Pre-pottery clay innovation in the Zagros foothills

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Dr Amy Richardson

iv. Institutional affiliation

University of Reading

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vi. Abstract

Neolithic material engagements transformed the ways that communities interacted with the physical world and one another. On the flanks of the Zagros Mountains, in western Iran and northeastern Iraq, Robert Braidwood initially proposed his hilly flanks hypothesis for the origins of agriculture and sedentism. The evidence for multi-centred developments in domestication has demonstrated that elements of these practices spanned Southwest Asia in the Early Neolithic. The Zagros Mountains (and the eastern branch of the Fertile Crescent as a whole) constituted an area of vibrant engagement with new ideas, materials, experimentation, and innovation, participating in the networks of interaction and exchange that facilitated the spread of alternative lifeways. This research examines how engagements with clay influenced the development and spread of new ways of thinking about the physical world, highlighting the role of clay as a transformational material through sites in the Central Zagros.

vii. Main text

Investigations of the ways in which materials were used by the inhabitants of Early Neolithic sites illuminate key features in the development of networks of interaction between communities across the Fertile Crescent. Sedentarising communities exchanged knowledge, technologies, and ideas through the materials they were using for producing objects. Living ever more materially bound lives, these innovators maintained connections with a vast landscape of people, ideas, and things.

This paper aims to combine the scientific analysis of materials with theoretical approaches to materiality, in order to investigate creative clay use as a transformational process in the Pre-Pottery Neolithic, through a case study at the eighth millennium BCE settlement at Bestansur in the Neolithic Zagros. This study demonstrates how people developed new ways of understanding the world through small-scale and localised innovations, creatively engaging with materials within a wider network of social transformation.

MATERIALS AND MATERIALITY

The object-oriented ontological turn has sought to bring the symbiotic relationship between humans and things into focus, re-examining things as powerful actors in the world (Latour 1999; 2005; Olson 2010, 27). New materialisms have influenced discourse in archaeology, addressing and expressing the dynamic co-agential relationships between people and things (Demarrais *et al.* 2004; Bennett 2010; Witmore 2014). These lines of enquiry are rooted in examinations of material agency, in which people and materials are performative co-agents in production, each working with their own forces to forge new understandings of processes of becoming through material engagement (Ingold 2007; 2013; Gosden and Malafouris 2015; Sofaer 2015).

Materiality-based approaches have found new paths in combination with current trends in cognitive evolution. Four key strands have followed this thread: examining material culture as a scaffold for distributed cognition (Dunbar *et al.* 2010; Gamble *et al.* 2014); quantifying longer-range processes to construct the evolution of social and material networks (Kristiansen 2004; Gamble and Coward 2010; Knappett 2011; Coward 2013; Knappett 2013; Kristiansen 2014; Coward 2016); exploring the ways in which material engagements have shaped the human mind (Lemonnier 1992; 2002; Renfrew 2004; 2007; Boivin 2008; Mithen 2010; Robb 2010; Lemonnier 2012; Malafouris 2013; 2014; Malafouris *et al.* 2014); and the application of theories of quantum entanglement to provide the apparatus to explain our relationship with the material world (Barad 2003; 2007; Hodder 2011; 2012).

In examining the materials used to shape the Neolithic world, we inevitably classify and divide the materials by a well-established set of typological systems: by object type, by mineralogy, by resource type. Yet perceptions of a material are not a fixed property; perceptions depend on contingent cultural values, interpretations, and understandings of origin. We differentiate value on the basis of availability, that those nearby and abundant are commonplace, and those from far away are exotic. These perceptions may be echoed in some Neolithic choices, but boundaries between the organic and the mineral are not always so clearly defined, where materials of the earth can be perceived as animate, sensual, and imbued with the properties of flesh and blood (Boivin 2004; Boivin and Owuc 2004; Boivin 2008). The late fourth and third millennium cuneiform lexical lists provide some insights into the ways in which materials were categorised in the region in subsequent periods (Postgate 1997). Wengrow's (1998) *The Changing Face of Clay* highlighted the complex relationship clay played in the development of urban life and writing in Mesopotamia, but the evidence indicates that these innovations were the product of a widespread creative experimentation that preceded agriculture and sedentism across the region.

PRE-POTTERY CLAY INNOVATION IN SOUTHWEST ASIA

Often referred to as the Aceramic Neolithic, or Pre-Pottery Neolithic, the late ninth to eighth millennium was a period of intensive experimentation and innovation with clay. Continued investigations of early settlement sites throughout the Fertile Crescent, and the enhanced resolution of radiocarbon dates for the region, have clearly demonstrated the fallacy of the term 'Aceramic Neolithic'. The advent of pottery technology emerged from a complex web of existing clay practices and pyrotechnological activities in Early Neolithic Southwest Asia, in the form of small clay unfired vessels, lined baskets, and large storage bins at sites such as Mureybet, Beidha, and Jericho, although ceramic technologies were already known in parts of Africa and East Asia (Tsuneki 2017).

