Techno-Chronological Reassessment of Palaeolithic Assemblages in the Imjin-Hantan River Area, Korea: New Data and New Considerations

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Recent excavations and research of the Imjin-Hantan River Area have furnished new data that presents a revised position on the age and technological characteristics of the palaeolithic industry. The initial date of hominid occupation is, if not earlier than, the later Middle Pleistocene. In addition, handaxes and associated small tools in the Imjin-Hantan River Area are predominantly bracketed into the OIS 5-3. Although several researchers suggest that the date of the Chongokni site falls in the later Middle Pleistocene, these new dates contradict the old notion that handaxe-based assemblages are chronologically equivalent to the Acheulian industry (or the Lower/Early palaeolithic technocomplexes). Rather, it is believed that the Imjin-Hantan River Area handaxe is not a direct output of either the hominid acculturation or technological transmission. The relatively simple and underdeveloped level of manufacturing technique suggests that this young handaxe might have been produced as a result of a provisional necessity in the demand for a reliable multi-purpose tool. This crude but instrumental tool-type persisted until new high-quality raw materials (obsidian and porphyry) began to be heavily exploited and the small-tool-dominant Upper Palaeolithic technology finally emerged during the terminal Pleistocene in this area.

Keywords: Imjin-Hantan River Area, Palaeolithic, handaxe, OIS 5-3, lithic raw material

Introduction[1]

In the Imjin-Hantan River Area (IHRA), located in the midwestern region of the

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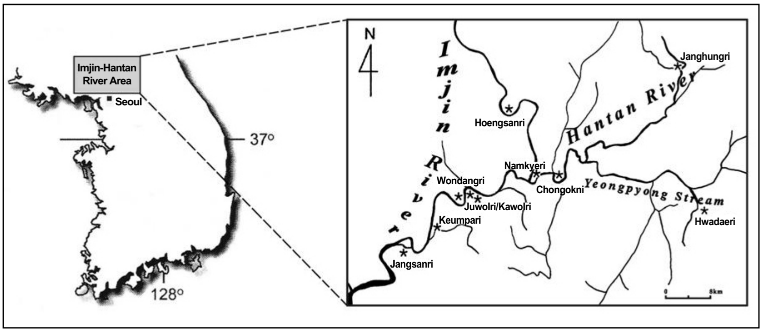
Korean Peninsula, are distributed more than forty palaeolithic localities. Since the late 1970s when Acheulian-like handaxes were discovered at Chongokni,[2] other neighboring localities have yielded over 100 handaxe specimens. This has led many international researchers to recognize this area as one of the most handaxe-abundant palaeolithic regions in East Asia. Several excavations and regional geoarchaeological research have been continuously proposing many important issues in the context of hominid's occupation history at the far eastern margin of the Eurasian continent. Among these issues, the exact date of the handaxe is one of the most debatable topics. Furthermore, the significance of the handaxe still remains questionable because this region is within the chopper-chopping tool area, a zone of Pleistocene cultural/technological retardedness suggested by Movius (1948).

Although endeavors have been made to date this culturally unique lithic assemblage, some inherent difficulty in interpreting the geological sequence of the later Pleistocene (ca 0.7-0.12 MYA) period has hindered researchers from acquiring an indisputable chronology. It is still a matter of time before the palaeolithic research in the IHRA is modulated with the aid of sound frameworks, and not plagued by a plethora of unpersuasive proxy data. In an

Figure 1 Location of the IHRA and distribution of the major archaeological sites



and useful post-lecture comments in preparing this article. In addition, I also thank the three anonymous reviewers for their useful comments and constructive advice.

2. Chongokni refers to an archaeological site which was established long before the new romanization began being used in 2000. In order to minimize confusion with the current use of Jeongok-ri, which indicates the smallest municipality of Gyeonggi Province where the site is located, this article will use the internationally more acknowledged Chongokni. The same applies to Keumpari (Geumpa-ri) and Kawolri (Gawol-ri).

attempt to invigorate the current discussion with a broader perspective, this article evaluates the validity of past research based on currently available archaeological and geological data. With new publications of chronometric dates and several unprecedented archaeological discoveries from Chongokni, Juwolri, Kawolri, Keumpari, Hwadaeri, and Janghungri from 2000 to 2006 (Fig.1), we can have a new perspective on the characteristics of IHRA lithic assemblages.

