Manufacturing and trade of Asian elephant ivory in Bronze Age Middle Asia. Evidence from Gonur Depe (Margiana, Turkmenistan)

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1. Introduction

This study of a significant collection of artifacts made from the ivory of Asian elephants (Elephas maximus Linnaeus, 1758) discovered at the Oxus Civilization site of Gonur Depe in southern Turkmenistan is part of wider research by the author about trade exchanges and cultural interactions between the greater Indus Valley and other regions of Middle Asia during the Bronze Age, which is based on a comprehensive review of the published archaeological and textual evidence upgraded through new detailed studies of specific groups of materials (Frenez, 2011; Frenez and Vidale, 2015; Vidale and Frenez, 2015; Frenez et al., 2016; Frenez et al., in press) (Fig. 1).

The objects in Asian elephant ivory found at Gonur Depe have already been partially published and briefly described in several volumes and papers by the late Professor Victor I. Sarianidi (2002a, 2005, 2007, 2008, 2010). In October 2008, the author documented in detail all ivories from Gonur Depe available in Ashgabad at the National Museum and at the Museum of Fine Arts and in Mary at the Regional Museum. The study combined morphological and stylistic analyses with the examination of the manufacturing traces still visible on the objects. Artifacts of Asian elephant ivory found at Bronze Age sites west of the Indus Valley are usually considered as evidence for the import of finished items from the Indus region (Cleuziou and Tosi, 2000: 27–30, pl. 32; Sarianidi, 2002a: 154; Döpper and Schmidt, 2013: fig. 10). In specific cases, scholars have proposed that ivory objects obtained from the Indus Valley were reworked locally to be eventually remarcketed (Potts, 1993, 1994, 2000: 126–127). This systematic examination of the Asian elephant ivory artifacts found at Gonur Depe provides evidence for a much more complex model of production and exchange of these prized objects and solid new data for future research on the subject.

2. The Indus Civilization and its external trade

The Indus (or Harappan) Civilization, developed along the Indus River basin and in the neighboring regions of present-day Pakistan and northwestern India between ca. 2600/2500–1900 BCE, was acknowledged almost one century ago as a cultural complex contemporaneous to the other Bronze Age state-level urban civilizations in Egypt, Mesopotamia, and the Iranian Plateau (Marshall, 1924; Lahiri, 2006). Nonetheless, due to the lack of success in decoding its writing system, fundamental aspects of its ethnolinguistic, sociopolitical and economic organization – and their development through time – remain still rather
elusive.

The study of interactions between the greater Indus Valley and other regions and polities of Middle Asia has played a central role in research about the Indus Civilization from its very beginning. The protohistoric dating of this cultural complex was in fact first proposed on the basis of parallels between the inscribed seals that were coming to light at Harappa and Mohenjo-Daro and those previously found in Iran and Mesopotamia (Mackay, 1925; Gadd, 1932). Moreover, by the middle of the twentieth century and as a consequence of the still prevailing colonialist environment of the time, the large urban centers of the Indus Valley were being interpreted as a secondary urban phenomenon deeply influenced by more advanced ‘western civilizations’ (e.g., Wheeler, 1968: 25 and 135).

Today, it seems evident that the development of this protohistorical urban culture in the greater Indus Valley represented only the apex of local traditions with roots back into the Neolithic period (Jarrige, 1991; Meadow, 1998; Possehl, 1999). The Indus Civilization resulted in fact from a long process of coherent selection, assimilation and eventual crystallization of cultural traits from different regional cultures spread over a vast and highly differentiated territory. The rapid inclusion of these communities as part of an integrated sociopolitical, economic and cultural superstructure took place in the centuries between ca. 2800 and 2600/2500 BCE (Algaze, 1993: 224–225; Durrani et al., 1995; Kenoyer, 2001; Vidale, 2005a). During these formative phases, there is discontinuous evidence for long-distance interactions between the greater Indus Valley and southeastern Iran, Mesopotamia and Central Asia (Cortesi et al., 2008; Kenoyer, 2008; Jarrige et al., 2011; Frenez, later in this paper). In the second half of the third millennium BCE, the Indus centers played instead a central role in defining, promoting and possibly regulating trade exchanges throughout the entire Middle Asia (Chakrabarti, 1990; Tosi, 1991; Possehl, 1996; Ratnagar, 2004; Kenoyer, 2008; Frenez, 2011; Frenez et al., 2016; Méry et al., 2017), with Indus artifacts that eventually reached the Near East and the eastern Mediterranean (Peyronel, 2015; Ludvik et al., 2014; Ludvik et al., 2015).

From 1900 BCE, the Indus Civilization began disaggregating as an integrated cultural and socioeconomic system and by 1500 to 1300 BCE the region returned to be a mosaic of local cultures each with specific cultural traits (Shaffer, 1993; Possehl, 2002: 237–245; Kenoyer, 2005). External trade suffered from the gradual political and economic decline of the Indus Civilization, which led to the temporary disruption and eventual reorganization of the major interregional networks (Ratnagar, 2004: 283; Kenoyer, 2004; Reade, 2008: 16–17).

Commercial exchanges between the Indus Valley and Central Asia have already been broadly discussed in the general picture of long-range trade during the Bronze Age (Masson, 1981; Possehl, 1996, 2002: 229–235; Kenoyer, 2004; Kaniuth, 2010; Vidale, 2017: 43–56). Moreover, the development of reciprocal cultural influences between these two regions in the last centuries of the third and the first half of the second millennium BCE has also been discussed (Ardeleanu-Jansen, 1991; Winkelmann, 1994; Possehl et al., 2004). However, the organization and mechanisms of implementation of these relations have yet to be precisely decoded. The information obtained from the ivory objects found at Gonur Depe provides solid data for better defining the strategies of cosmopolitan interaction developed and applied in Middle Asia during the Bronze Age.
3. Exchanges and interactions between the Indus and Oxus Civilizations

The Oxus Civilization — after the Greek name of the Amu Darya River — is also known as the Bactria-Margiana Archaeological Complex or BMAC. This civilization included the large urban centers and rural settlements that flourished between ca. 2400 and 1600 BCE in the alluvial basin of the Amu Darya river in the northern plains of Afghanistan (ancient ‘Bactria’ of the Achaemenids) and in the endorheic alluvial fan of the Murghab river in southern Turkmenistan (ancient ‘Margiana’), with extensions into southern Uzbekistan and western Tajikistan (Hiebert, 1994; Lamberg-Karlovsky, 2003, 2013; Vidale, 2017; for an updated chronology of Central Asia framing the Oxus Civilization in the ‘unbroken’ cultural evolution of the region, see Vidale, 2017: 8–10, 18 and Table 1).

In the last centuries of the third millennium BCE, the urban centers of the Oxus Civilization developed intense commercial and cultural exchanges with the neighboring regions of the Indus Valley and the Iranian plateau, but also with Mesopotamia, the Levant, and the Gulf region, probably fostered by the existence in the mountains of Central Asia of abundant sources of precious stones and minerals that were not present in the alluvial basins of the great rivers (Potts, 1993, 1994; Kohl, 2007: 244–260; Bushmakin, 2007; Salvatori, 2008; Kaniu, 2010; Vidale, 2017: 44–56). However, the discovery in Bactria and Margiana of seals and tablets bearing geometric and animal motifs that have direct parallels in the Early Harappan levels of Harappa, Kunal, Rehanm Dheri and other contemporaneous sites in northern Baluchistan, might predate the beginning of contacts with the Indus Valley to the first half of the third millennium BCE (for the seals in Bactria and Margiana, see Sarianidi, 1998: cat. no. 1324, 1325, 1345–1354; Masimov and Salvatori, 2008; 102 and fig. 7.5.1; for those in the Indus Valley and Baluchistan, see Alchin, 1986; Durrani et al., 1994–95; Kenoyer, 2001; Khatri and Acharaya, 2005).

Unfortunately, most of the objects testifying to commercial and cultural relations between Central Asia and the Indus Valley appeared in the antiquities market deprived of associations and discovery contexts (Liguibue and Salvatori, 1989; Sarianidi, 1998; Winkelmann, 2004; Vidale, 2017). A number of new finds, however, have been recovered during archaeological excavations at Gonur Depe, Altyn Depe, Kelleli 6 and Adji-Kui 9, in Margiana, and at Dashly-3 and Dzharkutan, in Bactria (Rossi Osmida, 2007, 2011; Kaniu, 2010; Lamberg-Karlovsky, 2013). Indus artifacts discovered in Bactria and Margiana consist mainly of ornaments made from semiprecious stones and faience, small containers in softstone, and a variety of objects made from ivory.

