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Bronze Age textile evidence in ceramic impressions: weaving and pottery technology among mobile pastoralists of central Eurasia

Paula N. Doumani & Michael D. Frachetti*



Textiles are powerful indicators of technology and contact, as the authors show for the peoples of the Bronze Age central Asian steppes. In this case the textiles are mainly missing, but have left their imprints on the surface of the inside of pots, captured when otherwise redundant cloths were used to paddle or jacket the clay before hardening and firing. A good supply of old cloths seems to have been part of a potters' equipment and some were used several times. The authors analyse and date the fibres and weaves to give an indication of changing cultural context through the Bronze Age.

Keywords: Russia, Kazakhstan, Bronze Age, third millennium BC, second millennium BC, steppe, textiles, pottery

Introduction

In central Eurasia, the late third to early second millennium BC marks the beginning of intensified regional interaction and productive economies, specialising in pastoralism of sheep, goat and cattle (Kohl 2007; Frachetti 2008; Hanks & Linduff 2009). For decades, regional socio-economic integration among early pastoralists across the Eurasian steppe zone has been traced geographically and chronologically through the distribution of associated stylistic classes of pottery and metal objects (Chernykh 1992; Kuz'mina 2007), while other significant material classes, such as textiles, have remained more elusive. Textiles in Eurasia represent a major component of community organisation and socio-economic integration, ethnographically and archaeologically (Good 2006; Naheed & Beck in press). But poor preservation and archaeologically scattered evidence still leaves them as one of

* Department of Anthropology, Washington University in St Louis, 1 Brookings Drive-CB 1114, St Louis, MO 63130, USA (Email: pauladoumani@wustl.edu; frachetti@wustl.edu)

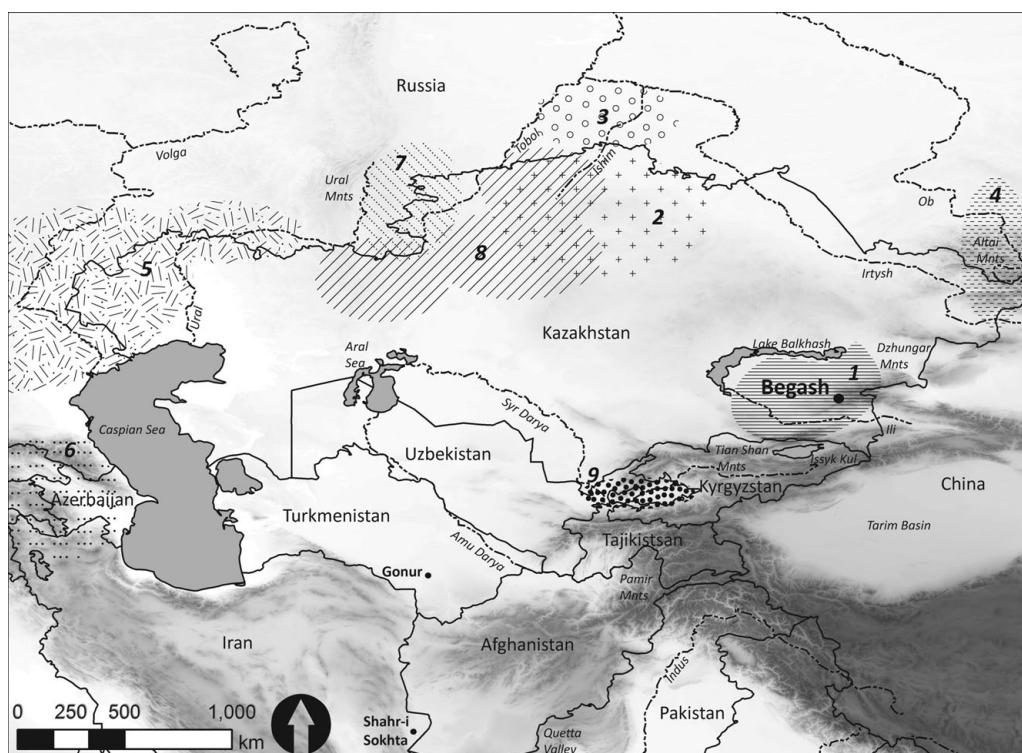


Figure 1. Map of archaeological groups and sites mentioned in the text: (1) Begash and Semirech'ye; Eneolithic (2) Botai, (3) Kirovlevka forest-steppe sites, (4) Afanasevo; and Bronze Age (5) late Yamnaya, (6) Kura-Araxes, (7) Sintashta/Petrovka, (8) Alakul, (9) Fergana Valley (map and graphics: Taylor Hermes and Paula Doumani).

the least investigated material classes in Eurasian steppe prehistoric archaeology. The few extant studies available (Chernai 1985; Shishlina 1999) show stylistic and technological consistencies across central Eurasia, suggesting a high potential for exploring regional preference and socio-economic integration in this formative period of Eurasian prehistory.

