anatolien, der Ägäis und Südosteuropa im späteren 3. Jahrtausend v. Chr. verstanden werden.

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Abstract: The following article presents the first mould ever discovered for casting a so-called “Syrian Bottle”, a distinctive vessel type that originated in Mesopotamia around the mid 3rd millennium BC and soon after spread to Anatolia, the Aegean and Southeast Europe, as imports and local derivatives. A few examples were made from precious metals and lead, the most notable one being a golden globular bottle, part of “Priam’s” Treasure A” from Early Bronze Age Troy. The mould from Lipnik seems to have been intended for the production of small metal bottles of ‘Syrian’ shape, and supportive agents like a green sand core applied for the production of such a complex item. The mould, however, was obviously never used. A review of associated manufacturing details like pegholes, riser and vent show that although these features were particularly prominent in the 2nd millennium BC, moulds from earlier (Anatolian) contexts do possess such characteristics as well. This currently unique, locally produced example is therefore dated to the latest 3rd or earliest second millennium BC, coinciding with ever-growing interaction between distant cultural entities stretching from Mesopotamia to Southeast Europe and beyond, and allowing for the exchange of ideas, fashions and technologies.

Keywords: Early Bronze Age, Middle Bronze Age, Bulgaria, Anatolia, Metallurgy, Moulds, Syrian Bottles

Globular or ovoid flasks with a stout or elongated neck count amongst the most prominent items in the Near Eastern Early Bronze Age. Generally known as “Syrian Bottles”, they encompass a wide range of shapes and also materials, and were distributed as imports or local derivatives over a vast area (Fig. 1)¹. Their actual form

¹ For recent assessments cf. Rova 1991; Schachner/Schachner 1995;

Fig. 1: Distribution of “Syrian Bottles” and their local derivatives in Mesopotamia and Anatolia, and the mould from Lipnik (After Rahmstorf 2006 and Massa/Palmisano 2018, with additions).

varies considerably, from squat globular flasks with short or long necks to tall, ovoid containers of considerable volume². The archetypical, eponymous “Syrian Bottles”, being roughly globular in shape, are known from Northern Mesopotamian Early Bronze Age/Early Dynastic contexts³. They seem to predate the ovoid variants attested in the final quarter of the 3rd millennium BC (Ur III-contexts), an observation that is however limited to domestic contexts: in burials, a mix of both basic shapes can nevertheless occur⁴. From Anatolia they are attested since the mid 3rd millennium BC at a variety of places⁵, both as “real” imports from Northern Syria and also as contemporary variants of particular local character (Fig. 2; Fig 3,9). Larger clay bottles of Syrian type from Troy and Külliöba,

black- or red coated in typical Anatolian EBA fashion, may serve as fine examples⁶. The rationale to assign vessels as seemingly different as the large ovoid bottles from Külliöba and Troy and tiny alabastron-like flasks from Gedikli-Karahöyük or Kültepe to the same category is the simple fact that there are no convincing predecessors for these bottles’ general shapes and proportions in the original Anatolian repertoire of vessel types – which makes a rounded handleless body with a clearly separated narrow cylindrical neck a novelty.

The actual significance of “Syrian Bottles” and their local counterparts for Anatolian populations is open to debate, but there is a suspicion that not only their shape or occasional decoration, but also the ingredients –rare or expensive oils, ointments, or perfume-like substances– triggered the interest in acquiring these bottles⁷. Occasionally visible on “Syrian Bottles” is a typological feature

Zimmermann 2005; Rahmstorf 2006; Sconzo 2014; Alp 2018; Massa/Palmisano 2018.

² Rahmstorf 2006, 56 Fig. 4; Sconzo 2014.

³ Rova 1991.

⁴ Schachner/Schachner 1995, 87.

⁵ For a recent compilation see Alp 2018; Massa/Palmisano 2018, 75–76.

⁶ Schliemann 1881, 441; 604; 606; Figs. 407–410; 1122; 1124; Zimmermann 2002; Efe 1999, 175 Fig. 5,1–3; 180 fig. 9; Efe/Ay-Efe 2001, 52; 76 Fig. 27.

⁷ Zimmermann 2005; Alp 2018, 63.