Schmandt-Besserat (1974) argued for a reappraisal of our understanding of the chronology of clay technologies in the Neolithic Zagros; her characterisation of the chronology of development can now be substantially refined. Experimentations in the use of small clay objects, the use of clay in architectural construction and the development of pyrotechnology all occurred much earlier than was speculated when she first observed the crucial role that clay played long before the appearance of pottery. People were manipulating and shaping clay into tokens and dwellings from the early tenth millennium, not just at the lowland sites of Nemrik 9 and Qermez Dere (Kozlowski 1989; Watkins *et al.* 1989), but also in the foothills of the Iranian Zagros at the site of Chogha Golan (Riehl *et al.* 2013).

The inhabitants of Ganj Dareh produced the earliest documented Neolithic pottery in the Eastern Fertile Crescent, dating to the late ninth millennium (Smith 1978; Zeder and Hesse 2000), shaping vessel forms in new and creative ways (Eygun 1992). The inhabitants of these sites utilised the locally available materials in complex configurations, some of which indicate that new material practices were exchanged across the Central Zagros spine, influencing building techniques, ritual practice, technologies and abstract expressions in clay, through tokens and figurines. Bernbeck (2017) has highlighted the Ganj Dareh inhabitants' awareness of the technological processes necessary to make fired ceramic vessels from the preparation of clay for mud-brick, and the transformative properties of fire applied to lightly baked figurines and tokens; yet stone continued to be the material of choice for vessels and clay was the preserve of storage facilities. Pyrotechnology and heat treatment were well established techniques in many aspects of production by the eighth millennium, and had been used in the preparation of fired lime from as early as the Natufian at sites such as Hayonim Cave and 'Ain Mallaha (Gibbs 2015). Fired lime preceded the use of ceramic technologies throughout Southwest Asia, including at Ganj Dareh and at Bestansur (W. Matthews 2016).

Clay token assemblages are well known from Early Neolithic sites in the high Iranian Zagros throughout the ninth millennium BC, with clay tokens published from sites such as Asiab (Schmandt-Besserat 1979; Zeder 2006), the earliest level 'E' at Ganj Dareh (Zeder and Hesse 2000; Zeder 2006), and Sheikh-e Abad (Cole *et al.* 2013; R.J. Matthews *et al.* 2013; Richardson 2014). Excavations at the early settlement at M'lefaat (217 km northwest of Bestansur) have provided some of the best early evidence for clay use in the tenth millennium, with around 40 fragments recovered over the course of the University of Chicago investigations at the site (Dittemore 1983, 682). However, amongst these only one spherical token and two clay cylinders have been identified from the disturbed layers (Dittemore 1983, 672; Schmandt-Besserat 1992b, 197). Jarmo in the seventh millennium has provided a wealth of around 2,000 tokens, largely cones and tetrahedrons, and 5,500 pieces of shaped clay overall (Broman Morales 1983, 369; Schmandt-Besserat 1992a, 45).

MATERIALS IN THE ZAGROS MOUNTAINS

The Neolithic settlements of the Zagros were located with access to an array of ecozones, incorporating lush, fertile valleys and rolling plains, high plateaus, and rolling limestone hills covered in scrubby vegetation, providing rich and varied natural resources. The Zagros Mountains comprise a fold-thrust zone, formed by the collision of the Eurasian and Arabian tectonic plates, creating a belt of parallel ridges running northwest to southeast across the landscape. These high peaks mark the current Iraq-Iran border, stretching over 1500 km (W. Matthews 2013). The collision zone has exposed Mesozoic sediments, predominantly composed of limestone, with marble, alabaster, and chert, as well as less commonly occurring gabbro, diorite, and basalt (Karim *et al.* 2009); nodules and cobbles of these materials have eroded from the rocky outcrops and can be gathered from the riverbeds (Jassim *et al.* 1982; Al-Barzinjy 2008; Azizi *et al.* 2013). The clay-rich deposits of the Mesopotamian plains and Zagros intermontane valleys are the result of orogenic activity, and the accompanying transgression and regression of the Tethys Sea (Khormali and Abtahi 2005; Abbaslou and Abtahi 2008; Godleman *et al.* 2016). Clays are the common denominator in the settlements of the Neolithic, used for constructing dwellings, lining pits and baskets, making tokens, figurines and, in the late Neolithic, vessels and trays.