Even though textiles are subject to poor preservation in Bronze Age central Eurasia, secondary evidence is widely recovered across the territory in the form of textile impressions in pottery that was produced using textile-lined moulds and other forming techniques (Figures 1 & 2). Here we present evidence for textiles from Begash, a newly excavated multi-period pastoral settlement in Semirech'ye in south-eastern Kazakhstan (Frachetti & Mar'yashev 2007), that offers the earliest evidence for cloth and pottery production in the eastern steppe region. The diverse array of textile prints in pottery from Begash has permitted the first in-depth study of textiles, weaving and pottery manufacture in Bronze Age south-eastern Eurasia.

Textiles from Begash

The recent excavations at the settlement Begash (Frachetti & Mar'yashev 2007) revealed textile-impressed, plain coarseware ceramics from the first phase of occupation (*c.* 2450 cal



Figure 2. Textile-impressed pottery, Early/Middle to Late Bronze Age Begash (2450–1000 BC).

BC) and throughout subsequent occupation phases to the medieval period (*c.* fourteenth century AD) (Doumani 2009). Here we focus on the 18 samples found in the Early/Middle and Late Bronze Age phases of the site (phase 1, *c.* 2450–1700 cal BC; and phase 2, *c.* 1650–1000 cal BC). Casts were made of the negative textile impressions using white baking clay, rendering a positive mould of the textile impression, to accentuate the weave characteristics of the original cloth. In Figures 3–6, the casts appear convex because the sherd surface was concave (on the inside of the pot). The moulds were examined under hand magnification and photographed using a macro lens ($\times 10$ magnification). Cloth structures were more visible in those samples where the cloth was pressed deeply into the wet clay. In some samples, the cloth structure was less visible due to shallow impressions, sherd wear or disturbance of the impression during the pot's 'wet' stage. However, in the remaining samples it was possible to detect different weaves, cloth densities, thread thicknesses, and possibly a number of raw materials used for making cloth. These are summarised in Table 1.

Description of the textiles implied

The Early/Middle Bronze Age samples from phase 1 at Begash (2450–1700 BC) include five cloth/fibre-impressed sherds. Two possible weave types can be identified: interlaced weave and twining. Sample 1 might show a woven cloth impression (Figure 3a). The shallow impression prevents a close reading of the sample. However, some of the elements cross one another perpendicularly, which is typical of plain weave interlaced elements. Sample 2, by contrast, shows a weft/warp-faced cloth impression (Figure 3b). This cloth impression could be the product of either twining or interlacing. Weft/warp-faced textiles, whether twined or interlaced, have one set of elements masked by the greater density of the opposing elements (Emery 1966: 76–77). Unfortunately, the compact spacing of elements obfuscates the weave structure, and consequently the weaving technique (King 1978: 90–91). Even though we cannot identify the weaving technique of sample 2, samples 1 and 2 together show early pastoralists in the south-eastern steppe were manufacturing two cloth structures—balanced-interlace and weft/warp-faced—which share technological parallels with roughly coeval and earlier societies in the western and northern steppe zone (Table 2).

The Early/Middle Bronze Age material from Begash also documents additional uses for processed fibres in potting manufacture, such as twine-wrapped implements for paddling

Table 1. Bronze Age textile impressed ceramics from Begash. Phase 1=2450–1700 BC, Phase 2=1650–1000 BC.

| Archaeological phase | Sample # | Weave structure | Thread width (mm) active/passive | | Thread count (cm) active/passive | | Final spin direction | Yarn characteristics | Cloth characteristics | Textile quality |
|----------------------|----------|-------------------------------|-------------------------------------|-----|-------------------------------------|----|----------------------|----------------------------|-----------------------------------|------------------------|
| Phase 1 | 1 | woven interlace (?) | – | 0.6 | – | 5 | – | – | closely spaced elements | – |
| Phase 1 | 2 | twined/plain weave (?) | 0.9 | 1.3 | 13 | 7 | S | – | weft/warp faced | – |
| Phase 1 | 3 | cordage (?) | – | 0.9 | – | 8 | – | – | – | – |
| Phase 1 | 4 | cordage (?) | – | – | – | – | – | – | – | – |
| Phase 1 | 5 | cordage (?) | – | 0.7 | – | 5 | – | – | – | – |
| Phase 2 | 6 | plain-weave interlace | 0.6 | 0.6 | 10 | 8 | – | fine, round, tight spin | near-balanced, spaced elements | – |
| Phase 2 | 7 | plain-weave interlace | 0.6 | 0.6 | 10 | 7 | Z | fine, round, tight spin | evenly spaced elements | mended |
| Phase 2 | 8 | plain weave interlace | – | – | – | 5 | – | – | – | – |
| Phase 2 | 9 | plain-weave interlace | 0.9 | 0.9 | 7 | 7 | – | flat, ribbon-like yarn | balanced compact elements | – |
| Phase 2 | 10 | plain-weave interlace | 0.5 | 0.5 | 12 | 12 | – | fine, tight spin | compact elements, very fine cloth | – |
| Phase 2 | 11 | simple-twined weave: S-twined | 1.1 | 1.1 | 5 | 5 | S | fibrous, loose spin | loose weave, very coarse cloth | missing elements, worn |
| Phase 2 | 12 | twined/plain weave (?) | 0.5 | 0.6 | 15 | 17 | Z | fibrous | compact elements, coarse cloth | worn |
| Phase 2 | 13 | twined/plain weave (?) | 1.4 | 1.7 | 6 | 4 | Z | – | chunky, knotty | – |
| Phase 2 | 14 | twined/plain weave (?) | 0.7 | 1.2 | 8 | 5 | Z | fibrous, fuzzy, loose spin | weft/warp faced, compact weave | missing elements, worn |