Fig. 2: Chart showing the maximum chronological range of “Syrian” bottles in Anatolia and the suggested date of the Lipnik mould (after Kouka 2013, modified).

in the shape of a lozenge or net bag design, eventually testifying to how these bottles were suspended during transport, after having arrived at their final destination, or while being carried around by their proud owner⁸. The number of piriform, globular or ovoid “Syrian” type flasks, or at least their local imitations in Anatolia proper, decreases notably at the beginning of the 2nd millennium BC. The reason might of course not be a waning demand for luxury ointments, but the simple fact that other containers were used to carry such goods, and that the “Syrian Bottle fashion” came to be outdated⁹.

In the scope of this contribution, a small number of exquisite bottles that are made from a variety of metals are of particular interest (Fig. 3).

A neck fragment from a tiny lead bottle with a steep shoulder of presumably “Syrian” shape comes from the EB II levels of Tarsus-Gözlükule (Fig. 3,5)¹⁰.

Fig. 3: “Syrian” type metal bottles and a clay bottle of “Syrian” fashion from Anatolia – 1–4) Demircihöyük-Sarıket; 5) Tarsus-Gözlükule; 6) Eskişehir; 7) Troy; 8) Küçükhöyük-Bozüyük. 9) Kinet Höyük – After Baykal-Seeher/Seeher 1998 (1–4.8); Goldman 1956 (5); Öztürk 1992 (6); Tolstikov/Treijster 1996 (7); Kinet Höyük Project (9).

Further to the northwest, an ovoid silver bottle adorned with grooved lines around neck and shoulder was found at Eskişehir, a multiperiod site located in northern central Anatolia (Fig. 3,6)¹¹. It was part of two caches of metal objects deposited in jars and buried in pits underneath the floor of a room in a late Early Bronze house, dated towards the end of the 3rd millennium BC¹². The remaining metal inventory (gold jewellery, beakers, omphalos pans and an electrum shaft-hole axe) underlines the elaborate character of this hoard – one of the very few that is securely documented in Anatolian prehistory¹³.

A small Early Bronze Age necropolis at Küçükhöyük-Bozüyük in the Eskişehir plain produced three lead flasks of “Syrian” type with elongated necks. They were placed in burials assigned to EB II, although their contents

⁸ Zimmermann 2006; Alp 2018, 63.

⁹ Massa/Palmisano 2018, 76–77.

¹⁰ Goldman 1956, 303; Baykal-Seeher-Seeher 1998, 117 with further lit.; 121 Fig. 1,10.

¹¹ Özgüç/Temizer 1993, 617 Pl. 116,1.

¹² Ibid. 613; Zimmermann 2009, 23; 24 Fig. 20.

¹³ Özgüç/Temizer 1993, Zimmermann 2009, 23.

Fig. 4: 1) The casting mould from Lipnik; 2) Upper and lower side of the mould; 3) Drawing of the mould; 4) Reconstruction of the core. Courtesy of the authors.

were otherwise insignificant with few diagnostic ceramics (Fig. 3,8)¹⁴.

The Early Bronze Age cemetery of Demircihöyük-Sarıket (Eskişehir), however, surpassed all other sites with no fewer than 32 lead bottles, all similar in their shapes and dimensions, and associated with various burials (selection on Fig 3,1–4)¹⁵. Two of the specimens were examined archaeometrically, confirming the working material as up to 97% lead, together with some natural and therefore irrelevant contaminations¹⁶. Of special interest in the context of this contribution is the observation that these bottles (and no doubt the ones from neighbor-

ing Küçükhöyük also) had to be cast, and could not be hammered, since a lead sheet with a maximum thickness of 1–3mm would be too brittle and crack very easily during the procedure – a problem that does not occur when working with gold or copper-based materials¹⁷.

Gold, however, is the working material for the example which is probably best known within the still limited group of “Syrian”-type metal bottles. This globular bottle is associated with the so-called “Treasure A” as part of the infamous Trojan treasure complexes unearthed by Heinrich Schliemann in the late 19th century. It is decorated with a faintly visible mesh pattern that may imitate a netbag. The object was supposedly cast in one piece, and represents, together with the Aegean “sauceboat”, one of the most evocative references to elite consumers in in 3rd millennium BC Anatolia (Fig. 3,7)¹⁸.

Until recently, no moulds or related metalworking equipment were known to indicate where and how such bottles were produced¹⁹.

A mould for globular-shaped “Syrian” bottles from the region of Razgrad, Bulgaria, the first one ever reported, now helps to shed some light on how these bottles were actually manufactured (Fig. 4).