What was gained and what was overlooked by past research?

The IHRA hosts numerous archaeological localities across the entire territory of the Imjin-Hantan river channels. The initial research of the IHRA coincides with the excavation of the Chongokni site. The age of its artifact horizon was suggested to be younger than 0.27 MYA based on the controversial K-Ar dates of the basalt bedrock (Kojima 1983). Some authors have argued that its age was partly contemporaneous with the time range of the Lower/Early Palaeolithic sequence, suggesting that the Chongokni handaxe is a direct equivalent of the Acheulian industry prevalent in the western hemisphere. This has led some authors to argue that the handaxe contradicts Movius's claim (Bae 1988). However, several authors proposed a different opinion that, although Movius's claim is supported by current data, the Quaternary geomorphology of this area and several younger chronometric dates–e.g., the TL and OSL dates presented by Yi (1989; 1996)–do not verify such a great "antiquity" of artifact horizon as to be dated to the Lower/Early Palaeolithic (Yi 1989, 1996, 2004).

After this initial debate, several researchers have vigorously investigated the IHRA assemblage, and recently made a claim that the Acheulian-like handaxe and associated lithic artifacts should be dated to ca 0.35 MYA, based on new chronometric dates–K-Ar and fission track methods–of the basalt bedrock and calculation of sedimentary rates above it (Danhara et al. 2002; Matsufuji et al. 2005). In addition, others have suggested that the IHRA handaxe, coeval to the Acheulian handaxe, was not technologically and morphologically parallel to the Acheulian one, which supports that Movius's claim is still *sensu lato* effective (Norton et al. 2006). Summing up these two claims, the IHRA assemblage is arguably one of the local East Asian Lower/Early Palaeolithic industries that technologically adumbrate the Acheulian characters: this is the basis for current discussions on the nature of the IHRA assemblage.

Challenging this current position entails evaluating how the dates were acquired and elucidating to what extent these dates can contribute to the geochronology of the IHRA. The terrain of the IHRA reflects a sequential fluvial action interrupted by several−possibly more than two−volcanic eruptions. Most archaeological horizons are distributed above the basalt bedrock and are formed as a result of cooled lava. In particular, the handaxes were discovered within the fine silty-clay layers positioned at the top of the entire stratigraphic column. Supposing that the age of the IHRA archaeological horizon is extrapolated by the time lapsed after the volcanic eruption, as indicated by Danhara et al. (2002), the formation of the handaxe assemblage is believed to be relatively young throughout the entire Pleistocene sequence. Most chronometric dates are dependent on the K-Ar dates of the basalt bedrock as the chronological datum point: other subsequent dates of the fluvial layers above the basalt bedrock resort to these K-Ar dates as a maximum oldest limit. However, the range of several K-Ar dates exceeds the tolerance of statistically significant value, from over 1 to 0.158 MYA (Yi 2005). The problematic distribution of the K-Ar dates leads to two fundamental questions about the nature of the basalt bedrock and the limitation of the K-Ar dating method: 1) why are the results almost always unreliable, and 2) to what extent is the K-Ar dating reliable in determining the age of such relatively recent geological events?

It is important to note that the lava flows directly and simultaneously covered the river channel including the river bed, the adjacent swamps, and the overbank area. These overlain zones have the potential to vaporize large quantities of minerals and of pyrolyzed organic materials that are critical to the ratio balance of atmospheric $^{40}Kr/^{40}Ar$. As a result of the thermal transformation occurring at the hydraulic zone, large amounts of miscellaneous isotopes are usually converted to either ^{39}Ar or ^{40}Ar. Consequently, the estimated age at which the lava cooled and consolidated into basalt rock cannot but be biased. The relationship between the hydraulic condition of the sampling locations and the extent to which the dates are biased can neither be adequately addressed nor be correlated for these conditions are unpredictable and stochastic. Therefore, it is still beyond the current capacity of the K-Ar method to establish reliable ages of lava flows.

