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ВТОРОЙ МЕЖДУНАРОДНЫЙ СИМПОЗИУМ «ПЕРВОНАЧАЛЬНОЕ ОСВОЕНИЕ ЧЕЛОВЕКОМ КОНТИНЕНТАЛЬНОЙ И ОСТРОВНОЙ ЧАСТИ ЕВРАЗИИ. СУЯНГЭ И ОГОНЬКИ»

Тезисы докладов

22 (2)[d] SUYANGGAE INTERNATIONAL SYMPOSIUM IN SAKHALIN “THE INITIAL HUMAN EXPLORATION OF THE CONTINENTAL AND INSULAR PARTS OF THE EURASIA. SUYANGGAE AND OGONKI”

Thesises

Составители: А. А. Василевский, В. А. Грищенко
Editors by A. Vasilevski and V. Grishchenko

Южно-Сахалинск
СахГУ
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В87 **Второй международный симпозиум «Первоначальное освоение человеком континентальной и островной части Евразии. Суянгэ и Огоньки»:** тезисы докладов / сост.: А. А. Василевский, В. А. Грищенко. – Южно-Сахалинск : СахГУ, 2017. – 100 с.
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СУЯНГЭ И ОГОНЬКИ»
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РАСПИСАНИЕ СИМПОЗИУМА
5–12 ИЮЛЯ 2017 ГОДА

4–5 ИЮЛЯ

(размещение в гостинице «Лада»)

Пленарное заседание: ***6 июля 2017 года***
(Коммунистический пр., 33, малый зал, первый этаж).
Церемония открытия: 10:00–10:30

Пленарные доклады: (10:30–11:30).
Председатели: *Ли Юнг-Джо, Василевский Александр.*

1. *Ли Юнг-Джо (Республика Корея)*. Суянгэ, почему так важно.
2. *Синг Гао, Ван Шэньян (Китайская Народная Республика)*. Археология Китая.
3. *Васильев С. В., Боруцкая С. Б. (Российская Федерация).* Результаты изучения самых древних Homo sapiens со стоянки Костёнки XIV.

Перерыв: 11:30–11:45.

4. *Кидонг Пэ (Республика Корея).* Чонгокни: ручные рубила и бифасы, новый взгляд.
5. *Свобода И. (ЕС, Чехия)*. Расширение Ашельской ойкумены в центре Европы.
6. *Масоджик М., Насср А. Х., Джу Юн Ким, Янг Кван Сон*. Последние исследования Ашельской культуры в Судане.

Перерыв: 13:00–14:30.

СЕКЦИЯ 1. «От нижнего палеолита к верхнему» (14:30–18:00)

Председатели: *Кидонг Пэ, Дроздов Николай и Свобода Иржи.*

7. *Се Гуан Мао, Линь Цян, Ву Янь, Ли Давэй (Китайская Народная Республика).* Ансамбли изделий на малых отщепах из Южного Китая и Юго-Восточной Азии.
8. *Ли Хон Джон, Ли Санг Сок, Сон Донгук (Республика Корея).* Культурная динамика возникновения и распространения Homo Sapiens в Корее.
9. *Ким Юнджон (Республика Корея).* Анализ черешковых острий со стоянки Суянгэ.
10. *Ким Джу-Юн, Ли Юнджо, Пу Ёнгун, Ли Сэнгвон, И Сангён, О Гын-Чан (Республика Корея).* Стратиграфия, хронология и палеорастительность с палеолитических стоянок речного бассейна Гым-Михо в Корее.
11. *Панер Хенрик (ЕС, Польша).* Стоянки разделки туш или ловушки? Артефакты и кости животных со стоянки HP 766 в Вади Умм Рахах (Северный Судан).
12. *Белоусова Н. Е., Рыбин Е. П. (Российская Федерация).* Новые стратифицированные ансамбли начального и раннего позднего палеолита на стоянке Кара-Бом (русский Алтай) по результатам пространственного анализа и исследований результатов ремонтажа.

СТЕНДОВЫЕ ДОКЛАДЫ

(малый зал. Галерея)

1. *Кирилова И. В.* Остеологические свидетельства человеческой деятельности в пещере Ostantsevaya (центральный Сахалин, Россия).
2. *Табарев А. В.* Микропластинчатые технологии в комплексах финального плейстоцена – раннего голоцена Северной Монголии: происхождение и распространение.
3. *Разгильдеева И. И., Решетова С. А.* Влияние палеоклимата на структурную организацию древних стоянок.

ЭКСКУРСИОННЫЙ ДЕНЬ 7 ИЮЛЯ

09:00–17:00 – посещение стоянки Сенная-1 среднего плейстоцена.

СЕКЦИЯ 2. «От верхнего палеолита к неолиту (часть I)»

8 ИЮЛЯ

(малый зал, первый этаж)

Председатели: *Акошима Каору, Рыбин Евгений, Се Гуанмао (09:00–12:30);*
Ксин Гао, Гиря Евгений (14:00–18:00).

1. *Акошима Каору, Хевон Хонг.* К стандартизации идентификации следов использования каменного инвентаря – к выработке универсальных критериев для Восточной Азии.
2. *Анойкин А. А.* Стоянка открытого типа Ушбулак-1 (Восточный Казахстан): новое свидетельство начального верхнего палеолита Средней Азии.
3. *Сайдин М. М.* Археология Малайзии.
4. *Ли Ги Кил.* Доказательства существования дальнего обмена обсидианом на стоянке Синбук в Корее.
5. *Каору Отани, Ли Юнг-Джо.* Микролитические индустрии Северо-Восточной Азии с точки зрения типологии Суянгэ.
6. *Гиря Е. Ю., Василевский А. А., Кимура Х., Понкратова И. Ю.* Далекие и близкие аналогии артефактам с резцовым сколом на тихоокеанском побережье Евразии.
7. *Дроздов Н. И.* Поздний палеолит Средней Сибири. История изучения.
8. *Дроздов Д. Н.* Палеолит Северного Приангарья.
9. *Ванг Вэй.* Текущее изучение останков Homini позднего плейстоцена и раннего голоцена, обнаруженных с каменными артефактами в Южном Китае.
10. *Люцина Доманска.* Обработка земли мезолитическими охотниками-собирателями: примеры с Польской низменности.
11. *Понкратова И. Ю.* Стоянка Ушки-5 (Камчатка) и ее место в периодизации археологических культур севера Дальнего Востока России.
12. *Фукуда Масахиро.* Стратегии освоения и изменения климата в эпоху неолита на Нижнем Амуре–Сахалине и Японском архипелаге.
13. *Нацуки Дайго.* Сосуществование финальной культуры верхнего палеолита и культуры изначального дземон на Хоккайдо.

ЭКСКУРСИОННЫЙ ДЕНЬ
9 ИЮЛЯ

09:00–17:00 – посещение стоянок позднего палеолита Огоньки 5–6.

СЕКЦИЯ 3. «От верхнего палеолита к неолиту (часть II)»

10 ИЮЛЯ

(малый зал, первый этаж)

Председатели: *Люцина Доманска и Грищенко Вячеслав.*

1. *Кимура Х., Лавров Е. Л., Василевский А. А.* Источники добычи и распространения обсидиана в период верхнего палеолита: распространение обсидиана Хоккайдо на Сахалине и Хонсю.
2. *Куникита Дай.* Радиоуглеродное датирование и анализ пищи посредством изучения обугленных остатков на керамике раннего неолита со стоянок в Северо-Восточной Азии.
3. *Грищенко В. А., Фукуда М.* Культура наконечников стрел на пластинах в островном мире Северо-Восточной Азии (Сахалин, Курилы, Хоккайдо) – взгляд из XXI века.
4. *Ли Кенгву, Ли Юнг-Джо.* Исследования окультуренного риса Сорори Чхонджу.
5. *Грон Оле.* Акустическое обнаружение подводных стоянок каменного века – новые результаты.
6. *Марсель Бартжак.* Неолитическая кремневая шахта в Кржемёнки в качестве примера популяризации археологических раскопок.
7. *Макулов В. И.* Неолитические комплексы среднего течения Подкаменной Тунгуски. Красноярский край.
8. *Дроздов Н. И., Цуань Цянькун, Дроздов Д. Н., Сон Донхек.* Пластинчатые индустрии Северной Азии.
9. *Ли Юй Цзе.* Истоки китайской цивилизации.
10. *Линьюань Конг.* Вклад Ван Нининшенга в этноархеологию Китая.
11. *Ву Сяньжу.* Останки рукокрылых, впервые обнаруженные и исследованные в городах Китая.
12. *Учида Казунори.* Осиповская культура.
13. *Фумито Акаи.* Последовательность расщепления в микролитических ансамблях в низине Исикари, Хоккайдо.

SYMPOSIUM SCHEDULE 5–12 JULY 2017

JULY 4–5. COMING DAYS

(Accommodation in Lada hotel)

Plenary session day. ***July 6, 2017****. Ceremonial hall. First floor.*
Opening ceremony: 10:00–10:30

Plenary reports: (10:30–11:30)
Chairmen: *Lee Yung-jo, Vasilevski Alexander*

Lee Yung-jo (Republic of Korea). Suyanggae Why So Important
Xing Gao, Wang Shejiang (People's Republic of China). Archaeology of China
Vasilyev S. V., Borutskaya S. B. (Russian Federation). The overall study of the most ancient Homo Sapiens from Kostenki XIV

Break: 11:30–11:45

Kidong Bae (Republic of Korea). Chongoknian; handaxe and biface reconsidered
Svoboda J. (EU, Chekh Republic). At the Edge: The Acheulian expansion in the middle of Europe
M. Masojc, A.H. Nassr, Ju Yong Kim, Young Kwan Sohn (International group). Latest research on Acheulean in Sudan

Break: 13:00–14:30

SESSION 1: From Lower to Upper Paleolithic

14:30–18:00
Chairmen: *Kidong Bae, Nikolay Drozdov and Jiri Svoboda*

XIE Guangmao, LIN Qiang, Wu Yan, Li Dawei (People's Republic of China). Assemblages of Small Flake Implements from South China and Southeast Asia
Lee Heon Jong, Lee Sang Seok, Son Donghyuk (Republic of Korea). Cultural dynamic of emergence and diffusion of *Homo sapiens* in Korea
Kim Eunjeong (Republic of Korea). The analysis of Tanged-points on the Suyanggae Site
Kim Ju-Yong, Lee Yungjo, Woo Jongyoon, Lee Seungwon, Yi Sangheon, Oh Keun-Chang (Republic of Korea). Stratigraphy, Chronology and Paleovegetation of the Paleolithic Sites in the Keum-Miho River Basin (KMRB) in Korea
Paner Henryk (EU, Poland). Slaughterhouse or trap hunting. Palaeolithic artefacts and petrified animal bones from the site HP766 in Wadi Umm Rahau (Northern Sudan)
Belousova N. E., Rybin E. P. (Russian Federation) New Stratigraphic Division of IUP-EUP Assemblages of the Kara-Bom Site (Russian Altai) according to the Results of Spatial Analysis and Refitting Studies

POSTER SESSION

(University hall. Gallery)

Kirillova I. V. Osteological evidence of human activity in the Ostantsevaya cave (Central Sakhalin, Russia)
Tabarev A. V. Microblade technologies in Final Pleistocene – Early Holocene Complexes, Northern Mongolia: origin and spread

Razgildeeva I. I., Reshetova S. A. Influence of Paleoclimate on the structural organisation of ancient sites

EXCURSION DAY. JULY 7

09:00–17:00 – Visiting Sennaya 1 Middle Pleistocene site.

SESSION 2. From Upper Paleolithic to Neolithic (Part I).

JULY 8

(Ceremonial hall. First floor)

Chairmen: *Akoshima Kaoru, Rybin E., XIE Guangmao (09:00–12:30)*
Xin Gao, Girya E.Y., (14:00–18:00).

Akoshima Kaoru, Hyewon Hong. Toward the standardised identification of lithic use-wear, for universal East Asian criteria.

Anoikin A. A. The open-air site of Ushbulak-1 (Eastern Kazakhstan): a new Initial Upper Paleolithic evidence from Central Asia

SAIDIN M. M. Archaeology of Malaysia

Lee Gi Kil. Paleolithic evidences for long-distance exchange of obsidians from the Sinbuk site in Korea

Kaoru Otani, Lee Yung-jo. Northeast Asian Microlithic Industries seen from Suyanggae Typology

Girya E. Y., Vasilevski A.,Kimura H., Ponkratova I. Y. Far and close analogues of the artifacts with the burin spalls of the Pacific cost of Asia

Drozdov N. I. Late Palaeolithic of the Middle Siberia. History of study

Drozdov D. N. Paleolithic of Northern Angara Region

Wang Wei. Recent recovery of Hominin remains associated with stone artifacts during late Pleistocene to early Holocene in South China

Domańska Lucyna. Patterns of exploitation of the land by Mesolithic hunter-gatherers: an example from the Polish Lowlands.

Ponkratova I. Y. The Site Ushki-V (Kamchatka) and its place in the periodization of the archaeological cultures of the Northern Far East of Russia

Fukuda Masahiro. Neolithic Occupation Strategies and Climate Changes in the Lower Amur-Sakhalin-Japanese Archipelago.

Natsuki Daigo. Coexistence of the terminal Upper Paleolithic Culture and the Incipient Jomon Culture in Hokkaido

EXCURSION DAY
JULY 9

09:00–17:00 – Visiting Ogonki 5–6 Upper Pleistocene site.

SESSION 3. From Upper Paleolithic to Neolithic (part II)

DAY. JULY 10

(Ceremonial hall. First floor)

Chairmen: Domańska Lucyna and Vyacheslav Grishchenko

Kimura H., Lavrov (late) E. L., Vasilevski A. A. Development of Obsidian Source and

Distribution of Obsidian during Upper Paleolithic Age: Obsidian from Hokkaido dispersal into Sakhalin and Honshu

Kunikita Dai. Radiocarbon dating and analyzing food habits using charred remains on pottery from the Early Neolithic sites in Northeast Asia

Grishchenko V. A., Fukuda M. Blade arrowheads culture of North-East Asia islands world (Sakhalin, Kuril Islands, Hokkaido) – the view from XXI centure

Lee Kyong woo, Lee Yung-jo. Research on domestication of Cheongju Sorori Rice

Gron Ole. Acoustic detection of submerged Stone Age sites - New results.

Bartczak Marcel. Neolithic flint mine in Krzemionki as an example of the popularization method of the archaeological site

Makulov V. I. Neolithic complexes of the middle flow of the Podkamennaya Tunguska river in Krasnoyarskiy Kray

Drozdov N. I., Tsuan Tsyankun, Drozdov D. N., Song Dongheck. Blade industry of Northern Asia

LI Yu Jie. The origins of Chinese Civilization

KONG Lingyuan Wang Ningsheng's. Contribution to China's Ethnoarchaeology

Wu Xianzhu. Chiroptera remains first discovered in China's urban archaeology and research

Uchida Kazunori. Osipovka culture

Fumito AKAI. Reduction sequences in the microblade assemblage of the Ishikari Low Land, Hokkaido

PLENARY SESSION DAY

Vasilyev S. V.,
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Borutskaya S. B.,
The Moscow State University,
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THE OVERALL STUDY OF THE MOST ANCIENT HOMO SAPIENS FROM KOSTENKI XIV

In Kostenki – "the pearl" of Russian Paleolithic age- more than 60 settlements which occurred at different eras and belonged to the different cultures were discovered and investigated at various degrees. That was Kostenki that provided us the fact of archeologists' extraordinary luckiness, when within three years four burials of Upper Paleolithic layer were discovered, three of which were opened and researched by A.N. Rogachev. Today 5 burials of Upper Paleolithic layer were found in Kostenki, 4 of them were discovered in early 50th , and another burial of a child was detected in practically 20 years.

The burial "Kostenki XIV" (Markina Gora) represents unique phenomenon of completeness and state of conservation of the skeleton. Anthropological studies of skeleton and skullcap have identified the following facts. The face is very low (common height nasion-gnation 98mm). The width between lateral boarders of jugal bridges is small too – 132 mm, nevertheless it is bigger than the width of the cranium (128 mm). Fossa canina are represented quietly but they are obvious enough, the deepness of the left one is 5,1mm. Chin boss is presented , although, in general, the chin doesn't project strongly – the angle between the line of infradentale-pogonion and basalis plane is 80^{o} (the angle of modern type of European is about 70°). The teeth are small, smaller than normal dimensions of the modern type of a human being. Brow ridges are strongly developed, though it doesn't form the supraorbital ridge. The forehead is comparatively narrow (93mm) and straight. The height of the cerebral cranium basion-bregma is not large – 129 mm, but is 1mm more than its transversal diameter. The measurements of the height of calvarium give us small dimensions, but they don't nowise go beyond variations of modern human. The occiput is roundish, anterior margin of the foramen magnum, when aligning in frankfort horizontal plane is situated higher than posterior. Other parts of skeleton don't have any неаньderthaloid features, except for the very strong inclination of the articular surface of tibia: angle of retroversion is about 220–230. The proportions of extremities are quiet modern.

V.P. Alekseev considered the skullcap "Kostenki XIV" as an illustration for processes of race genesis inside of western heart of race's formation, where, according to him, original variants of Negroids, Australoids and representatives of European ethnicity were formed. When hypothesizing that Australoid complex of craniological characteristics is morphologically intermediate between craniological complexes of Caucasoid and Negroids, V. P. Alekseev comes to the point that the formation of modern type of a human being in the western heart of race's formation passed through the phase of foundation of the Australoid complex. Populations of such Protoaustraloids entered sporadically southern European regions from where occurred the colonization of East European Plain. V.P. Alekseev, on the one hand, holds a view of V.V. Bunak about craniological polymorphism of European population of Upper Paleolithic layer. On the other hand, in his work of 1978, he recognized the differentiation of European population of Upper Paleolithic layer which was clearly represented only in two unique landmarks at that time, which gave a serial material – Prshedmosti and Solutre.

In the Upper Paleolith longstanding contact between the groups, which was necessary for consolidation of anthropological type under small numeral rate of population increase, occurred comparatively infrequently. In all likelihood, a real social unity, on the analogy of hunting nation, was small local lineage group, which intermittently co-operated for hunting and observances. The formation of clearly differentiated and more harmonious complexes of features (racial features) can be linked with the increase of the number of groups and the strengthening of contacts between them at the Neolithic time and beyond. It is another matter that we can state the actual existence in the past of certain morphological craniological complexes whose role in shaping of the features of subsequent generations of the population requires special consideration in each individual case.

In any case, the existence of the variant peculiar to the skull of "Kostenki XIV" on the territory of the Russian Plain can be considered as a reality, as its excellent preservation, excludes any doubts that have arisen in reference to many archaeological finds, particularly to "the Negroid Grimaldi" because of poor preservation of skulls.

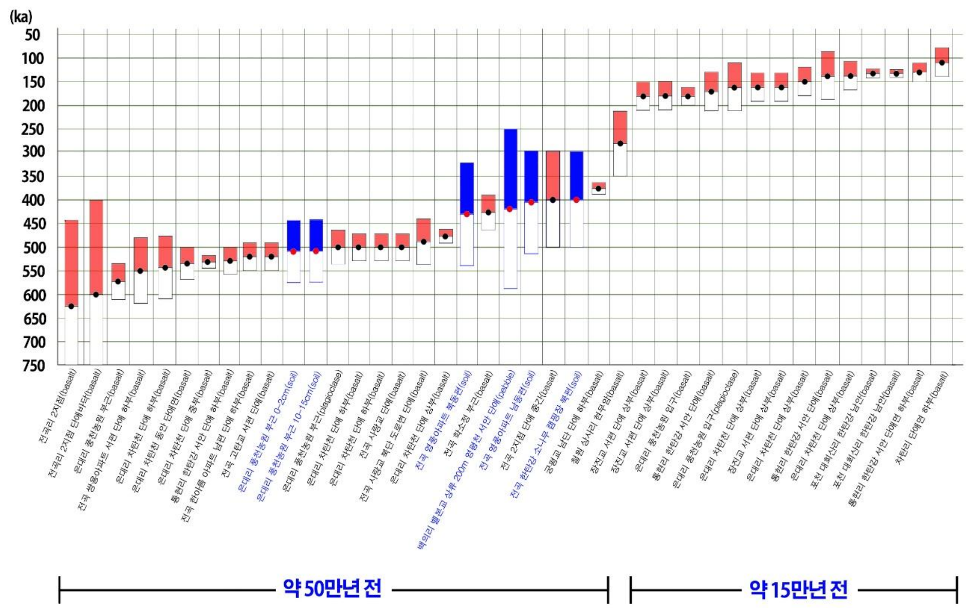
One last thing, recent studies have shown the antiquity of the samples from "Kostenki XIV". The date, which the authors of the article in "Science" give us – 38684 – 36262 years ago. Besides, paleogenetics succeeded in sequencing DNA from the sample and revealing that it contains Neanderthal DNA, at that in a larger proportion than modern Europeans do.

Bae, Kidong,
Professor of Hanyang University
and Director, Institute of East Asian Archaeology, Korea

DATING CHONGOK BASALT AND DATING PALEOLITHIC INDUSTRIES IN THE HANTAN-IMJIN RIVER BASIN, KOREA

In East Asia, few Paleolithic sites have been found in basalt geology which is very useful for establishing chronology of stone industries in the area. The Hantan-Imjin river basin had been filled by lave flows at least couple of times during the Middle Pleistocene and formed geology of river basin. The basalt has been dated many time by different dating techniques. Currently, chronometric dates of basalt in the basin are clustered to two concentrations with some variation in their range of dates: 0.15 MYA for the Chatan Basalt and 0.5 MYA for Chongok Basalt. The result is supposed to represent two major flows in the Middle Pleistocene, which were originated from a small volcano in the Cheolwon-Pyonggang plateau in the upper reach of the Hantan river.