The mould from Lipnik – history of retrieval and general description

The mould was said to have been found during the year 2000 in the vicinity of the modern village Lipnik, together with a bronze sickle. Both items were donated to the Razgrad Archaeological Museum, and registered as № ОИМ-Рз 5658 and №5659 respectively. In the same area at the locality Daravlu, the treasure hunters found another hoard of bronze items. They were then sold, but one sickle was donated to the Razgrad museum where it received inv. №5339.²⁰ Typologically the two sickles could be described as local products. They conform very well with types Dichevo (№5659) and Varbitsa (№ 5339) which are frequent along the lower Danube (Fig. 5)²¹.

¹⁷ Ibid.

¹⁸ Tolstikov/Trejster 1996, 32; Zimmermann 2009.

¹⁹ Baykal-Seeher/Seeher 1998, 116.

²⁰ The authors would like to express their gratitude to the colleagues Dilen Dilov and Georgy Dzanev from the Razgrad History museum for their help.

²¹ Дергачев, Бочкарев 2002, 259 и сл.; Дергачев 2011, 195 и сл.; 202.

¹⁴ Baykal-Seeher/Seeher 1998, 117.

¹⁵ Ibid. 115–116.

¹⁶ Ibid. 115.

Fig. 5: The two bronze sickles allegedly associated with the mould. Courtesy of the authors.

The mould was carved from a single stone block, which measures 15 cm in length, 11,7 cm in width and 6,6 cm in height. The mineral used is possibly talc or chloride according to texture and dark green colour, resembling that of the unfinished sword mould from the Pobit Kamak hoard²². The outer sides of the mould were roughly shaped, as indicated by the occasional chisel marks on the surface (Fig. 6a).

A thin straight line was cut into the stone on the left side of the mould, parallel to the inner surface of the matrix (Fig. 6b). Such lines are thought to have been carved by the ancient craftsmen in order to mark various areas of the stone block which needed further treatment. Identical lines can be seen on some moulds from the Pobit Kamak hoard²³.

The interior is smoothed very well, with the surface of the matrix evenly polished. The stone shows no visible

traces of soot or discoloration, which suggests that the mould was never used.

An interesting feature of the mould is its three visible peg holes. Two of them are located in the upper left of the stone block, with the third placed in its lower right corner. Two of them are of equal diameter and were drilled diagonally on opposite sides of the matrix. The third has a smaller diameter and a shallow depth. Judging by the position of the peg holes, one could suppose that the smallest peghole was drilled first. The artisan then changed his mind and drilled two new wider and deeper holes closer to the body of the intended metal vessel.

The mould was undoubtedly manufactured for the casting of a metal vessel with a globular body and cylindrical neck. It would have measured 11,9 cm in height, with a neck 4,0 cm high and a maximum diameter of 8,7 cm. The rim is ring-shaped and semi-circular in cross-section. A fine rib with a triangular cross-section decorates the upper half of the body (Fig 4,3).

²² Leschtakov 2019, 228 Fig. 53.

²³ Ibid. 222.

Fig. 6: Chisel marks (a) and other production-related markings (b) visible on the mould from Lipnik. Courtesy of the authors.

Notes on the possible manufacturing process

The actual chaîne opératoire of the casting process might be reconstructed as follows²⁴:

In order to cast a bottle of “Syrian” type or any other kind of thin-walled metal vessel, a two-part mould and a core is needed. This observation applies not only to the mould discussed here, but also to the related casting equipment from Pobit Kamak²⁵ and Aegina²⁶.

Still comparably little is known about such ancient metallurgical equipment. Most of the preserved cores seem to have been manufactured from stone, clay or bronze²⁷. They all have a more or less conical or cylindrical shape which corresponds to the shape of the shaft or the handle that had to be inserted in the metal cast afterwards. In our case the core should have an identical shape as the bottle, in order to cast the vessel hollow and with the desired volume (Fig. 7, 4–5). Stone, clay or bronze cores would be impossible to extract from inside the bottle once

the casting process was completed, thus making the cast useless. To solve this problem, the metalsmith had to search for appropriate agents to prevent such a mishap. One possible option is green sand – a material still used in metalworking today²⁸.

So-called green sand is a mixture of clay, sand, quartz and other minerals. It occurs in nature²⁹, but could also be produced artificially. Green sand deposits exploited in modern Bulgaria are known in the Sofia Basin, which was a lake bottom of a during the Neogene period³⁰.

