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RADIOCARBON DATES FROM PALEOLITHIC SITES IN KOREA

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ABSTRACT. Fewer than 20 radiocarbon dates have been obtained from Paleolithic sites on the Korean Peninsula. It is still unknown how and when Korean Middle Paleolithic stone industries developed, despite the handful of dates older than 40,000 BP obtained from some sites. A lower boundary for the Korean Upper Paleolithic of approximately 30,000 BP can be inferred from the few dates associated with stone blade industries. ^{14}C dates associated with microlithic industries of 24,000 BP are considered too old in light of evidence from other areas of East Asia. Most such assemblages are post-Last Glacial Maximum in age. Improved understanding of the Korean Paleolithic sequence will depend ultimately on the further accumulation of ^{14}C dates, as well as the application of alternative dating techniques and attention to the reconstruction of site formation process.

INTRODUCTION

The past 40 years of research have identified more than 150 Paleolithic sites on the Korean Peninsula and, at the current pace of study, this number is expected to increase dramatically in the near future. More than of these 30 sites have been excavated and several are designated as national historic monuments. Following Western archaeological practices, the Korean Paleolithic is divided into three sub-stages, the Lower, Middle, and Upper Paleolithic. These designations carry chronological and evolutionary implications. They should be treated with caution, however, as there is yet no firm consensus among Korean archaeologists on the chronological boundaries for each stage. Moreover, there are few clear changes in stone industries between so-called Early and Middle Paleolithic industries, bringing into question the utility of these designations.

The construction of a reliable chronology for stone industries on the Peninsula remains a critical issue within Korean Paleolithic archaeology. Radiocarbon dating plays a very important role in this endeavor and, at present, two new AMS ^{14}C labs are operating in southern Korea, one at Seoul National University (SNU) and the other at the National Research Institute of Cultural Properties (KCP). These labs have recently produced several hundred dates for late prehistoric and historic archaeological sites, but only two dates so far for Paleolithic sites. The predominance of acidic soils on the Peninsula and consequent poor organic preservation at most open-air archaeological sites is partly responsible for the slow accumulation of Paleolithic-age ^{14}C dates.

Korean Paleolithic Sites and Radiocarbon Dates

Seventeen ^{14}C dates have been obtained for 8 Paleolithic sites on the Korean Peninsula. Dates obtained from the Sokchangni site in the early 1970s by the Korean Research Institute of Atomic Energy (AERIK) (Sohn 1973) were crucial for demonstrating the presence of Paleolithic stone industries on the Korean Peninsula. However, most of the ^{14}C dates pertaining to the Korean Paleolithic are the result of very recent work. Most of the newly available dates represent the Upper Paleolithic or Microlithic, but some may also represent the late Middle Paleolithic. The oldest date yet obtained is an age greater than from Noeundong. Most of the dates were obtained from charcoal, but some from peat or concentrated organics (see Table 1).

Sokchangni

Sokchagni was the first site in Korea to yield ^{14}C dates and it remains a very important benchmark for regional Paleolithic sequence. The site, situated on the first terrace of the Kumkang river near Kongju city, was found in 1962 and excavated in 1964. A 12-m sequence of alluvial and colluvial deposits contained 12 cultural horizons. Two ^{14}C dates were obtained from charcoal samples col-