As most of Paleolithic localities in the basin have been found on the top of the basalt bedrock. Dates of the basalts are very critical to understanding the lower boundary of the age of industries from sites. Paleo-geomorphological reconstruction of the basin, attempted by the Korean-Japanese expedition team indicates that the Chatan Basalt overlain the older Chongok Basalt in the area of upper reach of the Hantan river in the Pocheon County. In the Yeoncheon County, the Chatan Basalt flew along the ancient river channel and leave higher part of the the Chongok Basalt uncovered. This is the reason why much older age dates were obtained from the sediment at the Chongokni site, while younger dates, mostly younger than 0.1 MYA from the sites in the Pocheon County. Therefore, most of chronometric dates can be understood as more or less stable representation of real age of each layers excepts some dates obtained in early stage of researches and unreliable methods.



Distribution of Chronometric Dates from Basalt in the HIRB

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AT THE EDGE: ACHEULEAN EXPANSION IN THE MIDDLE OF EUROPE

Acheulean paleogeography and its paleoanthropological interpretation is a hotly debated topic. Whereas Africa clarly represents the core area of the Acheulean on a global scale, Eurasia was only partly occupied by this technocomplex. External Acheulean boundaries (as outlined by Movius) are being precised for several decades. In Asia, vast territories in central and eastern part of this continent play a crucial role in these discussions. In Europe, one observes a clear division between the classical Acheulean in the west and southwest, in contrast to sporadic occurence in center, southeast and east of the continent.

Central Europe is one of the regions along the boundary. Here, the Acheulean technology differs from the more widespread small-dimensional, pebble and flake technologies of the Middle Pleistocene (Vértésszölös and Bilzingsleben). In the western part (present-day Germany), certain Acheulean sites provide chronostratigraphic background (the easternmost one being Markkleeberg), but along the eastern periphery (Czech Republic, Slovakia, Poland), comparable assemblages originate mainly from surface surveys. Here we present three of the easternmost sites in detail, namely Bratislava (W Slovakia), the Bečov area (NW Bohemia, Czech Republic) and the Stvolínky – Holany area (N Bohemia, Czech Republic).

Chronology. Basing on techno/typological features, these sites may be classified as Early Achelean (Bratislava) and Evolved Acheulean (Bečov II, IV, Stvolínky-Holany). Comparable French and German chronologies may serve as points of reference.

Raw materials. The potentially earliest assemblages with bifaces used local materials of lower quality such as quartz. After the Evolved Acheulean horizon has been established in the highlands of southern central Europe, the quartzites, available in various outcrops, predominated; abondance of material at place was a precondition for extensive usage of the prepared core technology. In the glaciated northern central Europe, various silicites („flints“) of glacial origin became more frequent.

Technology. The Early Acheulean assemblages (Bratislava) only include simple bifaces associated to cores, choppers and flakes, with no evidence of core preparation techniques. The Evolved Acheulean assemblages clearly document standardized bifaces in context of prepared-core technologies, including the Levallois technique and the Kombewa technique (Bečov II, Stvolínky I and II, Srní). The local quartzites suit well to this kind of production.

Typology. Whereas the early Acheulean industries only provide simple handaxes associated to unstandardized (or even dubious) pieces, in the Evolved Acheulean assemblages the diagnostic bifaces and cleavers make part of standard typological contexts with sidescrapers, endscrapers, notches and denticulates.

The Acheulean expansion. Acheulean paleogeography, as recorded in present-day Czech Republic, Slovakia and Poland, creates a kind of eastern-exposed “peninsula” of more western centers. However, this pattern does not coincide with paleogeography of *Homo heidelbergensis* (or any other human fossil taxon that could have existed in Europe during the Middle Pleistocene). *Homo heidelbergensis*, as the dominating and more widespread human species in Europe of that time, appears in context of both the Acheulean and the small-dimensional industries (the latter being best attested at Bilzingsleben and Vértésszölös).

SESSION 1:

FROM LOWER TO UPPER PALEOLITHIC

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ASSEMBLAGES OF SMALL FLAKE IMPLEMENTS FROM SOUTH CHINA AND SOUTHEAST ASIA

In South China (defined here as an area in the south of the Five Ridges) and Southeast Asia, the Paleolithic industries are known as Chopper-Chopping Tool Complex or Pebble-Tool Industry. Stone tools are often made on cobbles, and most of them are choppers. They are large and heavy. However, in the Upper Palaeolithic, small flake implements dominating the assemblage were found at some sites in this region. These sites can be represented by Bailiandong in South China and Nguom, Lang Rongrien in Southeast Asia.

Bailiandong cave is located in Liuzhou of central Guangxi, South China. It is a prehistoric site which spans in time from late Palaeolithic age to Neolithic age. Human fossil teeth, stone artifacts, pottery and animal fossils were unearthed from this site, which can be divided into five phases. Phase 1 phase 2 and phase 3 belong to Upper Palaeolithic age, while phase 4 and phase 5 Neolithic age. Two series were identified in the stone artifacts: pebble tools and small flake implements. Technologically and typologically, the pebble tool series belongs to the Pebble-Tool Industry in South China, while the small flake implement series is a new assemblage which is rare in South China.

The raw materials for making the small flake implements are nearly flint. Direct percussion and rare pressure technique were used to detach flakes. No prepared platform was found with cores. Retouched flakes are in a small number, and are often unifacially made. The tool types are scrapers, points etc., small in size, often with the length between 2–3 cm. This is in sharp contrast to the pebble tools. Although small flake implements continued to exist in phase 2, it decreased in number, and in phase 3 it dropped to a small number and the pebble tools became predominant.

Nguom rockshelter is located in Northern Vietnam. Three assemblages from different stratigraphic layers were identified at this site. Stone artifacts from layer 2 and layer 3 belong to Hoabinh Culture and Sonvi Culture respectively, while those from layer 4 and layer 5 belong to a new industry which was termed as Nguom Culture which was dated between 40 000BP and 23 000BP. Raw materials of the stone artifacts are mainly flint. Direct percussion is the only method for tool making. Retouched implements are many, small in size, and most of them were unifacially made on flake. Tools include choppers, scrapers and points with scrapers predominant.

Lang Rongrien rockshelter is located in southwestern Thailand near the Malaysian border. Excavation of this site uncovered a 3.5-m-thick deposit comprising 10 stratigraphic units with a time span from 2 530 to 43 000BP. Three phases were identified among the cultural remains. Phase1 is corresponding to Upper levels (unit 1–4) and belongs to the latter half of Holocene. Phase 2 is corresponding to Middle levels (unit 5-6) and belongs to the Hoabinian. Phase 3 is corresponding to Lower levels (unit 8–9) and belongs to Upper Palaeolithic. The stone assemblage of Phase 3 is primarily of small flake tools. Raw materials of the stone artifacts are mainly chert. Direct percussion is the only method for tool making. Retouched implements and utilized flakes consist of the majority of the stone artifacts. Types of the tools are choppers, scrapers, knives and gravers with scraper predominant. Most of the tools were unifacially made on flake.

Contrary to the long-standing, uninterrupted Chopper-Chopping Tool Complex or Pebble-Tool Industry in South China and Southeast Asia, the aforementioned assemblages from this region are primarily of flake tools. These assemblages are characterized by an extensive use of small, irregular flake implements. The occurrence of small flake implements in the Upper Palaeolithic in South China and Southeast Asia may be due to the change of climate and migration of prehistoric men. Data from the Niah Cave in Malaysia, the Tabon Cave in Philippines and the Nguom Rock shelter in Vietnam indicates that a cold and arid phase took place from 32000–23000BP. But the degree of climate change was enough to change the subsistence (which resulted in the change of the tool-kit) or not remain to be questioned, for in South China and Southeast Asia, sites from which small flake implements were found are few and far between. Assemblages from many sites of this period, especially the open-air sites in this vast region belong to the Pebble-Tool Industry. The reasonable interpretation may be that groups of the prehistoric men from the northern areas (southwestern China and north of the Five Ridges) migrated into South China and Southeast Asia during the cold phase, bringing their technology with them and made these small flake implements which were suitable to the somewhat changed subsistence strategies at this period.

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CULTURAL DYNAMIC OF EMERGENCE AND DIFFUSION OF HOMO SAPIENS IN KOREA

This article describes the regional characteristics of blade tool assemblages in Korea and presents a general overview of human migrations into the Korean Peninsula based on recent research. Paleolithic sites with blade tool assemblages are rare in East Asia except for the Altai and other regions of Siberia, and Shuidonggou in North China. At the end of 1990, the remains of a typical blade tool industry were found at the site of Koreri, Milyang City. For the last 10 years, several important sites have been found in South Korea.

IUP(initial Upper Paleolithic), which has some of the characteristics of the global culture, has been recently defined(Kuhn, S. 2016; Kuhn et al. 1999; Kuhn·Zwyns 2013). IUP has over 40ka chronological records, and it designates blade tool industry related to the Levallois technology. From the perspective of diffusionism, it seems to originate from Middle East area and it is confirmed that the traces of IUP culture also appear in Middle and Eastern Europe, Altai in Siberia and Northern China(Gao, 2016; Zwyns et al. 2016).

Altai area is one of the origins of blade tool industry, which represents IUP in North Asia. It is assumed that *Homo sapiens altaiensis* tried various ways to systematize how to manufacture blade tools in this area. Also, there is high probability of finding already well-known Karakol variant and Kara-Bom variant and even some remains with the combination of these two variants(Derevianko 2005, 2011). Such diversity could happen when blade tool industry was in the process of getting settled technologically, and this might be called “origin effect”. Therefore, it is too early to divide Upper Paleolithic in Altai area into IUP and EUP, one of the other chronology systems(Zwyns 2012). Rather, even with some differences in chronological recordings, it is essential to examine the technological diversity during IUP and how the blade tool industry settled down in this region.

Recently, the remains from around 40ka have been discovered in Northeast Asia. According to the absolute dating evidence, these two cultural variants are dated earlier than 40ka B.P.. The blade tool industry of the Altai spread to other regions of Middle and East Siberia and affected the blade tool industry of the Shuidonggou(SDG) in Ningxia, North China. These cultural activities were from 35 to 20 ka B.P., which is older than had been previously concluded(Liu et. al. 2009). Recent re-dating of SDG localities 1 and 2 now places the age of the early occupation phase much closer chronologically to the Mongolian and Siberian sites(Madsen et. al. 2013; Nian et. al. 2013).

The characteristics of Korean blade tool industry between 45ka and 30ka, including the fourth cultural layer in Suyanggae Loc. VI(Lee yj et al. 2014), show some aspects of blade tool industry unaffected by Levallois technology(Lee HJ 2015a·b; Lee HJ·Lee SS 2014). These consistent characteristics demonstrate that the Korean blade tool industry was intrusive, and probably the result of migration from Siberia via a steppe route from the Altai to the Russian Far East. This can be the evidence to prove that the anatomically modern human settled down in Northeast Asia including Korea after the fixation of blade tool industry. These new absolute dating data show that migration process was very fast to the eastern area such as North China and Korean peninsula.

This article describes the regional characteristics of blade tool assemblages in Korea and presents a general overview of human migrations into the Korean Peninsula based on recent research. Paleolithic sites with blade tool assemblages are rare in East Asia except for the Altai and other regions of Siberia, and Shuidonggou in North China. At the end of 1990, the remains of a typical blade tool industry were found at the site of Koreri, Milyang City. For the last 10 years, several important sites have been found in South Korea. Around 40ka B.P., blade tool assemblages appeared in the Korean Peninsula while the pebble tool tradition still existed in the early Upper Paleolithic. Most heavy-weight tools disappeared at typical blade tool sites. These consistent characteristics demonstrate that the blade tool industry was probably the result of migration. There is no evidence that a microblade industry(25~10ka) replaced the blade tool industry in Korea. Rather, these two cultures were probably produced by different populations who migrated into the Korean peninsula. When groups using microblades rapidly spread out to the entire Korean peninsula, the blade tool industry still coexisted from ca.25ka to 15ka B.P.

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MORPHOLOGICAL DIVERSITY AND FUNCTIONAL DIFFERENTIATION OF TANGED-POINTS

focused on Suyanggae, Jingeuneul and Yongsan dong site in the Korean peninsula

A large number of (281) Tanged-points have been excavated in the Korean peninsula. In this study, I examined the sizes of tanged points, the direction of the debitage remaining on the upper face (dorsal), the remaining parts of the blank, and the retouch levels of tangs and side-edges. And I conducted a cross analysis between analysis items to examine correlations in morphological change aspects of stone tools and to identity the causes of such morphological diversity in a series of working processes of ‘manufacturing, use, breakage and repair’. As a result, I presumed the morphological diversity of tanged points has been derived from correlations between the remaining parts of the blank and the retouch level of side-edges.

In order to find out the main functions of tanged points, I examined the change relations between the morphological symmetry and tool axis by targeting stone tools that underwent repairing processes. In case of stone tools in a complete shape with the whole blank remaining, I analyzed the manufacturing process of tanged tools. I checked the repairing (recycling) methods of tanged points by observing complete-type stone tools with the partially remaining blank. Based on correlations between the downscaling of the remaining part of the blank, the presence or absence of axis transition, and symmetry, I classified them into two categories: ‘reproduced stone tools (tanged point)’, which maintain the same function, and ‘repurposed stone tools’, of which the function has been changed.

The tanged point is a thrusting tool which has a long flake symmetrical with the vertical axis comprising the blank and has a tang formed by blunting on the edges of the both sides of the proximal part, and has a sharp blade formed where the edges of both sides of the distal part meet with the blank axis. Repurposed stones tools, which have some remaining parts of the blank and preserve the tang, has a remarkably smaller number compared to tanged points. Given this, I can assume that the purposes of stone tools have changed in the breakage and repair processes of tanged points, depending on the conditions of the remaining blanks. In this study, I named those stone tools which were recycled from broken stone tools as ‘tanged tool’ to distinguish them from ‘tanged points’. In addition to this, the morphological characteristics of stone tools are associated with their functions, and according to blade shapes and symmetry, those with thrusting blades are classified as ‘tanged points’, while those whose blades are repurposed for piercing and cutting are classified as ‘tanged tools’.

Key words: tanged points, morphological diversity, manufacturing and repair, reproducing and recycling, tanged-tool

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STRATIGRAPHY, CHRONOLOGY AND PALEOVEGETATION OF THE PALEOLITHIC SITES IN THE KEUM-MIHO RIVER BASIN (KMRB) IN KOREA

I. Introduction

The low fluvial terrace in the midstream of Keum-Miho River Basin (KMRB) is located below 35m asl and mainly composed of subrounded gravels and channel sands with some intercalations of backswamp organic muds or peaty clay layers (Kim, et al, 2000; Kim et al, 2008b). In particular the basal level of the gravels of low fluvial terrace reaches at about 25~30m in middle part of Miho River, and it can be categorized as thalassostatic terrace formed since the Last Interglacial (MIS 5e) (Kim et al, 2001; Kim and Lee, 2006). The paleoshoreline in the west coast of the Korean Peninsula may have been uplifted up to 26.5 m above current sea level since the Last Interglacial (MIS 5e), when we assume the uplift rate of 0.14~0.21 m/ka may be applied to the western part of Korean Peninsula (kim et al, 2008b).

In Korean Peninsula Upper Pleistocene terrace deposits are well developed in the Keum-Miho River Basin (KMRB), and particularly at the foothill of the mountain Geosols are prevailed in a number of paleolithic sites. In some paleolithic sites fluvial terrace deposits are pronounced at the elevation below ca 30 m (asl) in the Keum river basin; The relative height of terrace gravels are about 15 m above the present river bottom (kim et al, 2000).

In fact these Geosols are used as mapping units in USA ((North American Commission on Stratigraphic Nomenclature, 2005) and marker horizons of the Last Interglacial (Sangamon Geosol) and the Last Glacial (Farmdale Geosol). Geosols can be defined as unconsolidated soil-stratigraphic units based on bio- and physico-chemical properties of paleosoil on the basement rocks. They are composed of the yellowish brown paleosoils, dark reddish brown or brown paleosoils, and dark brown paleosoils in the stratigraphic order, which are indicative of relatively cold and dry climate than the present.

In this paper we aims to explaining the site geomorphic and sedimentary process as well as Geosol formations in the Keum-Miho River Basin (KMRB) (Fig. 1); Particularly some fluvial sand and gravel deposits as indicators of terrace system are explained in Mansuri and Sorori sites of Cheonju area.

II. Terrace system based on morpho-sedimentary deposits

In the Keum-Miho River Basin (KMRB), particularly at the Mansuri site at Cheongju area and Miho-dong site at Daejeon area, fluvial rounded gravels derived from the middle fluvial terrace were mantled at the old fluvial landscape distributed at the level of about 30m above the river bottom of the KMRB (Kim et al, 2015b). The low fluvial terrace is also developed particularly at the level of about 10 ~15 m above river bottom near Cheongju city and Daejeon metropolitan city areas. At Mansuri site 1 soil-sedimentary profile (Q28) is characterized by the fluvial gravel and sands, sandy muds and yellow, reddish brown, dark brown Geosols in the stratigraphical order (Lee et al, 2013; Kim et al, 2015a) (Fig. 2). The old sand and gravels are distributed at the level of about 16 m above the river bottom and regarded as low fluvial terrace, formed since the Last Interglacial MIS 5e). The OSL ages of the fluvial saads and sandy muds as Geosoils range >108 ka ~ 75 ka in Q 28 profile. A number of large stone tools were excavated at Mansuri sites 1 ~ 14 and Cultural Layer (CL) is temporarily concentrated at the Last Glacial ranging MIS 4 ~ MIS 3 (ca 67~35 ka). The chronology is relatively well defined based on a numerical of radiocarbon or OSL datings of the excavation profiles of site 10 (44~49 ka), site 12 (ca 31~35 ka) and site 14 (ca 56 ka).

III. Geosol Formations of the Last Glacial period

Landscape in the KMRB fluvial sand and gravel deposits are overlain by slope sediments as indicators of Geosols, which are well indentified in Naeheungdong site (Gunsan area), Seokjanri site (Gongju area), Mansuri-Sorori-Nosanri sites (Cheongju), and so on. Some slope sediments on the fluvial terraces are indicators of Geosol, particularly in Masuri-Sorori-Nosanri sites in Cheongju area (Lee et al, 2015; Kim et al, 2015).

Two typical Geosols are designated in the Cheongju Area (Fig. 3); The lower Geosol which is relatively short and discontinuous but attacked even the weathered part of basement in many cases. It may be interpreted to be formed during the interstadial of the Last Glacial Period (MIS 3, 55~35Ka) in Sorori site, Mansuri site, Nosanri site, and so on. The upper Geosol, prevailed in the KMRB, is typified by a number of craking polygons, ground veins and/or frost crack. The upper Geosol are impregnated with Fe-Mn concentrations in soil solum and horizontal laminar structures are in common. Lower cryoturbated Geosols are either on the weathered basement or over the Last Interglacial Red Geosol, prevailing at the altitude below 30m above present river bed of the KMRB. The lower Geosol is characterized by verical veins and cryo-dessication cracks originated from the dry and cold climate regime (Fig. 3). The upper Geosol, showing brown to dark brown, indicates suboreal steppe landscape of the LGM (MIS 2) at many Paleolithic sites in KMRB in Korean Peninsula. It is assumed that during the Last Glacial Period winter monsoon was more activated than now in Cheongju area, and a number of seasonally freezing and thawing grounds were generated to form several horizons of Geosols.

IV. Vegetation as paleoclmate indicators

In the KMRB Last Glacial organic mud deposits are regarded as indicators of fluvial wetland and the paleovegetations, which can be explained by palynological evidences identified in some paleolithic excavation sites, including Naeheungdong site in Gunsan area (Yi et al, 2007b), Sorori site (Kim et al, 2000, 2015a), and Bokdaedong site (Yi et al, 2007a) in Cheongju area. Particularly in the downstream oart of KMRB Naeheungdng Paleolithic site shows Last Galcial slope deposits (>50 ka), old coastal wetland organic muds (49~31 ka) and Geosols derived from the hillslope deposits and eolian deposits (ca 20 ka) in the lithostratigraphical order.

Among them the old coastal wetland organic muds are composed of such typical pollen zones in the Naeheungdong Paleolithic site (Yi etal, 2007b; Kim etal, 2016) (Fig.4); 1) *Pinus- Picea Zone* (cool, 36~35.8 ka), indicative of the mixed conifer-deciduous broadleaved forest on mountain-slope under cold temperate climate conditions. 2) *Pinus-Quercus Zone* (cool-transitional temperate, 35.8~33.5 ka), represented by mixed deciduous broadleaved-conifer forest with dominant cool-loving oak on mountain-slope reflecting temperate during the transition period. 3) *Quercus zone* (temperate, 33.5~28.1 ka), represented by the mixed forest replaced by deciduous broadleaved one in general, predominating cool-loving oak tree on mountainous area indicative of temperate climate conditions.

These cool to cold climatic conditions were indicated by well-representing non-arboreal pollen together with pine and cold-tolerant oak trees. Pollen zones reflect paleovegetation change respondinf to climatic and environmental changes during the MIS 3 of the Last Glacial. In addition palynological assemblages, halophilous herbaceous plant such as Chenopodiaceae, Gramineae, Cyperaceae and *Artemisia,* combined with freshwater- and marine-algae of dinoflagellates and acritarchs present throughout the whole section, suggest that the Naeheungdong old wetland deposits were formed at coastal backswamp during the Last Glacial.

At the midstream of the KMRB Bokdaedong-sorori sites of Cheongju city area old fluvial deposits are composed of the sand and gravels on the low fluvial terrace of about 12 ~ 14 m above Mihocheon river bottom. organic muds of backswamp was identified and radicarbon ages of the peaty clays indicate 43,600~52,990 yrBP (uncalib.)