Contrary to the baffling situation of the lower limit, the upper limit, the possible youngest date of the IHRA archaeological horizon, is well-established. Yi (1996; Yi, Soda, and Arai 1998) first discovered the Aira-Tn (AT) tephras from the top crack of the silty-clay layer superseding the handaxe horizon. He then postulated that, based on the solid dates of the AT (ca 27 to 24 KYA), the handaxe assemblage of the IHRA might have persisted until the global climatic deterioration during the OIS 2 before it was rapidly replaced by a new, high-quality-material-based Upper Palaeolithic technology (Yi 2004). What is clear from this position is that, regardless of the age of the initial handaxe production in the IHRA, the Acheulian-like handaxe assemblage does not chronologically coincide with the typical Acheulian industries of the western hemisphere; and the temporal coevalness suggested by Norton et al. (2006) can be contradicted based on the late survival of handaxe manufacturing until the terminal Pleistocene. The remaining questions are, therefore, what approximate dates of the IHRA assemblage can be indicated by the current data, and how can we present a meaningful explanation on the nature of the IHRA handaxe. In an attempt to answer these questions, the next section will illustrate the general geological/archaeological features based on the new data.

New dates before and after the volcanic eruption

Although most IHRA assemblages are distributed above the basalt bedrock, some assemblages predate the volcanic eruption. An example is located at the downstream area of the Imjin River, far beyond the stretch of the maximum lava flow range−the Jangsanri site (Yi 1996, 2004). The Jangsanri site is the oldest Palaeolithic occupation discovered so far in the IHRA and is positioned on top of the ancient river terrace formed by the fluctuation of the Imjin River. As the artifact horizon lies more than 20 m above the current lava flow, its relative age to the basalt bedrock can be easily understood. Furthermore, the lava flow covers, as indicated by the exposed outcrops at the volcanic area, the fluvial channel bed formed after the downcutting of this deposit; thus, there is no doubt that the terrace surface was formed much earlier than the formation of the basalt

Table 1 Several "young" K-Ar dates from the basalt samples of the IHRA

DATES (KYA)	SOURCES	LOCATION	REMARKS
108±158	Kojima (1983)	Chongokni	Too wide an error range
138.4±5.7 and 136.5±5. 4	Park et al. (1996)	Chongokni	Double dating
160±25 and 18±2	Danhara et al. (2002)	Chongokni	Single sample with two methods
158	Yi (2005)	Shindapri	Peak comparison method

bedrock in the IHRA. In recognition of its importance in the Quaternary stratigraphic sequence of the IHRA, the formal name “Jangsanri Terrace” was given to this deposit (Yi et al. 2004; Fig. 4). While no indisputable handaxe was found at Jangsanri, a large pointed tool indicates that handaxe manufacturing was already on its way when hominids first resided in this area (Fig 5: 1). Despite its real age possibly being older, the current available chronometric date of the Jangsanri Terrace is ca 0.23 MYA, based on the Infrared stimulated luminescence dating (IRSL) method (Yi 2004). It would, therefore, not be presumptuous to take this date as a provisional lower age limit of the IHRA assemblage.