| | | | | | | | | | | |
|---------|----|---------------------------|-----|-----|----|---|---|-------------------------------|--|------------------------------|
| Phase 2 | 15 | twined/plain weave (?) | 0.7 | 0.7 | 11 | 5 | Z | fibrous, fuzzy, loose spin | weft/warp faced, compact weave | missing elements, worn |
| Phase 2 | 16 | twined/plain weave (?) | 0.9 | 1.1 | 8 | 3 | Z | fibrous, fuzzy, loose spin | weft/warp faced, dense & fluffy cloth | – |
| Phase 2 | 17 | twined/plain weave (?) | – | – | – | – | – | – | – | – |
| Phase 2 | 18 | twined/plain weave (?) | – | – | – | 6 | – | – | compact weave, coarse | – |

Table 2. Textile evidence in central Eurasia from the Eneolithic to Bronze Age. Key to citations: 1) Olsen & Harding 2008; 2) Chernai 1985; 3) Glushkov & Glushkova 1992; 4) Shishlina *et al.* 2003; 5) Shishlina *et al.* 2000; 6) Shishlina 1999; 7) Gryaznov 1969; 8) Good 2006; 9) Heinsch & Vandiver 2006; 10) Tatarintseva 1984; 11) Bird 1956; 12) Kupriyanova 2008; 13) Uzmanova 2010; 14) Vinogradov & Mukhina 1985; 15) Orfinskaya *et al.* 1999; 16) Heibert 1994; 17) Chernai 1981; 18) Gulyamov *et al.* 1966; 19) Sprishevskiy 1974; 20) Korobkova 1962.

| Time period | Geographic region | Archaeological culture | Textile evidence | Vessel manufacture | Cloth structure | Raw material | Citation |
|--|---|---------------------------------|---|---------------------------------------|-----------------------------|-----------------------|-----------|
| c. 3700–3100 BC | north Kazakhstan | Botai | textile & cordage impressions | concave moulding, paddling, stamping | unwoven, twined | bast (hemp/nettle) | 1, 2, 3 |
| c. late 4 th mill BC | Tobol-Irtysh forest-steppe | Krohalevka & neighbouring sites | textile & fibre impressions | concave moulding, paddling, stamping | unwoven, twined | – | 3 |
| c. 3700–2500 BC | north Caucasus | Majkop, Yamnaya | textile impressions, textiles, basketry | – | plain weave, twined | wool, flax, cotton(?) | 4, 5, 6 |
| c. 3700–2500 BC | Minusinsk basin | Afanasevo | cordage impressions | stamping | – | – | 7 |
| c. late 4 th mill BC | Iranian plateau | Shahr-i Sokhta | textile impressions, textiles | unspecified | plain weave | – | 8 |
| c. 3500–2500 BC | Caucasus | Kura-Araxes | textile impressions | possible moulding | unspecified | – | 9 |
| c. late 3 rd mill BC | Ishim forest steppe | Vishnevka I & II(site) | textile impressions | concave, convex moulding | twined, plain weave | – | 2, 10 |
| c. late 3 rd mill BC | Quetta Valley, Pakistan | Harappa | textile impressions | convex moulding | plain weave | – | 11 |
| c. 2450–1000 BC | south-east Kazakhstan | Begash (site) | textile & cordage impressions, yarn | convex moulding, stamping | twined, plain weave | plant & wool(?) | – |
| c. 2050–1900 BC | south-east Ural mountains, north Kazakhstan | Sintashta | textile impressions, textiles | convex moulding | plain weave, twined | plant & wool | 2, 12–15 |
| c. 1900–1750 BC | south-east Ural mountains, north Kazakhstan | Petrovka | textile impressions, textiles | convex moulding | plain weave, compound weave | plant & wool | 2, 14, 15 |
| c. 1700–1500 BC | north-central Kazakhstan | Alakul | textile impressions | convex moulding | plain weave | plant & wool | 14, 15 |
| c. 2200–1800 BC | Turkmenistan | Gonur (site) | textile impressions | – | – | – | 16 |
| 2 nd –1 st mill BC | Moscow region | D'yakovska | textile impressions | moulded | twined, knitted | – | 17 |
| 2 nd –1 st mill BC | Fergana Valley, Uzbekistan | Chust & later | textile impressions | convex moulding and other unspecified | plain, twill, repp | – | 18–20 |