At the southern part of Sorori site in Cheongju city area, Bokdaedong Paleolithioc site is well known of old fluvial wetland deposits (backswamp organic muds) (Yi et al, 2007a; Kim et al 2016) (Fig.5); Organic muds or peats of the Last Glacial period were found above the fluvial sand and gravel deposits of the KMRB and two typical paleovegetation are manifested in organic peaty clay layers based on palynological production. It may indicate that relatively cool and boreal climate was prevailed during the MIS 4 and MIS 3, on the basis of two pollen zones (Kim et al, 2000, 2015a); 1)*Pinus-Picea-Betula-Ulmus- Quercus zone* (62~55? ka), typified by the mixed conifer-deciduous broadleaved forest on mountain-hillslope, showing water-loving sedge and tree on backswamp of old fluvial area, and reflecting cold temperate climatic condition. 2) Poor pollen production zone, 3) *Pinus-Larix-Quercus-Tilia zone* (cool~temperate, 50?~42 ka). indicating generally warming climate (cold to cool temperate), encouraging to keep mixed conifer-deciduous broadleaved forest on mountain-hillslope. but water-loving grasses were replaced by dry-tolerant grasses, due to changes in humidity and depositional setting. Predominant non-arboreal pollen in overall pollen assemblages indicate that cool to cold climates were prevailed in Bokdaedong Paleolithic site during the early Last Glacial period.

Lastly at Sorori Paleolithic site of Cheongju city area 3 peaty clay layers are well defined with the dominance of Gramineae (Poaceae) in the lower part of Young Fluvial Sequence (YFS). Sorori wetland is associated with YFS since ca 20 ka, and characterized by transition of paleovegetation mainly from dominance of Gramineae (Poaceae), through evergreen conifer (Betula-Abies-Piceas) towards broad-leaved deciduous (*Alnus-Quercus)*(Fig.6). The YFS includes the lowermost peaty clays (ca 17~17.5 ka), middle peaty clays (12-15 ka), and humic Geosol in the transitional period (ca 10ka) of initial Holocene (~ 12 ka). Sorori Peaty clay layers were dated 12,920~17000 yrBP. It indicates a repetition of warm-humid and cool-dry prevailed in the Sorori site during the post-LGM. IN sorori site proto-rice seeds, as *Oryza Sativa (?),* dated ca 12,000yrBP by AMS radiocarbon (Kim et al, 2012; Kim et al, 2015a). It may be very significant to notify that latest Pleistocene rice seeds were produced in the Sorori site of the KMRB, and it may be linked to domestication of rices in the western part Korean Peninsula (Kim et al, 2015a).

V. Summary and Conclusion

It can be assumed that the low fluvial terrace (or the 2nd fluvial terrace) at Mansuri-Sorori-Nosanri Paleolithic sites was formed under the influence of the fluctuations of paleo-shoreline since Marine Isotope Stage (MIS) 5e. The Geosols prevailed on the fluvial sedimentary deposits along the KMRB was mainly formed during MIS 2 ~ MIS 4 of the the Last Glacial period.

The Geosols as soil-stratigraphical units may apply to the Paleolithic site site-forming processes, the AMS radiocarbon ages of which may be used to support the chronology for site soil-sedimentary formation (Kim et al, 2000; Kim et al, 2012) during the Last Glacial period.

Paleovegetation change of the Last Glacial period it may be interesting to note that old wetlands were formed at the trasitional period between the stadial (cool~cold, dry) period and the interstadial (cool ~temperate, relatively wet), which can be supported from a number of the palynologcal evidences (Fig. 7);

1) *Pinus-Picea-Betula-Ulmus-Quercus zone* (cold~temperate, 62~55? ka) covering from MIS 4 to MIS 3 transition in the Bokdaedong site (Cheongju city).

2) *Pinus-Larix-Quercus-Tlia zone* (cool~temperate, 50?~42 ka), ranging from early MIS 3 to middle MIS 3,

3) From *Pinus-Picea Zone* (cool, 36~35.8 ka), through *Pinus-Quercus Zone* (cool-transitional temperate, 35.8~33.5 ka), to *Quercus zone* (temperate, 33.5~28.1 ka) ranging the late middle MIS 3 to Late MIS 3.

4) Dominance of Gramineae (Poaceae) - Betula-Abies-Piceas (evergreen conifer) - *Alnus-Quercus (*broad-leaved deciduous*),* characterizing transition from cool~cold and dry to warm and wet paleovegetation after the Last Glacial Maximum (MIS 2 ~ MIS 1).

Lastly in the KMRB Paleolithic stone tools such as bifaces, polyhedron and choppers, flakes, bords, scrapers and needle tools excavated from the Masuri, Sorori and Nosanri sites in Cheongju area change progressively from a relatively heavy and large stone tools to small stone tools represented by flakes, blade, and micro-blade. The transitional period between lower and upper Geosols (35-22ka, MIS 3-2) may be representative of the middle to late upper Paleolithic boundary particularly at the Sorori site, and the association of stone artefacts and Geosol evidences may be further examined in the other Paleolithic sites in the KMRB.

Acknowledgements

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Key word: Fluvial Terrace deposits, Last Interglacial, Last Glacial, Geosols, Wetland deposits, Paleovegetation, pollen production, Cultural layers.

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NEW STRATIGRAPHIC DIVISION OF IUP-EUP ASSEMBLAGES OF THE KARA-BOM SITE (RUSSIAN ALTAI) ACCORDING TO THE RESULTS OF SPATIAL ANALYSIS AND REFITTING STUDIES

Introduction

The assemblages of Kara-Bom, the open-air multilayered Paleolithic site, deserve special attention in the context of research on lithic technologies of the Initial Upper Paleolithic in Northern Asia. New research in the spatial and stratigraphic structure of Kara-Bom has resulted in the data presented in the article.

Research on the site is associated with the discovery and excavation in 1992–1993 of archeological materials occurring in well-preserved deposits located under a steeped schist cliff in the Excavation Area 4. At that time for this area of site were obtained a series of ^{14}C dates, arranged in direct chronological order [Goebel et al., 1993]. Two Middle Paleolithic culture-bearing horizons (not analyzed in current publication) and six Upper Paleolithic habitation levels were identified [Derevianko et al., 1998]. The culture-bearing deposits of the Upper Paleolithic were excavated over an area of about 28 square meters. The following feature was discovered for the culture-bearing deposits of the site – the farther from the cliff, the greater was the degree of disturbance and mixing of layers.

Upper Paleolithic deposits occurred in the lithological layers 4–6 (Fig. 1). Layer 4 contained artifacts designated as habitation level 1 and was formed of sandy loams. It had the greatest angle of inclination and terminated as a result of slope erosion processes at a distance of 2–3.5 m from the cliff. Layer 5, also formed of loam, was genetically uniform, but was divided into two lithological horizons. Layer 5A contained materials of habitation level 2 and was slightly inclined; the angle of inclination gradually increased from the cliff. Its upper part was “cut off” as result of erosion at a distance of 3.5 m from the cliff, and the base was cut off at a distance of about 6 m. Layer 5B contained materials of habitation level 3 and was deposited subhorizontally. Artifacts correlating with habitation level 4 were discovered in the upper part of the layer 6 which was deposited horizontally at the boundary with the layer 5B; artifacts of habitation level 5 were discovered in the middle part of level 6, and artifacts from habitation level 6 were discovered in the base of level 6. The surface angle of colluvial slope deposits was significant and reached 15–20°.

Re-examination of the Upper Paleolithic cultural deposits in the stratified part of the site in the present study was caused by the need to identify the evidence for the mixing of the archeological materials from individual habitation levels. Only if we determine the reason for mixed cultural deposits, verify and adjust the existing concept of dividing cultural deposits through studying planigraphy and stratigraphy of Excavation Area 4, can we further study the processes of lithic reduction which were used at Kara-Bom at various stages of the Upper Paleolithic. Thus, the purpose of this study is to validate a new pattern of archeological stratification of the cultural deposits dated to the Initial – Early Upper Paleolithic at the Kara-Bom site.

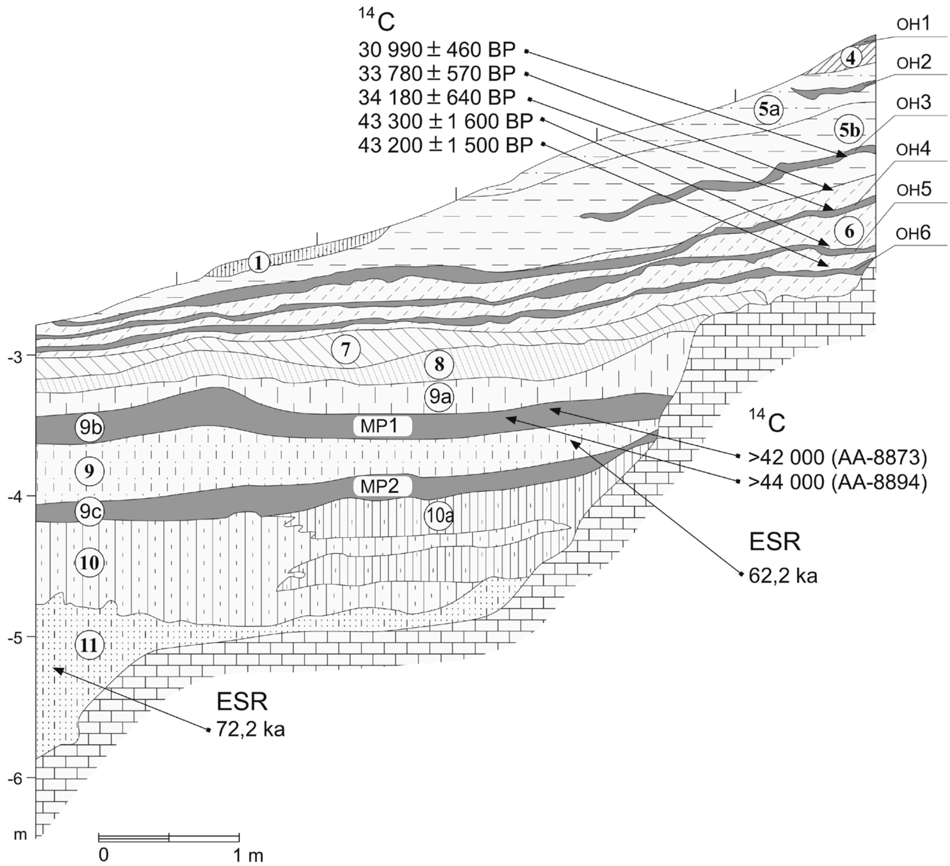


Fig. 1. Kara-Bom site. Stratigraphic profile along the gridline I
(modified after Derevianko et al., 2000)

Methods and Materials

All spatial observations were made by identifying the spatial connections between individual lithic artifacts within the cultural units. Identification of "connections" between the products of reduction belonging to a single group of raw materials was first carried out by the method of refitting, and second, by the analysis of petrographic features of the artifacts (raw material and refitting units. The first method made it possible to establish the relationship between the fragments of a single artifact or several artifacts belongings to one reduction sequence. The second method involved uniting the artifacts into groups according to their raw material using their petrographic characteristics (texture, color, type of cortex, etc.). Specific features of stone raw materials, predominantly represented by pieces of black and grey fine-grained cherts (of effusive origins) [Kulik et al., 2003], which were used by the inhabitants of the site, make it possible to successfully use both approaches.

The analysis of the archeological assemblage belonging to habitation levels 1–6 (1876 items) made it possible to arrange the artifacts in accordance with their raw material groups using the method of refitting and petrographic analysis (Table 1).

Horizon	N			
	Identified raw material units	Artifacts within raw material units	Refits	Refitted artifacts
UP1	22	153	21	49
UP2	53	665	30	182
Indeterminable	7	50	6	12

Table 1. Summary of distribution of artifacts from Excavation Area 4 according to raw material and refitting units

The first method allowed us to identify 101 groups of conjoining artifacts within raw material groups (231 items) and 6 groups of conjoining artifacts (12 items) which did not belong to them. Second method allowed us to arrange over 50 % of artifacts in accordance with their raw material groups, and identify 75 groups (818 artifacts); all groups became the subject of planigraphic analysis. In general, the assemblage of stone objects included in the refits, amounts to about 13 % of the total finds from habitation levels 1–6; all groups were analyzed in terms of their planigraphy. In this work we will be using both refits obtained during the earlier studies by V. Slavinskiy & E. Rybin and N. Zwyns, and new research data.

Spatial Analysis

Spatial analysis of the Upper Paleolithic assemblages occurring in six habitation levels of the Kara-Bom site allowed us to verify and adjust the currently accepted pattern of how the cultural deposits are divided. Excavation Area 4 revealed two habitation levels, which we designated as Upper Paleolithic horizon 1 (UP1) and Upper Paleolithic horizon 2 (UP2). The conclusions are based on the projecting of planigraphic connections, leveling marks of hearths and fire spots, and large slate slabs on the latitudinal and longitudinal stratigraphic profile of Excavation Area 4, as well as on the analysis of the distribution of artifacts from individual raw material groups.

Analysis of the projections from the spatial connections, recovered by the refitting method, on the longitudinal profile of the excavation along gridlines E, G, Z, and I testify for two separate levels where the artifacts occurred. The projection of connections along gridline Z, with high artifacts density, is the most indicative in this case (Fig. 2, A). According to the reconstruction, the angle of inclination for the distribution surface of artifacts in the upper horizon UP1 was ca. 25°. The conjoining objects were distributed downhill at a distance of 6 m. The active influence of slope processes as well as water flows of different origin on the deposits of the later horizon 1, apparently led to significant downhill displacement of cultural deposits contained in the horizon. The distribution of artifacts from this horizon occurred from gridline 3 to gridline 8.

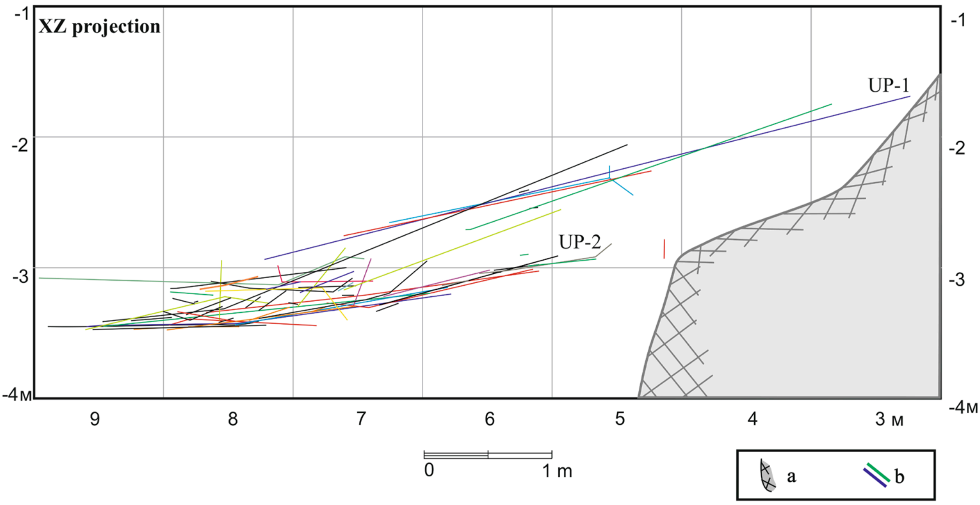
More numerous artifacts of the lower horizon UP2 occurred subhorizontally; the angle of inclination for the distribution surface of finds was ca. 10°. Steady inclination of the surface extended from gridline 4 to gridline 7; then on the gridlines 8 and 9 the inclination of the slope decreased to the minimum values. The pattern of distribution of the conjoining objects along the slope differ significantly from the UP1 – as maximum the finds were located at the distance of 2–3 m from each other; the greatest distance between the finds occurred at the area with the larger inclination angle of buried surface. Cultural deposits probably underwent minor displacement along the slope, but not as significant as in the later period. The layer between the horizons is only relatively “sterile”; it disappeared downhill, causing partial contact between the cultural deposits of the two horizons at a small area along gridlines 7 and 8. It should be noted that sporadic artifacts from the upper horizon found their way into the deposits of the lower horizon (the variation in elevation marks of the conjoint objects on gridlines 7–8 reached 43 cm). The artifacts from the deposits of the lower horizon also penetrated into the overlying deposits. In particular, a large difference in elevation marks of the refitted objects can be seen for 3 refit from the gridline 5, reaching 11, 16, and 37 cm.

A more detailed and complete picture of localizing the identified cultural horizons in space was obtained after analyzing horizontal and vertical proliferation of spatial connections of raw material groups (Fig. 2, B). Most of the objects from the identified 76 groups belonged to the horizon UP2 (Table 1). According to the data from the analysis of the spatial distribution of artifacts belonging to various raw material groups, we may draw the following conclusions:

The artifacts from the *Upper Paleolithic horizon 1* gradually shifted over time from the upper part of the slope, located on a rocky ledge, and superimposed on each other at the lower part of the slope. Judging by the reconstruction of the connections between the artifacts from the raw material groups and most pronounced fire spots, we may identify two working areas. The upper section included a cluster of debitage and a clearly expressed fire spot. It was located in grids Z \ 3–4 with the depth of the artifacts reaching 170–185 cm below datum. This area was unearthed in the course of excavations as habitation level 3. The lower ground was identified on the basis of a high concentration of artifacts relating to two raw material groups. It was located along the gridlines 7–8; the depths ranged from 310 to 315 cm. In the process of excavation the area was recorded as habitation level 4. Most of the artifacts from the raw material groups belonging to the UP1 were dislocated from the upper area. In the process of movement cultural deposits from the upper area gradually overlaid the lower area. Mapping of the depths of artifacts from the UP1 on the cross-section of the excavation site showed that they reveal a significant vertical dispersion in most cases. The initial depth of finds may be determined only for the above-described two zones.

The Upper Paleolithic horizon 2 represents a clearly localized and highly dense concentration of various kinds of remnants of human activities. Judging by the location of the remaining clusters of artifacts which originated from the raw material groups associated with the UP2, and most clearly expressed fire spots, people intensively carried out their activities in the area. According to the intensity and nature of using the ancient surface, the area of the horizon UP2 can be divided into two zones. First zone was located in grids G, Z, I \ 4–7 at a vertical rock wall. This area is relatively scarce with stone artifacts (the concentration of artifacts increased on gridline 6); this area contained one huge fire spot in grid Z \ 4 and a hearth in grids Z, I \ 5–6. This area also contained several large schist slabs (gridlines 5–7). During the excavation a large part of the upper area was recorded as habitation level 4. The second area is located along gridlines 8–9; it was very rich in lithic artifacts (the concentration of the materials increased downhill). Large accumulation of slate slabs on gridline 8 as well as some mild fire spots were found in the same area. The concentration of archeological material reached its maximum on gridlines 8 and 9, representing a continuous breccia of artifacts, bones, and charcoal. It should be noted that the first zone was located slightly above the second zone – the drop of height gradually began on gridline 6 and was particularly expressed on gridline 7 (with the inclination angle of approximately 15°); further the ancient surface was almost completely flat. Judging by the distribution of raw material groups in the UP2 horizon, a gradual shift of artifacts from the area of gridlines 5–6 to gridlines 8 and 9 occurred there. Point projecting of the depths of artifacts from the raw material groups belonging to the UP2 on the longitudinal profile showed that the findings were concentrated relatively densely at one level; only 15 instances when the artifacts deviated from this level were found.

A



B

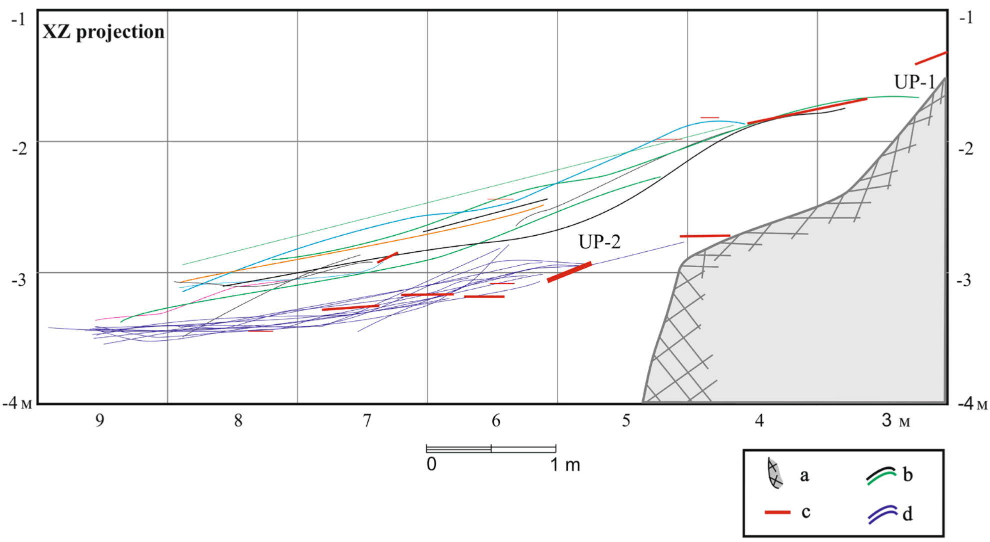


Fig. 2.
A. Kara-Bom site. Spatial connections of refitted artifacts plotted on longitudinal profile of Excavation Area 4 (along the gridline Z).
a – vertical border of the cliff;
b – connections between refitted artifacts.
B. Kara-Bom site. Spatial connections of artifacts according to different raw material units plotted on longitudinal profile of Excavation Area 4 (along the gridline Z).
a – vertical border of the cliff;
b – raw material units from archeological horizon UP-1;
c – hearths plotted against profile;
d – raw material units from archeological horizon UP-2

According to point projecting of the artifacts' heights, the ancient habitation surface of the UP2 on gridlines E, G, Z and I was located within the same depth points. There is every reason to believe that the second zone was the peripheral portion of the working ground (the "workshop" of Okladnikov) which was partially uncovered in the process of examining the adjacent Excavation Area 1.

The analysis of the spatial connections reconstructed on the basis of refitting and projected onto the longitudinal profiles of excavation at gridlines 5–9 supported the suggestion about existence of two separate horizons in the Upper Paleolithic cultural deposits.

Discussion

Judging by the spatial data, lithic artifacts which had been previously associated with habitation levels 1, 2, and 3 may essentially be treated as a single horizon UP1, and the majority of the finds from habitation levels 5 and 6 can be viewed as a single horizon UP2. The finds occurring in the intermediate space between the horizons of UP1 and UP2 during the excavations were considered as habitation level 4.

