THE EARLY TO LATE PALEOLITHIC TRANSITION IN KOREA: A CLOSER LOOK

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ABSTRACT. In Korean Paleolithic archaeology, it is traditionally thought that the Late Paleolithic stone tool industries were in some way derived from the Shuidonggou site in northern China. The latter site has long been considered to be the type site of the eastern Asian Late Paleolithic blade technology. However, recent studies suggest that a number of Korean Late Paleolithic sites probably predate Shuidonggou, some by several thousands of years. Here, we present a series of accelerator mass spectrometry (AMS) dates recently analyzed by the AMS laboratory at Seoul National University and discuss further the possibility that the introduction of blade (and later microblade) technologies into Korea may have originated directly from Mongolia, Siberia, and possibly other areas of northeast China, rather than from Shuidonggou.

INTRODUCTION

The nature of the Early to Late Paleolithic transition in Korea was recently reviewed and critiqued (Bae 2010; Bae and Bae 2012).[4] Here, we contribute an array of accelerator mass spectrometry (AMS) samples analyzed in the Seoul National University AMS laboratory primarily between 2009 and 2012 (Table 1; see also Bae and Kim 2010). We calibrate the AMS dates using CALIB 6.1 (Stuiver and Reimer 1993) and IntCal09 (Reimer et al. 2009). We incorporate here other recently published AMS and optically stimulated luminescence (OSL) dates that were not available until recently (e.g. Han 2009; Lee 2011). The locations of the Korean sites listed in Table 1 and discussed here are presented in Figure 1.

We also present further assessments of the various models in light of new data that have been used to explain the Early to Late Paleolithic transition in Korea. One point recent papers have discussed (e.g. Norton and Jin 2009; Bae and Bae 2012) but perhaps did not emphasize enough is that there appears to be growing evidence to suggest that Shuidonggou in northern China, long considered the type site of the eastern Asian Late Paleolithic, may in fact not be the oldest site in the region. Thus, the evidence from Korea, at least some of which appears to predate Shuidonggou, may suggest an alternative route to the peninsula from Siberia, Mongolia, and/or other regions of northeast China. A migration from Siberia could have followed the Liaohe and Sunghe rivers through northeast China toward the Korean Peninsula.

IMPORTANT SITES

The Shuidonggou (SDG) site in northern China has long been considered the type site of the eastern Asian Late Paleolithic, in part because the localities and materials have been subjected to various multidisciplinary studies since its initial discovery in 1923 (Licent and Teilhard de Chardin 1925; Madsen et al. 2001; Pei et al. 2012). A series of localities have been identified at Shuidonggou, with the calibrated AMS dates ranging from ~32,000 to ~6000 cal BP. The cultural remains belong to the Late Paleolithic and Neolithic (Pei et al. 2012). Blades are present at many of the localities, but vary in overall representation per locality. For instance, blades represent only 2% of the total whole flake stone tools at SDG Locality 2, but are as high as 30% at SDG Locality 9, which also has a greater percentage of higher quality raw materials (Pei et al. 2012). The rest of the lithic assemblages are

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[4]We use the 2-stage cultural sequence "Early and Late Paleolithic" as outlined by Gao and Norton (2002).