Table 1 List of ^{14}C dates from Paleolithic Sites in Korea

#	Site name	Coordinates lat., long.	Sample position	Date (BP)	Lab code	Material	Culture	Reference
1	Janghungri	38.11, 127.17	Layer 2	24,200 ± 600	SNU00-380	Charcoal	Microlithic	Choi et al. 2001
2	Janghungri	38.11, 127.17	Layer 2	24,400 ± 600	SNU00-381	Charcoal	Microlithic	Choi et al. 2001
3	Bongmyoungdong	36.38, 127.23	Cultural layer II	12,260 ± 40	GX-25513	Charcoal	Microlithic	Lee 2000
4	Bongmyoungdong	36.38, 127.23	Cultural layer I	49,860 ± 2710	GX-25897	Charcoal	Middle Paleo. ?	Lee 2000
5	Bongmyoungdong	36.38, 127.23	Cultural layer I	48,450 ± 1370	GX-25515	Charcoal	Middle Paleo. ?	Lee 2000
6	Sokchangni	36.26.35, 127.11.30	Cultural layer 11	30,690 ± 3000	AERIK-5	Charcoal	Upper Paleolithic	Sohn 1973
7	Sokchangni	36.26.35, 127.11.30	Cultural layer 12	20,830 ± 1880	AERIK-8	Charcoal	Microlithic?	Sohn 1973
8	Sokchangni	36.26.35, 127.11.30	Cultural layer 8	50,270	Beta-60807	Charcoal	Middle Paleolithic?	Sohn 1993
9	Suyanggae	36.57, 128.20		18,630	UCR-2078	Charcoal	Upper Paleolithic	Yun 1996
10	Suyanggae	36.57, 128.20		16,400		Charcoal	Microlithic?	Yun 1996
11	Noeundong	36.22, 127.18	Layer 3a	22,870 ± 110		Charcoal	Upper Paleolithic	Han 2000
12	Noeundong	36.22, 127.18		>54,720		Charcoal	Middle Paleolithic	Han 2000
13	Chommal	37.12, 128.14	Depth 78–94 cm	13,700 ± 700	AERIK	Charcoal	Upper Paleolithic?	Lee 1977
14	Sorori	36.41, 127.25	30.8 msl[a]	13,010 ± 190	GX-24334	Peat	Microlithic	Lee et al. 1999
15	Sorori	36.41, 127.25	30.8 msl	14,820 ± 250	GX-25494	Peat	Microlithic	Lee et al. 2000
16	Sorori	36.41, 127.25	30.8 msl	17,310 ± 310	GX-25495	Peat	Microlithic?	Lee et al. 2000
17	Sorori	36.41, 127.25	~36.5 msl	>36,350		Organic	Middle Paleolithic	Lee 2000
18	Sorori	36.41, 127.25	~36.5 msl	>36,210		Organic	Middle Paleolithic	Lee 2000
19	Sorori	36.41, 127.25	32.6–32.13 msl	12,930 ± 400	SNU01-286	Peat	Microlithic?/Neolithic?	Lee &Woo 2001
20	Sorori	36.41, 127.25	32.6–32.13 msl	12,500 ± 200	SNU01-293	Peat	Microlithic?/Neolithic	Lee &Woo 2001
21	Sorori	36.41, 127.25	32.6–32.13 msl	12,780 ± 170	GX-28416	Peat	Microlithic?/Neolithic	Lee &Woo 2001
22	Sorori	36.41, 127.25	32.17–32.10 msl	13,270 ± 180	GX-28417	Peat	Microlithic?/Neolithic	Lee &Woo 2001
23	Sorori	36.41, 127.25	31.76–31.36 msl	13,420 ± 180	GX-28418	Peat	Microlithic?/Neolithic	Lee &Woo 2001
24	Sorori	36.41, 127.25	31.43–31.36 msl	14,020 ± 190	GX-28419	Peat	Microlithic?/Neolithic	Lee &Woo 2001
25	Sorori	36.41, 127.25	31.76–31.69 msl	14,000 ± 190	GX-28420	Peat	Microlithic?/Neolithic	Lee &Woo 2001
26	Sorori	36.41, 127.25	31.43–31.36 msl	13,920 ± 200	SNU01-291	Peat	Microlithic?/Neolithic	Lee &Woo 2001
27	Sorori	36.41, 127.25	31.43–31.36 msl	14,800 ± 210	GX-28421	Peat	Microlithic?/Neolithic	Lee &Woo 2001
28	Sorori	36.41, 127.25	~29.0 msl	17,310 ± 310	GX	Peat	Microlithic?/Neolithic	Lee &Woo 2001
29	Yonghodong	36.23, 127.24	~39.7 msl	38,500 ± 1000		Charcoal	Upper Paleolithic	Han et al. 2000

[a]msl = meters above sea level.

lected from upper most horizons during the early excavations. The first sample, from the 12th cultural layers, was collected from a hearth in a supposed dwelling structure associated with microcores and dated to 20,830 ± 1880 BP. The second charcoal sample, from the 11th cultural layer (associated with blade technology), was dated 30,690 ± 3000 BP. This second date is believed to indicate the lower boundary of the Upper Paleolithic in Korea (Sohn 1973). A third date of greater than 50,270 BP on charcoal collected from the colluvial deposit is thought to provide a limiting age for the 8th cultural layer (Sohn 1993).

Bongmyoung-dong

Paleolithic artifacts were found in 1999 on a hill slope near Bongmyoung-dong in Chongju city as part of salvage excavations. In one area, artifacts were found on a sloping surface mixed with angular and rounded cobbles and are interpreted as having been redeposited from higher geological layers no longer in evidence at this site. On the lower part of this same slope, colluvial deposits of up to 3 m were exposed in test pits. Two cultural layers were identified, a micro-core stone industry in the upper layer and a Middle Paleolithic industry in the lower. Three ^{14}C dates were obtained from charcoal samples collected from the two cultural layers. Charcoal from the upper cultural layer dated to 12,260 ± 40 BP, while two samples from the lower cultural layer yielded ages of 49,860 ± 2710 BP and 48,450 ± 1370 BP (Lee 2000). The latter two dates probably represent minimum ages for the Middle Paleolithic stone industry.