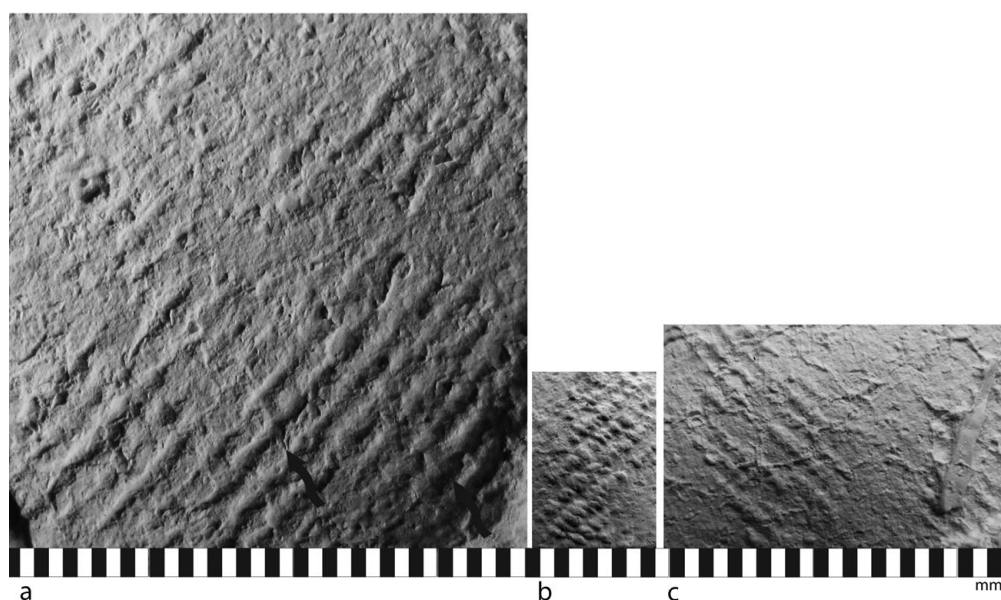


Figure 3. Textile and cordage impressions from Begash, 2450–1700 BC: a) sample 1, possibly woven; b) sample 2, twined or woven cloth; c) sample 3, possibly cordage.

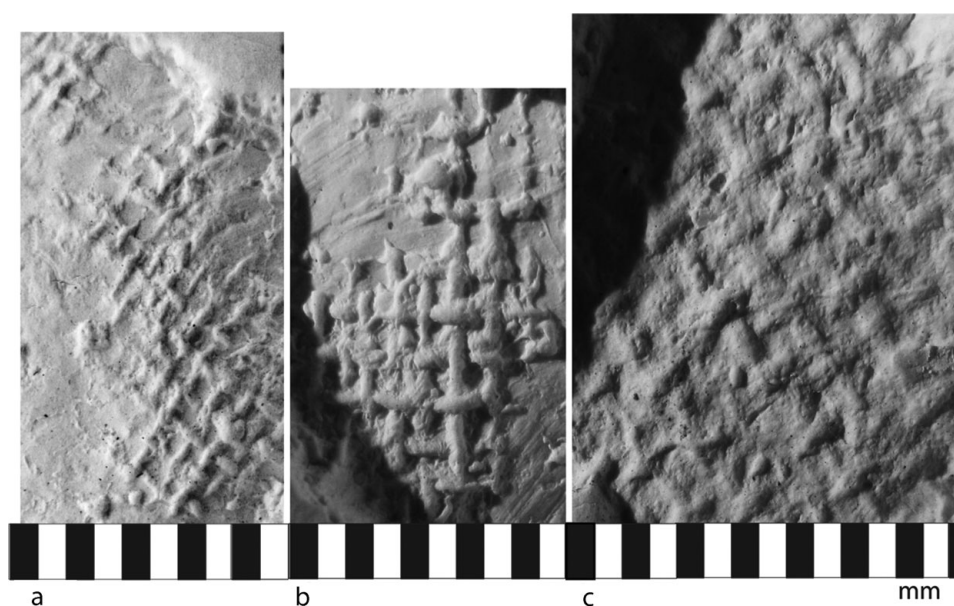


Figure 4. Plain weave textile impressions from Begash, 1650–1000 BC: a) sample 6; b) sample 7; c) sample 9.

vessel walls. Samples 3, 4 and 5 contain impressions from single direction elements typically left from cordage and not textiles (Figure 3c). Cordage-impressed pottery is documented among much earlier fourth-millennium BC hunter-gatherer and early pastoral societies of Siberia (Table 2).

