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People – Goods – Ideas

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Mobility of Goods, Ideas, and Technologies in the Oxus Civilisation

Insights from the Adji Kui Graveyard in Margiana (South Turkmenistan)

Gian Luca Bonora

Abstract: The Middle and Late Bronze Age necropolis of Adji Kui in Margiana (southern Turkmenistan) consists of 817 tombs dug both inside the residential structures of two walled villages, Adji Kui 1 and 9, and in the ground between the two fortresses. Unfortunately, numerous tombs have been looted. However, the excavation has also brought to light a large number of intact graves with no signs of looting which have yielded funerary inventory consisting of ceramic vessels, gold, silver, and copper/bronze artefacts, stone tools and other instruments typical of the Oxus Civilisation. The Raman and X-Ray Powder Diffraction analyses (XRPD) of some metal and stone artefacts conducted in the ISPC Laboratory of the CNR (National Research Council) in Milan are presented. These discoveries, published here for the first time, open new perspectives and insights on the mobility of people, goods, ideas, and technologies relative to the specialised manufacturing of some goods in Margiana and the long-distance cultural interactions in the late 3rd millennium BCE between Central Asia, the Indo-Iranian borderland and the Indus River valley.

Keywords: Oxus Civilisation, Bronze Age, Margiana in south Turkmenistan, mobility, long-distance trade.

Резюме: Некрополь Аджи-Куи, относящийся к среднему и позднему бронзовому веку и расположенный в Маргиане (южный Туркменистан), включает 817 захоронений, выполненных как внутри жилых построек двух укрепленных поселений – Аджи-Куи 1 и Аджи-Куи 9, так и в межкрепостном пространстве. Многие из этих могил оказались разграблены, но археологам также удалось обнаружить значительное количество нетронутых захоронений, содержащих погребальный инвентарь. Среди находок – керамические сосуды, изделия из золота, серебра и меди/бронзы, каменные орудия и другие артефакты, относящиеся к культуре Окса. В лаборатории Института исследований культурного наследия (ISPC) Национального исследовательского совета (CNR) в Милане провели анализ с помощью Рамановской спектроскопии и порошковой рентгеновской дифракции (XRPD) для изучения некоторых металлических и каменных артефактов. Результаты, впервые публикуемые здесь, открывают новые перспективы, давая возможность оценить мобильность людей, товаров, идей и технологий, связанных со специализированным производством в Маргиане, и свидетельствуют о широких культурных взаимодействиях конца третьего тысячелетия до н. э. между Центральной Азией, индо-иранским пограничьем и долиной реки Инд.

Ключевые слова: Цивилизация Окса, Бронзовый Век, Маргиана на юге Туркменистана, мобильность, торговля на дальние расстояния.

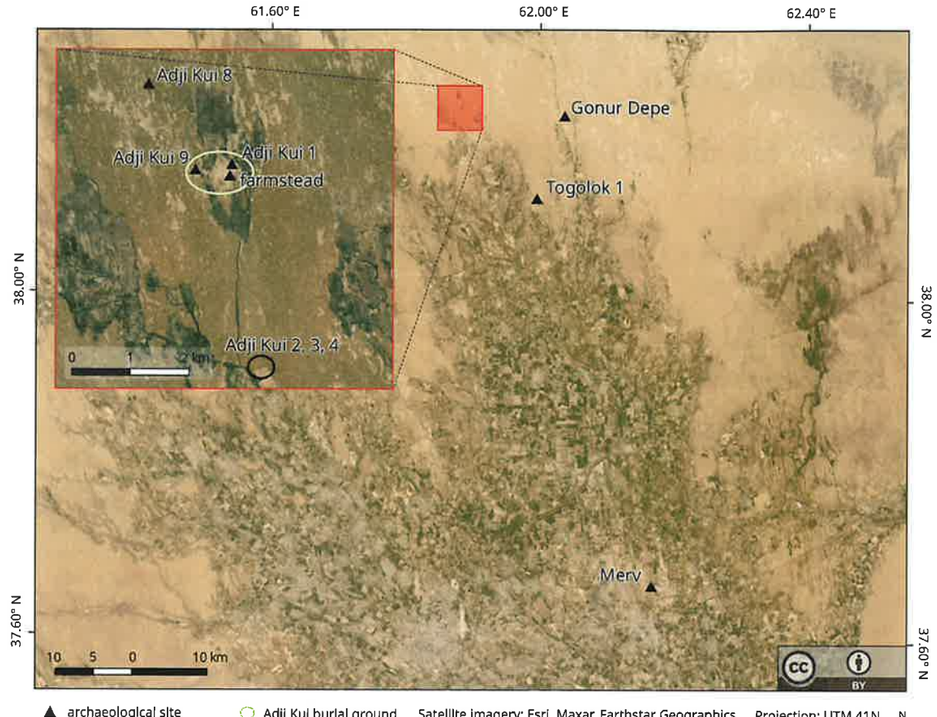


Fig. 1: Map of Margiana featuring the location of the Bronze Age Adji Kui site cluster, Gonur Depe and Togolok Depe, and medieval Merv (RUTISHAUSER/BONORA 2026, Zenodo, https://doi.org/10.5281/zenodo.17491807).

