THE LATE PALEOLITHIC-NEOLITHIC TRANSITION IN KOREA: CURRENT ARCHAEOLOGICAL AND RADIOCARBON PERSPECTIVES

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ABSTRACT. The application of chronometric dating studies in Korean archaeology has lagged behind similar research in China and Japan. The focus of this article is to provide an update on the accelerator mass spectrometry (AMS) radiocarbon dates derived from Korean Paleolithic and Early Neolithic sites. One of the major highlights from recent AMS ^{14}C studies in Korea is that blade (and microblade) technologies may have diffused directly from Siberia, rather than through northern China as originally thought. In addition, a Neolithic wooden boat has been discovered in Korea that is as old as, if not older than, similar discoveries from eastern China. More detailed archaeological and chronometric studies in Korea in the coming years will certainly clarify many of the points mentioned here. In particular, through more detailed studies, we will be able to further evaluate the causal factors that provided the impetus for the Late Paleolithic-Neolithic transition in Korea.

INTRODUCTION

The application of chronometric dating studies in Korean archaeology has lagged behind similar research in China and Japan. For example, Ono et al. (2002) published several hundred radiocarbon dates from various Japanese Paleolithic sites, while only 29 ^{14}C dates were reported in the same issue of *Radiocarbon* for Korean Paleolithic sites (Bae 2002). The focus of this article is to provide an update on the accelerator mass spectrometry (AMS) ^{14}C dates derived from Korean Paleolithic and Early Neolithic sites (see also Bae and Kim 2003). Updated ^{14}C dates for the Korean Middle Neolithic to Bronze Age are provided in our other contribution in this issue (Kim and Bae 2010). Most of the AMS ^{14}C dates reported here were analyzed directly by the AMS laboratory at Seoul National University (SNU-AMS), with other data culled from the published literature. Because of the paucity of interaction between North and South Korean scholars, relatively little is known currently about recent developments in North Korean archaeological research (Norton 2000a). Thus, our discussion focuses on the South Korean record.

Late Paleolithic

Traditionally, in Korean archaeology the Paleolithic is divided into a 3-stage sequence: Lower, Middle, and Upper, similar to what has been done in China (Ikawa-Smith 1978; Norton 2000a; Gao and Norton 2002; Bae 2002, 2010). However, due to the absence of a distinctive behavioral pattern that would support a "Middle Paleolithic" in Korea (e.g. development of the Levallois technique in most of the western Old World), we suggest the Korean Paleolithic be divided into an Early and Late period, with the division occurring when blade stone tool technologies appear in the Korean Peninsula. When exactly this division occurred in Korea is still a subject of much debate (Bae 2010). Traditionally, the lithics from Sokchangni were often considered to represent the division between the Early and Late Paleolithic, with the boundary occurring around 30,000 BP. However, based on new AMS ^{14}C studies, it is now likely that blade tool technologies appeared in Korea possibly as early as 38,000 BP, as evidence from sites like Yonghodong, Deokso, Hwaderi, and Wolpyeong indicate (Table 1). Of interest here is that Korean Paleolithic researchers often consider blade technology to have reached Korea from Siberia via the Shuidonggou site in northern China (Bae 2010). The problem that arises with this model is that Shuidonggou is now considered to date to 29,000–24,000 BP

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(Madsen et al. 2001), thus well postdating the earliest appearance of blade technology in the Korean Peninsula (see also Norton and Jin 2009 for discussion).[1] If the AMS ^{14}C dates from Yonghodong, Deokso, Hwaderi, and Wolpyeong hold up to further scientific scrutiny, it may be possible that blade technology diffused directly from Siberia to Korea skirting China. It should be noted that a small number of Korean scholars (e.g. Seong 2006) argue that blade technology developed indigenously (but see Bae 2010 for critique of this argument).

Another interesting aspect of the Korean Late Paleolithic is that the well-known traditional core and flake tools (Norton et al. 2006) continue to appear in Korea up through the end of the Pleistocene (Bae 2010), a case not unlike China (Chen et al. 2010), particularly southern China (Norton and Jin 2009). It is not clear whether the presence of traditional core and flake technologies in Korea represent population movements from southern China as recently argued by Bae (2010) or represent continuous occupation of the region by the same foraging groups. The more parsimonious explanation is that the pattern represents similar foraging groups moving around the Korean Peninsula during the Late Paleolithic. Irrespective of which model is correct, the boundary between the Early and Late Paleolithic in Korea now appears to be pushed back to between 40,000–35,000 BP.