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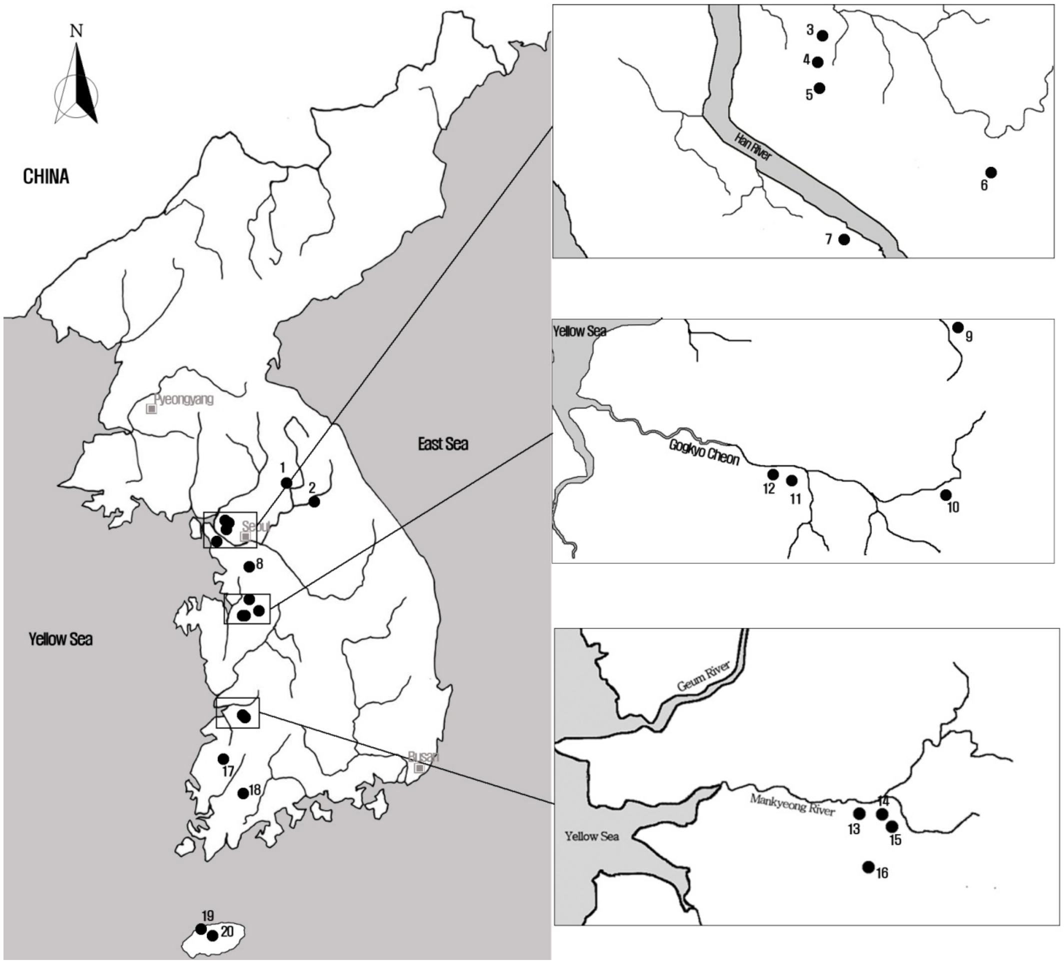

Figure 1 Representative Late Paleolithic sites from the Korean Peninsula: 1) Chuncheon Galdun; 2) Hahwagyeri Beki; 3) Paju Unjeong Location 17; 4) Paju Unjeong Location 36-5; 5) Deoki-dong; 6) Goyang Samsongdong; 7) Gimpo Singok-ri; 8) Osan Cheongho-dong; 9) Jiksan Soohearl-ri; 10) Chungdang-dong; 11) Kwongok-dong; 12) Cheongryonggol; 13) Bongkok; 14) Jangdong; 15) Saguenri; 16) Deokdong C; 17) Jeungsan; 18) Dosan; 19) Jeju Oido; 20) Jeju Odeungdong.

reminiscent of the "small tool tradition" common in northern China during the Late Paleolithic (Zhang 1990; Gao and Norton 2002). The oldest dates from Shuidonggou for the cultural deposits are currently at ~32,000 cal BP, though it should be noted that surveys in nearby areas identified the presence of other sites that may be older than Shuidonggou (Gao et al. 2004).