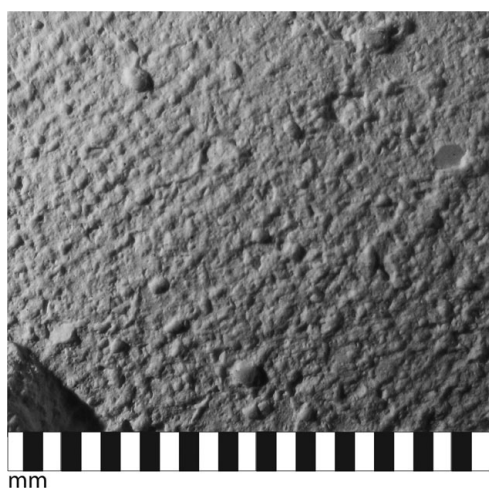


Figure 5. Plain weave textile impression from Begash, 1650–1000 BC (sample 10).

The 13 Late Bronze Age textile-impressed sherds from phase 2 at Begash (1650–1000 BC) exhibit various weaves, numerous thicknesses and ‘fluffiness’ among yarns, coarse to fine cloth, and possibly a number of fibre sources or processing techniques (Table 1). Impressions in Begash samples 6 and 7 were created by balanced plain weave cloth with a very fine, thin and tightly spun yarn (Figure 4: a & b). These samples bear a resemblance to textile impressions in pottery from slightly earlier Petrovka sites in the western steppe zone (Orfinskaya *et al.* 1999: sample 20). Sample 9 shows a denser balanced plain-woven cloth with a wider, ribbon-like yarn (Figure 4c), that resembles

slightly earlier textile-impressed pottery from Sintashta and Andronovo period cemeteries in southern Russia (Orfinskaya *et al.* 1999: samples 11, 13, 17). Samples 6, 7 and 9 demonstrate some technological consistency in pottery and textile manufacture between the western and eastern steppe zones, though multiple processes might account for these similarities. By contrast, the cloth impression in sample 10 is distinctive in the Begash assemblage for its compact weave and exceptionally fine yarn (Figure 5).

Within the later Bronze Age assemblage from Begash, samples 11 and 12 present unique, coarsely woven textiles made of either a different raw material fibre or a yarn processed and manipulated with a special technique (Figure 6). Sample 11 documents a simple S-twined fabric and offers the first solid evidence for twining technology at Begash and in the south-eastern steppe zone. Dating to as early as 1650–1000 BC, the twined-weave structure visible in sample 11 shows crossed woven elements and slanted indentations in the clay impression—features typically associated with twined cloth structures (Emery 1966: 196).

Sources and techniques of manufacture

Imprints of cordage, basketry, netting and cloth in pottery can index various vessel building and decorating procedures. Such techniques can include resting pots on woven mats during shaping, stamping for vessel ornamentation, paddling with cord-wrapped implements or lining pottery moulds with cloth. The 18 textile/cordage-impressed samples from Begash suggest mould-forming techniques were dedicated to vessels with specific uses, or perhaps in times when quick production was necessary. Shepard (1956: 63), in her study of potting industries, notes that mould-based potting is typically a technique to facilitate the *ad hoc* production of multiple vessels. Moreover, high labour investments behind cloth production probably encouraged cloth ‘recycling’ (Drooker 1992: 49) for moulding vessels, as it would not make economic sense to use pristine or newly manufactured cloth for potting. Five of the Begash samples (Table 1) exhibit torn, frayed and mended textiles, a strong indication