Farther afield, materials such as obsidian are abundantly common in the highly volcanic region of southern and eastern Turkey along the Anatolian Plate, and to the east in Armenia (Cauvin *et al.* 1998; Chataigner and Gratuze 2014). Rare minerals, such as carnelian and turquoise, can be found in the Alborz mountain range in the north of Iran (Beale 1973; Alarashi 2016; Richardson 2017). This wide range of mineral resources was utilised by the early inhabitants of the region and plays a crucial role in our understanding of materials and materiality in the Eastern Fertile Crescent.

Human habitation in the region is well-documented in the Upper Palaeolithic levels of the high caves and rockshelters, positioned with sweeping valley views over rivers that supplied water, attracted animals, and provided the stone cobbles and pebbles that were used for making chipped stone tools. Exotic objects were mobilised across long distances, in the form of marine shell beads and pendants at Shanidar Cave, Zarzi and Palegawra, where the earliest obsidian thus far known in the Eastern Fertile Crescent was recovered (Garrod 1930; Solecki 1963).

From the twelfth millennium BCE, people began to build encampments closer to the rivers and streams. Sunken pit dwellings are found at sites such as Nemrik 9 and Qermez Dere, shaping new living spaces in the landscape from the clayey soils. This malleable material, which lined hearths and formed beaten floors, was soon used for shaping higher structures for the dwellings, packing pisé or stacking slabs to form mud-brick walls. The Epipalaeolithic to Early Neolithic transition is characterised by increasing intensity of occupation, which incorporated new material and technological repertoires. As Watkins (1989, 24) observed at Qermez Dere, these were 'increasingly sedentary and, paradoxically, increasingly interacting societies'.

BESTANSUR: A CASE STUDY

Excavations at the Neolithic site of Bestansur (Fig. 1) have been undertaken by the Central Zagros Project, directed by Prof Roger Matthews and Dr Wendy Matthews of the University of Reading, since 2012. The site is situated at the edge of the fertile Shahrizor Plain, in Sulaimaniyah Province, located in Iraqi Kurdistan. Investigations have revealed a substantial settlement, with a complex of buildings dating to the early to mid-eighth millennium (R.J. Matthews *et al.* 2016; interim reports available on www.czap.org). Situated at the ecotone between the foothills of the Zagros Mountains and the fertile Shahrizor Plain, Bestansur provides insight into an eighth millennium BCE community that engaged with the material exchanges and practices of the Taurus-Zagros arc. Embedded within material practices of using and making, stone tools were fashioned from obsidian transported from the shores of Lake Van, which in turn the inhabitants of the Zagros foothills used to shape marble bowls and bracelets from local stone (R.J. Matthews *et al.* 2018). Hundreds of kilometres from the sea, people incorporated sea shells such as cowries and dentalium into mortuary rituals. Across Southwest Asia, people shared common practices of house construction, applying fired lime and pigments throughout living spaces (Godleman *et al.* 2016; W. Matthews 2016).

Amongst the silty-clay colluvial sediments of the spring-fed Shahrizor Plain, delicate traces of lightly baked clay forms provide tantalising clues of a community who were shaping new ideas out of the land they inhabited. Drawing on the established repertoires of figurine and token shaping, the Bestansur villagers replicated the common forms used by communities across the region, but also experimented with creating new variations and adaptations, turning the material to their own purposes.

Twelve of the fourteen trenches have thus far identified Neolithic levels of activity, five of which have contained objects made from clay. This range of clay objects, including fragments of fired clay objects, unfired unidentifiable objects, and elements too fragile to survive excavations from the dense clayey soils, has been studied as a whole, incorporating all elements as part of the same technological repertoire in the Early Neolithic.

The Bestansur assemblage of 44 clay tokens provides new evidence for the intervening chronological and geographical gaps in our knowledge of the spread of these commonly occurring objects in the Eastern Fertile Crescent. The tokens comprise roughly even quantities of balls, cones, and squashed or nullified buttons, with a larger number of crude teardrop shapes (13 in total). These are similar in form to Schmandt-Besserat's (Schmandt-Besserat 1992a, 206) pinched sphere or plain ovoid, although they do not formally sit within the pan-regional token or figurine repertoires and may relate to a more localised purpose. In the token assemblage, only the cones stand out as having been carefully and deliberately rendered – a feature which may also be observed in the drum-shaped token from the site. Cones and drum-shapes are known to exist across the Fertile Crescent at contemporary sites, with the latter being rare and sparsely distributed. Local to the Central and Eastern Fertile Crescent, similar examples are known from sites such as Maghzaliyah, Jarmo and Sarab (Kozlowski, S.K. and Aurenche 2005, fig. 7.6). Clay cones are particularly well-documented at Ganj Dareh, where there are parallels for cones with a scored gash on the exterior, numbering 204 at the slightly earlier settlement in the mountains (SF264, Fig. 6; Broman Morales and Smith 1990).

