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"Modern behaviors" of ancient populations at Shuidonggou Locality 2 and their implications

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ABSTRACT

Both the behavioral and skeletal evolution of *Homo sapiens sapiens* have been hotly debated for more than 20 years. This paper analyzes archaeological materials from Shuidonggou Locality 2 with respect to ecology, technology, economy and social organization, and symbolic behaviors. Locality 2 shows a range of cultural innovations in different archaeological layers. The continuous evolution of flake technology in North China from 40ka to 20ka supports the hypothesis of "Continuity with Hybridization" of Chinese ancient populations from a cultural perspective. On the premise of this model, seeking cultural innovations of Chinese ancient populations should focus on evolutionary processes leading to individual behaviors rather than identifying modern behaviors using a list summarized from materials derived from findings in Europe and Africa. The variation of behavior after the appearance of *H. sapiens* in China and elsewhere demands research into behavioral variability and its causes, instead of treating modern behavior as a single, homogeneous list of features.

1. Introduction

The evolution and dispersal of Modern humans (*Homo sapiens sapiens*) are important questions for paleoanthropologists to answer, and interpretations of them are extremely controversial, especially for East Asia. Several hypotheses has been proposed to clarify these debates, and among them two are the most popular: 1) a strong "out of Africa" replacement model (e.g., Cann et al., 1987; Stringer and Andrews, 1988; Stringer, 2002); and 2) multiregional evolution or continuity with hybridization models (e.g., Wolpoff et al., 1984, Smith, 1982, 1985, 1992; Wu, 1990, 1998, 2006; d'Errico, 2003; Zilhão, 2007; Gao et al., 2010; Derevianko, 2011a,b). Accompanying debates of origins and spread of modern humans, Paleolithic researchers have focused on cultural innovations occurring roughly at the same time as modern humans began dispersing across the world, such as blade technology, ornaments, bone and antler tools, and burial behavior.

Those innovations considered as indicative of "modern behavior" or "modern human behavior" are usually assigned to *H. sapiens sapiens*. They are usually thought to be important cultural, behavioral and cognitive markers to differentiate modern humans from the previous archaic hominins (e.g., Henshilwood and Marean, 2003; Marean, 2007; Conard, 2010), and to have originated in Africa and later dispersed to other continents. However, it is unreasonable to expect a synchronization between cultural and physical evolution, whether in prehistory or in the current world (Conard, 1990, 2008; d'Errico et al., 2003). Some evidence of behavioral innovations is considered to be associated with Neanderthals as well, such as burial and ornamentation (d'Errico et al., 2003; Zilhão et al., 2006, 2010; Zilhão, 2007, 2012; Caron et al., 2011; but see; Bar-Yosef and Bordes, 2010; Higham et al., 2010; Mellar, 2010). Consequently, several scholars have rethought meanings of the term of "modern human behavior" instead of assigning it to *H. sapiens sapiens* directly, and developed several new terms to indicate behavioral innovations after the appearance of anatomically modern humans (e.g., Chase, 2003; Henshilwood and Marean, 2003; Nowell, 2010; Shea, 2011).

Lists of modern behaviors have been proposed by various authors (e.g., Mellars, 1973; White, 1982; Mellars and Stringer, 1989; Bar-Yosef, 2002; Mellars et al., 2007). These lists usually include blade technology, special tool types (e.g., burins and endscrapers), use of bone, antler, and teeth for making tools, standardization of stone tools, ornaments, and long-distance exchange behaviors. Scholars mainly have compared the Middle Paleolithic with the Upper Paleolithic in Europe, and then considered the new cultural characteristics in the Upper Paleolithic as modern. This view was critiqued as a European-centered approach (McBrearty and Brooks,

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2000; Nowell, 2010; Shea, 2011). Although Mellars (2005, 2007) insisted that this list was not intentionally created to generalize worldwide cultural innovations and should be used only on a regional scale, in practice it have been applied globally (Nowell, 2010). McBrearty and Brooks (2000) summarized findings of the so-called modern behavior in Africa, and divided them into four packages: ecology, technology, economy and social organization, and symbolic behavior (Table 1). Each package contains several behavioral innovations, and their first appearance occurred at different times from 280 ka to 50 ka, and also varied in frequency. Henshilwood and Marean (2003) suggested the use of the term "fully symbolic *sapiens* behavior" to replace "modern human behavior", and considered symbolic behavior as core of modern behavior. Some scholars think symbolic behavior is the only marker of behavioral modernity in the world (Texier et al., 2010). However, Shea (2011) rethought definitions of modern behavior conceptually and argued that the concept of behavioral modernity is a qualitative, essentialist one, and instead proposed a research agenda focused on the strategic sources of human behavioral variability.