Sorori

Situated on the flat agricultural plain between the Miho-chon river and low mountain range, the Sorori site was found in 1994 and excavated in 1997. Three localities were excavated, one at an elevation approximately 4–5 m below the other two. Three distinct cultural layers were identified within a clay overlying peat deposits. The uppermost cultural layer, represented by a pseudo-microcore industry, was found at all the three localities. Despite the fact that there are no clear differences in the lithic technologies, the lower two cultural layers are thought to represent separate Middle and Upper Paleolithic industries (Lee 2000). These layers were identified only at the two higher elevation localities. Three ^{14}C dates were obtained from the peat deposits at the low elevation locality, 13,010 ± 190 BP, 14,820 ± 250 BP, and 17,310 ± 310 BP, and are stratigraphically consistent. These dates may provide a maximum age for the pseudo-microlithic industry at the site. Maximum ages for the two lower cultural layers may be provided by ^{14}C dates from peat deposits exposed at each of the higher localities, 36,350 BP and 36,210 BP (Lee et al. 2000). No standard deviations are reported for these dates.

Changhungni

This site was found in the early 1980s, but was excavated in 1999 for road construction. Stone artifacts were found in fluvial deposits lying on a basalt plateau. Two ^{14}C dates, 24,200 ± 600 BP and 24,400 ± 600 BP, were obtained at the AMS lab at Seoul National University from charcoal collected from upper most clay layer containing a microlithic industry (Choi 2001). If accurate, they represent the oldest microlithic industry on the Korean Peninsula.

Noeundong

This site was found during the construction of a football stadium for the 2002 World Cup football games in Taejon. Charcoal collected from a paleosol identified by vertical soil cracks dated to 22,870 ± 110 BP (Han 2000). Microlithic tools were found directly above this paleosol. A second

radiocarbon date of 54,720 BP was recently announced for a much lower layer, and presumably represents the Middle Paleolithic (Choi 2001).

Suyanggae

At Suyanggae, fluvial terrace deposits of the Namhan River have yielded tens of thousands of stone artifacts. Remains of a stone knapping area were exposed and many artifacts from within this feature were successfully conjoined. While a formal report has not yet been published, preliminary information indicates the presence of three cultural stages, represented from the top of the sequence by microlithic, Upper Paleolithic, and Middle Paleolithic stone industries. It should be noted that a tanged point, technologically similar to knife-type tools in western Japan, was found for the first time in Korea at this site. Two ^{14}C dates, 18,630 BP and 16,400 BP, were obtained from charcoal collected at the site (Lee and Yun 1994). Unfortunately, the provenance of these samples is unclear.

In addition to the sites mentioned above, Chommal Cave and the recently excavated Yonghodong site have produced several new radiocarbon dates. These results are not yet published.

DISCUSSION AND CONCLUSION

In spite of the large number of known sites of apparent Paleolithic age in Korea, few have been systematically dated using the ^{14}C technique. The exceptions generally are associated only with single dates, which presents some problems for evaluating the reliability of the age determinations. Ages obtained for so-called Middle Paleolithic assemblages, some of which approach 50,000 BP, are still highly questionable. These dates likely represent only minimum ages. In contrast, the small sample of dates presently available points to a maximum age for the Upper Paleolithic on the Korean Peninsula of approximately 30,000 BP. ^{14}C age estimates for the earliest appearance of microlithic technologies are not substantially younger at approximately 24,000 BP. The majority of ^{14}C dates associated with Korean microlithic industries are terminal Pleistocene in age, however, which is consistent with the accepted age range for these technologies in greater Northeast Asia.

To resolve these outstanding questions, there is an immediate necessity for intensive dating programs focused on Paleolithic stone industries. In this regard, the recent dramatic increase in the number of ^{14}C-dated Paleolithic sites in Korea is encouraging. It is important to recognize, however, that ^{14}C dating offers a partial solution to the problems at hand because of the widespread distribution of acidic soils on the Korean Peninsula and the consequent poor organic preservation at most Paleolithic sites. It will be necessary therefore to employ alternative dating tools, including relative chronological methods and strict attention to site formation processes, to provide a complete chronological picture of the Paleolithic sequence. To date, little attention has focused on the geochronology of Korean Paleolithic sites.

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