Ten objects of clay that have been shaped to indicate figurative elements include a cone token with navel and the division of legs, one simple seated figurine, three objects indicating animal attributes, and five small shaped objects which appear to indicate reclining female forms. Human – and particularly female – figurines are a common feature at sites across the Zagros flanks in the Early Neolithic, at Asiab, Ganj Dareh and Ali Kosh (Broman Morales 1983; Daems 2004). Comparable with simple, seated types seen elsewhere in the Eastern Fertile Crescent, seated figurine SF532 has retained legs, but the head is absent, with a smoothed, flat surface at the neck (Fig. 4). Figurines of this Early Simple Type (Broman Morales 1983, 377-78) are seen in the early eighth millennium at Sheikh-e Abad (Cole *et al.* 2013) and in later eighth to early seventh millennium contexts at Jarmo, Sarab, and Guran, where the enlarged hips, thighs and buttocks are interpreted as a sign of feminity (Daems 2008, 84).

The incorporation of the decapitated figurine with disarticulated remains suggests specific reference to the activities taking place in this space. Bailey (2007) has explored the ways in which representational absence and cropping are employed in the restructuring and redefinition of the body and identity in the Balkan Neolithic. In the Zagros, these simple seated figurines have been considered as possible teaching tools for female bodily development (Daems 2004; 2008) or as an artefact of sympathetic magic practices, in which it is the performative nature of their creation which is most significant (Broman Morales 1983 384-385). At Çatalhöyük, Meskell has explored the possibility that these figurines, with their "fleshy and bodily qualities", should be considered not as representative, but as embodied entities (Weismantel and Meskell 2014). The performance of processes of body preparation, disarticulation, and deposition on a clay figurine at Bestansur highlights and re-enacts the processes the inhabitants undertook following the death of someone within their community.

The figurative repertoire at the site is not limited to clay, with pebbles and stones also appearing to have pubic triangles and leg divisions incised to incorporate a human element, with no other shaping to render them humanoid. The dominant preoccupation with human figurative depiction of the body at Bestansur, in contrast with sparse indications of animal imagery, corresponds with other sites across the region, as concepts of personhood changed (Kuijt and Chesson 2007). The development of clay technologies afforded experimentation and creative play.

Other clay objects are too fragmentary to identify the original form, although larger elements indicate that they pertain to objects up to 10cm in size. Broman Morales (1983, 391-2; Broman Morales and Smith 1990, 27) has acknowledged the fragility of the artefacts found at Jarmo and Sarab. Almost 17 boxes, each a cubic foot, of clay objects were collected at Jarmo (Matson 1960, 63), including clay figurines, tokens, shapes and lumps. The seemingly casual manufacture, baking, and disposal of these clay objects gives weight to the suggestion that the power of the object was in the making, not in its retention (Broman Morales 1983, 392-3; Weismantel and Meskell 2014, 240). Rapidity of making, tactility, portability and impermanence were common features of these small clay objects.

The use of clays was not reserved for the shaping of small objects at Bestansur; it pervaded all avenues of activity. This malleable, adaptable material was transformed to serve a range of purposes, for cooking, constructing, roofing, and plastering (Richardson 2014; Iversen 2015; Godleman *et al.* 2016; W. Matthews 2016). Lining the walls of cooking pits and the base of hearths, fire-hardened clays provided infrastructure for the inhabitants of the Neolithic settlement at Bestansur. Sun-baked clays were essential to the construction of mud-brick and pisé rectilinear buildings on the flanks of the low natural rise. The soils in this area are clay-rich, with abundant deposits available along the river beds and in the Zagros foothills – deposits which are still used by local inhabitants of the region today for shaping bread ovens. Clay was used abundantly and experimentally. Late Neolithic pottery has been previously identified in the course of field survey (Nieuwenhuyse *et al.* 2012). However, no Early Neolithic pottery has been recorded over the course of excavations at the site and excavations have not located any levels corresponding to this late ceramic phase.

ANALYSING CLAYS

Analysis of Late Neolithic clays at Çatalhöyük have demonstrated the complexity of clay relationships and the diversity of factors affecting their selection, preparation, and transformation, through a wide-range of techniques, including thin-section petrology, scanning electron microscopy, and x-ray fluorescence (Tung

1999; Hodder 2011; Doherty 2013; Anderson *et al.* 2014). Combined mineralogical and chemical analysis of the late ninth millennium clay figurines from Nevali Çori, using optical microscopy, scanning electron microscopy, X-ray powder diffractometry, X-ray fluorescence and neutron activation analysis, demonstrated the deliberate alteration of the natural properties of the local illitic clay through tempering and use of fire (Affonso and Pernicka 2000). The application of analytical techniques offers the opportunity to examine small, human actions in shaping material culture.