Table 1
Archaeological signatures of modern behavior summarized by McBrearty and Brooks (2000).

Ecology	Range extension to previously unoccupied regions
	Increased diet breadth
Technology	New lithic technologies: blades, microblades, and backing
	Standardization within formal tool categories
	Hafting and composite tools
	Tools in novel materials (e.g., bone, antler)
	Special purpose tools (e.g., Projectiles, geometrics)
	Increased numbers of tool categories
	Geographic and Temporal variation in formal categories
	Greater control of fire
Economy and Social organization	Long-distance procurement and exchange of raw materials
	Curation of exotic raw materials
	Specialized hunting of large, dangerous animals
	Scheduling and seasonality in resource exploitation
	Site reoccupation
	Intensification of resource extraction, especially aquatic and vegetable resources
	Long-distance exchange networks
	Group and individual self-identification through artifact style
	Structured use of domestic space
Symbolic behavior	Regional artifact styles
	Self-adornment (e.g., beads and ornaments)
	Use of pigment
	Notched and incised objects (e.g., bone, egg shell, ocher, and stone)
	Image and representation
	Burial with gravel goods, ocher, and ritual objects

Evolution of culture is uneven and variable, and cultural innovations could and probably did occur in repeated and mosaic ways. Existing lists and any attempts to create a list of modern behaviors are problematic, and the criteria to evaluate behavioral modernity are neither universal nor eternal (Soffer, 2009). Variability of behavioral changes requires regional perspectives and discussions with a well-controlled time and space frame.

The issue of the appearance of modern behavior has been discussed in China (Gao et al., 2004; Norton and Jin, 2009; Guan et al., 2012; Pei et al., 2012; Peng et al., 2012). The Shuidonggou Site plays an important role for discussions on technology interactions, modern behavior, and origins and dispersal of modern humans. In this paper, we analyze the archaeology materials from Shuidonggou locality 2 to identify the instances of so-called modern behavior, and then discuss their evolutionary meanings and implications in different archaeological contexts.

2. Behavioral innovations at Shuidonggou locality 2

Shuidonggou (SDG) Locality 2 is located on the opposite bank of the Biangou River from Shuidonggou locality 1, less than 100 m away (Fig. 1). Two separate trenches (units 1 and 2) up to 100 m^2 were excavated close to the natural profile as part of field campaigns in 2003–2005 and 2007. The stratigraphic sequence, with a total thickness of 12.5 m, consists mainly of lacustrine deposits. It includes 18 substrata (see Liu et al., 2009 for complete and detailed descriptions of stratigraphy), seven of which contain Paleolithic remains: these are designated culture layers 7 through 1 (CL7-CL1) from bottom to top (Li et al., 2013a). More than 15,000 artifacts were unearthed from this locality including stone tools, ostrich eggshell beads, faunal remains, and a bone tool. Several hearths were discovered from archaeological layers 4 to 1. The combined radiocarbon and Optically Stimulated Luminescence (OSL) dates show that the first archaeological layer (CL7) falls within the period from 41.5 to 34.4 ka cal BP; the second and third (CL5 and CL6) are expected to date from 34.4 to 32.6 ka cal BP (based on the ages of strata above and below); the fourth and fifth (CL4 and CL3), 32.6–31.4 ka cal BP; the sixth (CL2), 31.3–29.9 ka cal BP; the seventh (CL1), 20.3 ka (OSL BP) (Li et al., 2013a, b).

Guan et al. (2012) proposed that modern behavior was indicated by archaeological materials from locality 2 in different layers, including an increase in the variety of stone tool types, certain standardization of formal tool types, bone tool manufacture, proliferation of ornaments, complicated use of large scaled hearths, specialization of intra-site spatial use, and subsistence changes. Here, we present a detailed reevaluation of material culture in different archaeological layers at locality 2 (Table 2) referring to McBrearty and Brooks's four packages approach, and try to explain reasons for occurrences of behavioral innovations through the Paleolithic sequences.