A close inspection of the preserved valve of the mould reveals that the core must be slightly smaller than the matrix. It has a rectangular peg at the bottom and a conical protrusion at the upper end. To produce such a complex shape one needs another (in fact second) bivalve mould in which the green sand was packed and pressed in tightly (Fig. 7, 2). In order to make the core sturdier one can add a portion of resin to the sand. After the cast is complete, the metalworker needs to scrape the core out from the cast itself. In this process the core is destroyed. Most probably this was done with the aid of a metal wire (Fig. 7, 7).

²⁴ The authors are indebted to Stephan Stefanov for an in-depth discussion of the manufacturing process.

²⁵ Leschtakov 2019, 215 Fig. 34; 232 Abb. 57,5.

²⁶ Reinholdt 1992, 219 Fig. 5.

²⁷ Durman 1983, Taf. 1,3–4; 2,3; Wanzek 1989, 54 Taf. 14–15; Лещаков 2015, 159; Müller-Karpe 1994, Taf. 61,6–11.

²⁸ Радев, Атанасов 2007, 19; Campbell 2015, 135; the attribute „green“ refers not to the colour, but the fact that the clayish mixture is still wet when applied to the casting mould.

²⁹ Ammen 1979, 15.

³⁰ Янева 2001, 40; 2003, 40; Ангелов *et al.* 2010; Маринова *et al.* 2010.

Fig. 7: Reconstruction of casting process and final discarding of the core – drawing by L. Leschtakov.

After the cast was extracted from the mould, the excess metal left in the pouring channel and the vent was removed. Then the rim of the mouth was subjected to gentle smoothening. Finally, after plugging the rectangular hole in the bottom of the bottle, a final polishing of the outer surface of the bottle made it smooth and shiny.

If we compare this find with the other Bronze Age moulds found in modern Bulgaria it becomes clear that the technology used to manufacture them was identical. The custom of leaving the outer sides rough or untreated is visible in a variety of cases – with the hoard from Pobit Kamak³¹ as the closest example in geographical terms. Also, other features of the mould, like the peg holes, the riser or the vents correspond to a large number of casting equipment from Bulgarian Late Bronze Age contexts³².

We can now return to the globular “Syrian Bottle” from Treasure A at Troy, which closely matches the object that our mould was intended to produce³³. Its dimensions are 13,75 cm from top to bottom, with a maximum diameter of 13,5 cm and 3,4 cm for the mouth. Since the only other globular metal bottles from Demircihöyük-Sarıket and Küçükhöyük have markedly elongated necks, the bottle from “Treasure A” at Troy is indeed the mould’s closest parallel. The shape is distinctive enough to exclude any other local or non-local utilitarian item that could have possibly been cast in this particular mould: with their emergence shortly before the mid 3rd millennium BC, “Syrian Bottles” distinguish themselves from any preceding or contemporary vessel assemblages³⁴. Local derivatives from Anatolia may show some variation or even evolution in their shapes³⁵, but still betray their ancestry rooted in Mesopotamian containers for presumably precious liquids³⁶.

Concluding remarks

Unfortunately, the date of our mould remains uncertain. Furthermore, a typological autopsy of the sickles which were allegedly – and perhaps misleadingly – associated shows that they differ considerably in date themselves: the first item (Nº 5659) said to have been found with the

mould could be dated in the 14–13th c. BC, and the second (Nº 5339) several centuries later, ca. 10th c. BC³⁷. The mould, however, is – until further notice – unique, and devoid of any reliable archaeological context. That said, the morphological features – riser, vent, and peg holes, and the way it was made would also point to the later dates (13–12th c. BC) – much too late for “Syrian Bottles”, which had their heyday in the second half of the 3rd millennium. The characteristically globular example from Troy, the mould’s closest parallel and like it without a reliable provenance, is generally attributed to the mid-3rd millennium for its manufacture, and to the last quarter of the same millennium for its presumed final burial on the Trojan citadel³⁸.

However, we still do not know exactly when all the mould’s technological features appear in the Balkans for the first time. If we judge by the moulds for Beguntsi-type double axes, the appearance of riser and vent parallel to the core of the socket could date to the 14th century BC, if not earlier³⁹.

The current state of research also shows that there is not enough information about Bronze Age moulds found in modern Greece. Moulds with pegholes were in early use on Crete, however⁴⁰. A find from Malia shows that the pegholes on the island appear as early as MM I–II⁴¹.

In 3rd millennium Anatolia, however, pegholes appear on a mould for silver ingots from Kültepe, in addition to axe-moulds and mould fragments from Alişar, Boğazköy, Göksuncuk Köyü, Malatya-Arslantepe, Norşuntepe, Tarsus, Troy, and Akçadağ (Fig. 8)⁴².