Studies of clay variation have been trialled at Bestansur, applying non-destructive portable x-ray fluorescence (pXRF) to the fragile surviving clay objects. Similar approaches have been successfully proven in the discrimination between clay sources for cuneiform tablets and pottery in Mesopotamia (Goren *et al.* 2011; Daszkiewicz *et al.* 2012; Uchida *et al.* 2015). These later period clays belong to activities within administrated economies and have greater internal homogeneity within their groupings. However, examination of the Chalcolithic clay figurines, tokens and sling bullets from Chogha Gavaneh in Iran (Forouzan *et al.* 2012) has indicated the potential success for applying these methods to more heterogeneous groups of clay artefacts and identifying the movement and exchange of clay objects.

Non-destructive analysis has been conducted in field laboratories in the modern village of Bestansur using a Niton XL3t GOLDD+ analyser, in order to identify and compare materials used for the manufacture of clay objects. The portable spectrometer was calibrated in mining mode, in a tungsten-lined stand, running each of the four filters for 30 seconds, for a total run time of two minutes, with a minimum of two readings taken across the surface to average out material variation, and highlight and eliminate anomalies. Published NIST standards were run at the start and end of each run, for the purpose of refining the calibrations and checking for drift over the course of a set of samples. Data analysis has been conducted using the Paleontological Statistics (PAST) software package (Hammer *et al.* 2001).

For the purposes of this research, 26 of the 44 tokens have been analysed (selected for their contextual value and size suitability for analysis), in comparison with eight figurative objects, 12 fragments pertaining to larger clay objects, and 12 samples of fired clay. Three samples of raw, unfired silty-clay sediment were taken from boreholes directly below the occupation levels (Green et al. forthcoming), in order to evaluate the exploitation of clays in the immediate vicinity.

PEOPLE TRANSFORMING CLAYS

At the Neolithic settlement of Bestansur, we see different clays used in the construction of contemporary buildings (Godleman *et al.* 2016). Similar patterns of selection may have been a feature of the process of planning for making smaller objects in clay. In comparing the average values for each class of clay samples analysed (Table 1), it is evident that fired clays, pertaining to architectural features, including hearths, are compositionally close to the natural samples from below the Neolithic occupational horizon. These samples were collected from a single vertical column and are not necessarily reflective of the horizontal variation across the site.

Elevated calcium values in the artefacts may indicate either a preference for clays with a higher carbonate content and possible tempering with limestone to aid the firing process, or perhaps may be a product of the depositional context as a result of leaching in lime-plastered rooms and external spaces. For the figurines, objects and tokens, elevations in aluminium (Al), manganese (Mn), vanadium (V), chromium (Cr), strontium (Sr), zinc (Zn), and niobium (Nb) likewise may relate to either an addition of tempers or a preference for a compositionally more heterogeneous source. On the basis of the unfired clay disc correlating well with the average object composition, it is unlikely that the variability is a consequence of the firing process, which only reached low temperatures for these objects. This correlates with Schmandt-Besserat's (1974) analysis of the Asiab and Sarab tokens, which had likely been heated on an open campfire. The differentiation between the clays drawn directly from the local sediments used in their unaltered state and clays that have been tempered or collected from further afield for their distinctive properties is evident in the deviation between the principal component analyses (PCA) of the groups (Fig. 2). A strong proponent for the skilful experimentation with clay tempers is a small fragment (SF512, Fig. 5), which has crushed obsidian incorporated into the clay matrix and powdered ochre adhering to one side. This non-depictive, unfinished form appears to demonstrate experimentation in deliberately altering the raw material in order to achieve differing aesthetics from the clay.

Other outliers are highlighted by the PCA, including a small almond-shaped clay token (SF332). This small ovoid, with lenticular section, occurred in a slightly later context than the majority of the clay tokens from the site, and may account for changing manipulations of clay over the course of occupation. These differences are further clarified by examining the ratios between the K/Ti relationships in the make-up of the clays, alongside the Cr/Nb ratios (Fig. 3). Chromium and niobium likely derive from the pegmatite gabbro present in the region (Jassim *et al.* 2006, 218), occurring as small grit inclusions in the clay. This analysis highlights anomalies in the composition of a later Neolithic clay object with gashed features (SF248), an innocuous squashed clay token (SF335). Falling within the typical range of the Bestansur clays is a clay cone with deliberate gashes to the surface (SF264, Fig. 6). This particular style with gash marks cut into the soft surface of the wet clay are almost exclusively known from slightly earlier levels at Ganj Dareh in the Iranian Central Zagros, approximately 200km to the southeast of Bestansur (Broman Morales and Smith 1990). Combined stylistic parallels are not in this case indicative of a Ganj Dareh source, but the presence of this token is certainly suggestive of mobility and exchange between areas and people from the Early Neolithic, carrying with them concepts, technologies, and material potentialities.