The Adji Kui site cluster comprises nine settlements situated in the lower reaches of the Murghab River, approximately 66 km north of the contemporary city of Mary and 13.7 km north-west of Gonur Depe, the most significant site of Bronze Age Margiana. These nine sites, representing distinct chronological phases within the Margiana Bronze Age sequence, were identified and first explored by I.S. Masimov in the years 1975–1976 (MASIMOV 1979: 114–117). The archaeological complex was then investigated further by V.I. SARIANIDI (1990: 8–10; 1998: 82, Fig. 37) and by S. Salvatori, who in 1997 excavated a trench (3 × 3 m) in both Adji Kui 1 and Adji Kui 9 (**Fig. 1**). SALVATORI (2002) analysed the findings and determined that Adji Kui 9 predates Adji Kui 1: the former was occupied during the late phase of the Middle Bronze Age, whereas the latter was inhabited in the Late Bronze Age. Salvatori provided two C14 dates for Adji Kui 1 and three for Adji Kui 9. Despite inconsistencies in two samples, a C14 dating from Adji Kui 1 confirmed an absolute chronology between 2150 and 2000 BCE, while two C14 dates from Adji Kui 9 indicated a chronological range of approximately 300 years, from 2300 to 2000 BCE.

A new phase of research commenced in autumn 2001, when the archaeological investigation of Adji Kui 1 and 9 was resumed by the Centro Studi Ricerche Ligabue, Venice, represented by Gabriele Rossi Osmida, in collaboration with the Ministry of Culture of Turkmenistan, initially represented by Berdy Udeumuradov and subsequently by Annamurad Orazov. After the Ligabue Centre ceased exploration in the Murghab alluvial fan, Rossi Osmida continued as an independent researcher in the study of both fortified settlements and the graveyard located between them, which was first discovered in 2001.

In October 2013, a team from the Department of History and Cultures at the University of Bologna, directed by Barbara Cerasetti, joined Rossi Osmida and Orazov in the ongoing study (CERASETTI/ROUSE/DE NIGRIS 2018; ROUSE/CERASETTI 2018; SPENGLER ET AL. 2018). Three trenches (1, 3, and 5) were excavated just outside the south-western corner of the fortified citadel at Adji Kui 1. Among the findings was a semi-subterranean dwelling typical of pastoral populations of the Eurasian steppe, along with numerous post holes drilled into artificial platforms. These features, associated with fireplaces and storage pits, suggest the presence of light structures such as tents or proto-yurts used by mobile pastoralists. Additionally, in trench 5, a fireplace yielded a significant amount of carbonised botanical material, including four small grains of broomcorn millet (*Panicum miliaceum*). Radiocarbon dating of these grains from the burnt area indicated a date range between 2210 and 1960 cal BCE at two sigma (3708±45 BP). Despite the difficulties in correlating from a stratigraphic point of view the sedentary occupations inside the walls of the fortified village and the nomadic occupation outside them, the dates seems to suggest that during the final centuries of the 3rd millennium BCE, the site was occupied by two groups of distinct cultural and socio-economic backgrounds: inhabitants of the Oxus Civilisation within the fortified settlement and a pastoral population along its periphery.

1 Adji Kui 1

The core area of the Adji Kui 1 site is represented by a "citadel" or "fortress", square in plan, with thick peripheral walls (1–3.2 m wide) and fortification towers flanking the central entrance in the southern wall. Inside the "citadel", groups of small residential and storage rooms were excavated along the walls. The storage rooms contained a great number of large pottery vessels, possibly for the use of the whole community, as indicated by the discovery of clay sealings. Nothing in this "citadel" represents any military function and the settlement was more likely a centre for trading agricultural and other manufactured products with close and distant neighbours.

About 150 m south of the Adji Kui 1 "fortress", a discrete anthropic hill, rising approximately 1.5 m above the level of the surrounding alluvial plain, revealed an architectural complex composed of a sizeable residential edifice with a trapezoidal layout. It comprised about 24 communicating rooms of varying dimensions, encompassing small, medium, and large spaces, alongside an extensive courtyard, designated as "courtyard A", situated in the southern portion of the architectural ensemble. The excavators have designated this complex the "farmstead".

2 Adji Kui 9

The walled citadel of Adji Kui 9 is located about 550–600 m west of the "citadel" of Adji Kui 1. Adji Kui 9 is a rhomb-shaped fortress (67 × 76 × 65 × 77 m) of ca. 0.5 ha. It is surrounded by a wall 1 m thick with rectangular towers (ROSSI OSMIDA 2007; 2011). A second, inside wall runs alongside it, separated from the first by a corridor 2 m wide, divided into rooms. Considering the twin towers found at the south-eastern corner and shaped as a "dovetail", it is possible that similar constructions were located at all four corners of the fortress. Taking into account fortresses of the same period discovered in south Turkmenistan, Uzbekistan, and north Afghanistan, the total number of towers could be as many as 20, with five on each side of the fortification. The only entrance into the fortress, flanked by two towers, is narrow, with a high doorstep (20–27 cm) and therefore was primarily meant for pedestrians and not for carts or carriages. A large interior courtyard was later occupied by buildings with the typical Oxus Civilisation layout (i.e. separate households located along peripheral corridors and grouped around interior courtyards). Craft activities involving metalwork and pottery have been identified outside the fortress.