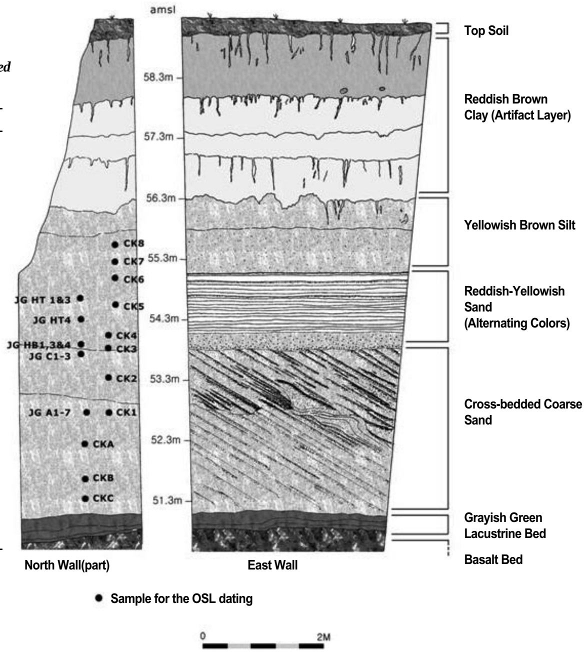
In addition to the age of the Jangsanri Terrace, attempts to date the burnt gravels beneath the lava flow have been made. Danhara et al. (2002) obtained a single fission track date of ca 500 KYA and assumed it to be the age of the basalt as it corresponds to their K-Ar dates. But it can be criticized on technical grounds as a single date from a single fission track etched on a single grain of mineral. Later on, new fission-track dates of ca 400 KYA from more and larger samples were published as the maximum age limit for the basalt flow (Yi et al. 2005; Yoo 2008). Additionally, several luminescence dates indicating the moment when the lava encroached in the basin were obtained by the burnt gravels beneath the basalt bed. However, some of these dates—within the range of ca 200 to 60 KYA (Yi 2005; Choi et al. 2004)—are apparently too young to be the real age for the basalt; another two samples from separate localities produced the same date of ca 148 KYA with slightly different error ranges (Choi et al. 2004). These apparently young dates are not believed to have been serendipitously acquired since there already exist several K-Ar dates of the basalt bedrock corresponding to these dates (Table 1). If we consider these dates valid for the age of the volcanic eruption, then the real age of the archaeological horizon above the basalt bedrock would be younger than previously thought. Of course, these young K-Ar dates are not indisputable because, compared to the general dating range of the K-Ar dating method normally applied to the far older geological ages, the measured values are liable to be the result of an insufficient amount of ^{40}Ar. More controlled sampling and innovative dating techniques should be substantiated in the future so that the K-Ar dates of the basalt bedrock are dependable.

For the direct age of the archaeological horizons on top of the basalt, several scores of luminescence dates were newly obtained between the basalt bedrock and the artifact horizon from a 2004 excavation campaign of the Chongokni site

Figure 2 Stratigraphic sequence of the Control Pit of the 2004's Chongokni Excavation Campaign (Dating Agencies: Korean Basic Science Institute and Institute of Paleoenvironment at the Chungcheong Cultural Property Foundation)

Sequence of the OSL dates measured by two dating agencies

Sample Code	Age(KYA)	Dating Agency
CK8	N/A	IPCCPF
CK7	60±10	IPCCPF
CK6	65±10	IPCCPF
JG HT1	57.8±3.1	KBSI
JG HT3	48.8±3.8	KBSI
CK5	72±9	IPCCPF
JG HT4	48.9±3.7	KBSI
CK4	83±13	IPCCPF
JG C1	57.4±3.3	KBSI
JG C2	38.2±3.2	KBSI
JG C3	64.1±3.6	KBSI
CK2	92±8	IPCCPF
CK1	120±6	IPCCPF
JG A1	60.9±5.1	KBSI
JG A2	38.2±3.2	KBSI
JG A3	56.7±3.2	KBSI
JG A4	36.9±3.8	KBSI
JG A5	43.6±4.7	KBSI
JG A6	51.5±3.7	KBSI
JG A7	58.0±3.5	KBSI
CHA	104±8	IPCCPF
CHB	127±6	IPCCPF
CHC	113±3	IPCCPF



(Figure 2). Except for a few problematic results, the majority of the dates belong to the later part of the Upper Pleistocene−from the OIS 5e to the OIS 3− including those from the lowermost part (Yi 2005; Yi et al. 2005). This series of OSL dates indicates that, after the termination of volcanic activity, the fluvial sediments were continuously accumulated before the hominid's occupation was initiated at least after the OIS 4. Because the lower part of the fluvial layers is predominantly composed of clastic sediments transported by a rapid and turbulent river flow, the assumption by several authors (e.g., Danhara et al. 2002; Matsufuji 2005) that the sedimentation of artifact layers progressed at a steady rate cannot be supported.