A number of Indus and Indus-related seals have also been found in Central Asia, including some specimens actually imported from the Indus Valley (Masson, 1981: fig. 1, 2; Sarianidi, 2005: 258 and fig. 114). Of particular significance are several seals branded with the distinctive Indus iconography of the Indian bison with the head lowered (Bos gaurus Smith, 1827), but made using local stones and with the animal represented following to the indigenous gyptic styles (for examples, see Sarianidi, 1998: cat. nos. 962, 1408, 1451, 1477, 1618; Winkelmann, 2004: 127–138 and cat. nos. I.4-01; II.1-02; II.1-03). Interestingly, the Indian bison is considered of having likely been the brand of Indus merchants formally acting in external trade (Vidale, 2005b). This evidence lends support to the existence, at the end of the third and into the first centuries of the second millennium BCE, of a specific phenomenon of ‘hybridization’ of local gyptics with elements of the Indus tradition, which has been observed also in other regions of Middle Asia (Laursen, 2010; Vidale and Frenez, 2015; Frenez et al., 2016, in press). Such hybridization possibly indicates the direct integration of Harappan trading families into the local societies and cultures and/or their formal delegation of part of their business to local agents (Fig. 2).

On the other hand, evidence of imports from Central Asia to the Indus Valley comprises only a few miscellaneous small finds, including bronze pins and arrowheads, the flower-shaped head of a metal pin, the steatite wig of a small composite figurine (Marshall, 1931: pl. CXXVIII.28; Meadow, 2002), as well as several stone and metal seals and their impressions on clay (Kenoyer, 2003: 412–413; Franke, 2010). As for the raw materials, the import of metals like silver, lead and tin is difficult to quantify, while stones like lapis lazuli and turquoise seem to have played only a minor role in the production of Indus ornaments.

The site of Shortughai, in the Kunduz region of the Oxus Valley, has been interpreted as an Indus outpost established in Bactria to control the extraction and trade of lapis lazuli (Possehl, 2004). However, the amount of such stone found at the site seems remarkably limited considering the scale of its exploitation in Southwestern Asia during the third millennium BCE, including southeastern Iran, Mesopotamia, northwestern Syria and Egypt (Pinnock, 1988; D’Amato, 2000; Casanova, 2013; Vidale and Lazzari, 2017).

4. Gonur Depe and the Indus Civilization

Gonur Depe is the largest of all Bronze Age settlements uncovered in the endorheic fan of the Murghab River in southern Turkmenistan (Sarianidi, 2008: 41). The site encompasses an area of about 55 ha and consists of three main distinct areas, which cover a timespan between ca. 2400 and 1600 BCE and include different occupational phases (Vidale, 2017: 8–10, Table 1) (Fig. 3). A main, roughly elliptical, fortified complex labeled Gonur North, ca. 330 × 460 m, includes the so-called Monumental Palace and its subsidiary buildings, several temples and ritual areas, the so-called Royal Necropolis, and two major and several smaller water reservoirs, all dating from ca. 2400 to 1900 BCE (Sarianidi, 2002b, 2005: 31; Vidale, 2017: 9, Table 1). Most of the elephant ivory objects found at Gonur Depe came from funerary structures that can be dated to the last occupational phase of this area, which according to material culture comparanda are considered contemporaneous to the upper levels of Alyn Depe, in southwestern Turkmenistan, and Mohenjo-Daro, in the Sindh province of present-day Pakistan (Table 1). A smaller, square complex labeled Gonur South (ca. 130 × 120 m), fortified with two series of massive concentric walls with round towers along their perimeters, is located immediately south of the main complex and can be dated between ca. 1900 and 1600 BCE (Sarianidi, 1993; Vidale, 2017: 9, Table 1). A large necropolis, with just more than three thousand graves of different type and dating, encompasses an area of ca. 10 ha about 200 m west of Gonur North (Sarianidi, 2007).

The possibility of compiling a detailed list of artifacts imported to Gonur Depe from the Indus Valley, or somehow related to different Indus iconographies and productions, is presently limited by the absence of a systematic publication of the finds and by the lack of physical and chemical analyses suitable for determining the origin of specific raw materials. Among the published ceramic vessels there are only a few complete specimens that can be positively related to the pottery productions of Baluchistan and the Indus Valley (Sarianidi, 2002a: 93; 2007: 64 and fig. 24). Other objects imported from the Indus Valley and/or inspired to the Indus productions are some long and bleached carnelian beads, ornaments in faience, and possibly also a few softstone vessels with motifs inspired to the Indus iconographic tradition (Sarianidi, 2002a: 125; Sarianidi, 2005: 278 and fig. 127–128; Sarianidi, 2007: 116–117 and figs. 211, 221).

An Indus origin is evident for a square stamp seal made of fired steatite found in the ‘temple of the water’ of Gonur North, which bears the image of a standing Asian elephant carved below an inscription composed of eight Indus signs (Sarianidi, 2005: 258 and fig. 114). The number of signs in the inscription and its carving style broadly date the seal to the last phase of the Indus Civilization, ca. 2200–1900 BCE (Kenoyer and Meadow, 2010). A two-sided round amulet/seal made from a yellow-brownish stone found at Gonur South belongs among the previously discussed Indus ‘hybrid’ seals with the image of an Indian bison. Its recovery from archaeological context provides solid support
also for the interpretation of other similar seals from private collections (Sarianidi, 1998: cat. no. 1618; Sarianidi, 2002a: 259).

More complex is the interpretation of one anthropomorphic and one theriomorphic sculpture found at Gonur North that have direct parallels mainly at contemporaneous sites in the Indus Valley, but also in southeastern Iran, and in the antiquities market. The unfinished fragment of a kneeling male figure, found in Room 132 of the Royal Sanctuary of Gonur North (Sarianidi, 2005: 121–122 and fig. 30), closely resembles in its posture and sculpting style the series of kneeling men found in the upper levels of Mohenjo-Daro, including the famous priest-king, and a comparable specimen from Dholavira (Ardeleanu-Jansen, 1984, 1991; Bisht, 2015: 591–594 and fig. 8, 306–307). The stone sculpture of a squatting ram, placed in Grave 3220 of the royal necropolis of Gonur North to support the head of a deceased (Sarianidi, 2005: 250–252 and fig. 93), closely resembles a group of similar statues found at Mohenjo-Daro, as well as one specimen property of the Metropolitan Museum of Art (Ardeleanu-Jansen, 1987, 1991; Pittman, 1984: 85–88 and fig. 39).3

In the absence of detailed analyses of the carving techniques and of the geological provenance of the stones used to manufacture all these statues, it is impossible to positively establish whether they were local productions or the result of exchanges. However, the local manufacturing of a kneeling man at Gonur Depe, the evident affinities with the figures embossed on silver vessels from Bactria, with comparable pieces found in Sistan, and with the decoration of an alabaster vessel

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3 Considering the paucity of objects of Indus origin traded in the antiquities market, the squatting ram of the Metropolitan Museum of Art (Pittman, 1984: 85–88 and fig. 39), might have possibly originated from a plundered necropolis in Bactria rather than from a site in India or Pakistan.
found at Dashly 3, in northern Afghanistan (Ardeleanu-Jansen, 1991: pl. 148; Winkelmann, 1994; Dales, 1988; Possehl, 1996: 178–179; Kaniuth, 2010: fig. 5), suggest the existence – at the end of the third and in the first centuries of the second millennium BCE – of an intercultural sphere of shared beliefs that led to the local creation of similar cult objects and ritual paraphernalia, rather than the mere exchange of finished goods between Central Asia, Baluchistan and the Indus Valley.

5. Distribution and exploitation of *Elephas maximus* in the Bronze Age

The results of this study are based on the careful examination of all artifacts found at Gonur Depe up through the 2008 field season and generically labeled слоновой кости (Eng. “elephant bones”). However, this category resulted including also a number of different objects, mainly hairpins with their heads decorated with incised lines or carved in the typical shape of a fist, made from animal bones instead of true ivory. All artifacts made from ivory were instead clearly manufactured from the tusks of Asian elephant (*Elephas maximus* Linnaeus, 1758).