3 The Adji Kui burial ground

Between the "fortress" of Adji Kui 1, the residential complex or farmstead, and the "fortress" of Adji Kui 9, an area of about 2 ha, used for several decades as a burial ground, was excavated from 2001 to 2011 (BONORA ET AL. 2024). Mostly it consisted of graves; however there also were several constructions such as empty pits, pits for water, and fireplaces which were located right beside the burials and apparently somehow related to the funerary rituals. All these structures were identified as *extra moenia* graves, while the *intra moenia* graves were burials excavated in the floors and walls of rooms and corridors of both citadels and the residential complex. The total number of the *extra* and *intra moenia* graves, and pits with different purposes, identified and excavated was 817.

During the last centuries of the 3rd millennium BCE, the inhabitants of Adji Kui practised, more or less contemporaneously, inhumation both in the abandoned residential structures of the fortified villages as well as in the empty ground between them. This was a typical behaviour of the Bronze Age communities of the Oxus Civilisation, as attested at other sites such as Dzharkutan, in southern Uzbekistan, where there was contemporaneity between the *intra* and *extra moenia* burials (ASKAROV/ŠIRINOV 1993: 46–47). The question of contemporaneity or non-contemporaneity between the *intra* and *extra moenia* burials at Adji Kui is not easy to resolve since most of the *intra moenia* tombs contained skeletons of infants and children without funerary equipment, which is very useful, if not necessary, for a preliminary chronological determination. The very few *intra moenia* burials with ceramic vessels and other funerary equipment show the same and equivalent typologies found among the grave goods of the *extra moenia* tombs, suggesting an absolute contemporaneity between them.

Fig. 2: Pottery inventory consisting of five conical cups, two storage jars, a large tulip-shaped jar, and a truncated-conical bowl from grave 126.AK1 (photograph by the author, 2010).

Unfortunately, at Adji Kui numerous burials were looted in the past, and many were either partially or ruinously damaged by agricultural work and ploughing carried out by local farmers in the 1960s and 1970s. Such was also the case at the graveyard of Gonur Depe, located only 14 km to the east and excavated first by S. Salvatori and then by V.I. Sarianidi. Grave pillage at Gonur involved the entire burial ground and had a systematic character (Salvatori 1993; 1994; 1995a; Sarianidi 2002a; 2007).

Despite this, funerary contexts and materials in a fairly good or perfect condition of preservation were found in about 35% of the excavated graves of Adji Kui. They were characterised by well-preserved funerary structures, skeletons lying in their original position on the right-hand side facing south-west and with inventories composed of several artefacts, some of which were of great distinctiveness and richness.

4 Pottery production

The ceramic corpus is represented by more than 1,300 relatively complete vessels. They were manufactured in buff and red ware, in black burnished ware, and in handmade grey/black ware. Vessels manufactured in buff and red ware, without painted decoration or incised or grooved ornamentation, predominated in the pottery production (**Fig. 2**), while black burnished pots and the handmade grey/black ware, also without decoration, were both very rare. The number of pots found in very bad conditions of preservation and partially or completely fragmented is very high.

Of the Incised Coarse Ware of the Arkaim–Sintashta and Andronovo (Petrovka, Alakul' and Fëdorovo) cultural traditions that spread across the Eurasian steppes in the Middle and Late Bronze Age, not one vessel or sherd is documented in the burial ground of Adji Kui. This could be interpreted as evidence of the fact that life in both fortified villages ended before the beginning of the slow and gradual infiltration in Southern Central Asia of the mobile pastoralists from the Eurasian steppe. The starting point of this process of intrusive movement or migration of nomadic herders was dated chronologically to the final phase of the Late Bronze Age, from around the start of the second quarter of the 2nd millennium BCE (about 1800–1500 BCE). This is according to the dating of the campsites of Gonur North, Ojakly (site 1744), and Chopantam (sites 1211 and 1219), all in Margiana (Hiebert 1994a; 1994b; Cattani 2008; Salvatori 2008; Frachetti/Rouse 2012; Rouse/Cerasetti 2014; Bonora 2021).

Recently, this chronological picture has been substantially changed by the discovery of a semi-subterranean sunken dwelling or pit-house, and several post holes, storage areas, and fireplaces relating to non-permanent living structures such as tents or huts near the south-western corner of the fortified village of Adji Kui 1. As already stated, despite the difficulties in correlating from a stratigraphic point of view the sedentary occupation inside the walls of the fortified village and the nomadic occupation outside them, the nomadic phase was dated to the late period of the Middle Bronze Age: between 2210 and 1960 cal BCE at two sigma (3708±45 BP). Sedentary and nomadic groups were then living contemporaneously in the same physical space and shared an unconscious degree of integration, including not only residential proximity, but also ceramic production and eating habits (Cerasetti/Rouse/De Nigris 2018; Rouse/Cerasetti 2018; Spengler et al. 2018). Nevertheless, taking into account the analysis of the burial ground and the finds of funerary equipment, we have to stress that no evidence of cultural integration and social coexistence between the sedentary and nomadic groups has been shown or suggested by the finds from the necropolis, where, from the more than eight hundred graves