A growing number of sites exist in Korea that can be assigned to the Late Paleolithic, but appear to be coeval or predate Shuidonggou (Bae 2010; Seong 2011; Bae and Bae 2012). The major sites are Hopyeongdong, Hwadaeri, Hahwagaeri, and Wolpyung and all have calibrated AMS dates as old as or older than Shuidonggou. For instance, Hopyeongdong has a series of dates that place it between 27,850 and 32,650 cal BP. Wolpyung has associated calibrated dates between 31,250–32,050 cal BP, with a single date at 40,250–41,950 cal BP; the latter date may or may not be accepted. Hahwagaeri has more recent dates, but also a single AMS date that places the site between 42,050–45,650 cal BP. Currently, at least 11 sites in Korea can be assigned to the Late Paleolithic and are older than ~30,000 BP (Seong 2011: Figure 2; see also Bae 2010; Bae and Bae 2012).

Table 1 AMS dates for Korean Paleolithic sites analyzed in the AMS Laboratory at Seoul National University between 2009–2012 and other recent published sources.

Site (location)	OSL (BC)	Original AMS date (BP)	Date cal BP (68.2% prob.)	Date cal BP (95.4% prob.)	Sample position	Material	Lab code	Reference
Jungpyung		29,000 ± 500	33,101–34,458	32,130–34,664	Pit 1, East Wall layer 8b	Sediment	SNU09-029	
		28,700 ± 400	32,509–33,908	31,983–34,489	Pit 1, East Wall layer 5	Sediment	SNU09-030	
		28,900 ± 500	32,906–34,203	32,023–34,617	Pit 1, East Wall layer 14	Sediment	SNU09-031	
Eunjeong (Paju, Gyunggi)		29,400 ± 3000	30,247–36,304	26,667–39,591	Locality 2, Area 17, Pit E4, Sample I	Sediment	SNU09-105	
		36,000 ± 1000	40,067–41,974	38,842–42,499	Locality 2, Area 17, Pit E4, Sample II	Sediment	SNU09-106	
		41,700 ± 1000	44,441–45,862	43,519–46,745	Locality 2, Area 17, Pit E4, Sample III	Sediment	SNU09-107	
		37,400 ± 1500	40,888–43,350	39,111–44,359	Locality 2, Area 17, Pit E4, Sample IV	Sediment	SNU09-108	
		18,300 ± 500	21,250–22,443	20,465–23,005	Locality 2, Area 17, Pit I3, Sample V	Sediment	SNU09-109	
		36,300 ± 1000	40,384–42,170	39,054–42,718	Locality 2, Area 17, Pit I3, Sample VI	Sediment	SNU09-110	
		32,000 ± 1000	35,212–37,545	34,701–38,804	Locality 2, Area 17, Pit I3, Sample VII	Sediment	SNU09-111	
		32,900 ± 1000	36,544–38,736	35,237–39,994	Locality 2, Area 17, Pit I3, Sample VIII	Sediment	SNU09-112	
Eunjeong (Paju, Gyunggi)		35,000 ± 2000	37,824–41,777	36,139–43,080	Locality 1, Area 36-1, Pit B3, Sample 1	Sediment	SNU09-113	
		11,100 ± 100	12,862–13,120	12,700–13,197	Locality 1, Area 36-1, Pit B3, Sample 2	Sediment	SNU09-114	
Eunjeong (Paju, Gyunggi)		6580 ± 60	7431–7510	7417–7580	Locality 1, Area 36-5, PJ-J11 AMS1	Sediment	SNU10-937	
		9170 ± 80	10,240–10,418	10,204–10,521	Locality 1, Area 36-5, PJ-J11 AMS2	Sediment	SNU10-938	
		8180 ± 60	9027–9142	9000–9303	Locality 1, Area 36-5, PJ-I9 AMS2	Sediment	SNU10-939	

Table 1 AMS dates for Korean Paleolithic sites analyzed in the AMS Laboratory at Seoul National University between 2009–2012 and other recent published sources. *(Continued)*