In addition to these luminescence dates, several new C14 (AMS) dates were acquired from organic samples directly associated with the artifact horizon (Table 2). At the Chongokni site, a biostratigraphic zone of fossil burrows distributed below the AT level was dated approximately 20- 30 KYA (Yi 2005).

Table 2 AMS dates from the artifact horizons of the IHRA

DATES (KYA)	SOURCES	SITES	REMARKS
20.840±0.45	Lim et al. (2004)	Chongokni	Slightly below the top crack
30.490+4.76/-2.59	Lim et al. (2004)	Chongokni	Almost identical to the artifact horizon
31.500±1.300	Bae et al. (2006a)	Keumpari	Charcoal No. 2 from Grid W23N6-1
30.800±0.400	Bae et al.(2006a)	Keumpari	Charcoal No. 3 from W23N6-1 Keumpari

These burrows are believed to have been dug by hibernating rodents and their hollow ducts were subsequently filled with organic sediment after the rodents vertically penetrated and disturbed the original artifact horizon. Though its original age is believed to be somewhat older and needs to be verified, a handaxe was discovered from the same level as this burrow zone (Figure 5: 2). At the Keumpari site, two AMS dates are available from the charcoal samples in association with the artifact horizon; and their dates commonly suggest that the age of lithic assemblage is not older than the lower limit of the OIS 3. Taking these young AMS dates into consideration, the IHRA lithic assemblage was principally formed after the later phase of the OIS 4 and continuously survived until the terminal Pleistocene (Yi 1996, 2005). However, we are still far from understanding the exact provenience of handaxes in this area because most specimens are from the surface collection. Except for several pieces retrieved from the upper part of the silty-clay layer, the vertical position of the “handaxe cultural layer” is yet to be clearly defined. Despite our knowledge that handaxes survived until the final phase of the OIS 3, the maximum we can take is the bare possibility that the age of handaxes in the IHRA is not so old as supposed by conventional approaches dominant among past researchers.[3]

Some clarifications and hypotheses on the characteristics of the IHRA assemblage

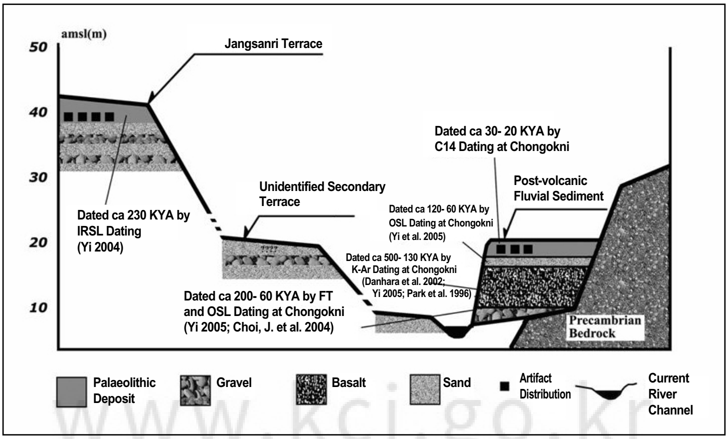
Fig. 3 is an illustrated general scheme of archaeological horizons distributed in

3. Nevertheless, a very recent publication of new OSL dates indicates that the lower part of the sediments above the basalt bedrock was formed during the OIS 6 (200-125 KYA) and that the majority of these deposits might have been subsequently eroded by fluvial actions in the course of rejuvenating the original channel energy (Kim et al. 2009; Yi 2009 pers. comm.).

the IHRA. The exact correlation of the chronometric dates is hard to attain because the sequence of strata is different from location to location. The geographic range of site distribution reaches the upper region of the Imjin River beyond the DMZ, and it is even distributed into the far downstream area in the western region (Jangsanri site; see Fig. 1). The distribution of the basalt bedrock is concentrated in the upper and middle region of the IHRA, but it is not well-represented in the lower part of the Imjin River. Especially associated with the Keumpari, Juwolri, and Kawolri sites, the basalt layer principally exists as the remnant of stacked cobbles transported from the upper region. Yi and Lee (1993) also noticed that the Juwolri/Kawolri areas were almost devoid of any evidence of basalt flow. In sum, the geological contexts in the entire IHRA are far from being the result of uniform and simultaneous formation processes, and the assumed comparable temporal ranges across the localities cannot be verified by current geological and archaeological evidence.