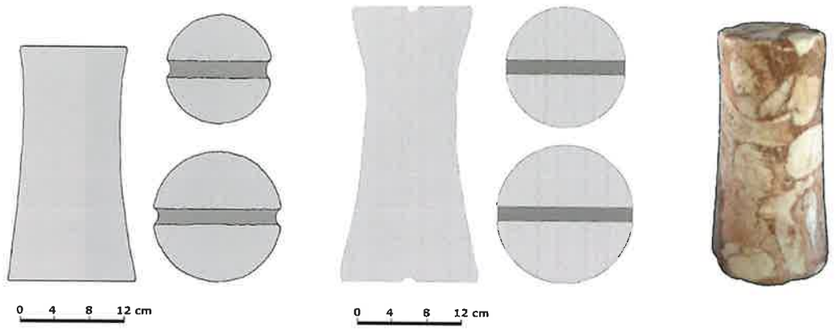


Fig. 3: Miniature stone columns respectively from grave 7.01, grave 328.07, and grave 441.07 (photographs and drawings by the author). The last is not in scale.

excavated, the typical objects of the mobile steppe pastoralists – coarse ceramic vessels decorated with incisions, grooves and comb-stamped patterns, as well as trumpet-shaped earrings, metal weapons such as daggers, spearheads and socketed axes – were completely absent. Furthermore, evidence of funerary practices carried out by a mobile community that was coexisting with the settled community may need to be sought elsewhere. However, the interpretation of these complex and, at times, contradictory data is challenging, necessitating more comprehensive analysis and reflection, particularly regarding the concept of mobility between Adji Kui in Margiana and the Eurasian steppes at the end of the 3rd millennium BCE. In terms of assessing the extent of social and cultural mobility towards the north, specifically towards the Eurasian steppe, it must be concluded that the Adji Kui burial ground provides no supporting evidence. Based on the available data, it is reasonable to infer that the mobile pastoralists from the Eurasian steppe arrived at Adji Kui after settled life in both walled villages had already come to an end.

Besides the ceramic vessels, analysis of other artefacts from the Adji Kui graves, such as the stamp seals in metal and stone (Bonora et al. 2021a; 2021b), allows us to state that the material culture from the Adji Kui graves belongs completely to the first phase of evolution and development of the Oxus Civilisation, when southern Central Asia and Middle Asia[1] were tightly linked economically, socially, and culturally: in these regions in the late 3rd millennium BCE the mobility of people, goods, and technologies was extremely high and multidirectional, also affecting the regions of the Indus Valley to the east, and Mesopotamia, Anatolia, and Egypt to the west. A decisive impetus in this respect was furnished by the domestication of the camel: the "ship of the desert" became the main means of transport, greatly increasing the mobility of the population and playing an essential role in the continuous development of long-distance trade. In the same period, a new type of transport vehicle appears, namely, four-wheeled wagons drawn by camels, or, less commonly, by bulls.

5 Miniature stone columns

Three miniature stone columns were found in three different graves: 7.01, 328.07 and 441.07. While the last find was not described and measured, the first two columns[2] were decorated with grooves on their tops and bases while their sides were not ornamented (**Fig. 3**). These enigmatic artefacts, made of assorted stones, have frequently been found in illegal excavations, more rarely in scientific researches. Some were discovered in the ruins of presumed cultic buildings of the Middle and Late Bronze Age at Tureng Tepe and Tepe Hissar, both in north-eastern Iran (Schmidt 1937: 216–219, Figs. 96–99, 132; Deshayes 1977b: 99, Fig. 4; Gürsan-Salzmann 2016: 32; Bessenay-Prolonge/Vallet 2019: Fig. 8), and Ulug Depe, Altyn-Depe, Gonur Depe and Togolok 21 in Southern Turkmenistan (Sarianidi 1986a; 1990; 1998a; 2002a; 2007; Sarianidi/Dubova 2010; Mas-

1 I define southern Central Asia as the geographical area comprising Turkmenistan, Uzbekistan, and Tajikistan, while Middle Asia encompasses Iran, Afghanistan, Pakistan, and western India as far as the Indus River Valley.

2 Stone column (7.01-1) from grave 7.01 – height: 27 cm; diameter of the top: 12.4 cm; diameter of the base: 14.8 cm; stone column (328.07-1) from grave 328.07 – height 32 cm; diameter of the top: 14 cm; diameter of the base: 16 cm.

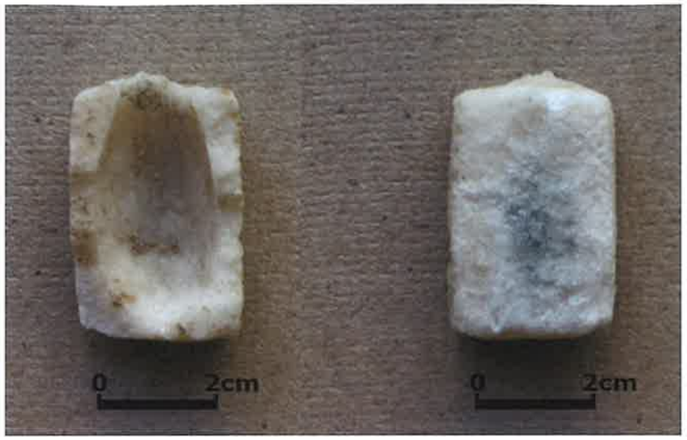


Fig. 4: Fragmentary square-sectioned phial in gypsum from grave 389.07.
Left: view of the inner receptacle. **Right**: view of a side of the phial (photographs by the author).