CLAYS TRANSFORMING PEOPLE

Over the course of the Early Neolithic, dynamic interactions with clay became embedded in the lifeways of the inhabitants of the Eastern Fertile Crescent and across Southwest Asia. With innovation came a stronger understanding of the potentialities of the material. These discoveries became so deeply entrenched in daily life that we continue to use clay in building our homes and preparing our food, and we are still learning the properties and potentialities of this material. At almost every site in Neolithic Iraq and Iran, people took to making small figurative shapes and tokens from clay. These forms spread hundreds of kilometres between communities, and their exchange afforded the sharing of working techniques and abstractions of the human body. Their physical exchange may have contributed to the comprehensive spread of early forms of numeracy, as this shared language was employed in the form of *bullae*, and subsequently in the earliest forms of writing (Schmandt-Besserat 1979, 1981). As Zeder (2009, 44) observed, it was these "micro, highly contingent, and localized factors [which] seem to have played the greatest role in shaping the individual trajectories of cultural evolution".

Closer examination of these objects at sites such as Bestansur highlights the small-scale innovative practices conducted by individuals, and their engagements with networks that facilitated the exchange of knowledge across the Neolithic world. Sitting at a crossroads between the obsidian sources to the north, marine shells from the south and west, and exotic materials such as carnelian from the east, the Neolithic inhabitants of the Shahrizor Plain were receptive to engaging with the material and social networks that traversed Southwest Asia. This openness to things and ideas – people drawing connections between different spheres of knowledge – is demonstrated in the creative thinking and innovation of the experimental clay assemblage.

In the clay repertoire, at least, this shared network of technological innovation and conceptual representation was evident throughout the sites of the Zagros and beyond. Mimetic behaviours were present across Southwest Asia in the Early Neolithic, as ideas were exchanged and people gave them new form through myriad iterations. The production of clay tokens and figurines at Bestansur is part of a much broader suite of ideas and ideologies that spanned the region, one which encompassed constructing living spaces, sedentarising lifeways, and the increasing management of plants and animals.

These networks of knowledge underpinned and acted as a catalyst for the spread of ideas. As people gave these ideas form, their experimentations changed the way they thought, the way people understood the world, and opened up the potentialities of materials for the pursuit of a variety of new lifeways. The Neolithic was more than a period of change in isolated aspects of human lives, reaching beyond the symbolic, the religious, or the agricultural, to a full-bodied transformation of our engagement with the world around us.

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ix. Tables

Table 1. Averaged values for analysed sample types.

	% composition					**parts per million**								
Sample Type	Si	Ca	Al	Fe	K	Ti	Mn	V	Cr	Sr	Zr	Zn	Rb	Nb
Natural	19.0	8.0	3.9	3.3	1.1	2987.4	455.7	211.5	188.9	139.2	94.5	61.1	24.7	8.3
Fired Clay	14.8	14.7	3.4	3.0	0.9	2458.1	865.0	215.1	146.0	144.8	80.3	65.8	16.4	8.2
Figurine	19.1	13.0	4.9	3.5	1.1	3036.1	1873.4	262.0	220.6	182.1	102.7	95.8	21.5	10.4
Object	18.6	14.1	5.2	5.3	1.2	2775.1	1293.6	274.1	236.9	187.4	92.3	97.4	23.6	10.2
Token	20.7	14.0	5.8	3.7	1.2	3089.3	1512.2	302.5	239.4	212.1	102.2	106.9	24.1	10.8