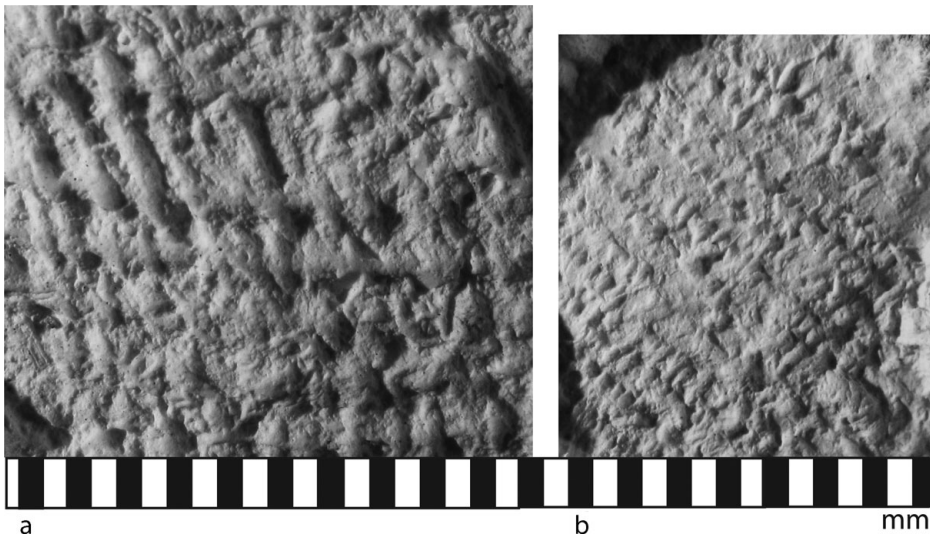


Figure 6. Twined textile impression from Begash, 1650–1000 BC: a) sample 11; b) sample 12.



Figure 7. Spun yarn from Begash, 1950–1700 BC (photograph: Robert Spengler).

of fabric recycling of rather tattered textiles. These economic factors might account for the utilisation of various cloths for potting at Begash.

To date, Begash has yielded only scanty primary evidence of textiles themselves, consisting of small fragments of carbonised S-twisted yarn recovered through soil flotation of a pit hearth radiocarbon-dated to between 1950 and 1690 BC (Figure 7). Carbonisation and deterioration prevented identification of the yarn as either animal or plant derived (Robert Spengler, *pers. comm.* 2010). The piedmont steppe environment around Begash produces a number of wild plants with fibre compositions suitable for spinning thread, such as *Cannabis ruderalis*, *Artemisia* spp., *Urtica* spp. and *Celtis* spp., and a suitable ecology for animal pastoralism and therefore wool harvesting (Frachetti *et al.* 2010). Although we cannot

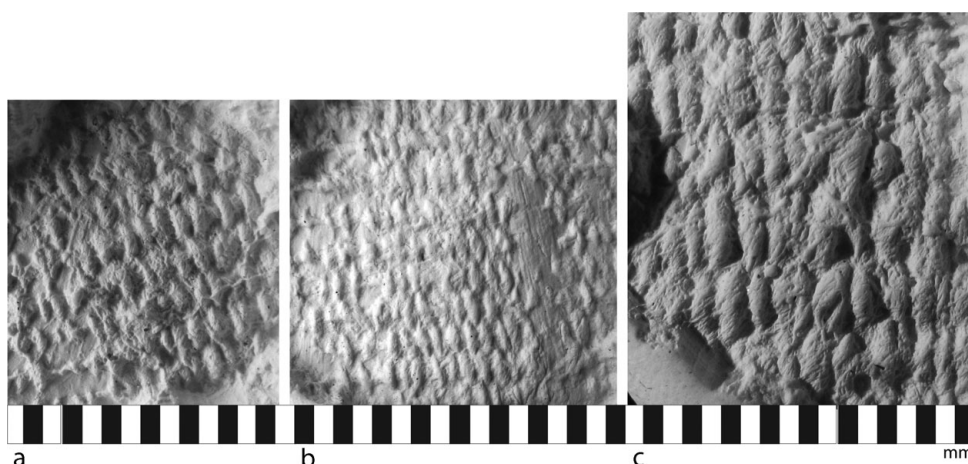


Figure 8. Textile impression showing fibrous raw materials from Begash, 1650–1000 BC: a) sample 14; b) sample 15; c) sample 16.

as yet identify fibre sources from clay impressions, the Begash pottery demonstrates marked differences in the broad characteristics of textiles that may derive from various raw material fibres or from multiple fibre processing techniques. For example, the yarn in samples 14, 15 and 16 is extremely fibrous and bestows a ‘fuzzy’ finish to the cloth impression (Figure 8). In contrast, samples 6 and 7 show a finer yarn clean of loose fibres (Figure 4: a & b). The impression in sample 10 presents an additional contrast whereby tiny balls of fibre are distributed along the fine strands of yarn, termed ‘slubbing’ (Figure 5). Slubbing occurs when excess fibres catch in the finished thread during spinning or when wool is spun tight enough for balls of fibre to bunch up along the yarn. Economic investments in pastoralism (Frachetti & Benecke 2009) and domestic and wild plant utilisation (Frachetti *et al.* 2010) at Begash would have facilitated a range of perishable fibre manipulations to produce the broad range of cloth impressions documented among its pottery.