The finds from Troy II and Kültepe⁴³ (Fig. 8.1.2) situate the emergence of the pegs and associated pegholes as a method of aligning the two halves of the mould as early as the late Early Bronze Age. This new feature, certainly recognized for its usefulness, soon appeared on moulds for a variety of items – jewellery, ingots, and also weaponry. It was widely used during the Middle Bronze Age as evidenced by finds from Tarsus, Akçadağ⁴⁴ (Fig. 8.3.4) and other items from the workshops of Kültepe strata 2 and 1b.

³¹ Leschtakov 2019, Fig. 24; 25; 32; 33.

³² Черных 1978, Taf. 30,15; 31,14; 42,3; Wanzek 1989, Taf. 39,6; 46, 4; Leschtakov 2019, Abb. 16; 17,25.

³³ Tolstikov/Treister 1996, 32; Sazcı 2007, 154–157.

³⁴ Schachner/Schachner 1995.

³⁵ Alp 2018, 65–66.

³⁶ Zimmermann 2005; 2006.

³⁷ Дергачев 2011, 264 Рис. 155.

³⁸ Treister 2002; Sazcı 2007, 361.

³⁹ Panayotov 1980, 186–187; Popov/Jockenhövel 2010, 273.

⁴⁰ Evely 2000, 357 Fig. 142,6; Pl. 91,1–2; 92,2; 93,6.

⁴¹ Ibid. 356.

⁴² Müller-Karpe 1994, Taf. 20,4; 37,1.6–7; 38,2–6; 39,1.3.6; 40,2; 41; 42,3–4; 43,4.6; 44,1.3–4; 45; 46,2–3.5; 51,2–3.5; 52; 53; 61,3.

⁴³ Müller-Karpe 1994, Taf. 41,1; 61,3.

⁴⁴ Ibid. Taf. 43,4; 46,5.

Fig. 8: Selection of casting moulds with peg holes from Anatolia (after Müller-Karpe 1994).

Nonetheless, other morphological features of the Lipnik mould (the riser and vent set parallel to the core) did not occur in Anatolian metallurgy, and may instead represent a local invention. A newly discovered stone mould fragment from a Middle Bronze open settlement near Vladinya⁴⁵ in central northern Bulgaria shows that the method of fixing the core by the means of a special groove cut in to the stone occurred during this period⁴⁶.

There is no doubt that the basis for comparisons remains extremely limited. Most of the casting equipment from 3rd millennium contexts that could shed some light

on our alleged bottle mould produced simple shapes like flat axes and ingots. Nevertheless, by the start of the MBA, all of the Lipnik mould's technological features (e.g. riser, vent, and peg holes) and the method used to position the core were already familiar to regional metallurgical practice. Its attribution to the turn from the 3rd to the 2nd millennium is therefore plausible.

By way of conclusion, the technology needed to cast a bottle with globular body is rather complex and documented for the first time in the Eastern Balkans. Vessels promoting the emerging local elites, like the so-called *depas amphikypellon* and "Syrian Bottles", are prominent material witnesses for the ever-expanding trade and exchange connections between Mesopotamia proper and the Aegean world with Eastern Europe. They gained their

⁴⁵ Actual dates range from 2205 to 1872 cal. BC; currently there are 11 dates from various features such as burnt houses and pits.

⁴⁶ Василева 2020, 59.

momentum especially in the second half of the 3rd millennium BC when the "Great Caravan Route" opened the way towards the increasing globalization of Middle and Late Bronze Ages⁴⁷. The presence of fortified settlements like Selimpaşa and Mikhalich or outright copies of Troy II-type citadels like Kanlıgeçit show that the emergence of local elites coincided with the presence of foreigners, their goods, customs and know-how – however not excluding local communities engaging in adopting, embracing and finally altering their fashion⁴⁸.

In the wake of a flow of goods and people, certainly technical novelties and crucial know-how were also disseminated. The bottle mould from Lipnik, perhaps created to satisfy the demand for exotic devices commissioned by a local elite, can be appreciated as an extraordinary, but finally not surprising relic of this dynamic period.