Several indicators coalesce to enable identifying elephant – and specifically Asian male elephants – as the unique source used to produce the ivory objects discovered at Gonur Depe. In particular, the presence and arrangement of the so-called Schreger lines, the distinct cone-in-cone pattern resulting from the continuous growing of the elephant tusks, the occasional presence of residual traces of cementum on the surface of a few objects, and the specific mode of surface exfoliation due to post-depositional processes, are characteristic of elephant ivory (for an overview of ivory identification techniques, see Espinoza and Mann, 1992; Campbell Pedersen, 2015: 42). Moreover, in several cases the thorough examination of the size and orientation of the cone-in-cone pattern made it possible to broadly reconstruct the size, proportions and curvature of the tusk and to determine the portion of the tusk from where the object was obtained. This latter information testifies to the use of ivory coming from male *Elephas maximus* instead

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4 Tusks of both elephant and mammoth show a typical surface pattern of intersecting arcs visible on cross-sections taken perpendicular to the longitudinal axis of the tusk. This pattern, first described by Bernard Schreger (1800), is termed in the gemological literature “Schreger lines” and consists of rhomb-shaped curvilinear lozenges created by the regular intersections of gentle arcs of alternating brownish and yellowish striae. This surface texture is an optical effect caused by the reflection of light from the extremely fine fibers of the collagen protein, which are oriented in two distinct directions in the matrix surrounding each dentine tubule. The Schreger lines are unique to elephant and mammoth ivory: the Schreger angles are obtuse in elephantine ivory (> 115 degrees), while in mammoth ivory they are acute (< 90 degrees) (Espinoza and Mann, 1993; Bracco et al., 2013).
African elephants (Loxodonta africana), the former having smaller, straighter, and narrower tusks (Banerjee et al., 2008; Campbell Pedersen, 2015: 30–45).

No elephant bones have been found at Gonur Depe or at any other sites of the Oxus Civilization to date (Moore, 1993; Moore et al., 1994; Sarianidi, 2002a: 154). However, besides the finished ivory objects, the large section of an elephant tusk (ca. 11 cm long and with a diameter between ca. 15 and 17 cm) was discovered together with other artifacts in elephant ivory in Grave 3245 at Gonur North (Sarianidi, 2010: 110–111 and the related colour plate). The presence of Elephas maximus is presently restricted to the Southeast Asia, from India and Nepal in the west to Borneo in the east (Sukumar, 2003), but in historical times its range extended further northwest of the Indus River basin (Kaniuth, 2010; Vidale, 2017). Therefore, the correct interpretation of the Gonur Depe ivory necessitates the identification of the most likely source of ivory for the Bronze Age sites in Central Asia. In fact, the Oxus Civilization had commercial links that extended from the greater Indus Valley and Baluchistan to southeastern Arabia and northwestern Syria (Kaniuth, 2010; Vidale, 2017).

Information about the distribution of the Elephas maximus in South and Southwestern Asia during the Bronze Age is scanty and discontinuous. Nevertheless, the few elephant remains discovered in the region, combined with archaeological evidence of ivory productions during this period, and evaluated at the light of the different iconographic and textual sources, provide a rather substantial scenario. According to R. Sukumar (2003: 57–58), “elephants were present in the Indus River basin at that time (ca. 3000–2000 BCE) and this must have been the northwestern limit of their distribution. […] There is no evidence that the elephant’s range extended further northwest of the Indus River basin”.

Table 1
Gonur Depe. Ivory artifacts ordered by discovery context and with indication of the associated finds [Keys: * = Plundered in antiquity; n.d. = Not described; M = Male; F = Female; MN = Main Necropolis; RS = Royal Sanctuary; RN = Royal Necropolis; N = Northern burial ground; SW = Southwestern burial ground].

| Context | Loc. | Sex | Ivory items | Associated items |
|---------|------|-----|-------------|------------------|
| Room 115 | RS | – | Stick-dice | Unfinished steatite statue of a kneeling man |
| Grave 575 * | MN | F | Stick-dice | 11 ceramic vessels, 1 st. bead, 1 st. vessel |
| Grave 1898 * | MN | M | Stick-dice | n.d. |
| Grave 2228 | MN | F | Comb | 7 ceramic vessels, 2 st. beads, 1 br. seal, 1 silver earring, 2 br. hairpins, 1 br. mirror. |
| Grave 2900 | N | M + F | Gaming board (> 60 y) | (M): 27 ceramic vessels, 2 silver vessels, 1 silver cosmetic bottle, 1 silver bangle, 1 faience vessel, 2 faience bangles, 1 silver spoon, 1 silver pin, 1 double necklace (semiprecious st. beads and silver pendants), 6 br. vessels, 2 br. maceheads, 2 br. mirrors, 1 br. cosmetic bottle, 1 br. funnel, br. knife, 1 br. kidney vessel, 1 br. spear, 5 miscellaneous br. items, 31 flint arrowheads, 3 bone arrowheads, 1 st. composite statuette |
| Grave 3130 | SW | 3 rams | Gaming board | 8 ceramic vessels, 2 br. vessels, 1 br. cosmetic bottle, 1 faience cosmetic bottle, br. and semiprecious st. beads, br. dagger, br. mirror, 2 br. harpoons. |
| Grave 3155 | SW | M + F | Winding snake (M) | 9 ceramic vessels, 1 stone miniature column, (M) 2 br. vessels, 1 st. cosmetic bottle, 1 st. plate, semiprecious st. beads, gold beads; (W) 3 ceramic vessels, 2 br. vessels, br. bangles, 1 br. ring, 1 st. cosmetic bottle, 1 br. mirror, semiprecious st. beads, gold beads, 1 tc. figurine |
| Grave 3210 * | RN | M | Gaming board | 30 large ceramic jars, 1 silver trumpet, 50 flint arrowheads, 2 st. discs, 1 st. scepter, 1 st. horse figurine, br. beads, st. animal figurines, gold beads, st. composite statuette |
| Grave 3220 * | RN | M | Gaming pieces Decorated discs | 2 gold vessels, 17 silver vessels, 5 br. vessels, 2 ceramic vessels, 1 gold bangle, 1 br. and st. bracelet, 2 stone miniature columns, flint arrowheads, 1 st. disc, 1 ram st. sculpture, 1 br. axe, 1 br. seal, 1 st. composite statuette, 44 flint arrowheads, 6 stone arrowheads |
| Grave 3235 * | RN | M | Decorated plaques | 2 gold vessels, 3 silver vessels, 2 br. vessels, 1 br. hairpin, 3 semiprecious st. and gold beads, 2 semiprecious st. and gold flower, 1 st. cosmetic bottle, 1 st. scepter, 13 flint arrowheads |
| Grave 3245 | RN | F | Elephant tusk Cosmetic statuette Decorated plaques | 1 br. bowl, 1 br. cosmetic spatula, 1 br. mirror, 1 st. vessel, 1 st. container, faience bangles, semiprecious st. beads, gold beads, st. needles |
| Grave 3310 | RN | 1 horse | Gaming board | n.d. |

The existence of this presently extinct sub-species of Asian elephant was originally suggested by the discovery in Egypt of celebrative texts describing royal hunts in northern Syria during the Late Bronze Age, ca. 1500–1200 BCE (for a summary, see Trautmann, 2015: 72–74). Several inscriptions describe pharaohs Thutmose I (Reign, 1493–1481 BCE) and Thutmose III (Reign, 1479–1425 BCE) hunting hundreds of elephants at Niya, on the Orontes River. Large tasks and a young elephant coming as a tribute from Syria are also represented at Thebes in the tomb of Rekhmire, a vizier to Thutmose III. Royal hunts and propagandistic display of elephants in Syria are described also in the records of Assyrian kings, from Tiglath-pileser I (1114–1076 BCE) to Shalmaneser III (859–824 BCE). No mention of live elephants in Syria is later known until Strabo described the 500 war elephants obtained by Seleucus I Nicator from Emperor Chandragupta Maurya at the end of fourth century BCE (Strabo trans. 2016: Geography, XVI.2.10).

The evidence described in these textual and iconographic sources seems likely confirmed by the discovery of a consistent number of worked and unworked elephant bones and teeth, both incisors and molars belonging to Elephas maximus, in the Late Bronze Age and Early Iron Age levels of several sites in northwestern Syria, as well as in a few swamps and lakes (Pfälzner, 2013, 2016; Çakır and Ikram, 2016).