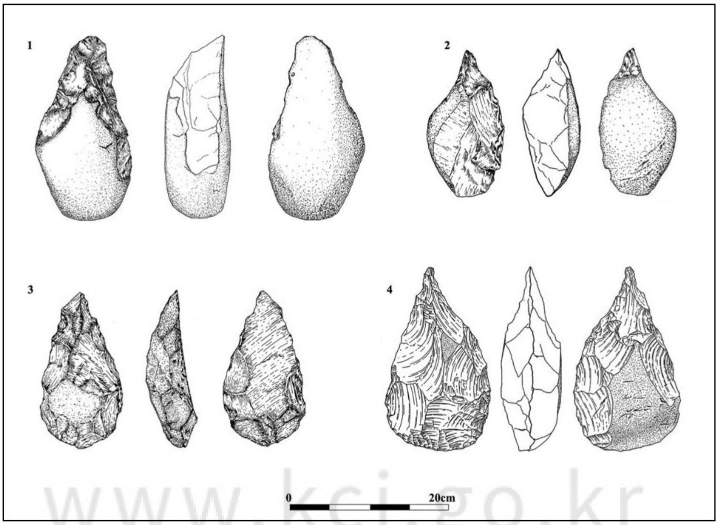
Therefore, it is clear that there might exist many variants of lithic assemblage in the IHRA with regard to the morphology and the manufacturing procedure of tool types. For example, some very refined handaxes, such as entirely bifacial shapes (Fig. 4: 3-4), are included in the Juwolri/Kawolri assemblages and these have almost perfect symmetrical morphologies emulating the typical Acheulian specimen. Nevertheless, the frequency of these refined handaxes in the total IHRA assemblage is very limited: a considerable number of the IHRA handaxes are crude, almost identical to the ficron type of biface under the Bordesian typological scheme (Débenath, and Dibble 1994:144). Most handaxes

Figure 3 Schematic cross-section of the IHRA archaeological/geological sequence



distributed in the IHRA are expediently finished and their thickness is notably greater than that of typical Acheulian implements as Norton et al. (2006:534) adequately presented. However, in contrast to what they claim (Norton et al. 2006:533), the blanks of the handaxes are equally composed of both large cobble-sized gravels and moderately reduced flakes. In either case, the reduction sequence is simple and the blanks are casually modified without being shaped to their perfection. At least three—unifacial, bifacial, and alternate shaping—manufacturing methods for producing handaxes were prevalent in the IHRA assemblages and each method is sufficiently effective to obtain workable lateral edges and a useful pointed tip at its distal end (Yu 1997). If these two formal properties had been achieved, additional intensive retouch on the remaining part of the blank might have been redundant; its cortex was, therefore, mostly left intact, possibly for grasping. It is believed that the IHRA hominids had an underdeveloped technique or even lesser need to perform intensive reduction for the purpose of shaping: a so-called mental template of the ideal form a handaxe should display might have been minimally imposed during the manufacturing stage. In this regard, the raw material constraints are not solely responsible for the morphological crudeness of the IHRA handaxes (Yoo 2008:158).

Figure 4 Handaxes from the IHRA localities. 1: Jangsanri lower layer; 2: Chongokni upper layer; 3. Juwolri disturbed top soil; 4. Juwolri top soil (Yi and Lee 1993; Yoo 2008)