2.1. Ecology

Increased diet breath is one of the features of modern behavior, and the use of plant seeds at locality 2 was considered as one trait of modern behavior (Guan et al., 2012). Plant use existed from layers 3 to 1 at locality 2 demonstrated by residue analysis (Guan et al., 2012; Guan and Gao, 2013). Although there have been few studies of Paleolithic diet in China, we know that *Homo erectus* inhabitants of Zhoukoudian locality 1 could exploit plant resources for food (Chaney, 1935), as could other pre-sapiens hominins (Goren-Inbar et al., 2002; El Zaatari et al., 2011; Hardy and Moncel, 2011; Henry et al., 2011, 2014). Therefore, isolated evidence of the use of plant seeds cannot indicate an increased diet breadth. As for faunal indicators of changing diet breadth, a small sample of faunal remains was recovered at locality 2, but unfortunately most of them are too fragmentary (<5 cm) to be used to determine the exploitation and consumption of animals.

2.2. Technology

Technological innovations include core reduction, formal tool categories, consistency of endscraper retouch, and use of bone as raw material at locality 2. A flat-faced blade core and an edge-faceted blade core were unearthed from CL7 and CL5a (Fig. 2: 8,

Table 2
Archeological signatures of behavioral innovations at Shuidonggou locality 2.

Behavioral traits		CL1a	CL1b	CL2	CL3	CL4	CL5a	CL5b	CL6	CL7
Ecology	Plants use	+	?	+	+	?	?	?	?	?
Technology	Blade technology	–	–	–	–	–	+	–	–	+
	Endscrapers	++	–	++	+	–	–	+	–	–
	Standardization (retouch of endscrapers)	+	–	++	–	–	–	–	–	–
	Bone tools	–	–	+	–	–	–	–	–	–
Economy and social organization	Transportation of long-distance raw materials	–	–	++	–	–	–	–	–	–
	Curation of exotic raw materials	–	–	+	–	–	–	–	–	–
	Intensification of plant resources	?	–	–	–	–	–	–	–	–
Symbolic behavior	Ornaments (Ostrich eggshell beads)	–	–	++	–	–	–	–	–	–

Reference: + present, ++ many, – absent, ? uncertain.

9), but other signatures of modern behavior were not discovered in these layers. CL7 and CL5a were related to the layers with large blade assemblage at Shuidonggou locality 1 (Li et al., 2013b) where an engraved stone showing symbolic behavior was identified (Peng et al., 2012).

The frequency of retouched tools at locality 2 is relatively low, and the dominant types throughout the sequence are side-scrapers and endscrapers (Table 3). There is a large number of tool types in CL1, but Brainerd–Robinson coefficients show each assemblage has similar distances from others through the sequence (Table 3) (Brainerd, 1951; Robinson, 1951; Odell, 2004). This demonstrates that proportions of retouched tool types among different layers are almost consistent. Endscrapers were finely retouched, and the retouch technique is consistent, especially in CL2: the degree of convexity of retouched edges is similar (n = 6, mean = 3.2, sd = 0.3), the position of retouch locates at the distal and lateral edges of blanks, and one convex and one straight retouched edges usually coexist on one specimen (Fig. 2: 1–7). However, the dimension of endscrapers varied considerably, as did those of side-scrapers (Table 4). One bone tool fragment was discovered in CL2, and was identified as a bone needle through its morphology and dimensions.

them eight were considered as hearths: two in CL1 (one in CL1a and one in CL1b), four in CL2, one in CL3, and one in CL4. All are flat to slightly basin-shaped unprepared hearths ranging in diameter from 20 cm to 55 cm and in depth from 4 cm to 6 cm at the core area. At CL2, four hearths were identified, and these could be the outcome of several short-lived activities instead of the large-scale use of fire. The close relationship of meat consumption and fire use was revealed by the distribution of faunal fragments and hearths (Fig. 3: a). Stone chunks and debris were not usually moved after knapping, but cores and flakes were probably moved around inside the site or taken outside for flaking or retouch. Consequently, chunks and debris may be more indicative of the position of flaking activity than cores and flakes. The planar distribution of chunks and debris in Fig. 3: d and e of Guan et al. (2012) shows that not only the area surrounding the hearth was used for flaking, but also other areas in CL1. This contradicts Guan et al.'s interpretation that the distribution of lithic artifacts reveals functional intra-site spatial organization, such as flaking, retouch and maintenance, and dumping areas (Guan et al., 2012: 382). The bone needle fragment found around hearth 1 does not necessarily mean that bone tool production occurred near it. Heat treatment of raw materials was thought to be one trait of modern behavior (Guan et al., 2012; Zhou et al., 2013). Identification of heat treatment at locality 2 was

Table 3
Numbers and frequencies of stone tools at Shuidonggou Locality 2 and their Brainerd–Robinson coefficients.