Unfortunately, the faunistic data currently available for Southwestern Asia present a substantial gap between the extinction of the Late Pleistocene species Elephas hyusdricus, the likely ancestor of Elephas maximus, and the earliest discoveries of the so-called Syrian elephant

5The most updated chronologies developed for both the Oxus and the Indus Civilizations make little or no use of the major chronological stages customarily used in the archaeology of the Middle East – Early, Middle and Late Bronze Ages – in favor of a different subdivision of the local periodization in Eras and Phases (Renoyer, 2004; Vidale, 2017: 8–10). Since the traditional labeling used for the Middle East can be misleading if applied to the other regions here considered, absolute dating is always provided to specify the chronological markers.
dated to ca. 1700 BCE (Lister et al., 2013; Cakırlar and Ikram, 2016: 173). It is therefore impossible to understand, relying on the sole bones and teeth remains, whether the Syrian elephant was a relict population endemic of Southwestern Asia or it was introduced during the Middle Bronze Age as an import from South Asia (for the endemic hypothesis, see Miller, 1986; Becker, 2005; Pfaßner, 2013, 2016 for the import of live animals from the Indus Valley, see Collon, 1977; Caubet and Poplin, 2010; Vila, 2010; Caubet, 2013, 2016; Cakırlar and Ikram, 2016). This lack of data affects also the possibility of defining whether elephants were present in northern Syria already during the late Early and early Middle Bronze Ages and, ultimately, whether this region can be considered a possible source of ivory for the Oxus Civilization site.

As argued by T.R. Trautmann (2015: 68), “Elephants have attracted kings [...] from the beginning of kingship. Where kings had access to elephants locally the attraction was magnetic”. In proto-dynastic Egypt, before their limitation to the sub-Saharan region, African elephants were buried in dedicated graves, represented on cosmetic palettes, painted ceramics and rock carvings (Trautmann, 2015: 70–71). In the Indus Valley, elephants were carved on a stamp seal since the Early Harappan phase, ca. 2800–2600 BCE, and for the entire duration of the Indus Civilization (Kenoyer, 2001: fig. 3.8; Jossi and Parpola, 1987: M-278 to M-286, H-89 to H-91, L-161 to L-172; Shah and Parpola, 1991: M-1141 to M-1162, M-1482 to M-1488, H-590 and H-591; Parpola et al., 2010: M-1912 to 1915). Moreover, the frequent representations on Indus stamp seals of elephants wearing a harness or a blanket-like covering while standing in front of a manger-like object, and the discovery of painted terracotta figurines of elephants may possibly indicate an incipient stage of taming of this animal (Kenoyer, 1998: 86, 166 and fig. 8.44; Clark, 2016: Appendix B; Trautmann, 2015: 91–95). Moreover, in both Egypt and the Indus Valley there was a limited but constant production of elephant ivory objects from the Chalcolithic throughout the Bronze Age (Krzyszowska and Morkot, 2000; Meadow, 1998; Moreno, 2014).

On the contrary, there are no representations of such a majestic and awe-inspiring animal in the Near East, Central Asia and the Iranian Plateau until much later periods, with the exception of a few iconographies evidently influenced by contacts with the Indus Valley (Moorey, 1994: 119; Collon, 1996: 213, fig. 8c; Sarianidi, 2005: 258, fig. 114; Trautmann, 2015: 79–82 and fig. 2.6; Caubet and Ikram, 2016: 169). Moreover, it is ascertained that during the Early and Middle Bronze Age the production of ivory objects in northern Syria and Cappadocia relied almost exclusively on hippopotamus ivory, while the limited manufacturing of elephant ivory in Mesopotamia depended on the supply of elephant tusks from the Indus Valley via the Gulf (Caubet and Poplin, 1987; Moorey, 1994: 115–116; Caubet, 2013, 2016).

Cuneiform texts represent another interesting source of information for attempting to understand the most likely provenance of the ivory used to manufacture the objects found at Gonur Depe. In “The Curse of Agade”, a lamentation broadly dated to the Ur III Period in the first quarter of the second millennium BCE, the ‘mighty elephant’ was mentioned in between monkeys and the water buffalo, two species endemic of the Indus Valley that were explicitly mentioned among the most exotic animals (Cooper, 1983: 50–51, line 21). According to R.M. Boehmer (1975: 11), Syrian elephant would not have been exotic enough to be mentioned in this specific context (see also Cooper, 1983: 237).

A number of cuneiform texts from Ebla, about 50 km southwest of Aleppo in northeastern Syria, mention elephant tusks and elephant ivory objects received as royal gifts from the polity of Dugurasu in the twenty years before Ebla’s destruction (Archi, 2016).6 Considering the allowance paid to the Eblaite envoys (Archi, 2016: 15–16), Dugurasu was definitely a remote place beyond the usual commercial circuits of Ebla. The identification of Dugurasu is still disputed between its interpretation as the Eblaite transliteration of an Egyptian word for the Nile Delta and its association on phonetic bases with the eastern polity of Tukrish, which is mentioned in the cuneiform sources of Mesopotamia during the first half of the second millennium BCE (Biga, 2014; Roccati, 2015; Archi, 2016: 1–4).7 Nevertheless, in either cases, during the last centuries of the third millennium BCE elephant ivory arrived in Syria from a distant and exotic land and it was clearly not available locally.

All considered, without entering in much detail into the thorny question of whether the alleged Syrian elephant was endemic or a later introduction from South Asia, it seems quite clear that elephant ivory might have reached the Oxus Civilization sites only from the Indus Valley, where the exploitation of *Elephas maximus* and its ivory dates back to the aceramic Neolithic, ca. 7000–5500 BCE, and became widespread during the Bronze Age.

6. Artifacts in ivory of Asian elephant from Gonur Depe

The artifacts made from Asian elephant ivory found at Gonur Depe mainly belong to the spheres of personal care and gaming or divination, but there are also a few miscellaneous objects of still unknown use that might have been part of furniture or used as ritual and/or cultic paraphernalia.8 They have been discovered almost exclusively in elite funerary contexts as part of affluent grave goods and, in one case only, also in a room of the so-called Royal Sanctuary complex (Fig. 3). Table 1 summarizes their discovery contexts and items the other associated finds. Unfortunately, most of the elite graves have been plundered in antiquity and a precise reconstruction of their content is almost impossible. However, it appears evident that the objects carved from Asian elephant tusks were regarded as distinctive symbols of the higher social and economic status.

6.1. Objects for personal care and embellishment

Sarianidi found two ivory combs, one each in Grave 2228, located in the main necropolis, and in Grave 2900, in the Western microcomplex of the Royal Sanctuary at Gonur North. The comb from Grave 2228 (ca. 11.00 × 10.50 cm) is undecorated and has a crescent-shaped handle (Sarianidi, 2007: 122 and fig. 239) (Fig. 4/1). The comb from Grave 2900 (ca. 12.00 × 8.50 cm) also had a crescent-shaped handle, likely flattened after its breaking, but decorated on both sides with a series of

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6 The historical causes and exact dating of the first destruction of Ebla between 2400 and 2300 BCE, during which Palace G and its royal archives were burned down, are still a matter of debate. For a comprehensive review of the different theories, see Biga, 2014: 102–103.

7 Texts from Ebla report that delegations from Dugurasu reached Ebla via Dulu, a city under Ebla’s hegemony, and presented a variety of items to its king, including elephant tusks and ivory objects, linen, copper and gold. In return, Ebla sent to Dugurasu lapis lazuli, gold, silver, tin and clothing (for a comprehensive and detailed list of the gifts exchanged between Ebla and Dugurasu, see Archi, 2016). Basing on the biographic inscription of an Egyptian official sent by a pharaoh of the Sixth Dynasty to “some unknown places in Asia, certainly beyond Byblos and Lebanon”, to acquire lapis lazuli, gold, silver and tin, and considering the gifts exchanged between Ebla and Dugurasu according to the previously mentioned texts, M.G. Biga and A. Roccati agreed on interpreting Dulu as Byblos and Dugurasu as the Nile Delta (Biga, 2014; Roccati, 2015). Of a different opinion is Archi (2016), who located Dulu north of Aleppo based on a standard sequence of allied city-states frequently mentioned in the Ebla texts and on onomastics similarities between Dulu and these cities sited north of the present Syrian-Turkish border (Archi, 2016: 2–4 and footnote 3). Considering that in the Ebla texts the spelling du-gú-ra-su (geographical name) could be normalized as Tukrash (G. Marchesi, personal communication), Archi eventually identified Dugurasu with Tukrish (Archi, 2016: 1). Interestingly, according to P. Steinkeller (2014), Tukrish might have corresponded to at least a part of the Oxus Civilization (see also, Vidale, 2017: 18). However, the direct correspondence between Dugurasu and Tukrish seems archaeologically inconsistent considering that Tukrish was famous mainly for its lapis lazuli, while the Ebla texts clearly state that Dugurasu imported the blue stone. Moreover, the number of tusks received by Ebla, 51 in 16 years (Archi, 2016: 18, pt. a), suggests that Dugurasu should have had a quite direct access to elephants and their ivory.