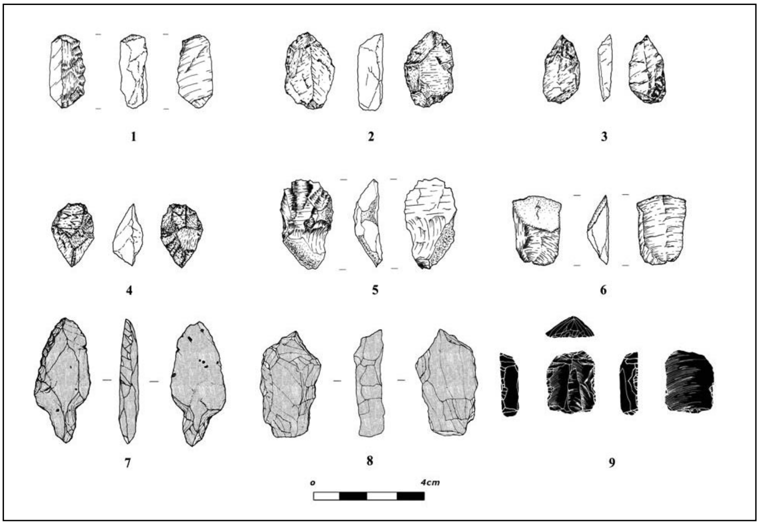


In addition to the handaxe, newly excavated assemblages from Chongokni, Juwolri, Kawolri, and Keumpari include a number of small tools made of various blanks including a normal flake, broken shatter, and miscellaneous chips (Fig. 5: 1-6). The distribution of these small tools is mostly concentrated at the level of the OIS 3. For example, in Chongokni, Kawolri, and Keumpari, various small tools were found just below the top crack where AT particles are usually discovered on the Korean Peninsula. The level of technological accomplishment shown in the small tool repertoires is not high; the position of retouch and formality of tool morphologies are rather arbitrary, comparable to those of handaxes. In this case, it can be addressed that the handaxe and various small tools were simultaneously made for a considerably long time before the OIS 2, and that both the production of the handaxe and the small tools was in a similar technological context. If the crudeness of general tool morphology can be attributed either to the poor quality of raw material (quartz/quartzite) or to the low level of manufacturing intensity, then the IHRA assemblage can be characterized as an output of technological organization constrained by a local raw material disadvantage and by a low necessity to produce high-caliber specialized tools.

These apparently crude and expedient lithic assemblages show a relatively drastic change approaching the OIS 2 in the IHRA. The quartz and quartzite, principally exploited for both large and small tools, became less dominant, and new high-quality materials such as porphyry and obsidian began to be heavily utilized (Fig. 5: 7-9). Accordingly, the handaxe and other large tools became scarce and several small tools of low quality materials survived. The Janghungri and Hwadaeri sites, which have a good survival of younger layers above the top crack, illustrate well the transition from a low to a high quality material assemblage. According to Hwadaeri excavation results (Choi and Yu 2006), the size of quartz tools was gradually reduced and new raw materials of rhyolite, porphyry, and obsidian emerged around the terminal OIS 3 (39±1.4, 30±1.7 KYA by OSL dating from bottom to top before the AT crack; Choi and Yu 2006:36). The Janghungri assemblage from the top cultural layer is composed of highly modified small tools and of such tiny blanks as heavily utilized chips and microblades.

Because most archaeological sites located at the midstream area of the Imjin and Hantan rivers have been vulnerable to post-depositional transformation due to human disturbance and floods, it is extremely difficult to identify the general tendency of lithic changes in this area. Despite this, while not found associated

Figure 5 Various small tools in the IHRA. 1: side scraper from Chongokni; 2: sidescraper from Kawolri; 3: point from Kawolri; 4: endscraper from Kawolri; 5: endscraper from Chongokni; 6: tranchet from Chongokni; 7: porphyry stemmed point from Hwadaeri; 8: porphyry scraper from Hwadaeri; and 9: obsidian endscraper from Janghungri (from Choi 2001; Choi and Yu 2006; Yoo 2008)



in situ, there have been several discoveries of high-quality materials at Chongokni (Yi, Yu, and Kim 2006), Keumpari (Bae et al. 2006), and Heongsanri (Bae et al. 2006). Considering this, it is probable that the low-quality materials were finally replaced by exotic high-quality materials in the entire IHRA around the OIS 2; and that the manufacturing technique of these high-quality materials equals the emergence of local Upper Palaeolithic tradition,[4] both chronologically and technologically. The transition from Middle to Upper Palaeolithic in the IHRA is not well-known, but, as far as when the transitional phase shown at Hwadaeri and Janghungri is taken into consideration, the change to high-quality materials and the "extinction" of the handaxe might have paralleled the emergence of local Upper Palaeolithic technology in this area (Yi