SON 1988: 65–68, Figs. 21–22, Pl. 35:1–3; MASSON/BEREZKIN 2005: 31, 39, 41, Pls. 44.3, 47.2, 63b, 70; LECOMTE 2006: 20; BENDEZU-SARMIENTO 2010: 526, Fig. 15; GASS/MASANZ 2018: 228–229). Others were found in elite burials of the same periods, at Shah Tepe (ARNE 1945: 149, Pl. 26, Fig. 195), Shahdad, Damin (TOSI 1970: 48, Figs. 19, 55), Tepe Hissar and Altyn-Depe, in the Quetta valley of Baluchistan (JARRIGE/HASSAN 1989: 153, Figs. 4–5), on the edges of the Dasht-i Lut and Dasht-i Kevir, and in a recently discovered cemetery near Nikshar (Iran), not far from the shores of the Strait of Hormuz. Considering that, unlike the equally enigmatic lock-shaped stone handbags and weights (BONORA 2021: 760–761; 2022), not one miniature column, grooved or plain, has so far been found across the Eurasian Steppe, it seems clear that their diffusion highlights the extent of the mobility as well as the social and cultural influence of the Oxus Civilisation communities towards the south and south-east as well as towards the Indo-Iranian borderland.

6 Phials

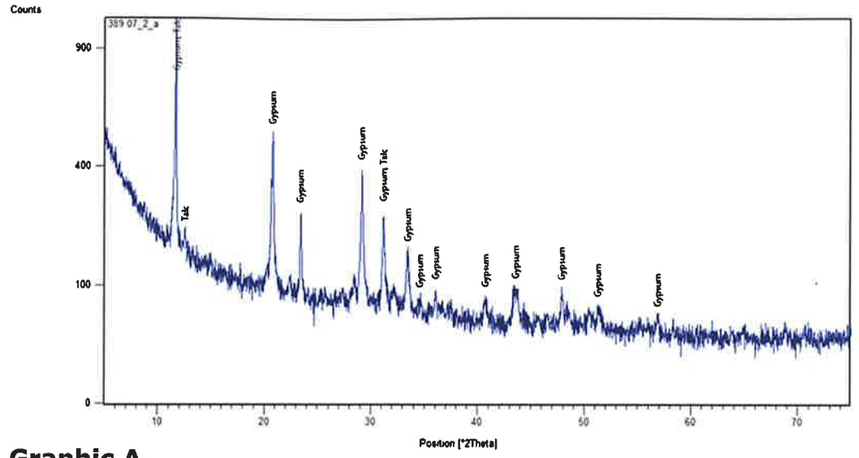
A number of small containers for cosmetic or therapeutic substances have been unearthed at the Adji Kui burial site (BONORA ET AL. 2021a). These phials are made of various materials, including metal (copper or bronze), faience, and stone. It is hypothesised that the metal phials may have been intended for a specific type of substance, while those made of calcite alabaster, terracotta, or faience were likely used to hold a different kind of material. However, this assumption remains speculative in the absence of chemical analyses to identify any preserved contents within these vessels. Although the prevailing scholarly view favours the hypothesis that these containers held cosmetic substances, a chemical analysis conducted by the Laboratory of Moscow University identified the contents of a bottle from Gonur as *Artemisia*, a herb known for its versatile applications, including medicinal use (SARIANIDI 2007: 92).

By the late 4th millennium BCE, the production and trading across Southern Central and Middle Asia of lead- and copper-based cosmetic substances had become an important social and economic activity. Cosmetic containers represented a wide, diversified class of small copper or bronze receptacles very common in the Oxus Civilisation (PITTMAN 1984: 42–46; AMIET 1988: Fig. 11; LIGABUE/SALVATORI 1988: Figs. 80–83, 107). Their contents are "most likely black paint made of a lead-based paste. Many of them still contain a white, powdery, oxidized residue of the ointment" (PITTMAN 1984: 42). This white substance, in light of our present knowledge, could be lead carbonate (cerussite and/or hydrocerussite) and/or laurionite, components of white foundations and eye-shadows artificially made by treating lead compounds in saline or carbonate solutions (BENOIT 2010; VIDALE ET AL. 2012).

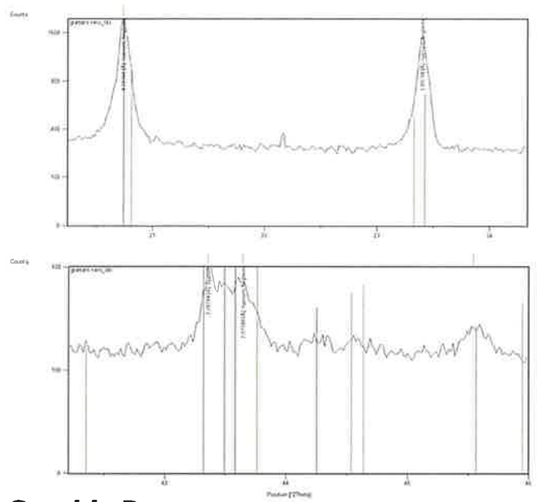
Grave 389.07 of Adji Kui hosted an individual about 35–45 years old. The funerary inventory consisted of a bell-shaped cup on low stem in buff/red ware (389.07-1), highly fragmentary, and a square-sectioned phial[3] in gypsum (389.07-2). Unfortunately, the stone container was also fragmentary: only half (lengthways) is preserved (**Fig. 4**).

Immediately after its discovery the stone phial was described by the excavators as an artefact in alabaster without any other further specification.