Early Neolithic

The nature of the Korean Paleolithic to Neolithic transition is poorly understood, though discussion of the Incipient Neolithic (~10,000–8000 BP) has been included in a number of recent reviews of the Korean Neolithic (e.g. Choe and Bale 2002; Norton 2007). One factor that should be included in any discussion of the Late Paleolithic-Neolithic transition in Korea is the effect of paleobathymetric variation. For example, Korean geologists (e.g. Park 2001) have suggested that during the last glacial maximum (LGM; marine isotope stage 2: MIS 2), ocean levels may have dropped as much as 140 m. A bathymetric drop of this magnitude would have lead to a drying up of much of the West Sea/Yellow Sea that currently separates eastern China and the Korean Peninsula. Thus, during the LGM much of that region would have been dry land and would have allowed population movement throughout much of the area (as reviewed by Norton 2007). However, when the climate warmed during the late MIS 2–1 transition sea levels rose and eventually reached the present level. A rise in the bathymetric levels in the region would have led to a necessary decrease in the amount of territory a foraging group could have utilized. This point has been argued by one of us (Norton 2007) to indicate that foraging groups would have become territorially circumscribed and probably provided at least some of the impetus to settle down and begin at least a semi-sedentary lifestyle, eventually leading to full-scale sedentism. It is well-known in Korean archaeology that by the Early Neolithic (~8000 BP), sedentary villages appear in many regions along the coasts and riverways (Nelson 1993; Norton 2000b, 2007; Choe and Bale 2002).

Korean Neolithic peoples' subsistence strategies are often considered to have been broad-spectrum, in that they collected local nuts and plants, hunted wild boar and deer, and utilized resources from the sea and air (Sample 1974; Sohn 1982; An 1991, 1994; Nelson 1993; Norton et al. 1999; Norton 2000b, 2007; Lee 2001; Choe and Bale 2002). There is growing evidence that by the Middle Neolithic, Korean peoples were harvesting plant domesticates on a small scale (Crawford and Lee 2003; An 2004). Indirect evidence for a change in subsistence strategies is present in the change in artifact patterning with the advent of the Incipient Neolithic. For example, fluted projectile points, microblades, and pottery were excavated together at the Kosanni site, the type site for the Incipient

[1]As one of the reviewers of this manuscript justifiably pointed out, there was no "Korea" or "China" during the Paleolithic. In the context employed here, we are just referring to the idea that some Korean archaeologists have suggested blade and microblade technology diffused from the "region" of northern China rather than directly from Siberia.

Table 1 Compilation of Korean Paleolithic and Neolithic ^{14}C dates published between 2002–2008.

Site	Coordinates (N Lat, E Long)	Sample position	Date (BP)	Lab code	Material	Culture	Reference
Yongbang	36.31', 127.27'	1st cultural layer 33 m asl[a]	25,430 ± 200	SNU06-562	charcoal	Early/Late Paleolithic?	Cheon and Lee 2008
		1st cultural layer	22,700 ± 200	SNU06-563	charcoal		
		2nd cultural layer	35,500 ± 800	SNU06-559	charcoal		
		32.5 m asl	43,000 ± 4000 BC[b]				
		29.8 m asl	59,000 ± 4000 BC[b]				
Deokso	37.35', 127.13'	layer 1	21,670 ± 100	SNU06-379	paleosol	Late Paleolithic	Yang et al. 2008
		layer 2	18,400 ± 400	SNU06-005	paleosol		
		layer 3	26,320 ± 200	SNU06-294	paleosol		
		layer 3	36,800 ± 200	SNU06-002	charcoal		
		layer 3	37,300 ± 200	SNU06-001	charcoal		
Sinbuk	34.41', 126.55'		20,960 ± 80	SNU03-568	charcoal	Late Paleolithic	Lee 2004a
			25,420 ± 190	SNU03-569	charcoal		
			18,500 ± 300	SNU03-912	charcoal		
			21,760 ± 190	SNU03-913	charcoal		
			25,500 ± 1000	SNU03-914	charcoal		
			18,540 ± 270	SNU03-915	charcoal		
Haga	35.38', 127.22'		19,700 ± 300	SNU06-971	charcoal	Late Paleolithic	Cheon and Lee 2008
			19,500 ± 200	SNU06-972	charcoal		
		Depth 22 cm	4100 ± 60	SNU06-962	paleosol		
		Depth 39 cm	12,700 ± 100	SNU06-963	paleosol		
		Depth 56 cm	12,700 ± 100	SNU06-964	paleosol		
		Depth 76 cm	26,700 ± 160	SNU06-965	paleosol		
		Depth 96 cm	20,100 ± 600	SNU06-966	paleosol		
		Depth 122 cm	23,300 ± 500	SNU06-967	paleosol		
		Depth 138 cm	25,300 ± 400	SNU06-968	paleosol		
		Depth 165 cm	34,900 ± 400	SNU06-969	paleosol		
		Depth 185 cm	29,000 ± 80	SNU06-970	paleosol		
Wolpyeong	34.52', 127.38'	1st cultural layer	21,500 ± 300	SNU05-686	paleosol	Late Paleolithic	Lee 2004b
			18,200 ± 100	SNU05-687	paleosol		
		2nd cultural layer	27,500 ± 150	SNU05-688	paleosol		
		2nd cultural layer	36,000 ± 400	SNU05-689	paleosol		