4. The term "tradition" in this text means a kind of sensible adherence to specific materials and to customized manufacturing processes commonly appropriated by human groups on a long-term basis. Under certain traditions, it is expected that some typified objects are repetitively produced and recurrently maintained as well as limited repertoires of resources are highly utilized. The global Upper Palaeolithic technology usually shares these types of cultural/technological aspects.

1999; Yoo 2008). This transition could have been instigated either by the arrival of a new hominid population at the far extreme of the Eurasian continent or by the prompt technological adaptation of an indigenous hominid in response to the rapid environmental deterioration around the onset of the OIS 2 (Yoo 2008). Concerning this, several new issues—the first occupation of Homo sapiens on the Korean Peninsula, the narrow spectrum of raw material selection, and the development of hominid's discerning capacity for suitable resource procurement—emerge to explain this rough chronological scheme of the IHRA palaeolithic assemblage, which needs to be fully substantiated in the future.

Conclusion

During the last several decades, palaeolithic researchers have been opting for an explanation encompassing the materialistic appearance of various archaeological traits. Especially in the field of lithic technology lies a general research trend concentrating on the relationship between the assemblage variability and the implications of hominid cultural/technological legacies. What is evident concerning this trend is that archaeologists try to extract meaningful dynamics from static archaeological records, and that they try to elucidate as many contexts as these records are formulated by. Notwithstanding the progress made in research, however, it seems still questionable to what extent the lithic data can be interpreted as a direct output of hominid's cultural/technological capacities in the course of their global colonization. Especially when dealing with seemingly crude and notably "expedient" lithic technologies in East Asia, researchers are liable to succumb to a lack of comparable data. As a result, some feel for a near-obsolete tenet (e.g., resuscitating Movius's claim; Norton et al. 2006), or others tend to overestimate the nominal plausibility of published data in the hope of launching a general scheme applicable to a larger domain of data (e.g., extending the explicability of chronometric dates for ranging the artifact horizon; Danhara et al. 2002; Matsufuji et al. 2005). In a sense, the explanatory limitation of current East Asian palaeolithic data is arguably due to their constitutional dullness and uncharacteristic monotone over a long period. Therefore, it is an arduous task to conduct a region-based research with reliable chronological schemes and solid typological systematics that are compatible with those of Europe and Africa.

This article is not intended to set an agenda that the past research of the

IHRA should be negated but to present a demand that the IHRA assemblage should be understood with a more flexible attitude. Taken from current data, a new perspective that the handaxe of the IHRA is not in the same vein—chronologically, technologically, and contextually—with that of the Acheulian industry can be proposed. Most IHRA assemblages are the output of hominid activity during the OIS 3, although some evidence older than OIS 5e also exists (e.g., the Jangsanri assemblage). The IHRA assemblage is not composed exclusively of large tools represented by the handaxe but equally of small tools that were manufactured in a similar technological context with large tool types; the crude and underdeveloped technology dependent on low-quality raw materials was abruptly replaced by a new technology based on high-quality raw materials such as porphyry, rhyolite, and obsidian from the terminal OIS 3 to the OIS 2; and, this new technology is identical to the emergence of Upper Palaeolithic tradition in this area reflecting either the population replacement or technological innovation accomplished by the local hominid.

Although still hypothetical, this perspective enables us to overcome an idée fixe that the Acheulian-like large tools discovered in East Asia cannot but be interpreted in the context of global Lower/Early Palaeolithic technocomplexes. If we take the young age of the in situ Chongokni handaxe (Fig. 4: 2) presented above, the IHRA can be characterized as a domain of the East Asian Palaeolithic tradition in which the non-Acheulian handaxe was continuously manufactured throughout the Upper Pleistocene; and this should be the starting point from where future discussions progress in their investigation of the significance of the IHRA lithic assemblage.

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