The textile-impressed pottery from Begash offers evidence for two distinct production techniques: tension-loom weaving and hand-twining. On-site yarn spinning and ceramic manufacture is supported by the discovery of spindle whorls, spun fibres and clay wasters. However, the material evidence from Begash lacks direct evidence for weaving, such as loom timbers and weights. Thus, textile impressions in clay from both twined and woven cloth offer one of the few investigative avenues for identifying weaving technologies of the south-eastern steppe zone between 2450 and 1000 BC.

Twined textiles can be manufactured using warp-weighted, untensioned frame looms or by manipulating the elements by hand (Emery 1966: 199, 200; Drooker & Webster 2000: 271). By comparison, the manufacture of 1/1 plain weaves requires stable and constant tension while weaving, which can be achieved with a relatively simple and unmechanised tension loom (Barber 1991: 80). Plain weave, interlaced cloth impressions from Begash place loom technology in south-eastern Eurasia no later than 2450 BC. Begash was a seasonal camp (Frachetti & Mar’yashev 2007) and looms fashioned from a few short sticks would have allowed ease of transport and reassembly in the lead up to and following seasonal

migrations. Thus, looms were probably light, small and portable, such as the back-strap loom, horizontal ground loom or untensioned upright loom. Low growing willow, poplar and elm trees (*Salix* sp., *Populus* sp. and *Ulmus* sp.), typically found in riparian zones around Begash, produce timber suitable for constructing such looms. These looms are widespread among ethnographic and historic mobile populations from Eurasia (Wulff 1966: 201; Wertime 1978: 15; Rutschowskaya 1990: 30) and were probably used by Eneolithic and Bronze Age populations as well (Chernai 1981). Interlaced and twined textiles at Begash would have been manufactured within a similar technological framework.

Context

The earliest fibre impressions known in Eurasia (c. 26 000 BC) are from Upper Palaeolithic Eastern Europe where cordage and basketry were accidentally pressed into clay that was then fired (Adovasio *et al.* 1996; Soffer *et al.* 2000). Cord-impressed pottery fragments in eastern Russia document the first deliberate use of processed fibres for potting in the latest phases of the Upper Palaeolithic (c. 10 500 BC) (Hyland *et al.* 2002). In Eurasia, the earliest textile- and cord-impressed pottery is associated with the early food producing economies of the Neolithic in Eastern Europe (Chernai 1981), and Early Bronze Age in the Caucasus (Shishlina *et al.* 2000; Heinsch & Vandiver 2006).

Textiles, mats and basketry constructed from plant fibres predate the first known woollen textiles in central Eurasia (Shishlina *et al.* 2003; Olsen & Harding 2008). Woollen textiles are thought to emerge along with economies investing in woolly sheep no earlier than the fourth millennium BC in Eurasia (Barber 1991: 2). Following the late third millennium BC in the western steppe zone, plant and woollen textiles are documented in domestic and ritual contexts at Sintashta and later Bronze Age sites (Glushkov 1993: 65; Shishlina 1999: 34–35; Galiullina 2000: 102; Kupriyanova 2008: 83; Ucmanova 2010).

The pottery from the Eneolithic and Bronze Age of central Eurasia documents long-term traditions in textile- and cordage-based potting techniques, as well as innovations in weaving and potting throughout prehistory (Table 2). In central Eurasia, vessel stamping and paddling is documented among Eneolithic hunter-gatherer and early pastoral cord-impressed pottery from the mid fourth and third millennia BC in northern Kazakhstan (Olsen & Harding 2008), throughout the Tobol and Ishim basins in western Siberia (Glushkov & Glushkova 1992) and in the Minusinsk basin (Gryaznov 1969: fig. 9) (Table 2). Mould-formed, textile-impressed pottery, on the other hand, spans the Eneolithic, Bronze Age and later periods across much of central Eurasia (Korobkova 1962; Chernai 1981, 1985).

Eneolithic fourth- and third-millennia BC potting techniques incorporate unwoven cloth and cordage for concave moulding and stamping, whereby impressions are found on the vessel exterior. Some scholars believe the comb-stamped and textile-impressed surface of round-bottomed Eneolithic pottery make references to baskets in their outward appearance (Chernai 1985: 103–104; Glushkov & Glushkova 1992: fig. 48). Therefore, the stylistic classification of Eneolithic pottery may also provide a formal classification of perishable containers that predate the earliest pottery in Eurasia. Starting in the late third millennium BC, the emergence of convex-moulded vessels coincides with a technological innovation in steppe textiles to woven cloth production. In addition, textile impressions fall ‘out of

view’—impressions appear on vessel interiors, a fraction of the vessel is impressed and impressions are often smeared away (Glyshkov & Glyshkov 1992: 56). Therefore, the use of textiles as a membrane for moulded pottery was probably a practical production measure later on. By the Late Bronze Age, in the mid to late second millennium BC, this pottery occurs in scattered archaeological contexts from the forest steppes of Siberia to the mountainous regions of southern central Asia, where it continues into the first millennium BC (Table 2).