The available data on the distribution of archeological materials within the lithological units makes it possible to determine which lithological layer included the materials from the UP1 and UP2 horizons. For doing that we could use the upper area of the horizon UP1, distinct and clearly localized in space. In the course of field examination, that object was accepted as habitation level 3, thus, respectively belonging to the layer 5B. The lower area of the horizon UP1 could also serve as a datum point; stone artifacts of this section were primarily recorded as habitation levels 3 and 4. The correspondence of the artifacts from the UP1 to the layer 5B is unquestionable. The materials from habitation level 4 were found in the contact zone between layers 5B and 6. The boundary between the layers at the part of the lower ground was indistinct most likely due to slope processes, and we may assume that it was exactly the upper part of the lithological layer 6 and the base of the lithological layer 5B that constituted the interlayer between the horizons. The deposits of the UP2 clearly occurred in the space of the lithological layer 6. Whether they happened to be in its central part or at the bottom of layer 6 depended on each particular location.

Based on the fact that the cultural remains from the UP 1 occurred in the lithological unit 5B, and the remains from the UP 2 occurred in the lithological unit 6, it is possible to suggest that depth level of the horizon UP1 corresponded to the 14C chronological range from ca. 31,000 BP to 34,000 BP. The UP2 horizon corresponds to the two dates ca. 43,000 BP [Goebel et al. 1993].

A part of the Excavation Area 4 was protected by a cliff from the north and northeast, so it had not been subjected to the full impact of the erosion. However, it was partly subjected to the influence of colluvial processes [Derevianko et al., 1998: 6]. The data obtained in this study confirms the conclusions of the previous research – apparently, it was exactly the impact of slope processes which cut the upper part of downslopes deposits at an angle of about 40° and provoked the subsequent gradual gravitational effects on the preserved sections of cultural deposits. In our opinion, the impact of gravitational forces determined the distribution of cultural deposits of the UP1, where cultural deposits gradually shifted downhill, stratifying on each other and creating the impression of several habitation levels. Cultural remains of the UP2 have been influenced by gravitational forces to a much lesser extent due to small inclination of habitation surface and protection by a vertical rock wall. Slope processes possibly began to exert their influence prior to the burial of all components of the cultural horizon.

Conclusion

The research of the planigraphic and taphonomic context of the lithic assemblages occurring in six Upper Paleolithic habitation levels made it possible to adjust the previously accepted stratification for the cultural deposits of the Kara-Bom site. In the sediments of lithological layers 4–6 from Excavation Area 4 we have identified two artifact-bearing levels – the uppermost Upper Paleolithic horizon 1 (UP1) and the lowermost Upper Paleolithic horizon 2 (UP2). It was also established that active impact of colluvial processes and, probably, sporadic low-energy water flows of various origins on the deposits of the later UP1 have led to the disturbance of the horizon and the displacement of cultural deposits. The sediments from the horizon UP2 have undergone minimal displacement along the slope and remained in a good state of preservation. A sterile layer between the horizons disappeared downhill resulting in the situation when two cultural horizons had direct contact in a small area. The results of spatial analysis allowed us to attribute lithic artifacts according to separate two cultural units. Having reconstructed the dynamics of settlement at the site, we may conclude that the identified cultural horizons could be the evidence of two habitation phases at the site, separated by an interval of several thousand years. Although we have not found the traces of micro-horizons within individual cultural horizons, we may assume that those phases are associated with the repeated visits to the territory of the site, indivisible due to the taphonomic conditions. Furthermore, relatively spatially restricted territory of site was the place of intensive human habitation, which resulted, at least for the UP2 horizon, in the emergence of a palimpsest consisting of various settlement episodes. The highest intensity of habitation which, judging by two radiocarbon dates separated by an interval of 100 years, took a relatively short time, is associated with the horizon UP2. Lithic technology characteristic for this assemblage with blade bidirectional reduction and associated “core-burins” technology and specific forms of tools is typical for the Initial Upper Paleolithic of Southern Siberia and Central Asia. In horizon UP1 similarly to the underlying layer, the recurrent cycles of visiting the site cannot be divided into micro-horizons. The intensity of settlement in this period is lower, but its chronological range shows that it lasted for a much longer time. Most likely, the features of settlement in the site, which we have identified, are associated with changes in human mobility systems whose definition will be the goal of future research.

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OSTEOLOGICAL EVIDENCE OF HUMAN ACTIVITY IN THE OSTANTSEVAYA CAVE (CENTRAL SAKHALIN, RUSSIA)

Ostantsevaya cave (049 ° 51’N, 143 ° 31’E) located on the southwestern slope of the Vaida Mountain in the central part of the East Sakhalin Mountains. In the limestones of Ostrinskaya Formation (Upper Jurassic), water formed a variety of karst cavities, including the Grotto of the Throne, the Cascade Mine, the caves of Lastochkin, Bear Tragedies, Vaidinskaya, Ostantsevaya and many others. In most of them, the remains of animals accumulated, indicating the long using for shelter, a reproduction and eating (Tiunov, 1984, 1985; Alekseeva, 1990; Kirillova et al, 2003, 2011). The Ostantsevaya is one of the few Sakhalin caves in which loose sediments include the remains of mammals from the end of the glacial period and the beginning of the Holocene at the same time as traces of human presence (Kuzmin et al., 2005; Kirillova et al., 2008).

The Ostantsevaya cave provided security and seclusion, as well as, at certain stages, a good overview of the valley of the Witwitza River. At present, because of the fracturing of limestones, water flows constantly on the walls, creating dampness and coolness in the warm season; in the cold seasons it still remains a wintering place for bears.

From the pre-entrance area, 199 bones (reindeer, snow sheep, musk deer, as well as hare, bear, Arctic fox, wild horse) was excavated; from the carst well – about 9000, belonging to 25 taxa of mammals, and 30 - to seven species of birds. Many of the bones are represented by fragments and, judging by the surface, had been exposed to the flowing water for a long time, which is common for the active karstic cavity. Many bones are gnawed; traces of canine and cheek teeth of large and small predators, as well as of rodents have place.

The remains of *Mustela* cf. *eversmanni* (light polecat), large Bovidae, *Spermophillus undulate* (Asian long-tailed ground squirrel), *Dicrostonyx* sp. (ungulate lemming), *Panthera spelaea* (cave lion, originally defined as a tiger) were first discovered on the Sakhalin in the Ostantsevaya cave’s well and expanded the range of these animals. An ancient horse was determined from the excavation site, with 14C age of about 15,000 years, and an arctic fox about 16,000 years old (Kuzmin et al., 2005).

Bones of bears and hares prevail in the well in all layers. Bears often use natural cavities for wintering, especially females, which at this time produce cubs; their bones are found more often. Hares could wander into shallow caves and fall into the “trap” of the well; moreover, the prey remains of predatory bird in the cave were carried into the well by water.

The reindeer and the snow sheep are the second pair in the number of residues. Their use in food purposes by man is beyond doubt.

In the cave, 19 stone tools were found, including 15 arrowheads, 2 knife-like plates, a scraper and flake, with jasper, siltstone and claystones of local origin, and obsidian from the Shirataki area of Hokkaido Island. A tool made from the moose horn was also discovered (Alekseeva et al., 2004). Perhaps the calcaneal bones of a reindeer with an artificial hole 26x10 mm from layer 3 (279–1516) and 11 (279–6720) are not evidence of extraction of the bone marrow (it is very small there, and the bone compact is very thick and dense), but of using as a composite tool. Traces of felling, blows and cuts of bones in different layers are noted.

The most obvious are the traces of tool on bearish cranial remains. On the frontal bone of the skull 279–378 (level 1) there is a through hole with a diameter of about 7 mm and anterior to the left = an oblique rub length of about 30 mm, in its central part. A breaking on the right parietal bone of the skull 279–977 (level 2), in combination with two through holes in the frontal bone in the center (diameter 10 mm) and left (17x12 mm) may be a sign of killing the bear or manipulations with killed animal. Traces of strokes in the left part of the frontal bone of the skull 279-1992 (level 3) are recorded. The oblique cut (37 mm long) at the base of the nasal bones of the skull 279-3390 (level 4) is located in the “shock zone”, the hit into which stuns and (temporarily) immobilizes the beast. All skulls have damaged or broken zygomatic arches.

Specific traces on the coronal processes of the mandibular bones indicate their cutting from the skulls which was in soft tissues. Most of all discovered in levels 2 and 10, there are also in l. 3, 4 and 11.

Marked traces indicate the use of the Ostantsevaya by a bear and a man practically throughout the entire history of sedimentation in the well. However, there are not enough good reasons to talk about the ritual killings of bears in the cave. Perhaps a thorough analysis of the chipped and traces on the bones along all well levels will make it possible to find out.

In all likelihood, the bones of different animals fell into the well not only by natural means, but also were thrown there by an ancient man.

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MICROBLADE TECHNOLOGIES IN FINAL PLEISTOCENE – EARLY HOLOCENE COMPLEXES, NORTHERN MONGOLIA: ORIGIN AND SPREADING[1]

Early Upper Paleolithic, its chronology, questions about local or import origin of blade industries, variants of subdivision and outer periodization of this stage take central place in the investigations of the Stone Age sites in Northern Mongolia. Much less attention has been paid to the peculiarities of various technologies of micropercussion, and, in particular, to its wedge-shaped modification based on pressure technique. Analysis of materials from the Final Paleolithic and the Early Holocene horizons of Tolbor-15 site along with the representative surface collections and GIS modeling of the archaeological locations patterns on Selenga river tributaries allowing to formulate the series of suggestions on the origin of wedge-shaped technique in Northern Mongolia, and directions of its spreading.

Key words: Northern Mongolia, Final Pleistocene, Early Holocene, microblade technique, chronology.

Starting from late 1990th the middle stream of Selenga River (Northern Mongolia) is in the permanent focus of quest and research of the Stone Age. Thanks to the multi-year projects of specialists from Mongolia, Russia, USA, France, Belgium, and Japan a big series of sites, dated from the very beginning of the Upper Paleolithic (45-43 000 BP) to the Neolithic (8-6 000 BP), was located and excavated. Of the greatest significance are materials of so called "Tolbor Paleolithic complex" **(Fig.1)** with the stratified sites Tolbor 4, Tolbor 15, Tolbor 16, Tolbor 17, Tolbor 21, Tolbor Paleolithic Cache, and Kharganyn-Gol 5 (Gladyshev, 2009; Gladyshev et al., 2012; Gladyshev et al., 2011; Tabarev et al., 2013).

Results of the investigations were published world-wide along with the presentations devoted to various aspects of the Stone Age in Northern Mongolia (lithic industry, stratigraphy, AMS-dating, use-wear etc.) at the international meetings in Europe, Far East, and the United States.

The most attention in these topics is given to the problem of the Early (Initial) Upper Paleolithic – its dating, questions about local or import origins of the blade industry, sub-periodization, and the correlation with the synchronous lithic industries in Altai Region, Trans-Baikal Region, Inner Mongolia, and Northern China. Some publications are devoted to the phenomenon of the *micropercussion* – microblades removals from specially prepared cores (microcores). The accent on the Early Upper Paleolithic problematic also reflects in the process of sites location, in preferences of the sites for the excavations, and in priority of sampling for AMS-dating.

Archaeological materials related to the Pleistocene – Holocene transition were also studied and published, but in a lesser extent. First of all, they are known for upper levels

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Fig. 1. Map of Mongolia with the concentration of the Stone Age sites in the middle stream of Selenga river

at Tolbor 4 (Horizons 1-3), Tolbor 15 (Horizons 1-4), and Kharganyn-Gol 5 (Horizon 3). From the other hand, the degree of the discussion about these complexes is much lower. Mostly they were studied in a "passing regime", just because of their presence at the multi-level sites, but never were the goal of the special research project or survey.

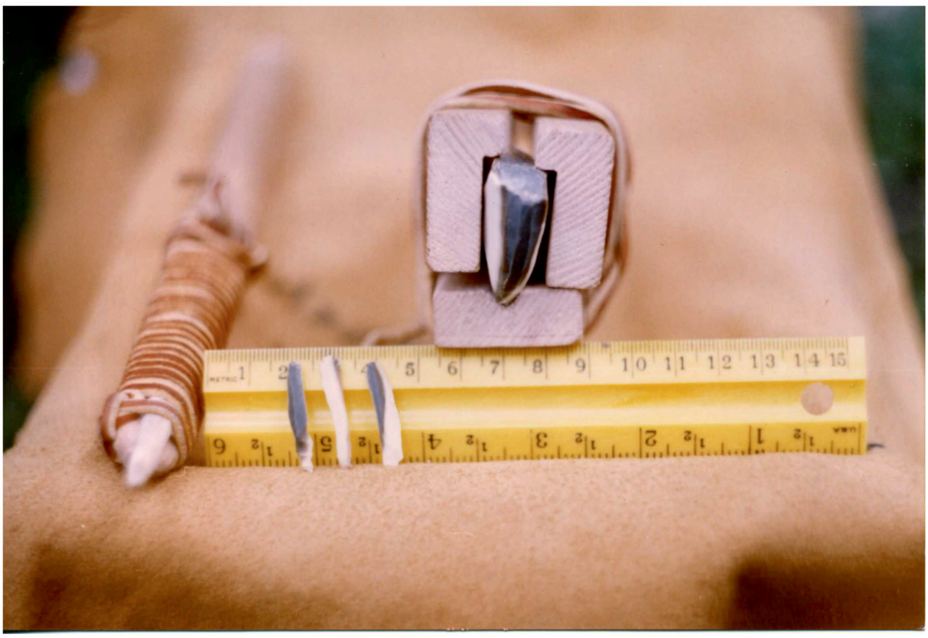
The appearance of microblade technology in the Paleolithic of Northern Mongolia is documented, first of all, with the wedge-shaped microcores, which were explored by *pressure technique* **(Fig. 2).** The pilot signal of this technique (microcore) is known at Tolbor 15 in Horizon 5 with the AMS data 28460±310 (AA-84137) (Gladyshev, Tabarev, Olsen, 2010) **(Fig. 3–1).** Such early age was skeptically met by some of the specialists who suggested possible penetration of this artifact from the upper horizons. The argument would be wealthy only if a series (or even a single example) of such microcores were ever found in the upper horizons. And while this was not fixed at Tolbor 15 and any other sites in the vicinity we prefer to propose the early appearance of microblade pressure technique about 28 – 27 000 BP which is the earliest manifestation not only in Northern Mongolia but in Central Asia and the Far East in whole.

Later, at Tolbor 15, in Horizons 4-3 (15–14 000 BP) and Horizon 2 (13–11 000 BP)[2] wedge-shaped microcores are represented in more sophisticated modifications – on uni- and bifacial preforms **(Fig.3 – *2–3*).** They all totally disappeared in Horizon 1 (the Early Holocene), while the microblade technology continues to be in use in format of micro-prismatic and micro-conical cores.

During 2009-11 and 2014 in frames of joint Russian-Mongolian-American archaeological expedition, in parallel with the excavations of multi-level sites, special survey project was conducted. It resulted with the discoveries of big number of the Stone Age sites along left and right banks of Ikh-Tulberiin-Gol valley along with the series of locations in the nearest Kharganyn-Gol and Altaatyn-Gol river valleys. According to typology of lithic artifacts gathered on the surfaces of the locations all

[2] At the moment there are no C14 determinations for Horizon 2, but industry clearly demonstrate typical Final Paleolithic characteristics.

1



2

Fig. 2. Experimental exploration of the wedge-shaped microcores.
1 – pressure microblade removal in a portative device;
2 – microblades (Photos from author's archive).

the materials were divided into several groups relevant to the Middle Paleolithic (or the transition from Middle to Early Upper Paleolithic), the Early Upper Paleolithic,

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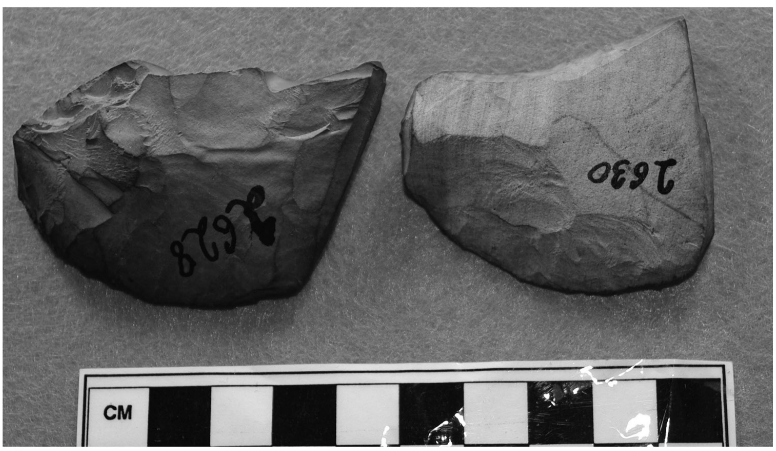
❷



❸

Fig. 3. Tolbor-15 site, microblade cores. *1* – Horizon 5; *2* – Horizon 4; *3* – Horizon 2.

the Upper Paleolithic, the Final Paleolithic, and the Early Holocene. All the sites were carefully located and integrated into relief maps with the GIS-technologies. This approach gave some interesting data for the interpretations.

First, all the Final Paleolithic locations with microblade assemblages (microblade cores with negatives of removals, exhausted cores, microblades and their fragments, bi-facial and uni-facial preforms, boat-shaped and ski-spalls etc.) were located on different altitude than the locations with the Upper or Early Upper Paleolithic materials[3]. And in turn, there are no wedge-shaped microblade cores (pressure technique) in the upper horizons of such multi-level sites as Tolbor-4, 16 and 21 where micro-technology is documented by cores reduced only by percussion.

Second, in the surface collections wedge-shaped microcores usually are accompanied by micro-conical and micro-prismatic cores. In other words, the area of habitation and activities of the Final Paleolithic and the Early Holocene groups in the valley of Selenga River were identical.

This last point allows returning to the question about the character of the transition from the wedge-shaped to micro-prismatic technology. As it was underlined above these two technologies so far were never met in one horizon at Tolbor complex sites which suggests the replacement one by another. Anyway, this situation was traced only at one site – Tolbor 15. It is quite possible that in case of special quest and additional excavations wedge-shaped and micro-prismatic modifications could be found, and their co-existence on the border of the Pleistocene and the Holocene. This will not contrary to the experimental data and strong evidence that to reduce wedge-shaped and micro-prismatic cores portable devices of different constructions were used (Tabarev, 2012).

Only 9 AMS dates are known for this period, they could be divided into two groups – the Final Pleistocene (Table 1) and the Holocene ones (Table 2). Within the Final Paleolithic dates 5 were done by egg shell (*Struthio*), and 2 – by bone, while both Holocene dates – by charred remains on pottery. Dates in the first group are in frames of 15700–128000 BP (18900–15200 cal BP), they totally match with the Final Paleolithic. Second group – 7700 6700 BP (8600–7600 cal BP) correspond with the Neolithic, possibly the Early Neolithic, because for today they are the most ancient carbon determinations not only for Selenga River basin but for the whole territory of Mongolia. There is a gap between two groups of dates – about 5000 – it is very possible that the degradation, the disappearance of wedge-shaped microblade technology, and its replacement by micro-prismatic technology occurred during this time period.

The time of the appearance of clay vessels in Northern Mongolia is a special and interesting problem. Fragments of vessels found at Tolbor 15 demonstrate developed technology and highly organized ornamentation. It is quite possible that the research project focused on this problem could lead to the discovery of earlier pottery – 10-9000 BP. Taking into consideration recent finds of early pottery with the Final Pleistocene age in Trans-Baikal Region (Ust'-Karenga VII, Ust'-Kyakhta III, Studenoe I, and Ust'-Menza I) we are suggesting that the technology of pottery penetrated to the middle Selenga territory from there.

In case with the wedge-shaped microblade technology the situation is quite different. According to the publications, chronological and areal subdivisions of microblade industries in Trans-Baikal Region often reflect the degree of archaeological knowledge and the intension of each researcher (M. V. Konstantinov, V.I. Tashak, Y.E. Antonova, P.V. Moroz, G.D. Pavlenok et al.) to contribute something personal into the problematic, or to change the previous periodization. Starting form 1990th we are observing

[3] The only except – Tolbor 15 site, but its location is unique for the sites with the Early and Upper Paleolithic horizons – not on the high terraces but almost in the Ikh-Tulberiin-Gol River bottom.

the appearance of so called “Studenovskaya culture” (18 – 10800 BP); “Chikoiskaya cilture” (15 – 11000 BP); “Old Chikoiskaya culture” (20 – 18000 BP), “Selernginskaya culture” (18 – 8000 BP); “Ust’-Menza phase” (18 – 13000BP); “Final Paleolithic Selenginskaya culture” (13 – 11000 BP) etc. Both versions – the microblade wedge-shaped cores technology penetrated to the Trans-Baikal region from Northern Mongolia and vice versa – are discussed in these publications. Almost all the specialists regard the Selenga River as the mainstream for these migrations.

During the survey in the Ikh-Tulberiin-Gol, Kharganyn-Gol and Altaatyn-Gol river valleys in 2011-2014 it was established that the mobility of ancient groups in the Paleolithic-Early Neolithic was not limited only by “Selenga corridor”, but on the contrary, people preferred to use the saddles in the mountain ridges for comfort transition from one river valley to another. Also, tributaries of Selenga River were not “dead end streets” or “pockets”, but transitional paths from the upstream to the mouth (Gillam et al., 2012, 2014).

We think that from the morphological and typological points of view the microblade technique in the Final Paleolithic of Northern Mongolia demonstrates more similarities not with the Trans-Baikal region but with the complexes archaeologically known in the southern and eastern directions. In case of southern direction, it is possible to mention the bright collection of Sven Hedin expedition in the Inner Mongolia; while in the eastern direction the famous Here-Uul Mountain site is of special interest. Further East we are founding analogies in Ustinovka industry (Maritime Region, Russian Far East), on Korean Peninsula, and on the Japanese Islands (Sato, Izuho, Morisaki, 2011). For example, the greatest number of similarities (especially within the technical spalls and forms of exhausted microcores) Northern Mongolia materials meet in the obsidian industry of Fukui Cave (Nagasaki Prefecture, Kyushu Island) (Kanomata et al., 2015).