8 If not specified otherwise, the term ivory refers in this paper to ivory of Asian male elephants.
five dot-in-circles motifs and with one dot-in-circles at the end of each of the wide lateral projections that protect the teeth (Sarianidi, 2007: 152 and fig. 43) (Fig. 4/2). In both cases, comb teeth were created with a metal saw, ca. 0.80 to 1.00 mm thick, the marks of which are still clearly visible on the sides of the teeth (Fig. 4/2).

Ivory combs, often decorated with dot-in-circles motifs, have been found at Indus sites (Marshall, 1931: 532; Mackay, 1938: pl. XCI/26, CXXV.24; Vats, 1940: pl. CXIX.6; Mackay, 1943: pl. XCI/4, LXXIX.12). They are also found in southeastern Arabia at Ras Al-Jinz RJ-2, Tell Abraq, and Bat (Cleuziou and Tosi, 2000: pl. 32; Potts, 2000: 100–105 and 126–127; Döppner and Schmidt, 2013: fig. 10) (Fig. 5). Similar combs, but made from wood and often undecorated, have been found at sites in northern Bactria and in southeastern Iran at Bampur and Shahr-i Sokhta (Askarov, 1977: Table XXI, 12–13; Stein, 1937: pl. IX, Bam.A.33; Costantini, 1979: 111–114 and figs. 28–31). The discovery of combs still in place on the head of the deceased in graves at Tell Abraq and Shahr-i Sokhta testifies to their use as headdresses (Potts, 2000: 102; Costantini, 1979: fig. 28).

Combs in ivory, but probably also in bone and wood, were exceptional and highly prized items in Bronze Age sites across Middle and South Asia as is confirmed also by textual sources (Potts, 1993, cf. Oppenheim, 1954; Spycket, 1976-1980). Their rarity and the common use of dot-in-circles decorative motifs do not permit us to make clear distinctions between different regional productions of combs, preventing from the possible to reconstruction of exchange patterns. However, two combs – very similar in shape to the one from Grave 2228 at Gonur Depe – found in a late third millennium BCE collective grave at Tell Abraq, on the border of the Emirates of Sharjah and Umm al-Qaiwain, were decorated with the floral motif of a long-stemmed tulip identical to the one carved on a stone flask from Bactria and on a stone vessel from Gonur Depe (Potts, 1993, 1994, 2000: 126–127; for the iconographic comparanda, see Pottier, 1984: pl. XX; Sarianidi, 2002a: fig. 81a; Sarianidi, 2007: 112 and fig. 198). These discoveries from Tell Abraq testify to the local production and/or reworking of ivory combs at Oxus Civilization sites, including possibly also Gonur Depe.

A large spatula ca. 30 cm long found in Grave 3245 at Gonur Depe, possibly used for cosmetics or for mixing liquids, ointments or powders, was manufactured following local shapes and art styles (Sarianidi, 2005: 248 and fig. 104) (Fig. 6/1). Its 15 cm long handle was in fact fashioned and finely decorated in bas-relief on both sides to reproduce a chimeric winged creature, with a snake head and lion body, devouring a cow. This motif has strong parallels in the polychrome mosaics that decorated several graves of the Gonur necropolis (Fig. 6/3) (Sarianidi, 2005: 248 and fig. 86; Sarianidi, 2008: fig. 125). An undecorated spatula, also from Grave 3245, was probably also produced locally (Sarianidi, 2010: 110–111 and related colour plate) (Fig. 6/2).9

A small ivory spoon found in Grave 2900 of the Royal Necropolis at Gonur North has the end of its handle carved in the characteristic local shape of a fist (Sarianidi, 2007: 152 and fig. 35; for fist-like decorated objects in stone and bone, see Sarianidi, 2007: fig. 223–224, 233, 236–237). It might have also belonged to the sphere of personal care and was possibly used for dosing cosmetic powders or medicines.

6.2. Objects for gaming and/or divination

At Indus sites and at Gonur Depe, a significant number of artifacts made from ivory are connected with practices of gaming and/or ritual divination. The distinction between gaming for amusement and ritual divination to predict the future or discriminate between different possibilities is archaeologically very elusive. In fact, such practices differ for the nature of the agents that are considered to affect the results, chance for gaming and the intervention of sentient supernatural or divine entities for divination. In both cases, the set of objects employed to perform games or rituals may be very similar (Gadd, 1946; Reith, 1999: 14–17 and 43–53; Becker, 2007: 12–14; Finkel, 2007a: 25–26; Holbraad, 2010).

In Grave 2900 at Gonur Depe, Sarianidi found what he originally

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9 There is mention of a further ivory cosmetic spade found in Grave 3220 (Sarianidi, 2005: 251), but it was not among the objects presented to the author for documentation nor it was illustrated in any of the several publications about Gonur Depe.
interpreted as a rectangular wooden lid decorated with of hundreds of tiny ivory segments, triangles, drops and circles (Fig. 7/1). As discovered (Sarianidi, 2007: 152 and figs. 32, 33), the inlays still had their original arrangement and there is no doubt that they were instead part of a gaming board for the so-called game of twenty squares, similar to the ones found in the Royal Cemetery of Ur and at Shahr-i Sokhta (Becker, 2007; Finkel, 2007a; Piperno and Salvatori, 2007: 287–295 and fig. 668) (Fig. 7/4–5). Direct examination of these inlays revealed that a few of them retain portions of dot-in-circles visible on the backside (Fig. 7/2). Evidently, they were cut out from larger decorated objects and probably testify to the continuous reworking of ivory objects in order to maximize the exploitation of such a precious material.

A similar gaming board, decorated with ivory segments and with two plaquettes carved in the form of a squatting bull, was found in Grave 3210 (Sarianidi, 2008: 203–204 and figs. 101, 102) (Fig. 7/3). Two more comparable gaming boards in ivory are reported respectively from Graves 3130 and 3310 of the Southwestern burial ground at Gonur North (Sarianidi, 2008: 204). This type of gaming board is not very common at Indus sites, where only five broken boards of lower quality have been found so far, one each in terracotta at Lothal and Mohenjo-Daro and three in limestone at Dholavira (Rao, 1985: pl. C-CXIX.1; Mackay, 1938: pl. CXII.82; Bisht, 2015: figs. 8.308–311) (Fig. 7/6).10

According to the available archaeological and textual sources, different types of dice were used with these gaming boards for playing the game of twenty squares, including sheep or ox knucklebones and tetrahedrons or four-sided stick-dice made of various materials (Mackenzie and Finkel, 2004:37–42; Finkel, 2007a).

A standardized type of four-sided stick-dice in ivory, measuring ca. 10 to 12 cm in length with a quadrangular section of ca. 1.20 to 1.60 cm, has been found at Gonur Depe (Fig. 8). Three complete ivory stick-dice come from Room 115 of the Royal Sanctuary at Gonur North (Sarianidi, 2005: 121 and fig. 29) (Fig. 8/1–2). At least four more dice of the same type have been found, entire and in broken pieces, associated with other ivory objects in Graves 3155 and 3220 also at Gonur North (Sarianidi, 2005: fig. 65; Sarianidi, 2008: fig. 107) (Fig. 8/3–4). Poorly preserved fragments of other ivory stick-dice have also been found in Graves 575 and 1898 of the main necropolis of Gonur Depe (Sarianidi, 2007: 122). Visual analyses of the sections of these broken fragments have confirmed that they are made from elephant ivory. In section, the Schreger lines form in fact an average angle > 115 degrees, which is the case for extant proboscidea includingElephas maximus (Espinoza and Mann, 1992) (Fig. 8, lower register; see also footnote 4 herein).

Three complete ivory stick-dice of the same type have also been discovered at Altyn Depe in levels dating to the late stages of Namazga V, ca. 2200–2000 BCE. One was discovered in Burial 252 (Masson and Berezkin, 2005: 388 and fig. 21.57 and pl. 56.5), and the other two were part of the so-called Ganyalin Hoard (Masson and Sarianidi, 1972: fig. 29.a; Kaniuth, 2010: 6 and fig. 3) (Fig. 9, upper-left).