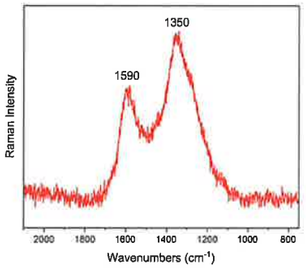
3 Height: 4.3 cm; length: 2.8 cm; width: 2.9 cm.



Graphic A



Graphic B



Graphic C

Fig. 5: Analytical investigations of the stone phial and its content.
Graphic A: XRD pattern of bulk dominated by Bragg peaks of gypsum and talc. In **Graphic B** the marker peaks of gypsum (red line) and of anglesite (green line) are present. **Graphic C**: Raman spectrum collected on the neck of the stone container; the band visible at 1590 cm^{-1} and 1350 cm^{-1} can be ascribed to a carbon-based black pigment.

Alabaster, calcite, alabaster calcite, marbled alabaster, chalk, and gypsum: these names have been freely applied in past literature to a wide range of important artefacts of the Bronze Age in Middle Asia by archaeologists and writers of archaeological narratives without any consistency, or, in other words, without any petrographic or other mineralogical investigation.

The XRPD analysis (X-Ray Powder Diffraction) performed in the Milan laboratory of the ISPC[4] demonstrated that the phial was made out of a raw stone composed of gypsum, as a primary mineral compound, and talc, as a secondary mineral

4 The Institute of Heritage Science of the CNR (National Council of Research). The XRPD analysis was carried out by C. Colombo, the micro-Raman analysis by C. Conti and A. Botteon. I extend my heartfelt thanks to them for providing me with this data.

Fig. 6: Hemispherical bowl with rounded base in chlorite from grave 5.03. The rim is decorated with a frieze of "dot-in-circle" motifs framed by two parallel incised lines (photograph by the author).

compound (**Fig. 5: Graphic A**). Moreover, this analysis highlighted the presence of anglesite, lead sulphate ($PbSO_4$), inside the neck of the stone container (**Fig. 5: Graphic B**). A subsequent micro-Raman analysis, conducted in the same laboratory on multiple spots of the stone container's neck, detected the presence primarily of black carbon (potentially graphite), and more rarely of wulfenite, a lead molybdate ($PbMoO_4$) (**Fig. 5: Graphic C**).

According to the analytical results collected, the presence of anglesite could be explained in three different ways: first, the anglesite could have been naturally present in the rock used to manufacture the container, as were gypsum and talc; secondly, the anglesite could have been present as a degradation of the raw material, i.e. gypsum, in association with a lead-bearing element such as wulfenite, which was detected by the micro-Raman analysis; and thirdly, the anglesite could have been added on purpose by the craftsman who produced the cosmetic or therapeutic substance contained in the small stone bottle.

Considering that anglesite was always detected in co-presence with black carbon on several spots of the inner neck of the phial, we may surmise that the deliberate mixture of pulverulent white powder (anglesite) and black powder (a pigment made from carbon) was probably intended to obtain a shade of grey for a dark eye make-up resembling kohl.

Substances such as lead carbonate (cerussite and/or hydrocerussite) and sulphate (anglesite), and black carbon pigments were also used in pre-Dynastic and Dynastic Egypt as well as in the Ur necropolis and in the Indus Valley for the preparation of several cosmetic and/or therapeutic products (Nicholson/Shaw 2000; Benoit 2010; Vidale et al. 2016). Moreover, our analysis of the content from a gypsum flagon from grave 389.07 documents that by the end of the 3rd millennium BCE Adji Kui was part of a very widespread cultural tradition of the production of kohl that extends as far as Egypt and Mesopotamia as well as across the whole Iranian plateau; this being an ancient eye cosmetic used as protection against eye ailments caused by excessive sun, dust, sand, and small insects, as an eyeliner to outline and/or darken the eyelids, and as a mascara for the eyelashes.

7 A chlorite vessel with dotted decoration beneath horizontal lines from grave 5.03

A hemispherical bowl of chlorite with a rounded base[5] (5.03-6) was found in grave 5.03 of Adji Kui (**Fig. 6**). Its rim is decorated by a frieze of "dot-in-circle" motifs framed by two parallel incised lines (Bonora et al. 2024). The stone container was held in the right hand of a 30- to 40-year-old female who was buried in a cist grave with walls of mudbricks and rammed earth. The funerary equipment in grave 5.03 was rather rich and consisted of five ceramic vessels; two biconical spindle whorls

5 Height of the stone bowl: 6.1 cm; diameter of the mouth: 8.4 cm; maximum diameter: 9.9 cm; diameter of the base: 2 cm.

Fig. 7: Two buckle-shaped ingots in lead from cenotaph grave 7.01 (photograph by the author).

in stone, respectively chlorite and white-and-pink mottled stone; two pin-heads, respectively of ivory and bone; a bronze applicator for cosmetics; and a truncated-conical, square-sectioned phial of alabaster calcite, decorated by six "dot-in-circle" patterns on each face of its body. Additionally, the skeleton of a goat was found in the north-western corner of the cist.