Table 1 Compilation of Korean Paleolithic and Neolithic ^{14}C dates published between 2002–2008. *(Continued)*

Site	Coordinates (N Lat, E Long)	Sample position	Date (BP)	Lab code	Material	Culture	Reference
Janggi	37.40', 126.38'		>50,000	SNU05-703	charcoal	Early Paleo-lithic	Jeon 2008
			>50,000	SNU05-704	charcoal		
			>50,000	SNU05-705	charcoal		
			43,000 ± 3500	SNU05-706	charcoal		
Kihwari Cave	37.20', 128.24'		28,400 ± 200	SNU07-921	sediment	Late Paleolithic	Park et al. 2007
			29,700 ± 400	SNU07-922	animal bone		
			20,500 ± 300	SNU07-923	animal bone		
Silokdong	36.47', 127.01'		25,750 ± 90	SNU05-243	charcoal	Late Paleolithic	Han and Huh 2006
			31,170 ± 140	SNU05-244	charcoal		
			37,460 ± 90	SNU05-245	charcoal		
Daejeongdong			19,680 ± 90	SNU??	charcoal	Late Paleolithic	Lee et al. 2002
Mansuri	36.37', 127.19'		>50,000	SNU06-811	charcoal	Early Paleo-lithic	Lee 2006
		5th layer	92,000 ± 3000[b]				
		6th layer	95,000 ± 4000[b]				
		10th layer	103,000 ± 8000[b]				
Unjung	37.45', 126.52'	cultural layer	40,300 ± 2000	SNU08-474	charcoal	Late Paleolithic	Lee 2006
		cultural layer	39,500 ± 2000	SNU08-475	charcoal		
Songduri	127.38', 36.52'	1st cultural layer	12,700 ± 200	SNU03-849	charcoal	Late Paleolithic	Lee and Kong 2004
		1st cultural layer	12,730 ± 320	SNU03-850	charcoal		
		1st cultural layer	11,850 ± 190	SNU03-852	charcoal		
		1st cultural layer	11,950 ± 110	SNU03-854	charcoal		
		2nd cultural layer	>48,000	SNU04-781	charcoal		
		peat layer between 1st and 2nd cul. layer	35,900 ± 1200	SNU04-786	peat		
		same as above	43,100 ± 1500	SNU04-851	peat		
		same as above	44,700 ± 1500	SNU04-783	peat		
		same as above	35,900 ± 1200	SNU04-786	peat		
		same as above	>48,000	SNU04-784	peat		
		same as above	>48,000	SNU04-785	peat		

Table 1 Compilation of Korean Paleolithic and Neolithic ^{14}C dates published between 2002–2008. *(Continued)*