x. Captions of Illustrations

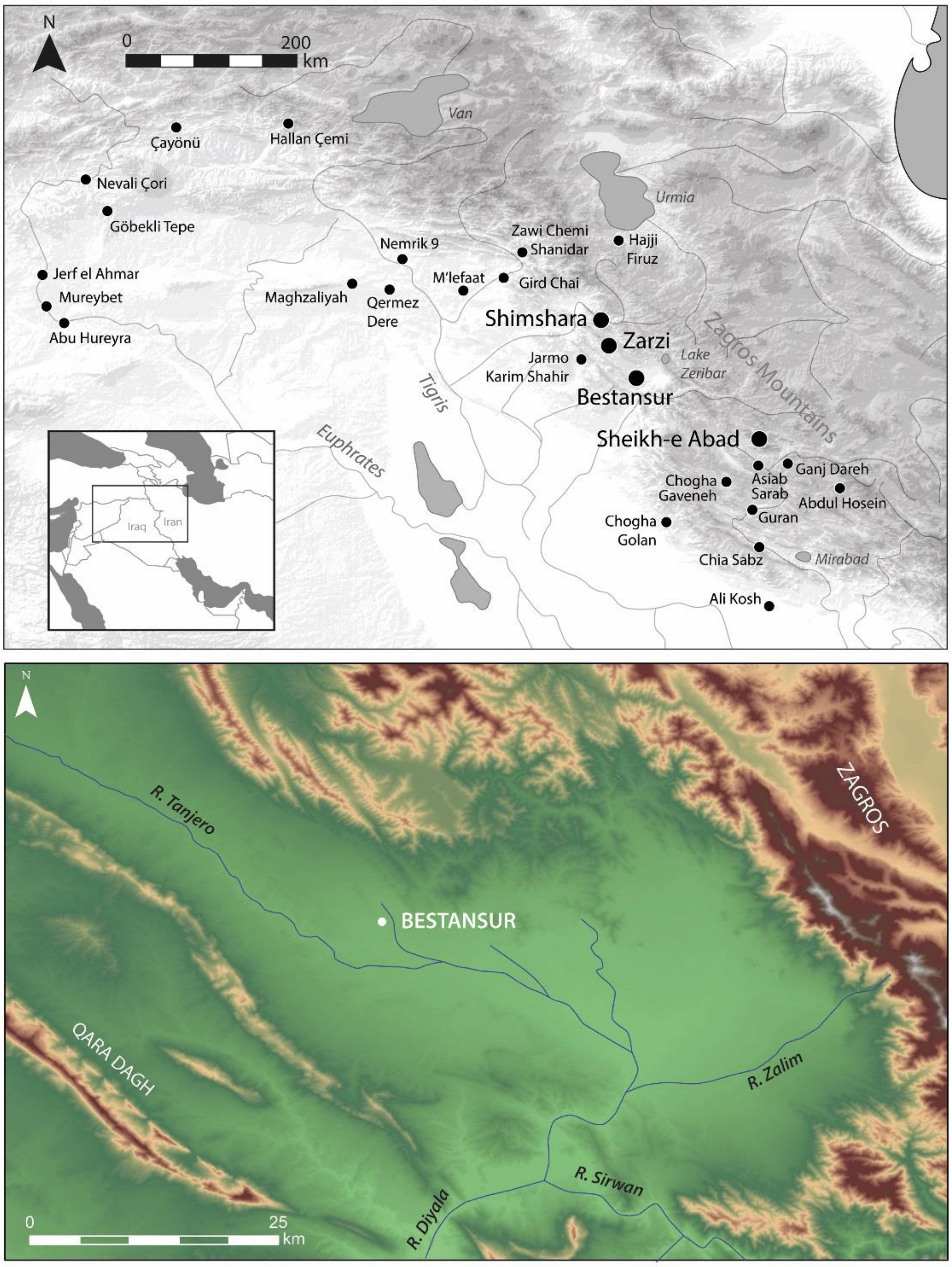

Figure 1. Map of the region with named sites, and topographical map of Bestansur.