In conclusion, all these facts confirm the most likely spreading of the pressure microblade technology in the Upper Paleolithic – from the regions of Central Asia (and Northern Mongolia in particular) to the coas tal and island territories of the Far East. The alternative direction proposed recently (Buvit et al., 2016) so far has not enough archaeological argumentation.

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INFLUENCE OF PALEOCLIMATE ON THE STRUCTURAL ORGANIZATION OF ANCIENT SITES

Paleolith, Transbaikalia, Planigraphy of Dwellings, Paleoclimates

Since the 1970s on the territory of Western Transbaikalia archaeological excavations of Studenoe (50˚03′31″ N, 108˚15′16″ E) and Ust′-Menza archaeological complexes (50˚13′28″ N, 108˚37′31″ E) have been carried out, which were associated with fluvial terraces of the Baikal basin. The investigations uncovered multilayer archaeological sites associated with depositions of I–II river terraces. In the cultural horizons of the sites the remains of dwelling complexes were found, ranging from 25 to 10.8 ths yrs. Researchers refer them to seasonal hunters' camps and find a series of distinct simple, or single-hearth and complex dwellings. Long-term excavations of the sites showed the stability in tradition of organizing ancient settlements, which on the one hand reflect conservative, and on the other hand – practically founded nature of sociocultural adaptation which existed over several thousand years.

Recent works dealt mostly with solving the question of analysis of environmental and paleoclimatic changes in late Neopleistocene-Holocene of Transbaikalia. Palynological analysis allowed to reconstruct the paleolandscape characteristics of Neopleistocene-Holocene age. Multiset of significant sites (e.g. Studenoe-1 site is characterized of 38 cultural horizons), multiplicity and distinctness of the dwelling complexes within chronologically successive cultural horizons of the common stratigraphic profile allowed to focus on the principles of changes in spatial and structural organization of the sites (Konstantinov, M., 1994; Konstantinov, A., 2001; Razgildeeva, 2013, 2016). Reconstruction of the patterns of life support and settlement strategy of ancient people was based on the complex analysis of archaeological materials and study of the dynamics of the development of human environment.

The examined data about the depositions of I–II fluvial terraces of the Chikoi and Menza Rivers indicate full stratigraphic profiles of Studenoe-1, 2 and Ust′-Menza-1, 2. In total more than a hundred of cultural horizons were identified at these sites which range in age from 20.6 to 2 ths yrs B.P. Excavations of 25 cultural horizons of Upper Paleolith uncovered the remains of ancient dwellings. Distinctness of the remains of the above-ground dwellings allowed to indentify single- and multi-hearth dwellings. Principles of their organization, conditions of distinct stratification with division of cultural horizons by sterile layers enabled the reconstruction of economic activity in particular paleoenvironmental conditions. Local paleoecology defined the specific character of site locations along with their natural area and of adjacent "often visited" territories.

Spatial analysis of cultural layers included multilevel diagrams with quantitative and qualitative characteristics of lithic artifacts and the presence of bone fragments. Plans were also drawn showing distribution of the material according to the type of the items, their shape and debitage nature. The type of the material was defined; conjoining method and technological analysis were applied. Based on the general character of Upper Paleolithic complexes which have distinct rounded and oval outlines, the spatial analysis of the inside of the dwellings included the method of circular modeling.

Reconstruction of paleoclimatic characteristics was based on the detailed palynological study of terrace sediments and their adjacent landforms. Palynilogical and geochemical analyses, systematization of geological data and creating a general basis of stratigraphic profiles of the main sites allowed to specify the information about the changes in paleolandscapes and climatic conditions.

Spatial analysis of Upper Paleolithic cultural horizons of Studenoe-1, 2 and Ust-Menza-1, 2 showed the dynamics of changes in simple and complex forms of spatial organization of the dwelling space. These changes of stable relief conditions (within the same area) which provide objectively identical appeal of the place (its solar exposition, compass rose, daily temperature drop, general configuration of habitation surface) gave grounds for practical investigation of dependence of adaptive reactions of ancient societies in terms of the changes of natural and climatic conditions. Reconstruction of cultural and economic activity of late Paleolith indirectly indicates the existence of basic short-term hunting camps of small moving population groups.

Cultural horizons of compound complexes are associated with sediments whose palynological spectra indicate climatic changes towards relative warming: 18-15 ths yrs B.P. and warming in the beginning of the Boreal. In such palynological characteristics showing cold climatic conditions, there prevail single-hearth and distinctly localized complexes in the structure of the sites.

SESSION 2:

FROM UPPER PALEOLITHIC TO NEOLITHIC (PART I)

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TOWARD THE STANDARDIZED IDENTIFICATION OF LITHIC USE-WEAR, FOR UNIVERSAL EAST ASIAN CRITERIA

INTRODUCTION

The study of lithic use-wear traces has already accumulated its 50 years of history since the English translation of Semenov's landmark volume (1964 from Russian in 1957), and its 40 years of history since the discovery of micro-polish (or microwear polish) identification by Keeley (1977). The methodology has spread in and around countries in the East Asia with their own degrees of enthusiasm or relative indifference to functional determination. Stable developments have been observed for both low power and high power techniques in Japan, China, Korea, Russia, and other countries such as the Philippines (just to name only a few, e.g., Akoshima 1989, Gao and Chen 2008, Chen 2016, Kim and Kim 2012, Pawlik 2009, 2015).

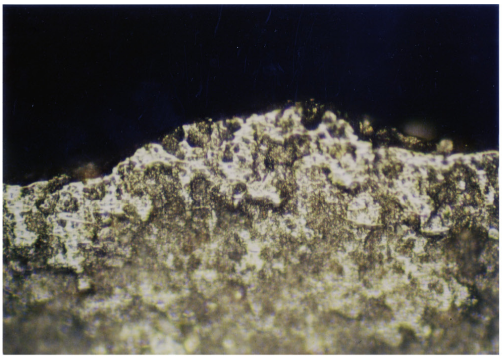
However, efforts to establish standardized procedures of use-wear identification are still needed. Considering the similarities and diversities in the Paleolithic cultures, functional evaluation of technology and typology is deemed critical, especially for a more productive endeavor of comparative research within the area of East Asia. The present paper discusses some essential problems and strategies for actual use-wear analysis.

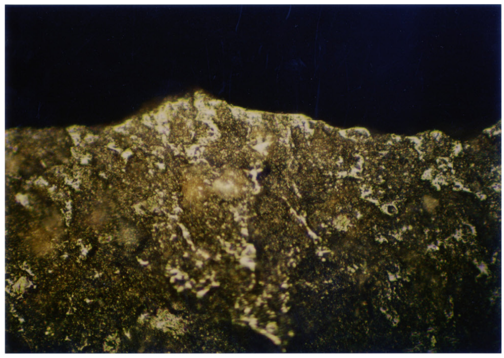
MICROWEAR POLISH

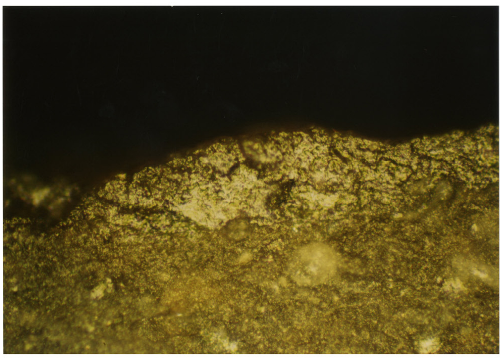
Microwear analysis in Japan was first initiated under the direction of the late Prof. Chosuke Serizawa in 1976. The project was a part of interdisciplinary program of archaeology and natural sciences under the auspices of KAKENHI. Akoshima was a student member of TUMRT (Tohoku University Microwear Research Team) which Serizawa organized and continued until his retirement from Tohoku University in 1983. The project carried out a large scale experimental replication work and the data were utilized as basic reference collections of functional identification. Use-wear analysis was also developed in Europe and America almost at the same period, and our team corresponded with specialists, sometimes in person, in England, France, Germany, and America. At the Suyanggae symposium held in Danyang in 2010, Akoshima (2010) explained the history, problems and prospects with the micro-polish analysis. The Tohoku University method spread to analysts in Japan and up to the present it has been recognized as a standard technique for functional determination.

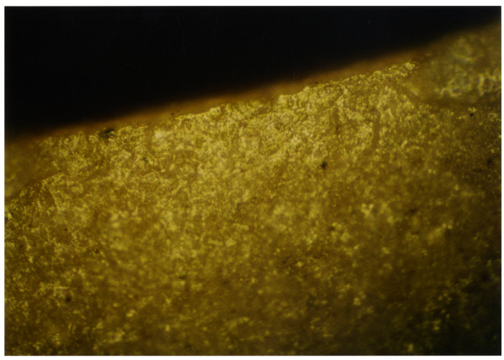
Although micro-polishes develop similarly on most types of CCS (crypto-chrystalline silica rocks), their correlations with the worked materials turned out to be probabilistic, rather than being exclusive. There are also wide ranges of variability in the appearances of micro-polish. These points were recognized nationwide and many use-wear analysts adopted the polish classification by TUMRT. The data base for both low power and high power analyses have been published now by TUMRT in Bulletin of the Tohoku University Museum (Akoshima and Hong 2014, 2016, 2017). Our intention is to contribute to microwear analysis in neighboring countries as well. Rock types, lithic technology, formal tool types and assemblage composition exhibit diversity, but we believe that basic data for controlled experimental replication would be of some use to international comparative studies.

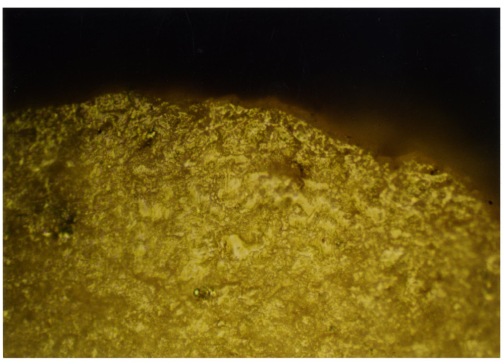
Space does not allow full presentation, but some examples for common East Asian framework are explained here. In the global replication programs, especially those for the European Paleolithic research, a type of worked materials are not necessarily broadly included in the identification criteria. The variety of Bamboo use-wear actually needs detailed investigation. Here, some examples of the “bamboo polish” are introduced in Figure 1. It is no doubt that during the prehistory in East and Southeast Asia, working bamboo and tools of bamboo require further investigation. Bamboo polishes are basically similar to “wood polish”, but their texture and subtle variations demand closer attention.

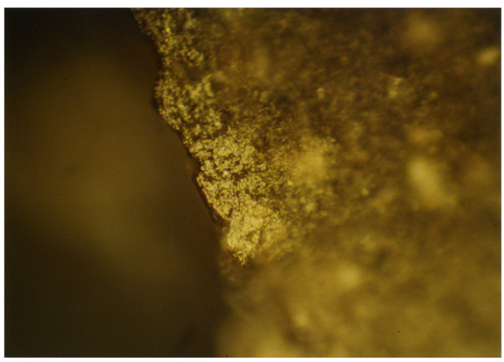

(1) bamboo saw 4000st. type B. (SH80)


(2) bamboo saw 4000st. type B. (SH80)


(3) bamboo whittle 1000st. type F1. (SH84)


(4) bamboo scrape 4000st. type B. (SH82)


(5) bamboo scrape 1000st. type B. (SH83)


(6) bamboo grave 1000st. type F1. (SH81)

These types are Tohoku team (TUMRT) classifications since 1981 (Akoshima 1989, 2010). Photographs of use-wear are also referable to many Japanese excavation reports by local governments and research institutions, although it is regrettable that very few English reference sources are there. Short description summarizes their characteristics, according to Akoshima and Hong (2017). The explication word order is approximately: contrast and texture, extension, other characteristics, and related worked materials (in the parenthesis, less common but related materials).

Type A: Very bright and smooth. Covers wide area rather evenly. "Filled-in" striations, "comet-shaped" pits; when underdeveloped, resembles Type B. Non-woody plants, (bamboo).

Type B: Bright and smooth. Round and "domed" appearance. Well defined patches develop on high portions, clear striations. Wood, bamboo, (bone, non-woody plants).

Type C: Relatively bright but rough. Covers wide area rather evenly with flat patches; patches are ill-defined. With numerous pits of various size/shape, depressions, striation; often surrounds Types D1 and D2. Sawing soaked antler (and bone).

Type D1: Bright and smooth; very flat and lacks "roundness"; includes "melted snow" type. Flat polish patches are well-defined. Directional undulations often constitute wide striated features. Bone, antler, (wood).

Type D2: Bright but less smooth than D1. Polish patches are well defined. Patch surface undulates with numerous parallel, sharp striations. Bone, antler, wood, (bamboo).

Type E1: Dull and relatively rough. Polish patches are small and confined. Numerous tiny pits and very minutely rugged ("rugose"); usually accompanies Types E2, F1, F2. Hide, meat, (wood).

Type E2: Dull and relatively rough, "matte" texture. Patches are less confined and sometimes flat; when developed, patches grow and "roundness" increases. Numerous tiny pits and very minutely rugged ("rugose"); usually accompanies Types E1, F1, F2. Hide, meat.

Type F1: Dull and rough, sometimes "greasy luster". Patches are not well-defined; polish follows micro-topography (on both elevations and depressions). Coarse "rugged" appearance; And Type F1 often develops into Type D1 on antler/bone. Dry antler, bone, hide, meat, wood.

Type F2: Very dull, weak. Polish follows micro-topography. Often accompanies other types. Generic polish, hide, meat, (wood, bone).

Type X: Dull, "battered" appearance. Extends widely. Very "rugged"; full of pits, depressions; striations everywhere. Soil (digging, etc.) or any other material in contact with soil.

Type Y: Relatively bright but no contrast (even brightness), variable texture. Entire surface is covered. Random striations; various pits. "Patination" polish, polish on naturally worn surface.

"Bright" and "dull" are used in terms of "brightness" of polish. It relates to the reflection of light. "Contrast" is used in terms of the difference of "brightness" between two areas. "Inner contrast" means the difference of brightness between brighter part and duller part of polished area. "Outer contrast" means the difference of brightness between polished area and unaltered area neighboring the polished area. "Smooth" and "rough" are used in terms of the evenness of the texture of polished area. "Rugged" means a distinctive appearance of polished area. The surface is very uneven, preserving the original micro-topography, shining with very fine grained difference of brightness, with some "greasy" luster. It looks like, as it were, a boiling liquid of high viscosity. "Coarse" and "fine grained" is used in terms of the surface texture of shale. "Pitted" is used when these "pits" do not seem to be the original depressions of micro-topography, but seem to be plucked off pits.

These types are from experimental specimens, and of course actual examination of excavated materials exhibit various differences from type specimens in the laboratory. There are also subtle differences produced from variations of raw material rock types which are variable in countries and regions. The discrepancy between results of experiments and examination of excavated artifacts is the fundamental source of learning for us. The regional differences between countries are derived not only from rock types and stone tool typology, but also from the given ecological conditions of prehistoric cultures. We are still in the stage of infancy for inter-regional use-wear analysis.

MICROFLAKING

The major target use-wear traces for the low power school have been microflaking, or microchipping. Needless to say, it is the microscopic phenomena of edge breakage and each produced microflaking scar is influenced by conditions such as edge angle, pressure exerted, percussion applied, hardness of the contact substance, and so on. Every working edge has numerous microflaking scars and they are actually variable one by one depending on the above mentioned factors. After some duration of repeated contact strokes, the edge develops some distinctive patterns of scars when the edge became "stabilized" when weak portions of the edge underwent continuous breakage episodes. Akoshima (1987) recognized such resultant patterns and quantified their characteristic collective patterns. These patterns are evidently related to the worked materials, especially hardness of them, and the method of use, especially parallel (longitudinal) or perpendicular (transversal) to the edge line.

In order to recognize the collective patterns of microflaking, a method of statistical graph counting was applied. Each microflaking is the one time phenomenon of breaking of the working edge. The repeated breakage of edge on both ventral and dorsal face produces distinctive patterns of damaged edge line. By counting attributes of these micro flake scars, graph expression is made representing characteristics of the worked materials (soft, medium, hard) and the direction of working motion (longitudinal, transversal). These generalizations give us clues to functional reconstruction.

It is well known that in China, Professor George Odell who was a pioneer for low power analysis in America was invited to IVPP and the workshop session resulted in a book (Gao and Chen 2008). In the reported volume from the summer workshop, a number of pictorial images are found which are very similar to our experimental specimens. From the experimental collection of TUMRT, photographic images which were taken at 8X (some at 3X and 4X) macro photo system of Olympus OM were exhaustively presented to exhibit the entire variations of chipped scars. The microflaing scars are actually diverse even within one working edge and also often contrastive between the faces of ventral or dorsal (Akoshima and Hong, 2014, 2016).

Here in Figure 2, our method of quantifying collective whole of these chipping is explained. Major attributes of analytical interests are, the shape of microflaking scar, the size of microflaking scar, the initiation of microflaking scar breakage, the termination of microflaking scar breakage, the density of microflaking scar per centimeter, the degree of concentration of scars to one face of the tool, ventral or dorsal.

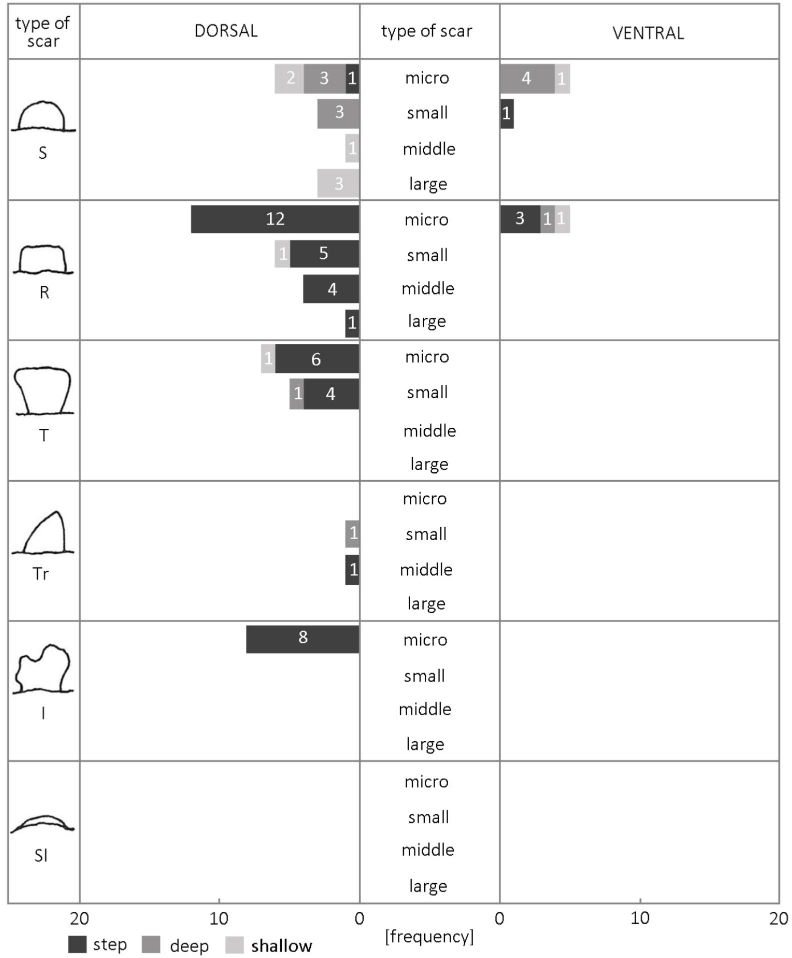
The experimental specimen was observed for all the resultant microflaking scars. They were recorded one by one for attributes such as shape and size. They were then counted as cross tabulation (Figure 2 for the left side table). Numbers cross tables were converted to bar graph diagrams for scar pattern recognition (Figure 2 for the right side bar graphs). A case from medium hardness contact material (from scraping soft wood of paulownia) is shown as an example of collective scar patterns due to limitation of space. In this analysis by TUMRT, actually 72 numerical tables and graph diagrams were made from a total of 3840 flaking scars, and they indicate that concrete patterns virtually exist among microflaking of different use tasks. The patterns are partially presented as statistical tendencies as were described in Akoshima (1987 in English), in such expression as "degree of concentration of scars to ventral aspect".

The analyzed attributes are as follows. They are, so to speak, characterization as collective group of scars by making combined bar graphs from cross tabulations of attributes type categorization (from Akoshima and Hong 2016, p.129-130).

SH111 wood scraping, 500 strokes (paulownia) edge angle 60° edge width 40 ㎜

type of scar		step D	step V	step T	deep D	deep V	deep T	shallow D	shallow V	shallow T	total D	total V	total T	total
S	micro	1		1	3	4	7	2	1	3	6	5	11	19
	small		1	1	3		3				3	1	4	
	middle							1		1	1		1	
	large							3		3	3		3	
R	micro	12	3	15		1	1		1	1	12	5	17	28
	small	5		5				1		1	6		6	
	middle	4		4							4		4	
	large	1		1							1		1	
T	micro	6		6				1		1	7		7	12
	small	4		4	1		1				5		5	
	middle													
	large													
Tr	micro													2
	small				1		1				1		1	
	middle	1		1							1		1	
	large													
I	micro	8		8							8		8	8
	small													
	middle													
	large													
Sl	micro													0
	small													
	middle													
	large													
total		42	4	46	8	5	13	8	2	10	58	11	69	69

D=dosal. V=ventral. T=total



THE SHAPE OF MICROFLAKING

The “shape” is the horizontal shape of the microflaking scar. Although there are many intermediate shapes, they are classified into “shape types”.

“Scalar” (“S”). Semi-circular shape and its variations.

“Rectangular” (“R”). Either side of the scar runs parallel to each other.

“Trapezoidal” (“T”). The sides of the scar broaden toward the inside.