Bibliography

- Alp 2018: E. Alp, Bottle Shaped Vessels in Anatolia and the Syrian Bottle. *Anadolu Araştırmaları. Jahrbuch für kleinasiatische Forschung* 21, 2018, 56–75.
- Ammen 1979: C. W. Ammen. *The Complete Book of Sand Casting. Tab books* 1979.
- Baykal-Seeher/Seeher 1998: A. Baykal-Seeher/J. Seeher, Gefäße aus Blei in der Frühen Bronzezeit Anatoliens. In: G. Arsebük/M. J. Mellink/W. Schirmer (eds.), *Light on the Top of the Black Hill. Studies presented to Halet Çambel* (Istanbul 1998) 115–121.
- Campbell 2015: J. Campbell, *Complete Casting Handbook* (Elsevier 2015).
- Durman 1983: A. Durman, Metalurgija Vučedolskog kulturnog kompleksa. *Opuscula Archaeologica* 8, 1983, 1–87.
- Efe 1999: T. Efe, Külliüoba 1997 Yılı Kazısı. 20. Kazı Sonuçları Toplantısı I (Ankara 1999) 165–181.
- 2007: –, The Theories of the 'Great Caravan Route' between Cilicia and Troy: The Early Bronze Age III Period in Inland Western Anatolia. *Anatolian Studies* 57, 2007, 47–64.
- /Ay-Efe 2001: – /D. Ş. Ay-Efe, Külliüoba: İç Kuzeybatı Anadolu'da Bir İlk Tunç Çağı Kenti. 1996–2000 Yılları Arasında Yapılan Kazı Çalışmaları Genel Değerlendirmesi. *TÜBA-AR. Turkish Academy of Sciences Journal of Archaeology* 4, 2001, 43–78.
- Evely 2000: R. D. G. Evely, *Minoan Crafts and Techniques. An Introduction. Vol. II* (Jonsered 2000).
- Goldman 1956: H. Goldman, *Excavations at Gözlükule, Tarsus. From the Neolithic through the Bronze Age* (Princeton 1956).
- Heyd/Aydingün/Gündoğan 2016: V. Heyd/Ş. Aydingün/E. Gündoğan, Kanlıgeçit – Selimpaşa – Mikhalich and the Question of Anatolian Colonies in Early Bronze Age Southeast Europe. In: B. P. C. Molloy (ed.), *Of Odysseys and Oddities. Scale and Modes of Interaction between prehistoric Aegean Societies and their Neighbours* (Oxford, Philadelphia 2016) 169–202.
- Jablonka 2014: P. Jablonka, Globalisierung im 3. Jahrtausend v. und n. Chr. – Interpretationen archäologisch sichtbarer Kontakte von der Ägäis bis zum Indus von der nordwestlichen Perspektive aus betrachtet. *Altorientalische Forschungen* 41, 2014, 41–62.
- Kouka 2013: O. Kouka, "Minding the Gap" Against the Gaps: The Early Bronze Age in the Northern and Eastern Aegean/Western Anatolia. *American Journal of Archaeology* 117, 2013, 569–580.
- Leshtakov 2002: K. Leshtakov, Galabovo pottery and a new Synchronisation of the Bronze Age in Upper Thrace with Anatolia. *Anatolica* 28, 2002, 171–211.
- 2014: –, Troy and Upper Thrace: What happened in the EBA 3? (Interrelations based on Pottery Evidence). In: E. Pernicka/S. Ünlüsoy/S. W. E. Blum (eds.), *Early Bronze Age Troy: Chronology, Cultural Development and Interregional Contacts. Studia Troica* 8 (Bonn 2014) 321–337.
- Leštakov 2016: K. P. Leštakov, Klassifikation und Chronologie der mittelbronzezeitlichen Keramik aus Gäläbovo (Südostbulgarien) im Vergleich zur anatolischen Siedlungsfunden. Teil 1. – *Studia Archaologica Universitatis Serdicensis, Tome 5*, 2015 (Sofia 2016) 5–115.
- Leshtakov 2019: L. Leshtakov, Der Gussformen-Depotfund bei Pobit Kamak und die Entwicklung der Metallurgie in Nordostbulgarien in der zweiten Hälfte der Spätbronzezeit. *Eurasia Antiqua* 22, 2016 (2019), 185–247.
- Massa/Palmisano 2018: M. Massa/A. Palmisano, Change and continuity in the long-distance exchange networks between western/central Anatolia, northern Levant and northern Mesopotamia, c.3200–1600 BCE. *Journal of Anthropological Archaeology* 49, 2018, 65–87.
- Müller-Karpe 1994: A. Müller-Karpe, *Altanatolisches Metallhandwerk* (Neumünster 1994).
- Özgüç/Temizer 1993: T. Özgüç/R. Temizer, The Eskiypar Treasure. In: M. J. Mellink/E. Porada/T. Özgüç (eds.), *Aspects of Art and Iconography: Anatolia and its Neighbors. Studies in Honour of Nimet Özgüç* (Ankara 1993) 613–628.
- Öztürk 1992: J. Öztürk (ed.), *Museum of Anatolian Civilizations. Metal Vessels* (Ankara 1992).
- Panayotov 1980: I. Panayotov, Bronze Rapiers, Swords and Double Axes from Bulgaria. *Thracia* V, 1980, 173–198.
- Popov/Jockenhövel 2011: Hr. Popov/A. Jockenhövel, At the Northern Borders of the Mycenaean World: Thracian Gold Mining from the Late Bronze and the Early Iron Age at Ada Tepe in the Eastern Rhodopes. *Anodos. Studies of the Ancient World* 10/2010 (2011), 26–283.
- Rahmstorf 2006: L. Rahmstorf, Zur Ausbreitung vorderasiatischer Innovationen in die frühbronzezeitliche Ägäis. *Prähistorische Zeitschrift* 81, 2006, 49–96.
- Reinholdt 1992: C. Reinholdt, Arbeitszeugnisse geometrischer und archaischer Schmuckwerkstätten. *Archäologischer Anzeiger* 15, 1995, 215–231.
- Rova 1991: E. Rova, Die Keramik aus dem Gräberfeld. In: W. Orthmann/E. Rova (eds.), *Gräber des 3. Jahrtausends v. Chr. im syrischen Euphrattal 2. Ausgrabungen in Wreide* (Saarbrücken 1991) 71–171.