Archaeological layers	CL1a	CL1b	CL2	CL3	CL4	CL5a	CL5b	CL6	CL7
Sidescraper	43	2	28	5	1	–	6	1	–
	56.58%	100%	58.33%	83.33%	100%		75.00%	100%	
Endscraper	12	–	8	1	–	–	2	–	–
	15.79%		16.67%	16.67%			25.00%		
Point	3	–	–	–	–	–	–	–	–
	3.95%								
Awl	2	–	3	–	–	–	–	–	–
	2.63%		6.25%						
Burin	1	–	–	–	–	–	–	–	–
	1.32%								
Notch	3	–	2	–	–	–	–	–	–
	3.95%		4.17%						
Chopper and Chopping tool	2	–	1	–	–	–	–	–	–
	2.63%		2.08%						
Tool fragment	10	–	6	–	–	–	–	–	–
	13.16%		12.50%						
Total	76	2	48	6	1	–	8	1	–
B-R coefficient (Mean)	159	*	162	159	*	*	159	*	*

Reference: – absent; * uncalculated for few specimens.

Complicated use of large-scale hearths in CL1 and CL2 and specialization of intra-site spatial use in CL1 were thought to be traits of modern behavior at locality 2 (Guan et al., 2012). Eleven features related to fire use were identified at locality 2, and among

ascertained from the red color of stone artifacts, especially dolomite with chert bands (Zhou et al., 2013). However, dolomite pebbles with red chert bands have been found in gravel layers near the site, and verification of heat treatment of raw materials at

Table 4
Dimensions of side-scrapers and endscrapers at Shuidonggou Locality 2 (mm).

Tool types and archaeological layers	Side-scraper CL1a ($N = 43$)			Endscraper CL1a ($N = 12$)			Side-scraper CL2 ($N = 28$)			Endscraper CL2 ($N = 8$)		
	L	W	T	L	W	T	L	W	T	L	W	T
Mean	28.3	27.9	9.7	21.3	19.8	7.1	32	31.1	9.2	39.4	37	11
SD	14.7	14.8	5.5	12.3	6.6	3.6	13.3	17	6.2	16.5	16.3	2.8

Reference: L-Length, W-Width, T-Thickness.

locality 2 requires more research (see Zhou, this volume). Fire use at locality 2 is neither complicated nor large-scale, and the intra-site space use is not functionally organized, except for the relation of meat consumption and location of hearths.

2.3. Economy and social organization

Black and gray high-quality chert artifacts with nodule cortex were discovered in CL2 at locality 2, which shows evidence of primary procurement of raw material. This type of raw material has not been sourced, but was not found in a radius of 5 km from the site. The higher retouch frequency of non-local raw material (31/217 = 14.3%) comparing to local material (17/650 = 2.9%), more fine retouch on endscrapers (Fig. 2: 3–7), no counterpart cores, and bipolar exploitation for small fragments, indicate a high degree of use of non-local materials. This curation of non-local material clearly differs from the expedient exploitation of local pebble materials in CL2, and in all other layers at the site.

Intensification of plant resource is a trait of modern behavior, and at Locality 2 consumption of grass seeds was thought to represent it (Guan et al., 2012). However, frequency and proportions of plant resources are hard to be determined due to the shortcomings of residue analysis. It is premature to conclude whether intensification of plant use existed or not based on residue analysis only. A possible grinder discovered in CL1 may suggest a certain intensification of plant resources, which needs future analysis.

2.4. Symbolic behaviors

As noted above, some researchers suggest that symbolic behavior is an unambiguous marker of modern humans, and indicative of emergence of complicated communication systems, such as languages. More than 70 ostrich eggshell beads were unearthed at locality 2 (Fig. 4), and all come from CL2. Almost all beads are complete or broken finished ones with polish on all faces due to use or manufacture process. The facts that these are finished items and there is little eggshell debris related to bead production indicate that beads were not made inside the excavated part of the site. Although it is hard to infer the occupants' ability to make beads, the use of beads shows they had the ability to express symbolic meanings.