The stick-dice from Gonur Depe and Altyn Depe have all the same pattern of motifs. Each of three sides has dot-in-circles in increments from one to three, while the fourth side has alternating series of transverse lines and saltire crosses or diagonal lines forming five or, more often, seven subdivisions. A similar semantic sequence, but with

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10 One of the four fragments of gaming boards found at Dholavira was not used for the game of twenty squares (Bisht, 2015: 594 and fig. 8.310 in the upper-left corner), but has affinities to a squarish terracotta gameboard found at Lothal (Rao, 1985: 510 and fig. 104.4).
longitudinal parallel lines or, more rarely, transverse crescents on the fourth side, occurs only on a few sticks found at Indus sites (see, e.g., Marshall, 1931: pl. CXXXVIII 41, 43, 48, pl. CXLIII, 43, 47, 49, 51; Mackay, 1938: pl. LX 12, 16; Vats, 1940: pl. CXXXIV 3) (Fig. 9, lower register). On the other hand, at Indus sites there is a greater variety of rectangular and shaped sticks, bars, and rods in ivory, all variously decorated and sometime inscribed. These were possibly used as gaming dice, either alone or associated with boards and gaming pieces, or as fortune telling sticks (for a general typology, see Mackay, 1931: pl. LX 12, 16; Vats, 1940: pl. CXXXIV 3) (Fig. 9, lower register).

According to I.L. Finkel (2007a: 17), stick-dice with incremental dot-in-circles have been found in Mesopotamia only at Ur and they have to be considered of external provenance. At Shahr-i Sokhta, in southeastern Iranian, stone stick-dice with dot-in-circles and crosses were found in both the settlement area and, together with a gaming board and gaming pieces, in Grave 731 that is dated to Period III, phase 4 (Tosi, 1983: 174 and fig. 11; Piperno and Salvatori, 2007: fig. 692; Cortesi et al., 2008: fig. 20) (Fig. 9, upper-right). The precise absolute chronology of this phase at Shahr-i Sokhta is still a matter of debate. The Italian team that excavated the site dates it between ca. 2500 and 2400 BCE based on a series of calibrated radiocarbon dates (Salvatori and Tosi, 2001; Cortesi et al., 2008), while the French team operating in Baluchistan dates it between ca. 2800 and 2600 BCE relying on ceramic chronology of this phase at Shahr-i Sokhta is still a matter of debate. The Italian team that excavated the site dates it between ca. 2500 and 2400 BCE based on a series of calibrated radiocarbon dates (Salvatori and Tosi, 2001; Cortesi et al., 2008), while the French team operating in Baluchistan dates it between ca. 2800 and 2600 BCE relying on ceramic
game of twenty squares were used along with other types of boards very similar to the ones still used in the South Asia for the Alquerque and Nine Men's Morris strategy games, known locally as Quirkat and Siuju (Kenoyer, 1988: fig. 6.39; Bell, 1979: 47–48, 91–95). The present evidence does not permit to understand whether the Oxus Civilization sites acted as a bridge over which the use of stick-dice spread across Middle Asia, but most likely they absorbed influences from different directions, typologically and for the raw materials employed.

Gaming boards and stick-dice are often found associated with various types of gaming pieces (Finkel, 2007a). In particular, the two stick-dice found in the Ganyalin Hoard at Altynteppe were buried together with twelve decorated ivory plaquettes, ten square and two round (Kaniuth, 2010: fig. 3) (Fig. 9, upper-left). Ivory plaquettes, one octagonal and one square, have also been found at Dzharkutan in contexts dating to the end of the third/beginning of the second millennium BCE (Kaniuth, 2010: 7 and fig. 4).

Identical square, round and octagonal ivory plaquettes have been discovered in several graves at Gonur Depe, including at least Graves 3155, 3220 and probably also Grave 2900 at Gonur North (Sarianidi, 2002a: 153; Sarianidi, 2005: fig. 65; Sarianidi, 2008: fig. 107) (Fig. 10). They have an average size ranging between ca. 3 and 4 cm and are variously decorated with oblique lines at their corners and central large concentric circles, with dot-in-circles motifs along the perimeter or completely covering their surface, or with orthogonal grid patterns sometimes filled with dot-in-circles. Considering their size, which perfectly matches the squares of the gaming boards, and their frequent association with ivory stick-dice, these plaquettes were presumably used as gaming pieces. A few comparable gaming pieces have also been found at Ur and Shahr-i Sokhta (Woolley, 1934: pl. 221; Cortesi et al., 2008: fig. 19), while they are quite rare at Indus sites (Marshall, 1931: pl. CXXXIV 3) (Fig. 9, upper-right for gaming pieces from Shahr-i Sokhta; lower-right for those from Mohenjo-Daro).

6.3. Miscellaneous objects

The collection of ivory artifacts found at Gonur Depe includes other exceptional pieces that have no equivalents in the ivory production of the Indus Civilization but do have strong connections to the artistic
traditions of Central Asia and of Margiana in particular.

A few ivory discs, ca. 6–7 cm in diameter and 1 cm thick, all found in funerary contexts including Grave 3220, have recurring motifs shallowly carved on both sides. Two of them bear a scorpion on one side and a schematic composition of heart-shaped pipal leaf motifs on the other (Sarianidi, 2005: fig. 92) (Fig. 11/1–2). These motifs recur frequently at Gonur Depe on metal and stone seals and were also used in the composition of polychrome mosaics (Sarianidi, 1998: cat. nos. 1788–1790; Sarianidi, 2002a: 279; Sarianidi, 2005: fig. 91; Sarianidi, 2008: fig. 137) (Fig. 11, lower-left). The heart-shaped pipal (*Ficus religiosa*) leaf motif almost certainly originated in the Indus Valley (Kenoyer 1998: 105–106; Simoons, 1998: 49–51), but it became soon part of the decorative tradition of Margiana. In contrast, representations of scorpions are found in the greater Indus Valley only on a bone/ivory button seal from the Early Harappan site of Rehman Dheri, in northern Baluchistan, in a level dated to ca. 3200–3000 BCE (Shah and Parpola, 1991: 352, Rhd-1; Durrani et al., 1994–95: 206 and fig. 1) (Fig. 11, lower-right).

Other ivory discs of a comparable size, also from Grave 3220, have dot-in-circles motifs drilled on both sides in concentric series and along the edge (Sarianidi, 2008: fig. 107) (Fig. 11/3–4). Considering their size and the rules of the game (Finkel, 2007a), which provide for the simultaneous presence of more than one piece on the board, these discs probably were not used with the standardized type of gaming boards found at Gonur Depe that have smaller playing squares whose side measures ca. 5 cm (cf. Fig. 7). What purpose they were used for remains unknown, although they might have been part of ritual paraphernalia or have been used in association with larger gaming sets made of perishable materials. In fact, ethnographic studies of the *pachisi* game, still widely played in South Asia, report that most gaming boards were embroidered on cloth (Norman, 1964).

A previously unpublished broken ivory handle from an unspecified provenience at Gonur Depe was carefully carved to form two interwoven snakes (Fig. 12/1). It closely resembles the handle of a metal knife from Grave 1922 (Sarianidi, 2002a: 114; Sarianidi, 2007: 82 and fig. 75) (Fig. 12, upper-right).

The sculptural representation of a winding snake made from ivory was found under the right shoulder of a male buried in Grave 3155 of the Royal Necropolis at Gonur North (Sarianidi, 2005: 200 and fig. 115) (Fig. 12/2). In Bronze Age Margiana, winding snake was a very common motif, which is found represented on ceramic containers, gold jewelry, metal and stone seals, bronze ceremonial axes, and polychrome mosaics (Sarianidi, 1998: fig. 6; Sarianidi, 2007: 78–79; Sarianidi, 2002a: 98 lower-right; Sarianidi, 2008: figs. 55, 125, 126) (Fig. 12, lower-right).

In Grave 3235, Sarianidi (2008: 206 and fig. 115) found three long and slightly curved ivory plaques perforated at one end, ca. 20 to 25 cm long and 4 cm high with a maximum thickness of ca. 0.80 to 1.00 cm, whose shape apparently follows the natural curvature and diameter of the tusk. These plaques, two of which are entire and one is broken into several pieces, are decorated on the obverse while the reverse was flattened and left unpolished (Fig. 13/1–2). They were decorated with the same pattern of five rectangular segments separated by three transverse lines, each of the lateral segment containing roughly carved
Fig. 9. Stick-dice and gaming pieces in Elephant ivory from Altyn Depe in Margiana and in stone and wood from Shahr-i Sokhta in Iran (upper register); Stick-dice, decorated sticks and an ivory gaming piece from the Indus Civilization site of Mohenjo-Daro in Pakistan (for Altyn Depe, modified after Mason and Sarianidi, 1972: fig. 117; for Shahr-i Sokhta, courtesy S.M.S. Sajjadi; for Mohenjo-Daro, modified after Mackay, 1931).