Site (location)	OSL (BC)	Original AMS date (BP)	Date cal BP (68.2% prob.)	Date cal BP (95.4% prob.)	Sample position	Material	Lab code	Reference
		31,660 ± 270	36,214–36,569	35,272–36,671	Locality 1, Area 36-5, PJ-J9 AMS3	Sediment	SNU10-939	
		30,700 ± 350	34,781–35,424	34,660–35,696	Locality 1, Area 36-5, PJ-J9 AMS4	Sediment	SNU10-941	
Jungsan		20,600 ± 500	23,901–25,148	23,408–25,940	Pit 2, Level 3	Sediment	SNU09-115	
		24,200 ± 200	28,737–29,306	28,503–29,465		Sediment	SNU09-115	
		21,600 ± 1500	24,216–27,854	22,358–29,376	Pit 5	Sediment	SNU09-116	
		23,200 ± 500	27,515–28,559	26,661–29,245	Pit 8, Level 4	Sediment	SNU09-117	
Dosan		27,800 ± 500	31,460–32,590	31,221–33,237	Da 33-3, Level 1	Sediment	SNU09-122	
		26,080 ± 300	30,575–31,045	30,330–31,179	Da 33-3, Level 2	Sediment	SNU09-123	
		9850 ± 60	11,206–11,304	11,170–11,404		Sediment	SNU09-124	
		9300 ± 120	10,369–10,601	10,224–10,790	Da 33-4, Level 2	Sediment	SNU09-125	
Sungnaemun (Seoul)		33,000 ± 3500	34,587–41,383	31,025–43,820		Charcoal	SNU09-R083	
Goyang Samsung		10,200 ± 60	11,810–12,034	11,693–12,112	KS-1	Sediment	SNU10-341	
		14,400 ± 300	17,150–17,881	16,862–18,094	KS-2	Sediment	SNU10-342	
		19,100 ± 100	22,473–22,980	22,399–23,297	KS-3	Sediment	SNU10-343	
		16,000 ± 120	18,986–19,176	18,879–19,419	KS-4	Sediment	SNU10-344	
		20,800 ± 400	24,325–25,371	23,874–25,925	KS-5	Sediment	SNU10-345	
		20,100 ± 200	23,780–24,300	23,468–24,473	KS-6	Sediment	SNU10-346	
Deokdong C (Junju New City)		14,820 ± 100	17,861–18,086	17,691–18,178	South Wall - 1	Sediment	SNU11-311	
		22,560 ± 140	26,972–27,614	26,730–27,842	South Wall - 2	Sediment	SNU11-312	
		25,700 ± 170	30,336–30,703	30,232–30,941	South Wall - 3	Sediment	SNU11-313	
		25,280 ± 160	29,779–30,079	29,588–30,443	South Wall - 4	Sediment	SNU11-314	
		40,000 ± 2000	42,479–45,394	40,771–47,519	South Wall - 5	Sediment	SNU11-315	

Table 1 AMS dates for Korean Paleolithic sites analyzed in the AMS Laboratory at Seoul National University between 2009–2012 and other recent published sources. *(Continued)*

Site (location)	OSL (BC)	Original AMS date (BP)	Date cal BP (68.2% prob.)	Date cal BP (95.4% prob.)	Sample position	Material	Lab code	Reference
Hahwagaeri (Gangwon)		48,000 ± 3000	Invalid	Invalid	BY-1	Charcoal	SNU06-216	
Kumsangni (Gangwon)		30,400 ± 200	34,738–35,038	34,605–35,223	E1N2 West Wall 5	Sediment	SNU05-930	
		37,300 ± 400	41,765–42,366	41,463–42,683	E1N2 West Wall 6B	Sediment	SNU05-931	
Cheongho-dong (Osan)		45,050 ± 1190	47,016–49,422	46,176–50,000	CH-1	Charcoal		Lee and Kang 2011
		40,880 ± 760	44,088–45,217	43,372–45,704	CH-2	Charcoal		
		32,430 ± 330	36,554–37,313	36,346–38,126	CH-3	Charcoal		
	33,000 ± 2000				Layer V			
	36,000 ± 2000				Layer VII			
	39,000 ± 3000				Layer VII			
Saguenri[a]		28,460*				Sediment		Lee and Kang 2011
		30,800*				Sediment		
Jangdong		20,300 ± 80	24,069–24,400	23,912–24,474	1st cultural layer			Lee and Kang 2011
		22,600 ± 200	26,960–27,677	26,668–27,956	1st cultural layer			
		30,290 ± 100	34,717–34,949	34,630–35,085	2nd cultural layer			
		34,200 ± 600	38,552–40,145	37,459–40,752	2nd cultural layer			
Bongkok		31,000 ± 1500	33,831–37,204	32,046–38,836				
		41,500 ± 1500	43,835–46,186	42,664–47,961				
Soohearl-ri	23,200 ± 1600				Layer 2 (1st cultural layer)			Han 2009
	29,600 ± 2500				Layer 3a (2nd cultural layer)			
		31,400 ± 1200	34,685–37,162	33,412–38,479	Layer 3b	Sediment		
	41,600 ± 3500				Layer 3d			