3. Who is the maker of archaeological materials showing behavioral innovations at Shuidonggou locality 2, and what are their evolutionary significances?

Two technological systems were represented by core reduction technologies at locality 2 (Li et al., 2013a). Two cores found in CL7 and CL5a demonstrate clear features of large blade technology,

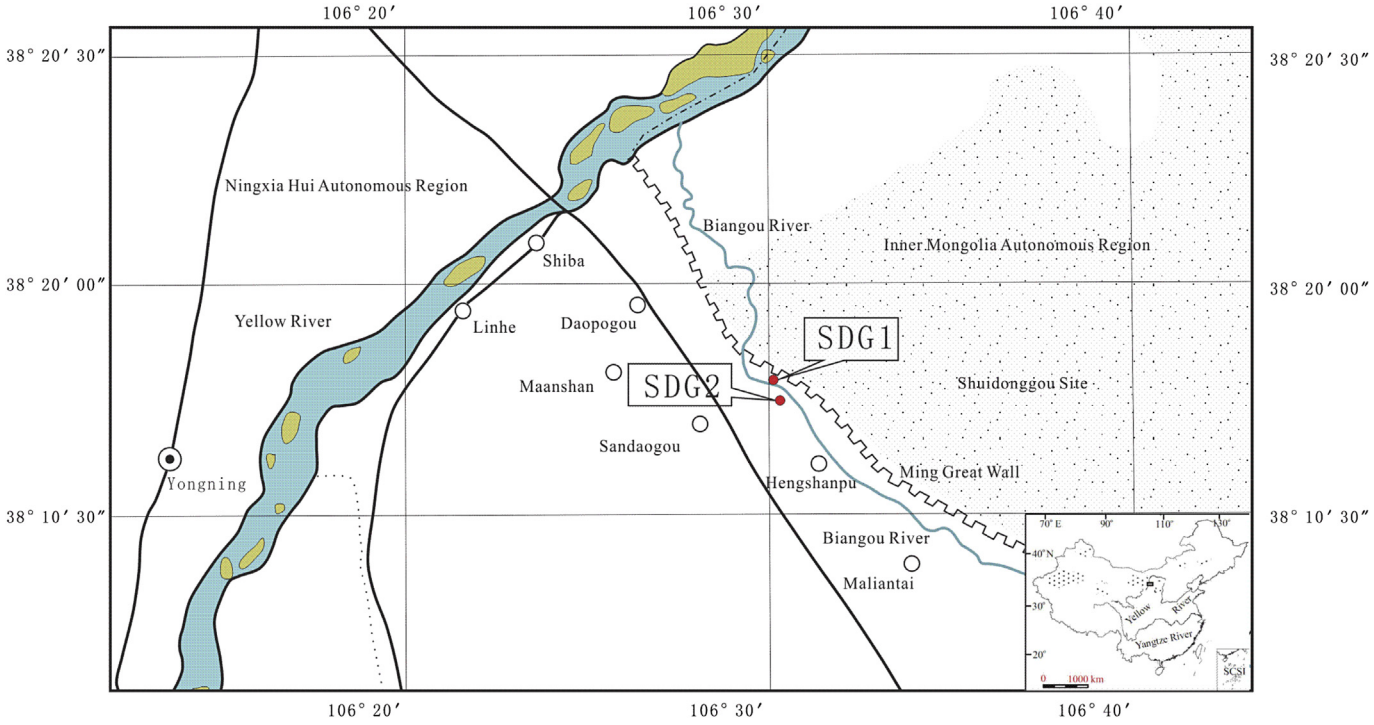

Fig. 1. Geographic position of Shuidonggou locality 2 (modified after Liu et al., 2009).