Fig. 10. Gonur Depe: (1–2) Decorated ivory plaquettes probably used as gaming pieces from Grave 3155; (3–4) from Grave 3220; (5–6) from Grave 2900 (photographs by D. Frenez).
Saltire crosses formed by intersecting bundles of lines (five lines in the two segments, and a lozenge-shaped grid in the central segment). This decorative scheme evokes that carved on fourth side of the stick-dice found at Gonur Depe and Altyn Depe (cf. Figs. 8 and 9), but the shape of these enigmatic objects would have prevented their use as dice or fortune sticks. Four identical perforated ivory plaques were found in Grave 3245, but they are decorated with a continuous motif of dot-in-circles (arranged in a zig-zag pattern, suggesting a specific use for these objects distinct from that of dice and counters (Sarianidi, 2010: 110–111 and related colour plate) (Fig. 13/3–4).

The decorations of these ivory plaques, including both segmented and zig-zag patterns, recall the motifs carved on four long animal bone sticks found at Altyn Depe, the actual function of which has not been clearly defined yet (Masson, 1981: pl. XIX/2/A–D; Masson and Berezkin, 2005: 385, fig. 18/34–37 & pl. 46/3–6; Possehl, 2002: 230 and fig. 12.32) (Fig. 13, lower-left). A morphological comparison with later ivory pieces found in Room SW 37 of Fort Shalmaneser at Nimrud, in northeastern Iraq, suggests that the ivory plaques found at Gonur Depe in Graves 3235 and 3245 might have been possibly used to decorate architectural elements and/or pieces of furniture (Herrmann, 1986: 13 and cat. nos. 684, 713, 1237) (Fig. 13, lower-right).

7. Manufacturing and trade of ivory objects found at Gonur Depe

The detailed study of the artifacts made from the ivory of Indian elephants found at Gonur Depe has demonstrated that there is significant functional, morphological and stylistic separation between this collection and the contemporaneous production of ivory objects in the greater Indus Valley. On the bases of the presently available data, and considering the absence of isotopic analyses for both the Gonur Depe ivory objects and the collections found at Indus sites, a complete reconstruction of the different stages of manufacturing and trade of these artifacts is presently unrealistic. However, it has been possible to define some firm points and propose solid hypotheses about the organization and significance of this important and still scarcely understood craft production.

The ultimate question that touches on all aspects of this research concerns the provenance and identity of the craftsmen who contributed to the manufacture of these objects. Who had the skills to transform an exotic and precious raw material that originated in the Indus Valley to produce artifacts following the local taste of Central Asian elites? Local craftsmen likely skilled in woodworking who transformed elephant tusks and ivory pieces that had been traded to Central Asia? Or specialized Indus ivory carvers that moved to Central Asia and worked as resident or itinerant craftsmen? A detailed analysis of the expertise and technical skills necessary to properly cut an Asian elephant tusks and transform it into a finished ivory object of a complexity comparable to the one of the ivories found at Gonur Depe might help answering this question.

7.1. Manufacturing stages of elephant ivory objects

The carving of elephant ivory reached an incredible level of artistic sophistication and technical complexity during different historical periods and in diverse regions across the world (for an overview of the different ivory productions, see Cutler, 1985; Caubet and Gaborit-Chopin, 2004; Campbell Pedersen, 2015). Even if the ivory items manufactured in Middle and South Asia during the Bronze Age were still rather simple objects, their production already required a specific expertise and technical skills. With the advent of metal tools, the carving process of ivory has not changed significantly over the millennia (Campbell Pedersen, 2015: 140). A comprehensive reconstruction of the technical actions performed traditionally to produce an object from elephant ivory is proposed here, summarizing and detailing the steps described by M. Campbell Pedersen (2015: 140–150):

(i) Before any work was done, a sketch of the finished item was made; in some workshops it was also customary to make a model in clay or wax; (ii) Having chosen a seasoned tusk, any enamel remaining was usually removed by abrasion; sometimes it was removed by […]
heating it and flaking it off with a chisel; (iii) The appropriate size for the design was calculated and cut from the tusk using a saw; it was important to work out exactly how to cut the ivory so as to make the best use of the precious material and to waste as little as possible; (iv) The design was drawn on the surface of the piece, which was then roughly shaped using saws and chisels; (v) It was customary to moisten the surface of the ivory to make it a little softer and less brittle; (vi) Various chisels, gouges, files and burins were used for carving, finer tools were used for fine work, eventually down to a sharp needle if necessary; (vii) The objects were polished using a variety of abrasive materials, including leather, seal and shark skin, rough fish scales and chalk to give the final shine; (viii) Polished ivory artifacts could be eventually incised and/or etched with thin lines to create designs or emphasize specific features; (ix) Finished objects in ivory could be bleached using a mixture of urine and lime; (x) In special cases, the creamy colour of ivory could be altered by heating, smoking, or staining with liquids, or by applying pigments; (xi) The objects were dampened in water to provide them with their original moisture content that might have been lost or altered and then greased to maintain it.

Not all these manufacturing stages and technical actions were adopted in the production of the ivory objects found at Gonur Depe. Even though the presence of traces of dark substances within the motifs that were drilled and incised on a few dice and plaquettes might suggest that they were originally filled with pigments (for the coloring of ancient ivory objects, see Affanni, 2012), there is no evidence for bleaching, and the general quality of the carving did not require the skills and finer tools used during later historical and modern periods for manufacturing pieces in-the-round or with an accentuated undercutting. Even so, their production still required an elevated level of technical virtuosity and close acquaintance with the raw material and with its preparation for the carving.

Based on historical and ethnographic evidence, the manufacture of elephant ivory required specific skills already for cutting the tusks, in order to maximize the size of the ivory roughouts and to obtain particular shapes and surface conditions (Runz, 1916: 241–251; Burns, 1976: 245–248; Cutler, 1985: 1–19; von Bargen, 1994: 51 and fig. 3–5; Caubet and Gaborit-Chopin, 2004: 16–17 and fig. 2; Bianchi, 2007: 358–360) (Fig. 14). These operations do not include only the actual cutting of the tusk, but also the careful removal of the hard enamel layers and of the cementum in order to facilitate the carving of the actual ivory and to prevent cracking and distortions of the finished objects due to the different hardness and elasticity of the diverse components of the tusk. In addition, the ivory near the pulp cavity, which is too soft and fragile to be successfully carved, needed to be removed as well. Moreover, the relative orientation of the accentuated cone-in-cone pattern of elephant ivory had to be preventively considered in view of the final shape of the object to be carved. This evaluation was necessary to minimize the waste, facilitate the carving, increase the structural resistance of the objects, and obtain the desired finishing of the different surfaces in a tridimensional piece (Cutler, 1985: 37–42; Bianchi, 2007: 358–360; Campbell Pedersen, 2015: 137–140).
The reconstruction of their original position into a hypothetical tusk was possible for several of the ivory artifacts found at Gonur Depe basing on the relative orientation of the cone-in-cone pattern visible on their different surfaces and on the curvature of the piece. This analysis has proven that the secondary cutting of the tusks, or of large sections of tusks, into smaller pieces was executed having already in mind the size and final shape of the objects to be eventually produced.\footnote{This conclusion is based on the protocol established in a seminal work by Caubet and Poplin (1987) about the technological and technical aspects involved in the production of the ivories found at Ugarit, which was developed further by G. Alfanni in his detailed study of the ivories from Arslan Tash (Alfanni, 2011, 2012, 2015).} This last evidence suggests that these fundamental stages of the manufacturing process were executed, after the customers had already commissioned the items to produce or after a thorough study of the local market and artistic trends, by skilled ivory carvers with a deep understanding of the physiology and physical proprieties of the different parts and components of an elephant tusk.

Determining the nature of the final stages of carving is much more problematic and hypothetical. According to different texts about crafts and arts in South Asia during the British Raj (Kunz, 1916: 250–252; Burns, 1976; Pal, 1978: 204–206), the carving of elephant ivory objects of a complexity comparable to the one of the artifacts discovered at Gonur Depe might have required – using traditional techniques and tools – to soak the objects into water at a specific temperature, followed by slow drying and possibly also oil baths during several of the different manufacturing stages. This process would have then facilitated the carving, but mainly prevented warping, deliberating and cracking of the ivory objects and would have eventually ensured their optimal conservation.