Taking into account the sizes and shape of the pot (a bowl with restricted mouth and rounded base), the material this item was made of (chlorite or soft stone), and the decoration under the rim ("dot-in-circle" motifs beneath horizontal lines), the vessel from grave 5.03 of Adji Kui finds analogies and similarities in some artefacts from sites very far from Margiana. The first comparison is represented by a soft stone bowl with double-dotted circle decoration found at Mohenjo-daro, in Pakistan (Cleuziou/Tosi 2007: Fig. 189), while several analogies con be detected with bowls in soft stone from Tarut, an island in the Persian Gulf (Zarins 1978: Pl. 70/252; Pl. 70/565; Pl. 70/586; Pl. 70/40; Pl. 70/594). The soft stone bowl from Susa in Elam (de Miroschedji 1973: Fig. 8) is the artefact closest to our Adji Kui specimen. The suggestions from the comparative analysis attest to the tight interconnectedness of the Bronze Age societies in southern Central Asia and Middle Asia and are witness to mobility and communication across vast distances, involving ship crossings and overland travel, shortly before 2000 BCE.

8 Ingots in lead from grave 7.01

Two buckle-shaped ingots in lead[6] were found in cenotaph grave 7.01 (**Fig. 7**). The ingots were found in association with a stone miniature column and a fragmented chlorite sceptre with a top decorated by a discoidal lead knob (Bonora et al. 2024). The presence of lead in the prehistory of Central and Middle Asia is a question that is difficult to resolve because it is practically impossible to identify it without specific chemical analysis. A thick greyish-brown lead wire, made of two braided strands and weighing 8.7 g, was found among the metal objects at the Sintashta culture settlement of Kujsak, located in the Trans-Ural region of the northern Eurasian steppe (Zaykov et al. 1999; Bonora 2021). The analysed microprobe showed that the specimen consisted of practically pure lead. From this analysis and the morphology of the objects, it was concluded that the material had come from what was originally a rod-like ingot. The lead was probably obtained from pure galena, the typical source for this metal in ancient times. The find was interpreted as evidence of the relationship between the vast regions of the central Eurasian steppe and Central Asia. In addition, the hypothesis of a possible import from the south, especially from the Zeravshan Valley (Anthony 2007; 2009), could not be set aside because lead had never before been found in the northern steppes as a pure metal. It was common at Sarazm, where some ingots of lead weighing 10 kg were found (Besenval 1987: 455), as well as in Bactria, where two lead discs from the Bactrian antiquarian market were published by M.H. Pottier (1984: 43, Nos. 290–291, Pl. 35, 290, Fig. 41.291). Each had a profiled lead handle, while their body was flat and decorated with five regularly spaced eight-pointed cruciform openings and a central circular opening. Possibly, they were ingots like the buckle-shaped artefacts from grave 7.01.

6 Buckle-shaped ingot in lead (7.01-3) – maximum diameter: 18.4 cm; minimum diameter: 17.7 cm; thickness: 2.5 cm. Buckle-shaped ingot in lead (7.01-4) – maximum diameter: 21 cm; minimum diameter: 18.7 cm; thickness: 2–2.5 cm.

Fig. 8. Photo mosaic of five different microbeads in faience from grave 6.A.
Microscope images of the samples at 32x magnification (photograph by the author).

However, objects made of lead and litharge (lead oxide, PbO), improperly called "ingots", as well as bits of galena ore, were also found along the eastern foothill plain north of the Kopet Dagh, both at Ilgynly Depe, dated to the 4th millennium BCE, and Altyn-Depe, dated to the second half of the 3rd millennium BCE. In both cases, they were discovered on the site surface (Salvatori et al. 2002; 2009). These finds suggest refining processes of lead and/or silver. An object in lead, identical to our ingots from 7.01, came from an illegal dig in Bactria (Sarianidi 1988: 116, Fig. 7:6), while two others, very similar to our items, but without the handle along the diameter, were found in cenotaph #728 (Sarianidi 2007: 81) and in pseudo-catacomb grave #500 of Gonur Depe. Here, they were associated with a long sceptre, or command stick, in greenish steatite (or chlorite) provided with a pommel in lead (Rossi Osmida 2002b: 90–91). Two different graves, 7.01 of Adji Kui and #500 of Gonur, from two sites very close each other, showed the same association between a round ingot in lead, a crucial resource for metal production and consumption, and a command stick in soft stone with lead top, a symbol of power and high rank. As has been stated in important research and publications of recent decades (Černyh/Kuzminyh 1989; Boyle/Renfrew/Levine 2002; Peterson/Popova/Smith 2006; Kohl 2007; Frachetti 2008; Hanks/Linduff 2009), the Middle and Late Bronze Age cultural horizons, documented across the Eurasian expanses, were characterised by important social, economic, and technological developments. These included, among other things, transitions in metallurgical technology, mining, and the exploitation of new sources of copper, tin, and lead ores, the growth in micro- and supra-regional trade and commercial relations between communities, an increase in the scale of warfare and, above all, competition, interaction, and control over vital resources such as animals and metals. Bronze Age societies of the steppe and the sown were based on forms of complex economic organisation and political leadership, structured according to institutionalised hierarchies and often renegotiated. It was a time when much of the power was held by those who mined the ore and smelted it for metal manufacturing, who would have produced, among other artefacts, ingots in lead such as the items from grave 7.01.

9 Steatite microbeads from grave 6.A

Grave 6.A was excavated in autumn 2007 (Bonora et al. 2024). It consisted of a mausoleum with walls of mudbricks, made up of a large burial chamber without a dromos. It hosted a female of about 45 years old. The funerary inventory consisted of 11 ceramic vessels, a cylindrical small lid with concave walls and rounded base, a bracelet, an earring and two rings in bronze, a biconical spindle-whorl in chlorite decorated on both faces by three "dot-in-circle" patterns, and two annular and two disc-shaped inlays in calcite or other material (ivory? bone?). Moreover, there were thirty ring-shaped beads in steatite, as well as a barrel-shaped bead in faience, an ovoidal bead in steatite, and thousands of tube-shaped microbeads in whitish and light blue faience (**Fig. 8**).