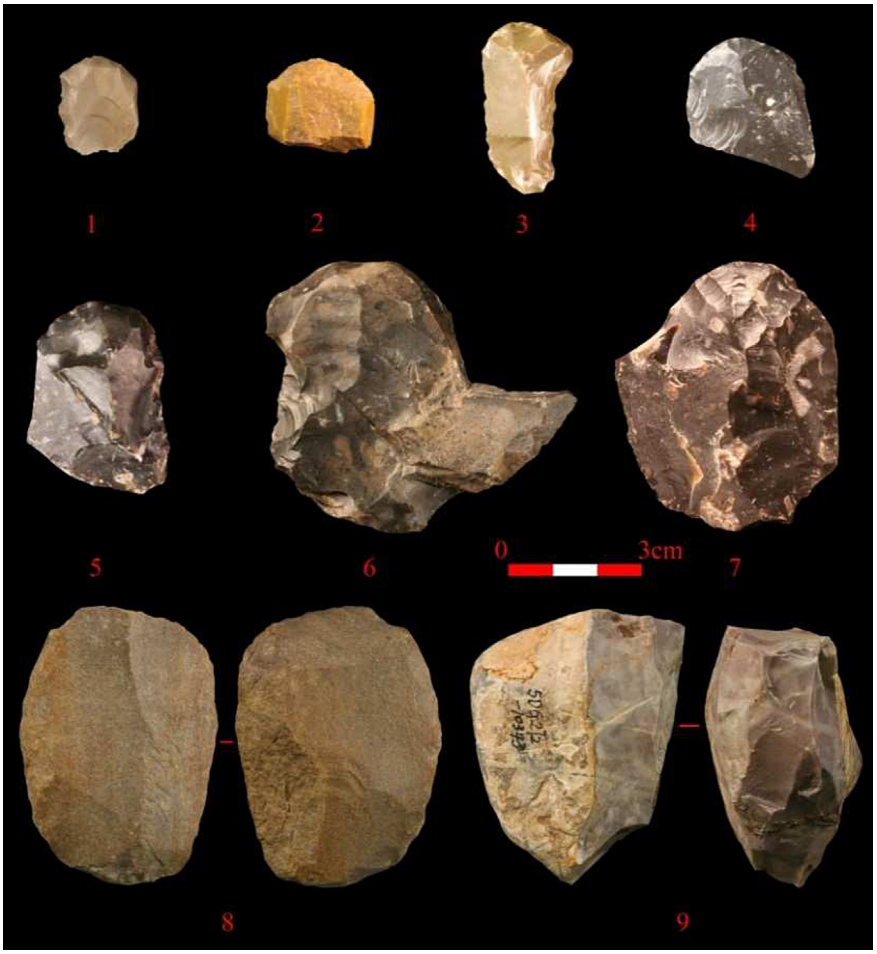

Fig. 2. Large blade cores and endscrapers from Shuidonggou locality 2.

which connects these layers with Shuidonggou locality 1. Cores from other layers (CL6, CL5b, Cl4-CL1) at locality 2 show the simple free-hand core reduction and bipolar reduction which are very common at contemporary late Pleistocene Paleolithic sites in north China (Li et al., 2013a). The blade industry with Initial Upper Paleolithic features, including Levallois blade core reduction, relatively high percentage of Upper Paleolithic tool types (endscrapers, burins etc.), is normally thought to be imported from Mongolia and Siberia (e.g., Licent and Teilhard de Chardin, 1925; Brantingham et al., 2001; Madsen et al., 2001; Derevianko, 2011a,b; Gao et al., 2013; Li et al., 2013b, 2014). The simple flake industry characterized by informal flake and bipolar core reduction, high percentage of side-scrapers, and low frequency of Upper Paleolithic tool types, shows a continuous evolution from early Pleistocene to around