⁴⁷ Efe 2007; Leshtakov 2002; 2014; Jablonka 2014; Leštakov 2016; Massa/Palmisano 2018; Şahoğlu 2019.

⁴⁸ Heyd/Aydingün/Gündoğan 2016, 191–194.

- Saczi 2007: G. Sazci, Troia Hazinesi (Istanbul 2007).
- Schachner/Schachner 1995: Ş. Schachner/A. Schachner, Eine 'syrische' Flasche aus Fara. Mitteilungen der Deutschen Orient Gesellschaft 127, 1995, 83–96.
- Schliemann 1881: H. Schliemann, Ilios. Stadt und Land der Trojaner (Leipzig 1881).
- Sconzo 2014: P. Sconzo, Syrian Bottles. In: M. Lebau (ed.), ARCANÉ. Associated Regional Chronologies for the Ancient Near East and the Eastern Mediterranean. Interregional Vol. I. Ceramics (Brepols 2014) 215–230.
- Şahoğlu 2019: V. Şahoğlu, The Early Bronze Age Anatolian Trade Network and its Role in the Transformation of the Anatolian and Aegean Communities. In: V. Şahoğlu/M. Şevketoğlu/Y. H. Erbil (eds.), Connecting Cultures. Trade and Interconnections in the Ancient Near East from the Beginning until the End of the Roman Period (Ankara 2019) 115–131.
- Tolstikov/Trejster 1996: W. P. Tolstikov/M. J. Trejster, Der Schatz aus Troia. Schliemann und der Mythos des Priamos-Goldes (Stuttgart/Zürich 1996).
- Treister 2002: M. The Relative and Absolute Chronology of the Trojan Treasures. In: R. Aslan/S. Blum/G. Kastl/F. Schweizer/D. Thumm (eds.), Mauerschau. Festschrift für Manfred Korfmann (Remshalden-Grundbach 2002) 245–258.
- Wanzenek 1989: B. Wanzenek, Die Gußmodelle für Tüllenbeile im Südöstlichen Europa. Universitätsforschungen zur Prähistorischen Archäologie 2 (Bonn 1989).
- Zimmermann 2002: T. Zimmermann, Eine „Syrische Flasche“ der Troiasammlung des Römisch-Germanischen Zentralmuseums. Archäologisches Korrespondenzblatt 32, 2002, 51–57.
- 2005: –, Perfumes and Policies – A 'Syrian Bottle' from Kinet Höyük and Anatolian Trade Patterns in the Advanced Third Millennium BC. Anatolica 31, 2005, 161–169.
- 2006: –, Bottles and Netbags – Some additional notes on my article about 'Syrian Bottles' in Anatolica 31, 2005. Anatolica 32, 2006, 229–231.
- 2009: –, Frühmetallzeitliche Eliten zwischen Ostägäis und Taurusgebirge im 3. Jahrtausend v. Chr. – Versuch einer kritischen Bestandsaufnahme. In: M. Egg/D. Quast (Hrsg.), Aufstieg und Untergang. Zwischenbilanz des Forschungsschwerpunktes „Studien zu Genese und Struktur von Eliten in vor- und frühgeschichtlichen Gesellschaften“ (Mainz 2009) 1–29.
- Ангелов *et al.* 2010: В. Ангелов/Р. Маринова/В. Гроздев/Д. Иванова/Д. Синьовски/И. Петров, Геоложката карта на република България М 1: 50 0000 картен лист София (София 2010).
- Валентинова 2020: М. Валентинова, Селище от началото на II хил. пр. Хр. и плосък некропол от късната класическа и ранноелинистическа епоха при с. Владиня, Ловешко. – в: Хр. Попов/К. Чукалев/К. Праматаров/С. Танева (ред.) Археологически проучвания в Ловешко. Минало и настояще. Национален археологически музей. Каталози, том XIX, София 2020, 49–67.
- Дергачев/Бочкарев 2002: В. Дергачев/В. Бочкарев, Металлические серпы поздней бронзы Восточной Европы (Кишинев 2002).
- Дергачев 2011: В. Дергачев, Топоры-кельты поздней бронзы Карпато-Подунавья. Выпуск 2: Кельты и серпы нижнего Подунавья (Кишинев 2011).
- Лещаков 2015: Л. Лещаков, Типология и хронология на бронзовите върхове за копия от късната бронзова и началото на ранножелязната епоха в Югоизточна Европа, АТЕ (София 2015).
- Маринова *et al.* 2010: Р. Маринова/В. Гроздев/Д. Иванова/Д. Синьовски/И. Петров/П. Милованов/А. Попов, Геоложката карта на република България М 1: 50 0000 картен лист Костинброд (София 2010).
- Радев/Атанасов 2007: Р. Радев/Н. Атанасов, Ръководство за лабораторни упражнения по металолеене (Варна 2007).
- Янева 2001: М. Янева, Седиментология на неогенските отложения в Софийския басейн. Автореферат към дисертация за придобиване на научната и образователната степен д-р. 40 с.
- 2003. –, Състав и произход на пясъците от неогенския Софийски басейн. – Сп. Минно дело и геология, 1–2, 38–42.