Table 1 AMS dates for Korean Paleolithic sites analyzed in the AMS Laboratory at Seoul National University between 2009–2012 and other recent published sources. *(Continued)*

Site (location)	OSL (BC)	Original AMS date (BP)	Date cal BP (68.2% prob.)	Date cal BP (95.4% prob.)	Sample position	Material	Lab code	Reference
Silyok-dong		25,750 ± 90	30,399–30,693	30,304–30,863	Layer 3b			Han 2009
		31,170 ± 110	35,243–35,596	35,131–36,297	Layer 3b			
		37,460 ± 320	41,909–42,423	41,664–42,698	Layer 3b			
Kwongok-dong	29,000 ± 1500				Layer 3			Han 2009
	64,800 ± 3500				Layer 4			
	64,500 ± 4200				Layer 5			
	57,300 ± 3300				Layer 6			
	59,500 ± 4000				Layer 6			
Chungdang-dong	32,000 ± 2000							Han 2009
	31,000 ± 1500							
Cheongryonggol	34,000 ± 2000							Han 2009
Singok-ri	26,050 ± 1900							Kim 2010
	32,590 ± 2880							
	31,490 ± 3090							
	32,570 ± 2260							
	31,800 ± 3530				1st cultural layer			
Deoki-dong	32,000 ± 3200				1st cultural layer			Song et al. 2009
	29,900 ± 2500				1st cultural layer			
	32,000 ± 3200				1st cultural layer			
	31,000 ± 2700				1st cultural layer			
	52,000 ± 3200				2nd cultural layer			

[a]* The error ranges for the Saguenri samples were not published.

Jangheungri is another important site in Korea because of the presence of microblades with AMS dates between 30,350–27,850 and 30,450–27,950 cal BP. The tight grouping and small error ranges suggest the dates should be acceptable (Seong 2011; Bae and Bae 2012), which in turn makes Jangheungri one of the oldest microblade sites in all of eastern Asia (Norton et al. 2007).

DISCUSSION

Blades and microblades appear in Northeast (NE) Asia, but not Southeast Asia (Norton and Jin 2009; Bae 2010). The reason for this is still unclear (see Norton and Jin 2009 for discussion). Nevertheless, it should be noted that blade technology did not simply sweep across NE Asia (Bae and Bae 2012). There are many sites in NE Asia that, despite being penecontemporaneous with the blade localities, are dominated by Early Paleolithic core and flake tools and/or do not have blades at all (Li 1993; Gao 1999; Bae 2010; Pei et al. 2012). The AMS dates presented here (Table 1) indicate these sites should be considered Late Paleolithic because of their chronometric age. This is despite the fact that most of the associated lithic toolkits are representative of the typical Early Paleolithic of eastern Asia. For instance, Locality 2 of the Eunjeong site in Korea has AMS dates ranging between 21,250 and 45,862 cal BP (Table 1) and only contains the traditional Early Paleolithic toolkit. Other Korean sites dominated by core and flake industries are Cheongho-dong, which has AMS dates ranging between ~32 and ~45 ka and optically stimulated luminescence (OSL) dates between ~33 and ~39 ka (Lee and Kang 2011); Singok-ri with OSL dates between ~26 and ~32 ka (Kim 2010); and Deoki-dong with OSL dates between ~30 and ~52 ka (Song et al. 2009). Even the Shuidonggou site in Ningxia, northern China, is dominated by the traditional core and flake tools, with blades comprising only a small portion of the overall toolkit (Pei et al. 2012). This supports the argument that, although blades (and later microblades) appear in the eastern Asian archaeological record after ~40 ka, in many cases the Early Paleolithic core and flake tool industry continued to be present in the region up through the beginning of the Last Glacial Maximum (Bae 2010; Bae and Bae 2012; Pei et al. 2012).