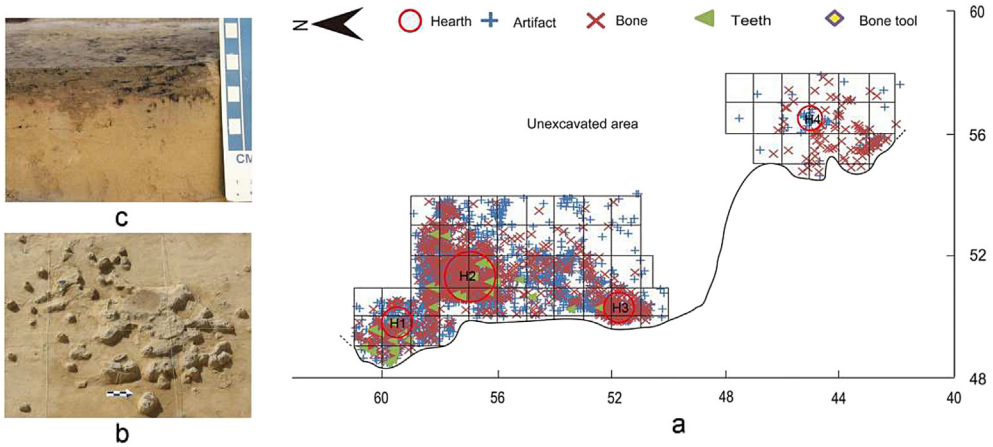

Fig. 3. Horizontal distribution of archaeological materials in CL2 at Shuidonggou locality 2. a, excavated meter-squares and plan view of artifacts, faunal remains, and hearths; b, plan view of hearth 2 and associated artifacts (the scale is 20 cm); c, profile of hearth 2 (each bar of the scale is 1 cm).

20 ka BP in north China (Zhang, 1990; Gao and Pei, 2006; Gao, 2013; Li et al., 2014).

These two technological systems in north China indicate at least two different populations coexisted during MIS 3 (Li et al., 2014). Populations with a large blade technology may have spread from Siberia and Mongolia and made material culture with other characteristics of modern behavior, such as engraved features. However, it is impossible to determine their species because of the scarcity of human fossils and the complicated outcomes of ancient DNA analyses (Krause et al., 2010; Reich et al., 2010). Local populations represented by a continuously-evolved flake technology express traits of behavioral innovations at Locality 2, especially in CL2, including consistency of retouch technique on endscrapers, use of ornaments, curation of transported raw materials, and bone tools.

The appearance of individual elements of behavioral innovations in different archaeological contexts at locality 2 has different evolutionary significance. CL7 and CL5a were occupied by intrusive populations and the novel aspects of their behavior may be the outcome of population movements accompanying technological diffusion. However, the modern type of behavior exhibited by locally-evolved populations in CL2 and CL1 may be due to regional cultural innovations and communication with other populations. Endscrapers were discovered through the flake technology sequence (CL5b, CL3-CL1), and the consistency of features on endscrapers that appeared in CL2 and continuously evolved in CL1 could indicate that this innovation was developed by local populations. Ornaments unearthed only in CL2 could be an intrusive phenomenon, considering that they are almost finished specimens and fragments in production process are rare. Ornaments accompanying blade assemblages in Siberia and Mongolia are dated much earlier and their occurrences are more consistent (Derevianko, 2011a), while early dated personal ornaments are sparsely distributed and most are located in the northern part of north China, such as the Shuidonggou site, the Upper Cave (Pei, 1934) at Zhoukoudian, the Zhiyu site (Jia et al., 1972), and Xiaogushan Cave (Huang et al., 1986). Moreover, long-distance transported raw materials in CL2 demonstrate that the inhabitants of this region sometimes traveled across a large territory, which would have provided possibilities for interaction with other populations. Consequently, the ornaments at Shuidonggou locality 2 may be result from interactions with populations further north. Artifacts of exotic raw materials were discovered only in CL2, including flakes, retouched tools, and debris. No counterpart cores were found, probably due to high degree of exploitation of these high quality raw materials. The bone needle fragment from CL2 may not have been produced at the site.

Most of the innovations at SDG2 appeared in CL2. Some might result from exchanges with other populations, such as ornaments and perhaps bone tools. Meanwhile, some might have been due to changes in regional adaptation strategies, such as long-distance raw materials transportation and the curated exploitation of high-quality raw materials. The main technological system in CL1 is consistent with the one in CL2, but not all innovations that originated in CL2 developed continuously. This may indicate that cultural innovations are more likely consequences of changes of regional adaptive strategy instead of a marker of particular population's behavioral modernity.

4. Discussion and conclusion

Evolution of modern humans is hotly debated, and two popular models were proposed by anthropologists. As one of the main regions containing evidence for continuity with hybridization model, East Asia plays an important role in discussions of the evolution of modern humans. Some scholars suggest that human evolution is continuous in China, and that replacement by modern humans from Africa never happened, even though they do not deny interactions with populations from the West. Recently, Gao et al. (2010) reviewed controversies of modern human origins, and proposed that a concept of regional diversity of evolutionary models should be considered to illustrate different evolutionary modes applied to different parts of the world. Archaeological materials from locality 2 demonstrate a scenario of a locally-evolved flake technological system and temporary intrusion of an exogenous blade technology. Flake technology evolved through almost the entire Paleolithic sequence in China until the emergence of microblade technology around 20ka, while blade technology lasted only a short time in north China, from 38 ka to 34 ka at Shuidonggou for example, and was thereafter replaced by a flake technology (Li et al., 2013a, 2014). The relationship of flake and blade technologies suggests the population represented by blade technology either 1) went extinct, 2) withdrew from the area, or 3) was absorbed into local hominin populations (Li et al., 2014). This scenario denies replacement of local populations by intrusive ones and is consistent with the continuity with hybridization model.