Site	Coordinates (N Lat, E Long)	Sample position	Date (BP)	Lab code	Material	Culture	Reference
Jangdongri	34.44', 126.59'	1st cultural layer	17,500 ± 100	Geochron		Late Paleolithic	Chung and Lee 2006
		2nd cultural layer	22,350 ± 100	Geochron			
Hwaderi	37.58', 127.20'	2nd cultural layer	31,200 ± 900	SNU03-340	charcoal	Late Paleolithic	Choi 2007
		1st cultural layer	22,000 ± 1000[b]				
		2nd cultural layer	30,000 ± 1700[b]				
		3rd cultural layer	39,000 ± 1400[b]				
Bibongri	35.37', 128.30'	1st shell layer	5330 ± 40	SNU05-343	charcoal	Neolithic	
		storage pit	4340 ± 40	SNU05-344			
		storage pit	4650 ± 60	SNU06-201	acorn		
		outdoor fireplace	3560 ± 60	SNU06-202	charcoal		
		3rd shell layer	6270 ± 60	SNU06-203	charcoal		
		5th shell layer	6550 ± 50	SNU06-204	wood frag.		
		storage pit	4420 ± 50	SNU06-205	wood frag.		
		storage pit	4900 ± 50	SNU06-206	wood		
		out door fire place	3540 ± 60	SNU06-207	charcoal		
		inner part of boat plank	6670 ± 60	SNU06-208	charcoal		
		2nd shell layer	5970 ± 60	SNU06-209	wood frag.		
		4th shell layer	6390 ± 60	SNU06-210	wood frag.		
		piece of boat body	6800 ± 50	SNU06-303	wood frag.		
Sejukni	35.28', 129.16'	layer III-1	6280 ± 40	SNU00-393	charred organic attachment on pottery frag.	Neolithic	Crawford and Lee 2003
		layer III-1	6260 ± 40	SNU00-394	same as above		
		layer III-2b	6110 ± 80	SNU00-395	same as above		
		layer III-3c	6420 ± 110	SNU00-397	same as above		
		layer III-3c	5700 ± 60	SNU00-398	same as above		
		layer III-3a	6480 ± 120	SNU00-385	same as above		
		layer III-2b	6260 ± 250	SNU00-386	same as above		
		layer III-2b	6740 ± 30	SNU00-403	same as above		
		layer III-2b	6440 ± 90	SNU00-403-1	same as above		
		layer III-6	6260 ± 40	SNU00-387	same as above		
		layer III-6	6330 ± 40	SNU00-388	same as above		
		layer III-3a	5930 ± 110	SNU00-390	acorns		

[a]m asl = meters above sea level.
[b]Dated by optically stimulated luminescence (OSL).

Neolithic in Korea. The artifacts may indicate a heavier emphasis on hunting, while the introduction of pottery suggests a heavier reliance on stored food items.

One major change between the Late Paleolithic and Neolithic in Korea is the appearance of shell middens along the coasts and major river basins. Because shell is very basic in terms of its alkalinity, bone preservation at these sites is excellent. Thus, we know that Neolithic peoples, in addition to collecting a diversity of shellfish, were hunting birds, fishing, and hunting deep-sea mammals. However, it was not until recently that Korean archaeologists found actual evidence of how Neolithic peoples were capable of deep-sea fishing and hunting. Evidence of a wooden boat was discovered during excavations at the Bibongri site, a Neolithic-Bronze Age open-air site located along the southern coast of the Korean Peninsula (Park et al. 2010). Because of the excellent preservation of biological materials at the site, in addition to parts of a wooden boat, many different types of seeds and animal bones were discovered. The AMS ^{14}C dates taken directly from samples of the Bibongri boat indicate it may be as old as ~6800 BP (Table 1). Assuming the AMS ^{14}C dates from Bibongri hold up to further scientific evaluation, the Bibongri boat may be as old as or older than the Neolithic boat from Kuahuqiao (Jiang 2004), which was excavated in eastern China near the Hemudu site. Further studies of the Bibongri site and materials will certainly clarify the position and significance of Bibongri within the East Asian Neolithic. It should be noted that watercraft technology was clearly known in the region going back at least ~40,000–35,000 yr ago (Ikawa-Smith 2008; Norton and Jin 2009; Norton et al. 2010).

DISCUSSION

Multidisciplinary approaches are critical to addressing broader ranging archaeological questions. Of the various disciplines usually involved, chronometric studies play an important role in contextualizing archaeological data. One of the major highlights from recent AMS ^{14}C studies in Korea is that blade (and microblade) technologies may have diffused directly from Siberia, rather than through northern China as originally thought. In addition, Korea has evidence of a Neolithic wooden boat that is as old as if not older than similar material from eastern China. More detailed archaeological and chronometric studies in Korea in the coming years will certainly clarify many of the points mentioned here. In particular, through more detailed studies, we will be able to further evaluate the causal factors that provided the impetus for the Late Paleolithic-Neolithic transition in Korea.

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