“Triangular” (“Tr”). When the axis of rectangular or trapezoidal scar becomes oblique to the edge, one side of the scar often protrudes from the edge line of the flake, and as a result, triangular scar occurs.

“Irregular” (“I”). Several types of complicated or overlapped scars are often found. It can be termed “others”.

“Sliced” (“Sl”). It looks “crescent” in horizontal shape. Thin edge is often snapped off and as a result, sliced scar occurs. When any overhang is observed, it is counted as “stepped sliced scar”.

The Size of Microflaking

It is problematic to define the size of flaking scars. Its ratio of length and width are diverse and the area is difficult to measure. However, considering the characteristics that most scars occur along the edge between ventral and dorsal aspects, the size is measured as the distance between two ends of the scar on the edge line. The size was measured under the magnification of 10 X.

“Micro” (“mi”). A scar which is smaller than 0.5 mm in width.

“Small” (“s”). A scar which is between 0.5 mm and 1.0 mm in width.

“Middle” (“m”). A scar which is between 1.0 and 2.0 mm in width.

“Large” (“l”). A scar which is larger than 2.0 mm in width.

The Termination of Microflaking

Microflaking scars as the result of breakage of the edge usually entail attributes as “conchoidal fracture”. In the case of stone knapping, categories of “feather end”, “step fracture” or “step flaking” (and “hinge fracture”) are conventionally used as criteria of termination. Also the negative “curvature” of flaked scar surface is an important feature to evaluate the depression of the surface. They are classified into three categories of, “Deep” (“D”), “Shallow” (“Sh”), and “Step” (“St”).

“Deep” and “Shallow” scars terminate with feather ending. Hinge fracture was included in “Step”. The curvature of scars was observed three dimensionally with a stereoscopic microscope.

The “Initiation” of scars as well as termination has been employed widely as a standard of scar classification. Initiation can be divided into two major categories, that is, “Cone” and “Bending”. It was observed that both initiations actually occurred and scars can be divided also by this standard.

Converted graph diagram

The above mentioned attributes and classification results were converted to the bar graph diagram for each specimen. The cross tabulation frequencies and the bar charts are rather self-evident here, but it is emphasized that the bar graphs on symmetric framework denote particular characteristics of microflaking scar patterns. The diagnostic bar graph patterns correspond to numerical summary of scar attributes which were explained in Akoshima (1987). The close relationships are recognized between microflaking attributes and working conditions (hardness of the worked materials and the direction of working motion). For example, such characteristics are expressed in the bar graph diagrams as the diversity or homogeneity of scar shapes, the ratio of step flaking, the size variation of scars, and the degree of concentration of scars to one aspect of the edge (or relatively symmetric distribution between both faces), scar pattern differences between ventral and dorsal faces.

Toward universal identification criteria of use-wear in the East Asia, an advantageous facet of microflaking analysis as opposed to micro-polish analysis is fundamental. It is the wide variations of utilized rock types throughout the vast area of Asia. The advantage is two-fold. One is the fact that under many actual circumstances, the phenomena of surface alteration or modification badly reduces the potential of the high power method. Especially the patination phenomena and/or the great antiquity of the artifacts often blur weak types of microwear polish. On the other hand, microflaking is relatively stable and observable for entire assemblages in many regions.

The second advantage would be its relatively broad applicability for a variety of different lithic raw materials. Very hard materials such as quartzite category for example in the Korean Peninsula still needs basic experimental framework as to their actual potentiality for micro-polish analysis. Basic framework of controlled experimental program is still of necessity. This is also true to microflaking analysis, though. Actually, the occurrence of micro-chipping is variable depending on the characteristics of rock materials. In this sense, fundamental region specific experimental program should be carried out. Once such regional standards are formed, inter-regional comparative analysis may be fruitful with typological and lithic technological understanding combined together.

DISCUSSION

There has been a tendency that methodological dichotomy existed in research history between the “low power school” and the “high power school” for adequate analytical strategy. The former emphasized attributes of microflaking scars while the latter emphasized differential patterns of microwear polish. At the present state of the art, it seems that either of the two “schools” does not keep enough bases for insistence to the method. On the contrary, new integrated methodologies are necessary to be further developed. The methods also need to include concrete data bases from different areas in the East Asia. They need to entail differences in rock types of the raw materials, fundamental core reduction techniques as resulted in blank flakes, retouch techniques for formal type tools. All these factors had influences on the ways of tool use, hence varieties in resultant use-wear traces.

The very complex and combined nature of these factors necessitate direct personal cooperation among use-wear specialists. Above all, academic exchanges of first hand opportunities to observe artifacts under magnifications with microscopes are critically important. Exchanges of common technical experiences with diverse rock types and use-wear phenomena are essential. Our experiences of the Suyanggae academic exchange and APA, the Asian Paleolithic Association, would play valuable roles in the near future, we strongly believe.

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We are very grateful to Professors Lee Yung-jo and Alexander Vasilevsky for inviting us to Yuzhno-Sakhalinsk. Southern Sakhalin was the archaeological field for the late Professor Nobuo Ito of Tohoku University in 1933 and 1934. The young Prof. Ito was then in his twenties and carried out one of the pioneers work for prehistoric archaeology of the Sakhalin Island. We are glad to succeed to his original work spirits under a new framework of international cooperation. We are truly thankful to Prof. Lee and the Suyanggae “family” for the symposium organization.

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Anoikin A. A.

THE OPEN-AIR SITE OF USHBULAK-1 (EAST KAZAKHSTAN): A NEW INITIAL UPPER PALEOLITHIC EVIDENCE FROM CENTRAL ASIA

In 2016, the joint Russian-Kazakhstan expedition of the Institute of Archaeology and Ethnography of the Russian Academy of Sciences and the National Museum of the Republic of Kazakhstan conducted exploratory works in the territory of the Kurchum, Zaysan, and Tarbagatai Districts of the East Kazakhstan Region of Kazakhstan. The main areas of research were the eastern shore of Bukhtarma Reservoir, and the southern and eastern shores of Lake Zaysan. The outcrops of silicified sedimentary rocks with high quality raw material were found in the southern part of the mountains bordering the lake (the Saur-Tarbagatai Mountains). The eastern part of the Shilikty Valley not far from the border with China, was explored in this area.

A multi-layered site of Ushbulak-1 ("Three springs") has been discovered in the course of the field survey. The assamblages of the site belong to different stages of the Upper Paleolithic, including its initial stage. The sites of the Late Middle–Early Upper Paleolithic have been well studied in Europe, the countries of the Eastern Mediterranean, Central Asia, Mongolia, and the Altai. However, until today this period in Kazakhstan remained one of the least researched periods, since stratified sites of this time had been unknown in the region. The Shulbinka site, the only site close in chronological terms, had not been fully explored and is now covered by the waters of Shulba Reservoir.

The site of Ushbulak-1 is located in the north-east of the Shilikty Valley, not far from the Dzungarian Gate – the pass between the mountains of the Dzungarian Alatau. Since ancient times these natural passageway was used by the nomadic tribes who traveled from the Central Asia to the territory of the present-day Northern China and Mongolia. Later, one of the branches of the Silk Road passed through this area.

During the expedition, the middle- and upper-stream of three springs separated by the distance of 300–400 m, have been investigated. The thickest part of loose deposits was preserved in the vicinity of the Vostochny spring which differed from other springs by the lowest flow power. In its upper-stream, the spring has the height of the banks reaching 5–10 m. The spring originates from under a rock outcrop bounded by small ravines on two sides. Abundant archaeological artifacts were found at a hundred-meter long section of the spring starting from the source. Artifacts occurred in great numbers directly on the spring bed. Collections of exposed artifacts and subsequent excavations consist of approximately 2000 items. In addition, the remains of two representatives of the Pleistocene fauna – an argali and onager – have been found.

Excavations were done on the left, higher and steep, bank of the rivulet (Fig. 1). An test pit was made approximately 15 m from the source of the stream (pit 1) perpendicular to the slope and going down in several steps to the total depth of 6 m. The lowest boundary of the excavation area was located 0.5 m below the water level. Seven geological layers have been identified in the section; six of them contained archaeological artifacts. In total, over six hundred lithic artifacts have been found *in situ* condition. According to the structure of the industries, technological features of the artifacts, its stratigraphic position, and accompanying faunal remains, three main cultural and chronological assemblages have been preliminary identified, comprising the Holocene assemblage (layer 1), the Upper Paleolithic assemblages (layers 2–4), and the Initial Upper Paleolithic assemblages (layers 6–7).

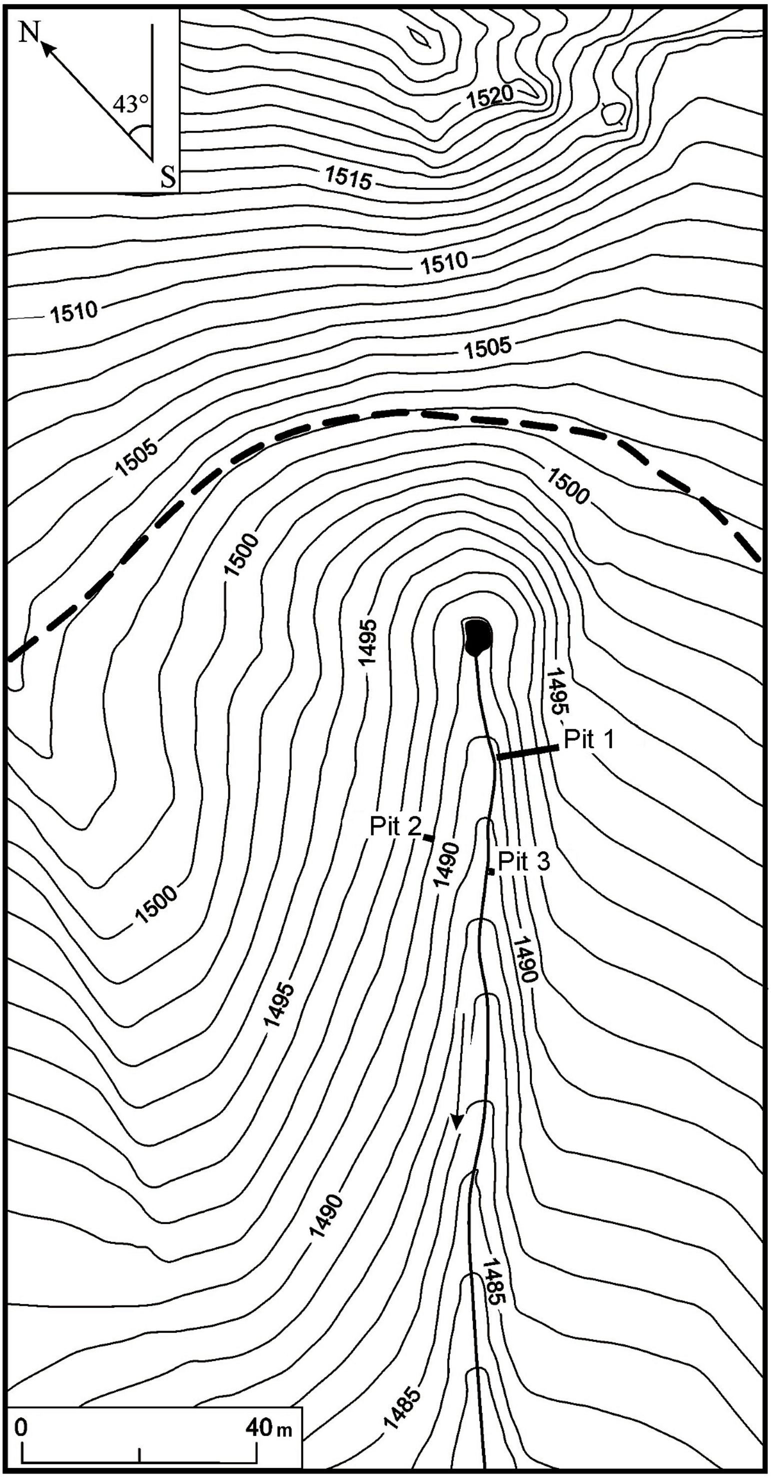

Fig. 1. Ushbulak-1 site. A layout of excavation of 2016.

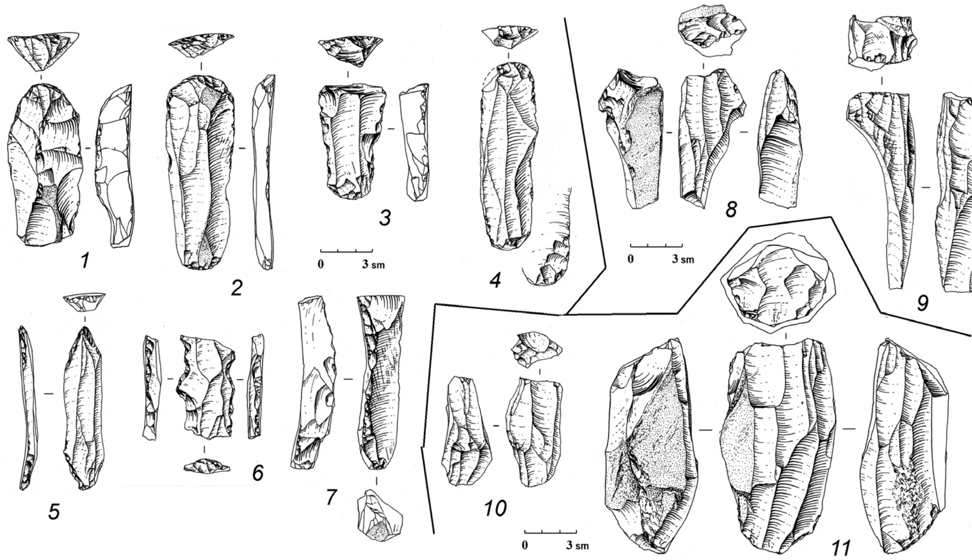

Fig. 2. Ushbulak-1 site. Artifacts from the layer 6.
1–7 – tools; *8, 9* – technical spalls; *10, 11* – cores.

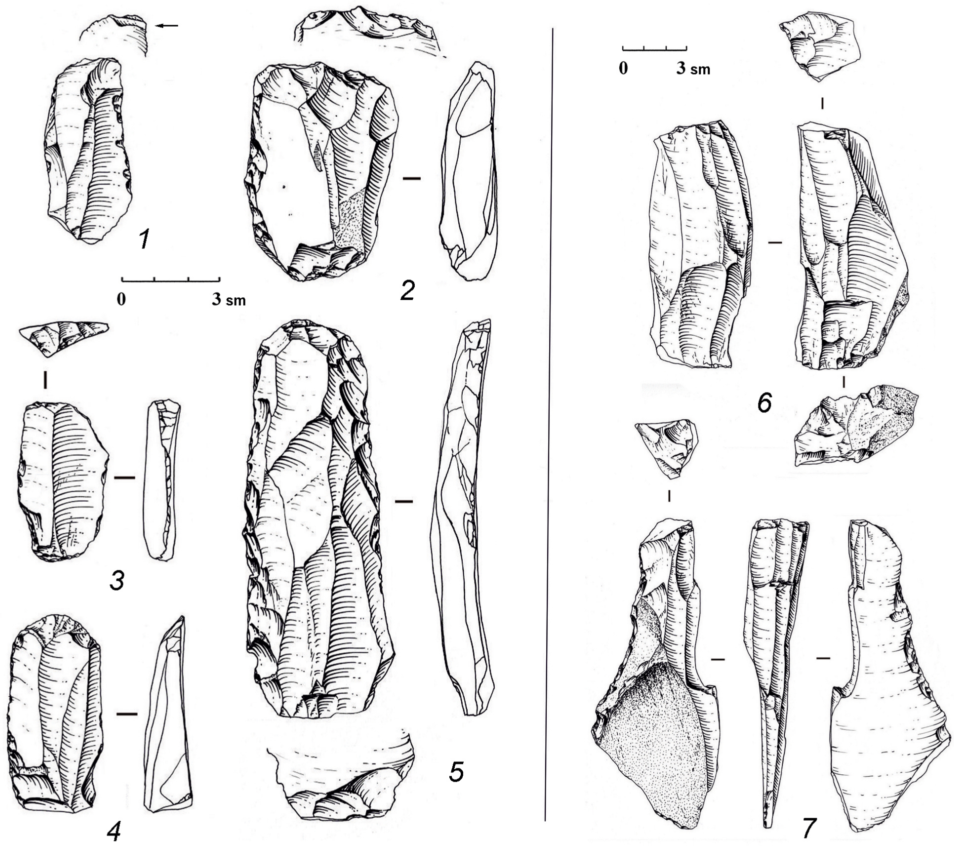

Fig. 3. Ushbulak-1 site. Exposed artifacts.
1–5 – tools; *6, 7* – cores.

The Initial Upper Paleolithic assemblages from the lowest layers 6 and 7 (test pits 1 and 3; 598 items) contain blade cores with the opposite *semi-tourné* platforms, numerous technical spalls, end scrapers on large blades, including those with ventral base thinning, truncated blades, and a tanged point (Fig. 2). Actually all cores were intended for blade production. Elongated blanks account for over 70% of the blanks. With rare exceptions, the striking platforms are smooth. Large numbers of blanks manifest various methods of overhang reduction including picketage method. Technical spalls well correspond to the cores. The majority of technical spalls (crested and semi-crested, plunging, and blade *debordantes*) also correspond to laminar volumetric and semi-volumetric flaking. Generally, due to the morphology and technological features, *in situ* industry from the layers 6 and 7 correspond to the exposed artifacts found at the site, which also include the tools typical to the Initial Upper Paleolithic, such as burin-cores (Fig. 3).

The fact that almost all exposed artifacts (from the spring bed) originated from layer 6 is confirmed not only by their technical and typological features, but also by the geomorphological situation at the site.

The presence of several specific types of artifacts (burin-cores, end-scrapers with ventral thinning, truncated blades, tanged point, etc.) makes it possible to attribute the assemblages from layers 6 and 7 to the initial stages of the Upper Paleolithic (45–35 kyr BP). Another indication is the predominance of blades among the blanks, including large blades up to 20 cm in length, and the use of specific methods of overhang reduction (picketage).

The finds from layers 2–4 apparently correspond to the latest stages of the Upper Paleolithic. They are separated from the lower layers (6 and 7) by a significant time gap, as indicated by almost one and a half-meter thick layer of archaeologically sterile deposits (layer 5) and fundamentally different lithic industry. The blades are much smaller there compared to the lower layers; the percentage of flakes is much higher; the size of the blanks is smaller; only few cores with overhang reduction. The absence of the formal tools in that collection does not yet make it possible to accurately correlate it with any specific period of the Upper Paleolithic.

The assemblage from layer 1 concluded 10 items belongs to the Holocene due to its occurrence in the humus horizon of the present-day soil, as well as pottery fragments, some lithic artifacts, and modern fauna bones.

Excavation pit 2 revealed nine artifacts occurring in three cultural layers (spalls and two cores). These materials, most likely, should be attributed to the latest stages of the Upper Paleolithic.

Thus, the site of Ushbulak-1 is a multi-layer site with the lower layers belonging to the Initial Upper Paleolithic (45–35 kyr BP). Judging by the composition of lithic industry, the materials from layers 6 and 7 correspond to the workshop at the outcrops of raw materials, located in the shore area of freshwater lake. At the same time, at least two habitation horizons can be clearly seen in the lower part of layer 6; each of them corresponds to a single short-term occupation event at the site.

Due to the presence of specific tool types, the Ushbulak-1 lithic industry is similar to the stratified assemblages of the Initial Upper Paleolithic found in Southern Siberia (Kara-Bom, etc.), Northern Mongolia (Tolbor-4, etc.), and Northern China (Dzungaria, Ordos). Since Ushbulak-1 has transitional geographical position, it possible to consider all mentioned industries as one technological Initial Upper Paleolithic variant in North-Eastern Central Asia. In the latest periods of the Upper Paleolithic up to the Holocene, this area was repeatedly visited by the ancient peoples, but the duration of habitation was substantially shorter.

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PALAEOLITHIC STONE TOOLS WORKSHOP IN LENGGONG VALLEY, PERAK, MALAYSIA

Archaeogeological survey in Lenggong Valley have mapped 13 areas with Quarternary river gravel deposit. The thickness of the deposits ranges between 30-150 cm, and covers terraces between 72-183 m above sea level depending on the location of the sites. Many if not most are quartzite and quartz rocks. The studies also showed that all the river gravel deposits are located north of the present Chenderoh Lake. A interpretation for the location and varying thickness of these river gravel beds could be that as the rivers (the Perak River and its tributaries) entered a palaeolake and their currents slowed down or when they changed their course they deposited the gravel along their shores or at their new channel. Thus the Lenggong Valley was provided with a wealth of natural material (river gravel) for any ancient stone tool industry. The significant open sites in Lenggong Valley are located on these gravel terraces. Therefore, with the abundance of stone resources beside other factors such as a suitable environment with wealth of fresh water, fauna and flora, prehistoric man selected Lenggong Valley as their habitation site. Excavation have been carried out at the open site of Bukit Bunuh, Kampung Temelong, Bukit Jawa and Kota Tampan. All the sites was used as a Palaeolithic stone tools workshop. These showed that Pleistocene populations in Lenggong Valley during the Palaeolithic period chose river gravels as the raw material for stone tool making. The lithic assemblage of all of these workshop sites has been classified into cores, anvils, hammerstone, pebble tools, flake tools and debitage. The present and association of these artifacts suggest a functionally-related site. Being undisturbed sites means that all the open sites can contribute to an understanding of Palaeolithic stone tools classification and technology while also throwing light on the loose finds from Palaeolithic sites in Southeast Asia.

The Uniqueness of Lenggong Valley

The Lenggong Valley is located at latitude 5^0 07’ 03”N and longitude 100^0 58’ 03”E, in Peninsula Malaysia (Figure 1). Lenggong Valley contains a large number of undisturbed *in situ* Palaeolithic sites, in the river gravel deposit as a raw material for stone tool making. In this respect, Lenggong Valley is unique outside of Africa and of extraordinary importance for the study of the culture of Palaeolithic Man. Generally, i*n situ* Palaeolithic site are extremely rare because these site can date back a few millions years ago and over a such a long time period, natural processes and human activities are bound to disturb the original archaeology context. Therefore, the evidence of Palaeolithic *in situ* sites in Lenggong Valley is very unique especially from the sites of Bukit Bunuh and Kota Tampan.