Discussion

The textile-impressed pottery from Early/Middle and Late Bronze Age Begash stands out as one of the most varied Bronze Age textile assemblages in central Eurasia. The breadth of cloth characteristics from phase 2 Begash is not reflected in assemblages elsewhere in the steppe. Apart from late second- to early first-millennia BC impressions of plain-, twill- and repp-weaves from the Fergana Valley (Korobkova 1962), textile impressions from Bronze Age central Eurasia include simple plain weave with little variation in cloth characteristics (Table 2).

Sample 1 from Begash places the first tentative evidence for woven textiles in the south-eastern steppe zone around 2450–1950 BC. Elsewhere in the steppe, plain weave textiles show up in pottery impressions and as preserved cloth around 2100–1800 BC at Stepno’ye and Arkaim in southern Russia (Kupriyanova 2008: 83). Sample 2 is significant because it offers the sole example in the steppe of weft-faced cloth impressions in ceramics for the Bronze Age. Bronze Age pottery impressions are usually woven (Orfinskaya *et al.* 1999), while twined, unwoven textiles are more typical of Eneolithic pottery (Table 2). Twined-cloth from early second-millennium BC Begash enhances the idea of durable channels of interaction between pastoral and hunter-gatherer societies from the northern steppe with pastoralists to the south-east.

Outside Semirech’ye, similar weave impressions to that of sample 10 might exist at Gonur, an Oxus civilisation site in Turkmenistan dating to *c.* 2200–2000 BC in the Middle Bronze Age (Hiebert 1994: fig 4.34). Frachetti has recently argued that broad material, cultural and economic affiliations may have formed through extended institutional ties among populations living in the south-eastern steppe zone and southern central Asia (Frachetti *et al.* 2010; Frachetti 2012; cf. Hiebert 2002). More specifically, compelling new evidence exists for the eastward spread of domestic plants and animals along this mountain zone into eastern Eurasia no later than the third millennium BC (Frachetti *et al.* 2010). Although the movement of textiles and pottery does not figure significantly in the model to date, the appearance of similar weave impressions in sample 10 and the sample from Gonur, and additionally textile-moulded pots from Bronze Age contexts in the Fergana Valley (Table 2), might evince a broader material basis of trade networks in this region. Alternatively, common methods for raw fibre processing and plant harvesting may have diffused along diverse vectors throughout the Inner Asian Mountain Corridor.

For a long time, the primary research goal in Eurasia has been to define the social boundaries of various mobile pastoral ‘culture groups’ through stylistic analyses of pottery (i.e. decorative and morphological studies). Kuz’mína’s (2007) regional culture-history of

Bronze Age Andronovo ceramics reflects the canonical basis for mapping demic diffusions of mobile pastoral populations across Eurasia beginning in the early second millennium BC. According to her model, migrant agro-pastoralists allegedly brought about massive changes in technology, material culture and economy around 1500 BC in Semirech'ye, where Begash is located (Goryachev 2004; Kuz'mina 2007). However, in recent years, absolute dating schemes have pushed the Eneolithic and Bronze Age chronology of central Eurasia back several hundred years (Frachetti & Mar'yashev 2007; Hanks *et al.* 2007; Svyatko *et al.* 2009), thereby calling for more detailed material studies into the whereabouts, timing and nature of technological innovations in the steppe. Although often overlooked, textiles offer key data to flesh out models of interaction, technological transfer and interregional exchange in central Eurasia (Good 2006). The textile and pottery assemblage from Begash show that longer-term and earlier technological trends were in place as early as 2450 BC.

Conclusion

We argue that the multiple uses of utilitarian items, such as textiles, had both direct and unforeseen impacts on socio-economic integration among pastoralists and their interaction with agriculturalists and hunter-gatherers across Eurasia from the Eneolithic into the Bronze Age. Given textiles' portability, they were undeniably essential containers for the transfer of material items between central Eurasian populations from at least the third millennium BC. Within the assemblage considered here, some textiles resemble those known from adjacent steppe contexts, while others are particular only to Begash. Systematic analysis and material comparisons of craft technologies used by other Bronze Age societies is of key importance for understanding long-term developments in mobile pastoral lifeways across the Eurasian steppe zone. This study traces a geographically broad tradition of both textile and pottery manufacture technology in the Bronze Age that is the first of its kind in the eastern steppe zone. Textile impressions in potsherds from Begash at 2450–1000 BC offer a rare line of material evidence for investigating perishable fibre technologies among some of Eurasia's first pastoralists, which in the future can be used as correlates to investigate interaction between additional productive economies across Eurasia.

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