All the beads, microbeads, and inlays were found hidden in a pear-shaped jar with flaring rim, in buff/red ware, which was in the upper part of the infill of the mausoleum, about 60–70 cm above the layer of deposition of the female skeleton. This vessel was the only one found in the infill; a globular storage jar was found in the niche or window of the northern wall, while a vase on high stem was found in the niche or window of the eastern wall. All the other vessels were lying on the deposition floor near the skeleton, in the two spaces dedicated to the funerary offerings: along the eastern wall and close to the southern wall.

Microbeads were till this point completely unknown in prehistoric Margiana, while they are known from several different Bronze Age sites of the Indus Valley as well as from a burial of the Mesopotamian city of Ur that belonged to a wealthy individual according to the interpretation of its excavator (Woolley 1934: 149; Beck 1940: 395–396, Pl. 114, Fig. 10). In the Indus Valley, they were unearthed in a burial at Harappa (Kenoyer 1992: 91), where they created an elaborate headdress or decorated the hair of the inhumated person. This type of bead tends, however, to be found cached (by the thousands or tens of thousands), as in the case of grave 6.A of Adji Kui, in small vessels such as those recovered at the sites of Lothal (Rao 1979: 583), Zekhada (Momin 1980), Kanmer (Endo et al. 2012: 563), Kuntasi (Dhavalikar 1996: 200), and Chanhu-daro (Mackay 1937: 10). That Harappans and inhabitants of Adji Kui hoarded steatite microbeads in the same way that they did precious metals or fine hard stone beads is no doubt indicative of their great value. Other microbeads were found at Lakhan-jodaro and in an unnamed prehistoric site in the Loralai District of northern Baluchistan (Law 2018).

Till now, these diminutive ornaments have been considered a typical artefact of the master craftsmanship of Indus Valley artisans, which was exported to Mesopotamia. However, this discovery from Adji Kui completely changes the picture. And additionally, it is important to add that R. Pumpelly and L. Warner unearthed something very similar to microbeads while excavating skeleton no. 9 at Anau North in 1904. Unfortunately, we cannot be sure that numerous microbeads were already found at the beginning of the 20th century in south Turkmenistan because neither drawings nor photos

were published, but the description of the minuscule finds is surprisingly promising: "In the softer earth about the pelvis and lower limb-bones, I took out 1066 minute white beads, apparently of stone. They were cylindrical, about 1/16 inch [1.57 cm] in diameter and length, and so delicately bored that a very fine needle was required to thread them. Their presence on the leg-bones and pelvis, and their absence on the upper parts of the body suggests that they might have been sewn to a girdle to other garment, and not used in strings ..." (Hiebert et al. 2003: 123). These microbeads were not cached in a vessel, but served as ornaments, as in the case excavated by J.M. Kenoyer at Harappa. At Anau North, the burial was dug in terrace V at a height of 29 feet (8.8 m) and is associated with period Anau IIA of the cultural evolution of the site established by Pumpelly and his colleagues. From a chronological point of view, this burial is very early as it is dated to the last two or three centuries of the 4th millennium BCE.

While there is variability in the average dimensions of microbeads between Ur, Anau and the sites of the Indus Valley, they all share one thing in common – they are astonishingly small. No item in the corpus of material culture from Central and Middle Asia in the late 4th to 3rd millennium BCE reflects the technological prowess of craftspeople and their penchant for miniaturisation so much as the microbead. It would have required craftsmanship of the highest order combined with extraordinarily good eyesight to fashion such delicate ornaments. And this assessment is true also for the tube-shaped microbeads from grave 6.A of Adji Kui: their length ranges between 0.12 and 0.28 cm, their thickness between 0.11 and 0.18 cm, while the diameter of the hole is between 0.05 and 0.08 cm.

The mobility of goods between Mesopotamia, the Indus Valley and southern Turkmenistan was already known thanks to the study of steatite stamp seals with geometric patterns and animal images, etched carnelian beads and other precious beads in carnelian, jasper, and other stones, small stone human and animal sculpture, and ivory gaming pieces (Frenez 2018). Now, we have another piece (the faience microbeads) to add into our puzzle, bearing in mind that we do not know for certain the direction of movement. Taking into consideration that most of the microbead finds are dated to the second half of the 3rd millennium BCE, and more precisely to the last two centuries of the 3rd millennium (the only exceptions seem to be represented by the microbeads from skeleton no. 9 of Anau North, dated to the late 4th millennium, and from the Loralai site, near Rana Ghundai, which may possibly date to the late 4th to early 3rd millennium), we are unable to state anything concrete about the first origin of these microbeads, that is whether they are of Indian origin, as we all thought until now, and then exported to southern Turkmenistan, Margiana and Mesopotamia, or whether the opposite is true. And again, it is not possible to say whether in the late 4th to 3rd millennium BCE there were different production centres of microbeads in Mesopotamia, Central Asia, and along the Indus Valley, each of which may have had specific features and its own characteristics while sharing the same technology, about which we know very little today.

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