Several scholars have proposed a substantial technical correspondence between the carving of ivory, bone and some hard woods (Barnett, 1982: figs. 4b-c; Cutler, 1987: 443–445; Evely, 1992; Krzyszowska and Morkot, 2000: 328–329; Di Paolo, 2009: 143; Feldman, 2014: 28; for a review, see Bianchi, 2007: 351–352 and footnotes 7–9). Unfortunately, there is almost no factual evidence for the organization of ivory workshops and its craftsmanship in the Bronze Age. In fact, this assumption relies mainly on evidence from ethnographic research in South Asia (Pal, 1978: 206) or from later historical periods, such as discoveries from at Palatine East and the Crypta Balbi in Rome for the archaeological data (St. Clair, 1996, 2003; Arena et al., 2001), Pausanias and Pliny for the classical sources, Heraclius and Theophilus for the Middle Ages (for a review of textual sources, see Bianchi, 2007: 350 and footnotes 2–3; for the archaeological evidence, see Bianchi, 2007: 350–351 and footnotes 4–6). However, even for the Roman period, most of the data about the objects carved came from bone working workshops and dumps, while tools were reconstructed mainly from those used for wood carving (Bianchi, 2007: 351–352). In any case, even if the technical approach, the tools employed and the different stages of production were certainly similar, the working of elephant ivory required a specific expertise and technical skills that were only partially comparable to the ones needed for carving bones and hard woods.

In the specific case of Gonur Depe, and for Bronze Age sites in Middle Asia and the Middle East in general, there is no evidence for workshops where organic materials such as ivory, bone and wood were transformed. A detailed comparison of the objects made from animal bones and from ivory found at Gonur Depe testifies to a clear technical and economic separation between these two productions. As previously mentioned, wooden objects morphologically and/or functionally comparable to ivory items found at Gonur Depe have been instead found at Shahr-i Sokhta and Bampur in southeastern Iran (Stein, 1937: pl. IX, Bam.A.33; Costantini, 1979: 111–114 and figs. 28–31). They include mainly combs with a flat back and raised points stylistically comparable to their ivory equivalents from Gonur Depe, but also functionally similar stick-dice and a gaming board, which were made from high-quality woods such as ash (Praxinus), maple (Acer), Indian rosewood (Dalbergia sissoo) and haldu (Haldina cordifolia) (Costantini, 1979). Even if morphological similarities do not imply the application of the same manufacturing processes (Vidale, 2000: 130–134; Binford, 2009: 1237).

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**Fig. 13.** Gonur Depe: (1–2) Long perforated ivory plaques from Grave 3235 decorated with crosses and transverse lines; (3–4) Long perforated ivory plaques from Grave 3245 decorated with zig-zag patterns of dot-in-circles (photographs by D. Frenz); (lower register) Decorated bone sticks from Alyn Depe in Turkmenistan and ivory panels used to decorate furniture from Nimrud in Iraq (modified after Masson, 1981: pl. XIX/2/A-D; Herrmann, 1986c 684, 713, 1237).
143–145), they suggest the possibility that at least some of the ivory objects found at Gonur Depe, including the two combs, might have been produced by local wood carvers or were imported as finished objects from the Indus Valley.

7.2. Trading strategies of elephant ivory objects

All considered, just a few of the objects made from Asian elephant ivory found at Gonur Depe might have been produced at Indus sites by local ivory carvers and eventually traded to sites in Margiana as finished objects. Based on analysis of the corpus of archaeological data from Gonur Depe, the most likely and prevalent scenario is that entire elephant tusks or, more probably, large tusk sections were traded from the Indus Valley to Central Asia and were carved locally into finished objects according to the specific demand of the local elites by local craftsmen originally trained in wood carving or by Indus-trained ivory carvers.12

This skilled craftsmanship might have been found at sites in Margiana with consistent demand of high quality wooden artifacts or might have been provided by the same merchants who traded the tusks, whether locals, Harappans or middlemen. The stable presence at sites in Central Asia of craftsmen who carved mainly ivory is instead quite unlikely due to the sporadic demand of working this rare raw material. According to R. Miller (1986: 31–32), the artisans who worked ivory in northern Syria during the late second and early first millennia BCE would probably have worked also on other luxury materials, “so the rate at which ivory was produced and used would be difficult to predict and may not have involved large quantities at any time”. Moreover, recent research by M. Vidale (2017: 315) on specialization, standardization and efficiency in ancient craft production have stressed that even a highly specialized manufacturing, such as the making of lapis lazuli beads, relied on a complicated and quite flexible production network involving the processing of diverse raw materials using different techniques, rather than a segregated operational sequence. Unfortunately, the absence in the present archaeological record of ivory workshops prevents from reaching a comparable level of description and understanding, but the overall organization of elephant ivory manufacturing, from the procurement of the tusks to the final carving, might have been even more complex than that of semiprecious stones.

An alternative and intriguing hypothesis is instead supported by significant archaeological and textual data from comparable socio-economic or geographical contexts, which suggest that the likely high commercial and ideological value of ivory and of the expertise required to carve it made also possible and economically profitable the presence in Central Asia of independent itinerant ivory carvers native to or trained in the Indus Valley. These itinerant artisans might have provided at the same time both the raw material and the unique skills to

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12 The complete absence of entire elephant tusks and tusk sections at sites in Central Asia, with the exception of the already mentioned one found at Gonur Depe, is not surprising considering the value of this exotic and rare material, which is also proven by the evidence for reworking noted in the Gonur Depe collection.
transform it into finished objects. Ethnographic research shows that long-distance traders and traveling skilled artisans were interested mainly in foreign markets polities and both activities were often undertaken by the same individuals (Helms, 1993: 40–41).

The presence of itinerant ivory carvers who moved between the northern regions of the Subcontinent and Central Asia has already been suggested for production of the stylistically heterogeneous group of Indus and Middle Eastern ivory objects. Moreover, the existence of such ivory workers in ancient South Asia is also described in a few literary sources. The *Gautila Jataka* mentions a group of ivory carvers who traveled from Benares to Ujjain to offer their products and skills to the local elites (Pal, 1978: 46), while a Buddhist Sanskrit *Vinaya* tells the story of an Indian master ivory carver who traveled “up to the land of the Yavanas”, most likely the Hellenistic Bactria, to put his superior expertise at the service of a renown local artist (Dwivedi, 1976: 19).

The historical and socioeconomic circumstances that led to the likely carving of elephant ivory at Central Asian sites during the Bronze Age can be fruitfully compared also with the earliest phases of ivory production at Etruscan sites in the West Central Italy during the eighth and seventh centuries BCE. As in Central Asia, no ivory, except for the tusks of wild boars, was in fact available locally in this region and ivory objects were therefore regarded as a highly valuable and exotic production (for an overview of ivory objects and ivory manufacturing in Etruria, see Huls, 1957; Martelli, 2008: 124–125; Naso, 2012: 434–435). After a short period of direct import of finished ivory objects at the end of the eighth and the beginning of the seventh century BCE, ivory started to be manufactured locally by immigrants from the Levant who eventually established a local tradition of ivory craftsmanship in Etruria (Rathje, 1979: 165–167; Martelli, 2008: 125; Camporeale, 2013: 888; Sannibale, 2014: 316).

8. Conclusions

The detailed study of the substantial collection of artifacts made from the ivory of Asian elephants (*Elephas maximus* Linnaeus, 1758) discovered at the Oxus Civilization site of Gonur Depe, in southern Turkmenistan, demonstrates that most of these objects were probably manufactured in Central Asia according to the local artistic tradition and did not arrive as finished items from sites in the Indus Valley. In fact, almost all ivory excavated at Gonur Depe show a marked degree of functional and stylistic separation from the contemporaneous productions of ivory objects in the Indus Civilization.

A few ivory objects may have occasionally arrived in Central Asia from the greater Indus Valley as finished items. However, considering the sources of elephant ivory available for Gonur Depe, the discovery on site of the large worked section of an elephant tusk, and the evidence for reworking of ivory objects at Gonur Depe and possibly also at other sites in the Oxus basin, it seems more likely that tusks of male Asian elephants were traded to Central Asia, whole or in large sections, by merchants who might have provided also the skilled craftsmanship necessary to transform them into finished objects. The highly specialized skills and expertise required to carve ivory objects comparable to the ones found at Gonur Depe suggest that they were manufactured by local wood carvers or most likely by Indus-trained ivory carvers.

Information obtained from comparable sociotechnical and ethnographic contexts and from later textual sources about the manufacturing and trade of elephant ivory in South Asia allow considering also the possible presence in Central Asia of Indus-trained itinerant ivory carvers. In fact, the high economic and ideological value that ivory objects acquired during the Bronze Age when exhibited outside the Indus Valley may have led to the establishment of specific socioeconomic structures for its manufacturing and trade, comparable to those adopted in the same period for the distribution across the region of other skilled productions (Kenoyer, 2008; Frenez et al., 2016; Mutin et al., 2016; Méry et al., 2017).

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