The extraordinary survival of early Palaeolithic evidence at Bukit Bunuh is due to the fact that a meteorite strike 1.83 Ma preserved many Palaeolithic stone tools in the melted suevite formed by the meteorite impact. This is an indirect evidence for hominid presence in the Lenggong Valley at around 1.83 million years ago. Therefore, Bukit Bunuh demonstrates hominid presence from as early as 1.83 million years ago. This showed that the cause and date of site abandonment in Bukit Bunuh was determined. The same data was detected in Kota Tampan site. Presence of ash from the last catastrophic Toba volcanic eruption in the *in situ* Kota Tampan site suggests that man

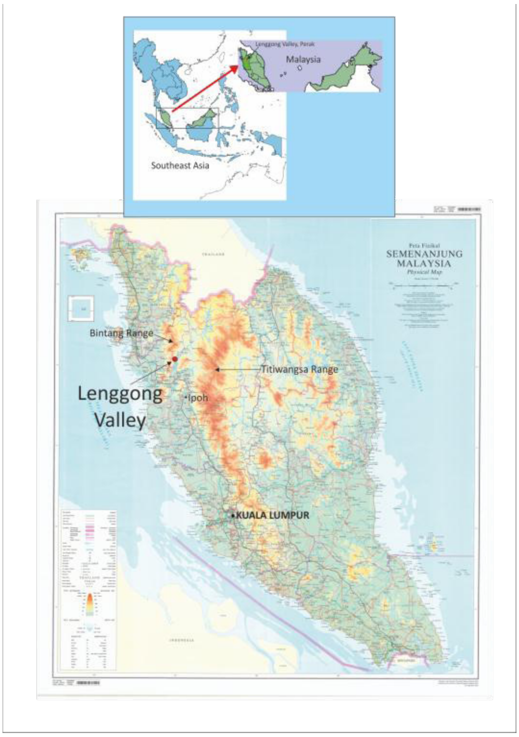

Figure 1: Location of Lenggong Valley in Peninsula Malaysia

had to suddenly flee the site because of this major eruption around 74,000 years ago, leaving behind his tool making equipment and both finished and unfinished tools in the workshop. In short, the Lenggong Valley through sites of Bukit Bunuh and Kota Tampan revealed *in situ* Palaeolithic workshop using river gravel as raw material. Because of the *in situ* situation, both sites can be dated chronometrically. And from the function as a Palaeolithic stone tool workshop, both sites reveal the technology of stone tool making and also the types of stone artifact that they used and produced.

Issue In Southeast Asia Palaeolithic Artifacts

In Palaeolithic archaeology of Southeast Asia, classification of stone artifacts has for the most part been based on selected portions of the collections. In the past, emphasis was placed on pebble tools. The most influential of this classification was provided by Movius (1944). He emphasized pebble tools in his description and analysis, and others after him has used his scheme very closely and often neglected to analyze the larger proportion of the flakes present in the collections. The classification of stone tools from Sai Yok, Thailand also emphasized on the pebble tools (Heekeren, 1972). In Southeast Asia where pebble tools persists with little change through time, it is especially important to analyze and define total collection of artifacts in order to understand the development of lithic tradition and cultural sequence. For the preceramic period, stone artifacts are our strongest clue to the past activities. Sorensen (1988) showed interest to analysis the flake tools.

Prior to the excavation of Kota Taman in 1987, little was known about how prehistoric people made stone tools in Southeast Asia and it had been assumed that the lithic tradition in this part of the world was under-developed. The classification of Kota Tampan assemblages (Zuraina, 1989), which are *in situ*, contribute the first complete Palaeolithic stone tools classification. The Kota Tampan classification was tested by Mokhtar (1997) with the site Temelong assemblages and found it is applicable. Excavation at Lawin (Mokhtar, 2006) and Bukit Bunuh (Mokhtar, 2012) also confirmed the classification. Latter, in 2009, research in Bukit Bunuh revealed the first handaxe in Malaysia dated more than 1.83Ma, contributed to more complete classification of Palaeolithic stone tools in Malaysia.

In any discussion of Southeast Asia Palaeolithic assemblage, especially manufacturing and classification of artifacts, mention has to be made of Movius (1944, 1948) influential works. Movius (1944:91) described the process of reduction as the “shattering process”. Based on the evidence from Bukit Bunuh and Kota Tampan, it may conclude that shattering was one of the methods used, but it does not portray the critical element in tool production, as flakes were also produced by methods other than shattering. What is more pertinent is that they chose to select pebbles or flakes that were suitable as tools.

Open Sites

A total of 13 open sites at Lenggong have been mapped in details. Excavations have been carried out at the open sites of Bukit Jawa, Kampung Temelong, Bukit Bunuh and Kota Tampan. However, until today, only Bukit Bunuh and Kota Tampan have a chronometric dates. Bukit Bunuh was dated more than 1.83Ma, 40Ka and 30Ka, meanwhile Kota Tampan dated 74Ka. These showed that Pleistocene population during the Palaeolithic period chose river gravels as the raw material for stone tools making (Zuraina 1989, Mokhtar 1997, 2006, 2012). Generally, both sites, Bukit Bunuh and Kota Tampan are presently on a hill slope but it was on a shore of the ancient Chenderoh Lake during the Pleistocene. The Chenderoh palaeolake interpretation is based on a study of topographic map, geomorphology and field mapping. Among the evidence today indicating a palaeolake are high terraces, overfit valleys, landslide scars and a palaeolake outlet (Zuraina and Tjia, 1988).

The Lithic Workshop

Palaeolithic open site in Lenggong Valley exposed a thick cultural layer of stone anvils, cores, hammerstones, stone tools and debitage. Excavation of all of these open sites revealed *in situ* evidence that they were used as workshop to produce Palaeolithic stone tools. Boulders had very distinct battered marks on the top surface, suggesting they were used as anvils. Flakes and chips were found around these boulders further confirming the function. The chunks were cores whose detached flakes were found within an approximately 0.25 m radius. Some of these flakes could be matched to their respective cores. The cores and anvils for instance, also showed attributes that were repeatedly found on many pieces, suggesting they were not natural. Instead, they revealed the existence of a system of production. Flakes were present in the thousands in the excavation and could not all have been broken and concentrated in the sand and gravel by natural processes. All of the flakes edges are sharp, whereas they would have acquired rounded edges if they had been naturally transported.

Furthermore, the cores and anvils showed attributes that were repeatedly found in many pieces and this suggests that they were deliberately and consistently worked on. The flakes and cores also showed straight flaking surfaces, which can only be produced on quartzite (dominant cores) by a skilled hand with keen knowledge of the lithology of the selected material. In summary, based on the evidence provided by the assemblages found in situ, it has been deduced that the following techniques were used in the manufacture of the lithic tools, (i) direct method of flake production- a core is struck directly againts a fixed anvil or a large round pebble (hammerstone) is used to flake a core, (ii) indirect method of flake production- a small round pebble (hammerstone) is used to strike at a core held against an anvil or perhaps a limb, and (iii) trimming method- a small hammerstone is used to flake or retouch pebble or flakes on an anvil.

Classification

Palaeolithic stone artifacts bear marks of human manipulation through flaking, bashing, trimming or utilization. From a recurrence of certain forms and the association of these artifacts, certain major categories were visible- those that are the tools of production, namely anvils, cores and hammerstones, those that are the products of manufacture, namely pebble and flake tools and those are the waste products of manufacturing, the debitage. The spatial arrangement of artifacts observed during the excavation, together with the position of anvils showing battered marks on their top surface, the cores and flakes that could be conjoined, and the sharp flakes and flaking surface of cores also confirmed our lithic artifact classification.

As would be expected at lithic workshop, the largest proportion of artifacts was waste material or debitage. It was evident that some artifacts were of dual purpose, for instance, a broken anvil could be utilized as a core. In such case, characteristics of both artifacts would be visible on the boulder, bashing marks as well as flake removal sufaces/scars. Also as expected, there were unfinished pebble and flake tools, and the numbers of completed pieces were low, as upon completion a large proportion of them would have been taken away and used.

In constructing the classification, certain categories were distinct and straightforward – anvils, cores and hammerstones, the equipment for production. The debitage, identified as the unutilized waste, was found in various sizes and shapes- chunks, flakes and chips. Classifying the end product of manufacture, that is, the tools produced for direct use or for the production of other tools, required more times and effort to obtain a satisfactory set of attributes for the types, that is, one which reflects the cohesiveness of a group of artifacts as a type, and separates it distinctly from other types.

Since the purpose of the classification was to detect the internal order in the lithic assemblage, to interpret function and behaviour, on the basis of which a typology could be constructed that would clearly communicate to others the internal pattern of the assemblage, it was decided that weight-mass was not a meaningful a criterion as form (pebble and flake). Thus, this classification distinguishes between pebble and flake tools. A tool type within each of these two broad categories was distinguished according to several morphological and technological attributes. Therefore, a classification that combines both technological and morphological criteria in its definition of types.

Anvils

Anvil is a stone of relatively hard stone placed on the ground or steadied by other means, against which a core can be struck in order to be flaked, a piece of pebble can be struck in order to be shaped, a flake or pebble can be placed in order to be retouched by hammerstone. Thus, anvils can be differentiated from other artifacts based on two attributes, (a) has a stable base (natural or flaked) and (b) a surface with usage marks opposite to the stable base, Therefore, Palaeolithic people used anvils as a work base. An unstable anvils will be flaked to make it stable.

Cores

Core is a raw material from which flakes and blades have been taken, in order to provide blanks for tools. So, core is a mass of material often preformed by the worker to the desired shape to allow the removal of a definite type of flake. Therefore, core is a piece of isotropic material bearing negative flake scars, or scar. Core can be differentiated from other artifacts due to its flake face/scars or facet which is different from flakes on other artifacts, which attributes that have (a) no marks found on the opposite side of the flaked face as found on anvils, and (b) the facets were made in many directions without taking into account the edge-angle produced. Analysis on cores revealed that the both sites Palaeolithic people used cores to obtain flakes.

Hammerstone

Hammerstone is a stone as a natural striker for knapping or retouching other stones. Hammerstones can be differentiated from other artifacts through three main atributes, (a) flaked and pitted marks on the pebble section, (b) all of them were the size of pebbles, which can be held in one hand, and (c) is long or round pebble. All three attributes suggests that the hammerstones were used to hit and break other stones. The stone tools analysis revealed that the both sites Palaeolithic people used hammerstones to flaked tools and pebbles, and trim edge-angles on pebble and flake tools. Therefore, the size, type and location of the usage marks found were according to the work it was used for.

Pebble Tools

Pebble tools are stone tools which can be differentiated from all other artifacts based on two attributes, (a) it maintain pebble shape even though after being flaked, and (b) flakes were made to produce edge-angles that could be used. Both sites pebble tools can be further divided into six types according to the morphological and technological criteria, which are (i) chopper, (ii) handaxe, (iii) palaeoadze, (iv) oval unifacial, (v) oval bifacial, and (vi) others pebble tools.

Oval Bifacial Pebble Tool

The bifacial pebble tool can be differentiated from other pebble tools according to several attributes, (a) the tool is flaked bifacially and surrounding on its sides, and (b) oval shaped. Some of the bifacial tools are flaked at the same angle on both faces, and some are flaked at different angles on each face.

Other Pebble Tools

Pebble tools in this category are pebble tools that could not be categorized into the prior categories. This category consists of pebble tools with different shapes and edge-angles in an amount too small to categorize into own group. For example, the flat notched pebble tool, the flat trimmed edge-angle pebble tool and flat-round perimeter flaking pebble tools.

Flake Tool

Flake is a general term which denotes a fragment of stone which is detached either from a core during its preparation (roughing out flake, preparation flake), or from a pebble, slab, core, anvil, hammerstone, possibly for later working into a tool(knapping flake, debitage flake) or from a tool during manufacture (retouch flake). Therefore, flake tool includes pieces made on knapped blanks or on natural blanks. It also includes unretouched pieces whose function can be demonstrated by trace analysis. Flake tool classification were done according to its morphological and technological criteria. The flake tool can be further divided into three types according to several attributes, (a) with notches called the notched flake tool, (b) with a pointed shape called the pointed flake tool, and (c) a mixture of several shapes to form the multi shaped flake tool. Flakes with concave side call notches if the depth of concavity is greater than 1/9 of its width. Ordinarily notches are made by finely retouching one side of the flake or by removing a single large flake. Flakes with one notch is classified as a single notched flake tool, some with two notched located side by side is classified as a double notched flake tool and some with a series of notches is classified as a denticulate flake tool. Pointed flake tools are made by notching opposite site of a flake to form a sharp drill-like tip. Some tip much wider and stronger than others that look like a becs.

Debitage

Debitage is discarded garbage or debris resulting from the manufacture of lithic tools. Debitage can be differentiated from other artifacts according to a few attributes, (a) if it has edge–angle, it does not show any sign of use or trimming, and (b) no sign of work such as a smash sign for a hammerstone, flake sign for a core abd no sign of work for an anvil. The debitage comprises of chunks, flakes and chips. Debitage analysis proves the sites are in situ as there are debitage which can be reattached to its original shape. Other than that debitage analysis indicates manufacturing technology is more influenced by stone fissures because the debitage formed has no specific shape. Therefore, the classification of artifacts using the morphology and technology criteria has built a stone tool typology for this site. The Palaeolithic community use anvil, core and hammerstone to create and mould their pebble tools and flake tools.

Summary and Discussion

Prior to the excavation of Lenggong Valley in 1987, little was known about how prehistoric man made stone tools in Southeast Asia and it had been assumed that the lithic tradition in this part of the world was under developed. Because Lenggong Valley revealed an undisturbed Palaeolithic stone tool workshop sites, the association of artifacts (raw materials, finished as well as unfinished tools, and tool making debris) is clearly visible. This assemblage of artifacts has revealed and made possible the identification and classification of multiple tool types with specialized functions and is evidence of a Palaeolithic lithic technology in Southeast Asia as sophisticated as anywhere else in the world. Furthermore, this in situ stone tool workshop provides a means to understand the cognitive behaviour of the tool makers. Their choice of raw material, an understanding of lithology, and an efficent method of production reveal a rational and systematic approach to tool making. This has made Lenggong Valley Palaeolithic sites as an important global reference for Palaeolithic stone tool making.

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NORTHEAST ASIAN MICROLITHIC INDUSTRIES SEEN FROM SUYANGGAE TYPOLOGY

Microlithic Culture is recognized broadly distributed in the Northern Hemisphere from the beginning to terminal stage of the Upper Paleolithic. Especially in the Northeast Asia, researchers have paid a lot of attention to microblade-cores in the period displaying various changes coming from development of the lithic technology. It is thought reflecting spatio-temporal variation in adapation to changing enviroment, related to human migration and diffusion of technology as well. Thus, by careful investigation for types of microblade-cores, we expect to reveal differences in aspects of flaking technology and lithic organization at each site. In that perspective, application of a well established typology of microblade-cores can be powerful to analyze a wide variety of dataset. In this paper, we apply the Suyanggae Typology of microblade-cores to some Siberan cases by making a comparative review, to examine its effectiveness.

In Korea, microlith was first found at the Seokjang-ri site in 1964, Since then, many excavations and analyses from various angles have been conducted, and with the accumulation of data, it is now possible to reconstruct the production process of microlith at each site. They are found distributed in the central to the southern Korean Peninsula.

So, about 200 Paleolithic sites are found in Korea up to the present, and there have been found about more than 60 sites in Korea that contain microblade industry. Among them, some sites are comprehensible to understand a series of microblade production process. Especially, in 1983, the Suyanggae site yielded a large lithic assemblage including microlith. As much as 250 specimens were typologically analyzed as microblade-cores for the first time in the Korean Paleolithic study.

The microcores are classified into 4 types; type I as wedge-shaped, type II as boat-shaped, type III as conical-shaped, and type IV as burin-shaped. And these microcores are also subdivided into 8 types based on process of core preparation and microblade flaking. Type IA is prepared core blanks by bifacial reduction and microblades flaking beginning lengthwise. It is similar to the “Rankosi” type in Japan. Type IB is prepared core blanks by bifacial reduction and microblades flaking beginning from crosswise. It is comparable with commonly called the “Yubetsu” or “Sakkotsu” type. Type IC is prepared core blanks by unifacial reduction and microblades flaking beginning from crosswise. It is similar to the “Tougesita” type.Type II based boat shaped is separated by two method of platform preparation; IIA is used the originally flat surface, and IIB is used the ventral surface of a flake for core platform. Type III as conical-shaped, subdivided into 3types based on microblade detachment; type IIIA is proceeded on narrow side of core, IIIB is used the wide front side of core, and IIIC is used the all side of core.In Suyanggae Loc.I, most of the microblades were produced by the method of type IB, removing a spall along the long axix of the core, which resembles the Yubetsu Technique proposed in Japan.

From the microlithic sites in Siberia, there were also found various types of microblade-cores. Most of them are wedge-shaped. Especially, numerous cores classified as Type IB, the main type of the Suyanggae site, were excavated from the northeastrn Siberia such as the Kurla near the Bikal, mid-lower reaches of the Lena River, Selemdja near the Amur River, Maritime Province, and Sakhalin. Along with the microblade-cores, there were also found bifacial blanks and ski spalls to produce microblade-cores. In this study, we have observed about 160 pieces of microblade-cores from 32 sites in 9 different localities including Sakhalin. Through refitting of the materials, it was possible to reconstruct the production process.

As a result, the microblade-core types that were not composed at Suyanggae Loc.I has been revealed in each area of Siberia. That is, the complexions of production appear different that multiple technical system are observed. These difference are believed to reflect temporal changes as well as regional variations. However, this examination only provides us with limited information as a preliminary research. It is essntial to secure fundamental data by more detailed examination to every particular item. We hope this study to be the first step of comparative study on microlithic culture in the North-East Asia.

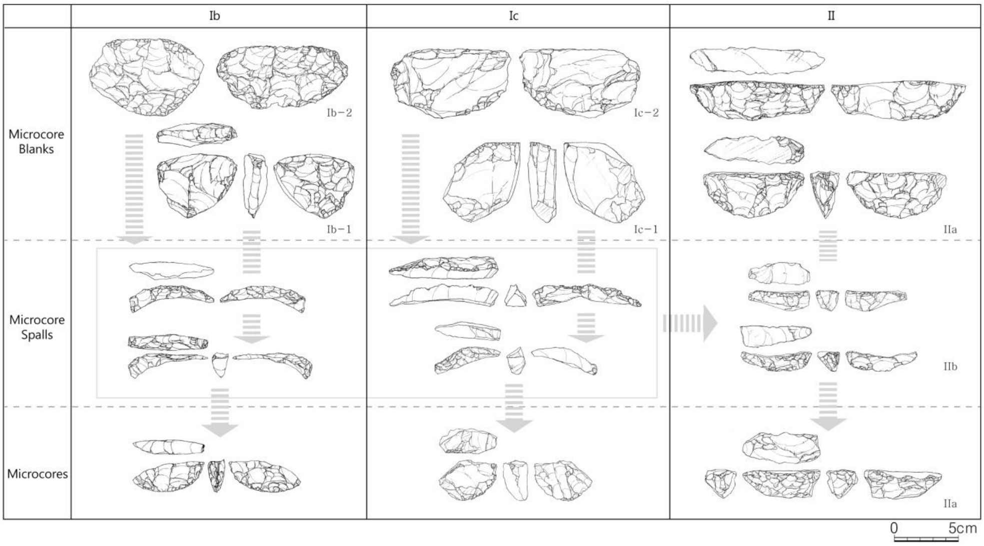

Fig. 1. Microblades production process at Suyanggae Loc.I

Fig. 2. Distribution of Microlithic Culture in North-East Asia

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ИСТОРИЯ ИЗУЧЕНИЯ ПОЗДНЕГО ПАЛЕОЛИТА СРЕДНЕЙ СИБИРИ

В 1874 г. в г. Иркутске при строительстве «Военного госпиталя» сотрудниками краеведческого музея (Черский И. Д., Витковский Н. И. и др.) была открыта первая палеолитическая стоянка в России и в Сибири.

Позже на р. Енисее в окрестностях г. Красноярска в 1884 г. Савенковым И. Т. была найдена палеолитическая стоянка «Афонтова гора», которую изучают более 135 лет, до настоящего времени: Громов В. И., Аурбах Н. К., Сосновский Г. П., Абрамова З. А., Цейлин С. М., Астахов С. Н., Дроздов Н. И., Артемьев Е. В., Деревянко А. П., Славинский В. П., Хазартц П., Чеха В. П. В результате многолетних работ многослойное поселение на Афонтовой горе было разделено на пять отдельных стоянок.

Интенсивное изучение палеолита в Средней Сибири начинается со строительством каскада гидроэлектростанций на р. Ангаре и Енисее.

При строительстве Красноярской ГЭС с 1960 по 1975 год работами палеолитического отряда (Абрамова З. А.) Красноярской археологической экспедицией (Грязнов М. П.) в зоне водохранилища были открыты десятки позднепалеолитических памятников.

В 1979 г. Абрамова З. А. в своей работе «Палеолит Енисея» все палеолитические памятники разделила на две культуры «Афонтовскую» и «Кокоревскую».

Палеолитические памятники в верховьях Енисея были найдены и изучены Астаховым С. Н., Васильевым С. А. при строительстве Саяно-Шушенской ГЭС. Их культурная принадлежность не входит в ареал «Афонтовской» и «Кокоревской» культур.

В это время в предгорной части Хакасии Ларичев В. Е. находит и долгие годы изучает многослойную палеологическую стоянку Малая Сыя.

На р. Ангаре самой северной является многослойная палеолитическая стоянка Усть-Кова. Три культуросодержащих слоя: нижний более 32 т. л., средний – 23–18 т. л., верхний 14 т. л. выделены в новую Ковинскую культуру.