Appendix 1:

List of findspots from Fig. 1

- 1) Lipnik
- 2) Zkatna Livada
- 3) Constantia
- 4) Galabovo
- 5) Troia
- 6a) Bozüyük
- 6b) Demircihöyük-Sarıket
- 7) Küllüoba
- 8) Karahöyük
- 9) Acemhöyük
- 10) Ovaören
- 11) Alaca Höyük
- 12) Eskiyağar
- 13) Alişar Höyük
- 14) Kültepe – Karum Kaneş
- 15) Hazarşah
- 16) Kestel
- 17) Tarsus – Gözlükule
- 18) Kinet Höyük
- 19) Sos Höyük
- 20) Norşuntepe
- 21) "Malatya"
- 22) Arslantepe
- 23) Gedikli
- 24) Zincirli
- 25) Tilmen Höyük
- 26) Gaziantep
- 27) Tilbeshar
- 28) Oylum Höyük
- 29) Amarna
- 30) Tell Ta'yinat
- 31) Ebla
- 32) Saraqıp
- 33) Hama
- 34) Müslüman-tepe
- 35) Norsuntepe
- 36) Titriş Höyük

37) KurbanHöyük	56) Tell Bderi
38) MezraaHöyük	57) Tell Melebiya
39) GreVirike	58) Tell Knediğ
40) Tell ShiyukhTahtani	59) Terqa
41) QaraQuzag	60) Mari
42) Kara Hasan	61) Hadidi
43) Tell Bi'a	62) Al-Qitar
44) Harran	63) Tel es-Sweyhat
45) Tell Ğidbe	64) Wreide
46) Hammam et-Turkman	65) HabubaKabira
47) Dehliz	66) Tawi
48) Tell Chuera	67) Halawa
49) KharabSayyar	68) Harran
50) Gernayir	69) Khafajah
51) Girnavaz	70) Kiş
52) Chogar Bazar	71) Abu Salabikh
53) Tell Beydar	72) Šuruppak
54) Abu Hğaira	73) Ur
55) Tell Brak	