In order to create a truly global perspective on the origins and dispersal of modern humans, research on "modern behavior" should highlight evolutionary processes in different regions, and then identify innovations through time. There is no reason to pick out a few pieces from the vast amount of archeological material represented in the Chinese Paleolithic and assert their behavioral modernity based on a list generated from Africa and Europe. Materials from locality 2 show features of innovation in different archaeological contexts, including locally-evolved technological changes, such as retouch consistency of endscrapers; transported raw materials; and curation of exotic raw materials. There are also exotic or diffused technological traits, such large blade technologies as use of personal ornaments. Unfortunately, it is premature to identify a group of cultural innovations after the emergence of modern humans at present in China due to scarcity and scatter of well-dated Paleolithic sites (but see Qu et al., 2013).

Evolution of hominin behaviors varies in different regions and time, and also is asynchronous with physical evolution. Physical traits of *H. sapiens sapiens* emerged in south China at around 100 ka (Liu et al., 2010; but see; Dennel, 2010), and true *H. sapiens sapiens* appeared at around 40 ka in north China (Shang et al., 2007; Fu et al., 2013). However, the so-called modern behaviors such as ornaments, bone tools, and blade technology, appeared neither broadly nor as a package in China, as was a scenario in Australia (Habgood and Franklin, 2008). They existed in few sites in north and northeast China with Late Paleolithic technology, while other regions of China show continuous evolution or long-lasing cultural characteristics (Zhang, 1990; Lin, 1996; Gao and Norton, 2002; Gao and Pei, 2006; Gao, 2013; Li et al., 2014). As a result, research of these archaeological materials should focus on topics of population dispersal, networks, and adaptation, instead of whether the behaviors are modern or not. Furthermore, existence of modern humans in China should not be determined by presence of modern behaviors in the European-centered list. Frequency of cultural innovations in CL1 and CL2 at Locality 2 suggests the so-called modern behaviors are more likely consequences of adaptation changes. Therefore, the approach proposed by Shea (2011) to focus on the strategic sources of human behavioral variability instead of listing modern behaviors will be more appropriate, and analyses of the Late Paleolithic archaeological materials in China will make us understand behavioral variability of ancient populations more comprehensively.

Behavioral innovations in continuously-developed flake technological system during a time range from 40 ka to 20 ka have some implications. Continuity of flake technology indicates an

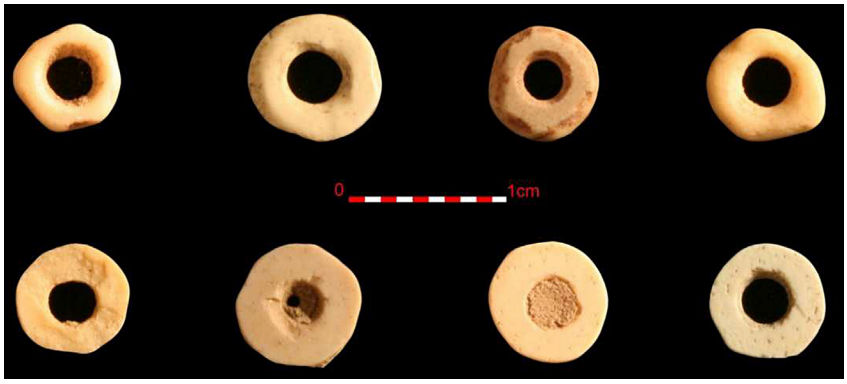

Fig. 4. Ostrich eggshell beads in CL2 at Shuidonggou locality 2.

autochthonous evolution of modern humans in China. With this perspective, identification of behavioral innovations after emergence of modern humans should be concerned with regional changes in ecology, technology, economy and social organization, and symbolic behavior, instead of making simple comparisons with a list of modern behaviors created in Africa and Europe.

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