Three different models have been proposed to explain the Early to Late Paleolithic transition in Korea: 1) *in situ* evolution model (Seong 2006); 2) North-South migration model (Bae 2010); and 3) migration/trade interaction model (Bae and Bae 2012). Briefly, the *in situ* evolution model argues that hominins living on the Korean Peninsula developed blade and microblade technologies largely on their own with little to no outside influences. The North-South migration model argues that Late Paleolithic blade-carrying foragers migrated from northern China, Mongolia, and Siberia, while Early Paleolithic core and flake tool-carrying hunter-gatherer groups migrated from southern China. The migration/trade interaction model suggests that migrations from the north likely occurred. Despite some genetic studies that conclude modern humans originated in southern China and later migrated northward (e.g. Jin and Su 2000), migrations from southern China have yet to be conclusively documented for 2 particular reasons (Bae and Bae 2012). First, other genetic studies (e.g. Karafet et al. 2001) suggest migrations into eastern Asia may have been from 2 directions (1 north and 1 south, both skirting the Himalayan Mountain range), rather than as a single migration. Second, few of these genetic reconstructions account for the influence of paleoenvironmental fluctuations during the marine isotope stages 3–2 transition (~40–25 ka). This is an important point because during glacial periods much of the Yellow Sea/West Sea region would have been dry land, which may have facilitated migrations from the south. However, the question was raised as to why move northward during glacial periods (see Bae and Bae 2012 for discussion). In turn, during interglacial periods, the Yellow Sea/West Sea would have served as a barrier for foragers dispersing to Korea from southern China because of rising sea levels (Bae and Bae 2012). Thus, indigenous foraging groups in Korea may have been part of a trade interaction sphere in the region, which could explain the continued use of Early Paleolithic core and flake tools during the Late Paleolithic and the slow introduction of blades and later microblades into the Korean toolkits. A recent review of these various models suggests little evidence supports the first model, while variable support is present for the second and third models (Bae and Bae 2012).

CONCLUSION

Traditional thinking in Korean archaeology is that blade technology may have diffused from the important Shuidonggou site in northern China. In this paper, we suggest that because of the growing evidence in Korea for blades that are penecontemporaneous or predate Shuidonggou, it is probable that blades may have come directly from Mongolia, Siberia, and/or other regions of northern China and skirted Shuidonggou. It is possible the same foraging groups that expanded out of Siberia and Mongolia, occupied Shuidonggou and Korea. It is also clear from this discussion that blades and microblade technologies did not simply sweep into the Korean Peninsula, but in fact may have only become important components of the lithic toolkits after ~30 ka.

More than a decade ago, Bae (2002) observed that there were only about 20 AMS dates for the Korean Paleolithic. More recently, Seong (2011) noted that there are currently more than 100 dates for Paleolithic sites in Korea. Moving forward, with the development of more AMS laboratories in Korea (e.g. Korean Institute of Geoscience and Mineral Resources) and a strong desire by Korean Paleolithic researchers to better contextualize their sites and materials by adding chronometric dates, there will continue to be an increasing number of AMS dates available to better understand the Paleolithic of Korea, particularly in its broader spatial-temporal context.

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