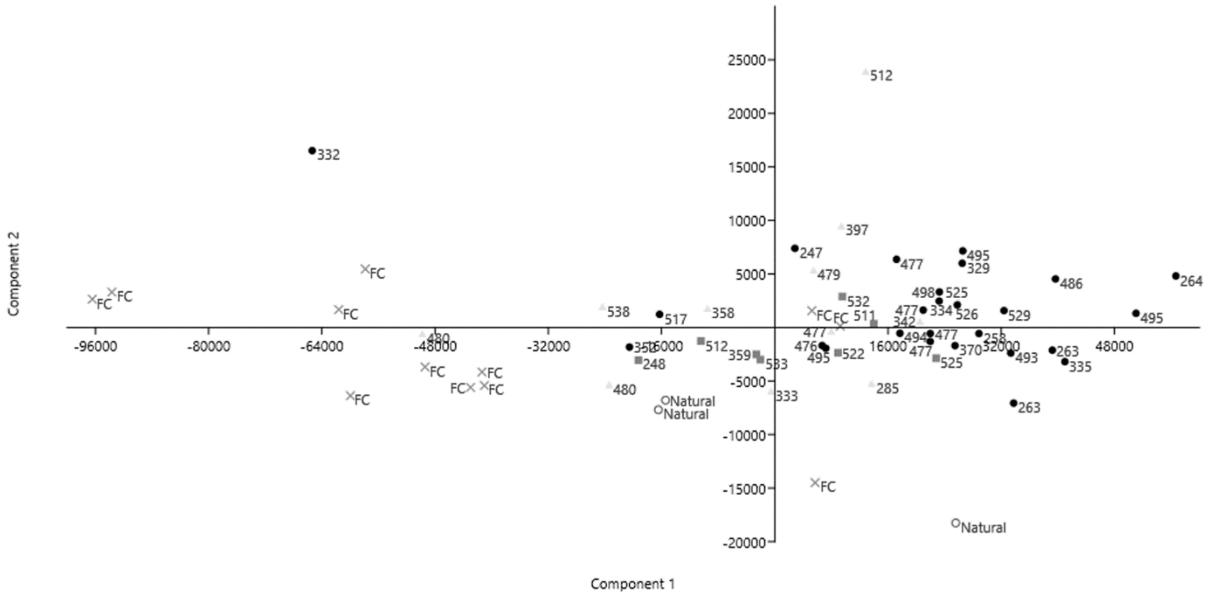

Figure 2. Principal component analysis (PCA) of seven elemental indicators (Al, Si, K, Ti, Rb, Nb, Zr).

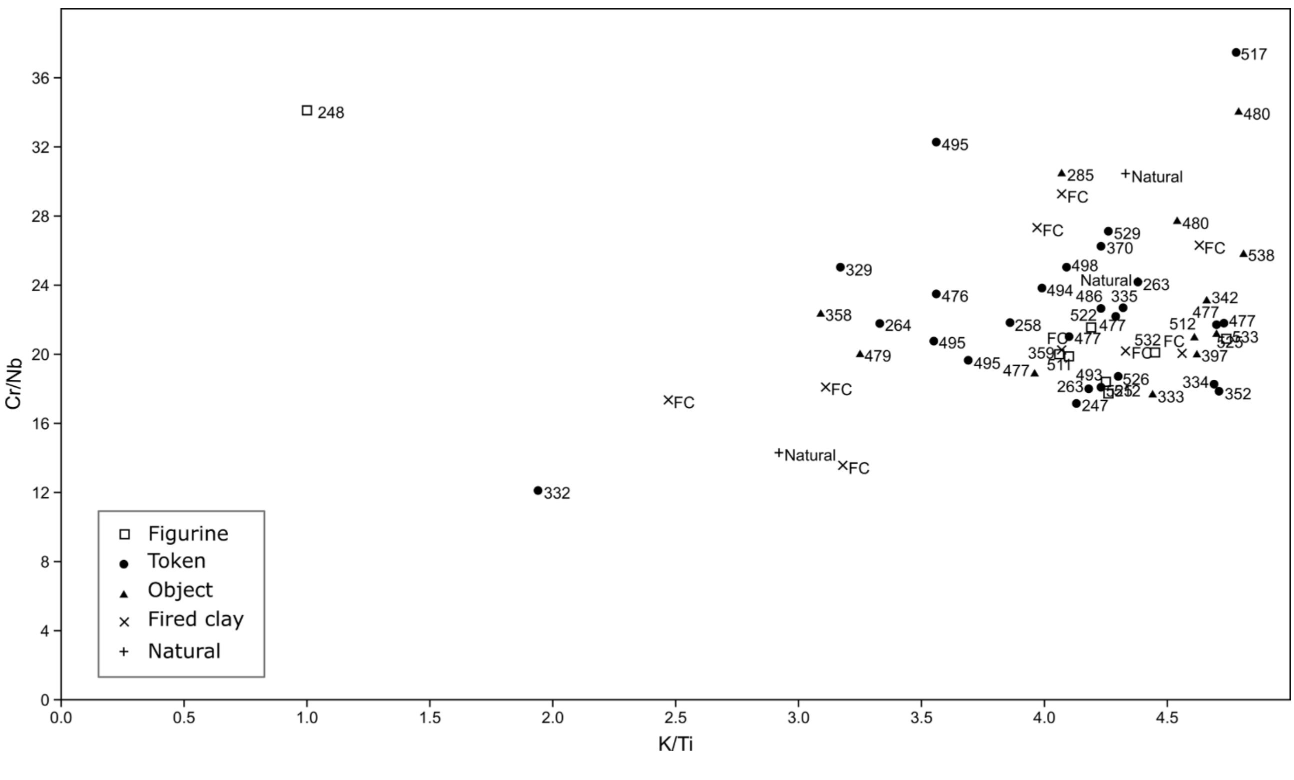

Figure 3. Potassium-titanium (K/Ti) and rubidium-zirconium (Rb/Zr) ratios for clay samples from Bestansur.

Figure 4. SF532 clay figurine.

Figure 5. SF512 with ochre and crushed obsidian.

Figure 6. SF264 gashed clay cone from Bestansur.