В 2008–2012 гг. при строительстве Богучанской ГЭС найдены и раскопаны еще пять позднепалеолитических стоянок, дополняющих Ковинскую культуру (Дроздов Н. И., Дроздов Д. Н.).

На реке Кан Медведевым Г. И. и Генераловым А. Г. раскопана многослойная палеолитическая стоянка «Стрижовая гора».

Изучение стоянки «Лиственка» на Енисее Акимовой Е. В. дало возможность выделения 18 культуросодержащих слоев и найти антропологический материал.

Поздний палеолит в Средней Сибири датируется в пределах 34–12 т. л.

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PALEOLITHIC OF NORTHERN ANGARA REGION

The Northern Angara region, comprising a big part of the Krasnoyarsk Territory, is located in the lower reaches of the Angara river that empties into the Yenisey.

Archeological settlements of the Northern Angara region have been known since the second half of the XIX th century**.** N. I. Vitkovsky discovered the Chadobets Neolithic settlement and petrogliphic drawings on the Aplinsky and Mursky rapids stones in 1882. In 1937 A.P. Okladnikov found the first Paleolithic Ust-Kova settlement which later became a key monument of Late Paleolithic (32–14 th. years B. C. in the Northern Angara region). The Ust-Kova Paleolithic settlement was studied for 35 years. Over the time of studying three cultural levels were identified: in the Karginsky destroyed soil (32ka), in the Early Sartan deposits (24–18ka) and in Late Sartan ones (14ka). In the layer 24ka unique objects of art were found – a mammoth figurine painted red and black, a figurine of “a bird”, graphic presentation of a horse, pendants, bored beads, etc.

Late Paleolithic monuments were discovered during the rescue excavations by specialists of the Institute of Archeology and Ethnography of the SB of RAS before flooding the water storage reservoir of the Boguchany Hydro-Electric Power Station.

The Kolpakov brook settlement was located on the left bank of the Angara, 25 km from the township of Kezhma down the river. It is a multilayer settlement: a paleometal layer, a Neolithic layer and a Paleolithic one. The latter occurred at the depth of one meter and more in finely broken stone and sand of eolian origin. In this layer 560 artifacts were found.

The Dvorets multilayer settlement was located on the left bank of the Angara river, on the 25 meters high terrace, 5 km down the village of Dvorets. At the depth of 2 meters, in the layer of Late Sartan clay-loam soil (16–17ka) artifacts of Late Paleolithic were discovered.

The Kosoy Byk multilayer settlement was located on the left bank of the Angara, onthe20 meters high terrace, not far from Kosoy Byk village. The Paleolithic layer was discovered at the depth of one meter and more. The artifacts found in the culture layer are 18-14 thousand years old and are close to the Ust-Kova culture in terms of their basic features.

The multilayer settlement of Beryamba was located on the right bank of the Angara, in the estuary of the Beryamba river, 7 km up the stream from the township of Tayozhny. The settlement was located on the 10 meters high terrace. The Paleolithic layer occurred in the north-western sector of the monument at the depth of more than one meter in the light-gray carbonatized clay-loam soil. The artifacts are dated to belong to the Late Paleolithic period, within the limits of 22–14 ka.

Thus over the past years (2008-2012) in the area of the Boguchany water storage reservoir in the Northern Angara region 4 new Paleolithic monuments dated within the limits of 24–12 ka were discovered. The archeological materials can be referred to the middle complex of Ust-Kova culture (24–12 ka).

At present all these archeological monuments are submerged by the waters of the Boguchany water storage reservoir. The archeological collections are kept in the museum of the Institute of Archeology and Ethnography of the SB of the RAS, in Novosibirsk.

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STUDY OF MICROBLADE INDUSTRY IN SIBERIAN, KOREAN AND NORTH CHINA AND ITS CULTURAL RELATIONS WITH CONTIGUOUS TERRITORIES

Key words: Microblade industry, North China, cultural relations, Selemdga Upper Paleolithic complex, Northeast Asia, micronucleus, Altai,Yenisei, Baikal.

Siberian is geographically adjacent to North China and Korea, Amur river basin in southern part of Russian Far East and Maritime region. This factor satisfy the condition of sharing same cultural area and it works the similar in microblade industry of Upper Paleolithic. Microblade industry in Northeast Asia shows a pattern of expending, in around 25,000 years including Russian Far East.

The main Paleolithic sites in the region of North China are consisted of Shuidonggou, Xiachuan, Hutouliang, in addition to this, several sites have been discovered and studied. The feature of microblade industry in North China is that, existence of wedge shaped core which is based on bifacial technique holds a majority, and even the existence of this kind of core continuously had been continued in the end of Upper Paleolithic, Partially there is a little difference but, the basic aspect is similar to Selemdga Upper Paleolithic complex and microblade industry of Korea.

In the first stage of microblade industry, it is characterized to appear small blade core and small blade. Stone tools using blade and flake had been abundantly found. It is not a typical microblade industry in Northeast Asia.

In the second stage, type of микронуклеусы had became diverse and miniaturization of stonetool had been settled. Wedge shaped core on the bifacial preform started to appear.

Even in the third stage, wedge shaped core on the bifacial preform had been continued and small stone tools such as nail shaded end-scraper, several kinds of burin, leaf shaped biface and arrowhead had been found.

Therefore, after the second stage, typical microblade industry had been appeared in North China, It is assumed to result of peopling migration from Selemdja complex, Russian Far East. In the end of Upper Paleolithic, North China kept on the similar character of microblade industry, which is found in the Russian Far East and Korea.

In addition, the Russian Altai, Yenisei River Basin, Baikal, such as these areas, the Tradition of microblade technology also have a strong similarity and genetic linkage with the Northern China and the Korean Peninsula.

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THE SITE USHKI-V (KAMCHATKA) AND ITS PLACE IN THE PERIODIZATION OF THE ARCHAEOLOGICAL CULTURES OF THE NORTHERN FAR EAST OF RUSSIA

The Late Pleistocene and Early Holocene sites from Ushki Lake (Ust-Kamchatsky district, Kamchatka peninsula) are among the most important sites for the understanding of the archaeology of North Pacific region.

The Ushki Lake sites were discovered by Nikolay Dikov in 1961 and they have been investigated up to the present time. Five sites have been discovered (Ushki-I to Ushki-V). The stratigraphic profile of the sites comprises seven cultural layers, although every layer is not necessarily represented at each of the sites. Only two of them (Ushki-I and Ushki-V) contain the seven cultural layers, presented here from youngest to oldest.

The site Ushki-V was discovered in 1964 by N. Dikov. After his death M. Dikova continued to study the Ushki-V site. Since 2004, a team of the North-Eastern State University (Magadan) continued to study the site under the guidance of I. Ponkratova.

Detailed dates from volcanologists on tephrochronology of Kamchatka, based on hundreds of radiocarbon dating, were «projected» in archaeological profiles. I. Melekestsev and M. Pevzner identified in the archaeological profiles of the specific ash eruptions, reported their dating. We made an instrumental survey of the topographic plan of the site Ushki-V, analyzed stratigraphy and the complexes of artifacts of the site.

The site Ushki-V is located on the Big Cape of Ushkovskoe lake. The coordinates of the site at GPS: N 56°09,969’, E 159°56,608’. The height of the site Ushki-V above sea level is 37 m, above the river level – 3 and 9 m.

According to the results of our research we have identified four stages in the settlement of the Ushki site. These stages correspond to the three eras: the first and second stages of settlement of the site Ushki-V are the transition from Paleolithic to Neolithic period; the third stage of settlement is the Initial Neolithic era; the fourth stage of settlement is the Early Neolithic era. Each stage has its own characteristics.

The first stage is the transition from Paleolithic to Neolithic period (post-glacial period, late Pleistocene). The chronological framework (11–9 thousand years). The climate of this stage is dry cold, the most severe all in the past. Dominate the cold tundra with the steppes. Typical representatives of the tundra-steppes herbaceous and shrub communities are alder, birch, green mosses, ferns and other. The fauna of this period: bison, bighorn sheep, Pleistocene horse, lemming, reindeer, moose, and birds (probably ducks), fish of the salmon species, rabbit, gopher and other.

During this period, the site Ushki-V was settled twice. The first stage of settlement matches early Ushkovsky culture. Its chronological framework: 10960–11320 B.P. This period is characterized by the predominance of seasonal of field sites from the ground one and two-chamber dwellings with open, without a stone lining, fireplaces; workshops for the manufacture of stone tools and decorations; burials, accompanied by grave things and ochre. Stone tools of this period: hunting and processing of its products tools (bifacial arrowheads and dart with stem, instruments for processing of hides (scrapers, piercings, adzes), butcher knives (symmetric and asymmetric foliaceous biface), tools for permanent household purposes (flakes and chips without secondary processing), tools for fish processing, tools for working wood, bone, stone, decorations. Raw material base of stone products consists of high quality raw materials (obsidian, quartzite, chalcedony, flint, pyrophyllite, basalt, sandstone). The economy of the inhabitants of this period was based on the catching of various species of animals, birds, fishing, gathering. In the spiritual life there had been representations associated with the worship of fire and of the hearth, fishing magic, belief in the afterlife, which were recorded in special burials, accompanied by grave goods, ocher, as well as in decorations.

The second stage of settlement the site Ushki-V correspond to late Ushkovsky culture. Time frame: 10240-9487 B.P. This period is significantly different from the previous one. There is an increase in area settlements (more than 40 houses with a population of at least 100-150 people), changing the design of dwellings, the appearance of stone tools. At this stage there is the first evidence of domestication of the dog, and the first works of art in the form of small stone sculptures and graffiti. Constructive feature of dwelling are represented by several types: 1. Recessed in the ground (0.3-0.5m) mushroom-shaped with an entrance hallway and a closed hearth, 2. Ground dwelling without entrance hall with fireplace closed type 3. Large ground-wrong-oval, rounded or patriciawalker forms with one or more hearths of the open type. Stone tools of the second stage are: hunting and processing of its products tools (bifacially arrowheads loosestrife, laurel or teardrop-shaped, single-edge scrapers on massive of flakes, microscribe, re-used and micronucleus microplate), butcher knives (symmetrical biface, flakes, plates and the microplate with the utilization retouch), tools for processing fish, tools for working wood, bone, stone. For processing organic materials used cutters and saws. As adzes and chisels were probably used a kind of combination of tools (chisel, adze, perhaps micronucleus). For the processing of inorganic material (stone) used rumble strips on an elongated oval pebbles in the process of preparing preforms of cores and performing the primary processing of stone tools. The raw material base of the stone tools: obsidian, quartzite, flint, basalt, sandstone. The economy of the inhabitants of that period was based on catching the various species of animals, birds, fishing, gathering (faunistic finds its composition is identical to the first stage of settlement (the skeletal remains of Pleistocene mammals, birds, fish)). This stage is characterized by beliefs about the afterlife, a totemic conception. There are signs of ritual activity in the form of initiations.

The Initial Neolithic (early Holocene) is the second era. This the third period of settling the Ushkovsky sites (cultural layer V). The chronological framework (8000-6900 B.P.). This is the period of landscape adjustment, when the cold tundra steppe are replaced by marshy tundra. Its vegetation is dwarf birch, alder, moss, green mosses, aquatic plants and other. This period is characterized by mild, humid climate. This is the time of forming the first floodplain terrace with epithelial deposits and volcanic ashes. There is a reduction of the area of the settlement in comparison with the previous period; human habitation – looks like the tent-roofed hut with lesions without ring clutches with some stones. Stone industry of the period is represented by the cores and the products of primary cleavage (prismatic cores, flakes, plates), gun set (bifacially products; flakes and retouching plates; scrapers, pebble tool, etc.). A detection element of this stage is the obsidian scrapers on the plates and of flakes. Raw material base of stone artifacts is represented by obsidian, quartzite, flint, basalt, sandstone. The elements associated with the spiritual beliefs of this period are not detected. There was a disaster in this period, related with the eruption and ash fall of the volcano Hangar (6900 years ago), accompanied with a strong fire.

The Early Neolithic (middle Holocene) is the fourth stage of settlement of Ushkovsky sites (cultural layer IV). Chronological frame is 6000-3000 B.P. The mild climate is interrupted by cold. Birch forests with plentiful herbage: dwarf birch, alder, moss, green mosses, aquatic plants have been appearing. Ground dwelling in the form of plague or hut, open lesions, site-workshops on the production of stone products, household pits are typical for this time. During this period, a totemic conception connected with the cult of the fish. The most important innovation of this period is the emergence of traditions of ceramic production.

Stone industry of this period has fully formed Neolithic look. There were cores and products of primary cleavage (prismatic, conical macro and micronucleus, flakes, plates and fragments); gun set (retouched pointes on the plates; plates that are used as knives and fragments of plates with traces of utilization made of obsidian and basalt, cutters, chisels, sandstone bumpers); figures of fish. Raw materials for making stone tools of this era are represented by obsidian, flint, basalt, and rarely by jasper. The strategy of life-support of society of this period is focused on hunting, fishing and gathering, as evidenced by faunal complex, the nuts of cedar and etc.

The obtained results give new perspective directions of scientific searching, associated with field and theoretical research.

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COEXISTENCE OF THE TERMINAL UPPER PALEOLITHIC CULTURE AND THE INCIPIENT JOMON CULTURE IN HOKKAIDO, NORTHEASTERN JAPAN

The concern over beginning of using pottery has risen for approaching correlation between human adaptation and ecological change during the Pleistocene/Holocene transition in the East and Northeast Asia. Recent studies focusing on neolithization have revealed not only that appearance of pottery dated back to the Late Pleistocene in several regions of the East and Northeast Asia, but differences in the time and local context. The purpose of this presentation is to provide a specific example that non-pottery culture with microblade technology coexisted with early pottery culture in northeastern Japan, and discuss the matter as different social and cultural groups.

Jomon pottery in the Japanese Archipelago is one of the oldest pottery traditions in the world, dated back to the end of Late Pleistocene, this time is called “the Incipient Jomon”. The most of sites bearing pottery during the Incipient Jomon are belonged to the Late Glacial period, and mainly distributed in Honshu, Shikoku and Kyushu. On the other hand, in Hokkaido which is the second biggest island and northernmost prefecture of Japan, blade and microblade industry without pottery continued until the end of the LG, therefore this time is called “the terminal Upper Paleolithic (TUP)”.

Although archaeological materials related to the Incipient Jomon in Hokkaido had been rarely found until 1990s, has increased since 2000s. The excavation of Taisho 3 site located in southeastern Hokkaido was carried out from 2004 to 2005, exposed an assemblage containing arrowheads, and pottery which has similarities to the Incipient Jomon pottery found from Honshu. The lithic primary reduction for producing stone tools is composed of flake and bifacial reduction, but lacks of blade and microblade production.

A similar assemblage with the Taisho 3 was found in Loc. M-I of Tachikarushunai sites (TCM) which are located in northeastern Hokkaido. Similarity between these two assemblages is based on typology of stone tool, because no potsherds have been found so far. In addition, samples from the TCM were dated to 12600-12380 ^{14}C BP. Dates from the Taisho 3 vary from 12480 to 11920 ^{14}C BP. Given the results on residue analysis of pottery from the Taisho 3 argued that pottery was used for processing anadromous fish and/or marine resources, the dates of the TCM is considered to be slightly older than those of the Taisho 3.

Another assemblages related to the Incipient Jomon are characterized by denticulate bifacial point. The denticulate bifacial points were found in northeastern Honshu and Hokkaido. The dates related to the denticulated point from Seiko-sanso B site in central Honshu were reported as 12340-12000 ^{14}C BP.

The TUP assemblages were found through the whole area of Hokkaido, are characterized by various types of microblade core and boat shaped tool, also stemmed point, and large blade. They can be divided into several groups according to typology of microblade core and boat shaped tool, chronology among them have not become clear yet. Dates from Nakamoto site where Hirosato type microblade cores, stemmed points, boat shaped tools are found, were reported to be 12600-12350 ^{14}C BP. Several TUP assemblages were recovered from archaeological sites in southern Sakhalin.

To date, as chronology of the Incipient Jomon and the TUP assemblages in Hokkaido, reliable dates have been to be restricted within the earlier warm period of the LG, while no direct evidence for the existence of the later cold period has been known. However, further research will fill the gap, because the dates of several assemblage groups corresponding to the LG are still unknown. Thus, the Incipient Jomon culture and the TUP culture are considered to be coeval archaeological cultures. Both cultural tradition were contemporaries that originated from at least two groups of people in Hokkaido during the LG.

Pottery technology became stable in Hokkaido from the onset of the Holocene. Tenneru-Akatsuki type pottery which is the earliest type of the Initial Jomon emerged in central and eastern Hokkaido. Potsherds having similarity to the Tenneru-Akatsuki type were also reported from Sakhalin. In addition, making of arrowhead was generalized, while microblade technology disappeared. This imply that composite tools in which microblades are slotted were replaced by bow and arrow as hunting weapon. Technique of making arrowhead with the Tenneru-Akatsuki is common with that of Honshu. On the other hand, notable difference of pottery between the two regions can be seen, especially appeared in the shape of bottom. To explain the formation of this new Neolithic societies in Hokkaido, it is suggest that more attention should be paid to not only the expansion of Jomon culture from the south, but also the change in previous TUP culture in Hokkaido and Sakhalin.

SESSION 3:

FROM UPPER PALEOLITHIC TO NEOLITHIC (PART II)

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DEVELOPMENT OF OBSIDIAN SOURCE AND DISTRIBUTION OF OBSIDIAN DURING UPPER PALEOLITHIC AGE: OBSIDIAN FROM HOKKAIDO DISPERSE INTO SAKHALIN AND HONSYU

Thanks to the volcanic island of Japan, there are lots of obsidian source and especially four sources are assigned in Hokkaido. Recent component analysis on obsidian both from source and archeological sites identify each one of sources, which lead to show the circulation of obsidian among sites and to consider concrete human behavior. However necessity for investigation of the source situation and observation on obsidian remains are still significance. In this paper we attempt to reveal how those obsidian from four main sources in Hokkaido, such as, Shirataki, Oketo, Tokachi-Mitsumata and Akaigawa, acted and what motivated this.

Sequence of Upper Paleolithic Cultures in Hokkaido

In Hokkaido acid soil, another gift from volcano, does not allow to survive organic matter. Because of this archeological sites exclusively produce stone artefacts. This brings difficulty to correlate sites with each other. The third gift of tephra gives effective ruler to determine sequence. Now Eniwa a pumice fall deposit (hereafter-En-a) is key to divide.

1 As for the first half of the 1st stage reliable industry under the lower part of En-a is found. It is extracted from Wakaba-no-Mori site dated to 27,640±230 ^{14}C BP and 24,810±170 to 23,930±230 ^{14}C BP, Kyoei 3 site and so on. It is marked by flake tool (or trapezoid like tool) using small round obsidian pebble. This industry is thought to be able to compare with those in Honsyu and place at the onset of Upper Paleolithic age. Actually chronological gap and scarcity of evidences make difficult to evaluate. Similar industry as this is found at Shirataki source area. The exploitation of obsidian is kept in collection and used small obsidian pebble at lower basin (secondary source around site) far from the primary source.

Industry thought to be at the second half of the 1st stage being later than above is uncovered from the lower part of En-a. They are Kami-Nitaira site (23,420±120 BP) and Kawanishi C site (21,780±90 to 21,400±90). This industry is characterized by the blade technique dispersed from Siberia through Sakhalin and noticeable relation with the industry from Makarovo IV site and Maljta site in Siberia. Around 23,000 years ago another industry marked by Rankoshi type microblade core is found at Kashiwadai 1 site from lower layer of En-a. From this time on industry being common with those in Siberia are developed next to next, which clearly show that Hokkaido is set into Northern Asian cultural area. The development of source is not thought to reach at the full. However, series of reduction from manufacturing blade core finally to microblade core (Rankoshi type) is reconstructed at Miyako site near Akaigawa source (Kimura 1978). And this reduction process needs to rather large angular gravel. Because of this full scale of development at source would be started during this stage.

Following industry is closely connected with flourish of stone processing, such as, large blade industry and the Yubetsu technique for one thing and the full-scale of development at source for another. This technological innovation and necessity to get specific raw material bring dispersal of obsidian covering large area from northern Honsyu, such as Kakuniyama site and Taki 1 site (750km from Shirataki) to Sokol site in Sakhalin (400km from Shirataki) and Hunsun site in Northeast China. In Shirataki area location of sites is depended on altitude. Akaishiyama is the mountain situated in the "Horoka–Yubetsu caldera" and obsidian source itself associated with outcrops on hillside. At 620 m alt. Horokazawa site Toma locality is situated and thought to be well representative of this stage. It is a workshop producing more than 600,000 unearthed artifacts and flakes from only 100m. Excavated materials clearly point reduction from raw material to blank or finished one, especially manufacturing Sakkotsu type microblade core (Kimura 1985, 1992, 2012) made by the Yubetsu technique. 24 Investigated sites among 100 sites along the Yubetsu river at 400m alt. yeilded more than 6,000,000 remains. Accordingly this density of sites and their contents seeing on both quality and quantity is not explained by stopping in the source and outcrops on Akaishiyama at each shortage of obsidian by Upper Paleolithic foragers one after another. In consequence of this at Sokol site same industry of the same stage contained certain amount of obsidian remains are found and those obsidian are identified to Shirataki under the component analysis (Kimura 1985, Golubev and Labrov 1988, Zajtsev, Vasilevskii et al. 2003). This allow us to infer certain group of people with good sense of gathering information about Shirataki source persistently occupied and took systematic resource management on there. On the top of this excavation at Akatsuki site located in Tokachi area bearing Tokachi-Mitsumata source behind shows another phenomena. Even though obsidian from Tokachi-Mitsumata is available, obsidian from Shirataki, specifically Sakkotsu type microblade core on Shirataki obsidian is transported as well as Araya type buirn made on shale and quartzite originated from southern part of Hokkaido is obtained as finished product at Akatsuki site. The Akatsuki group of people could be occupied intermediate position between the black stone group (Shirataki obsidian) and the white stone group (shale and quartzite from southern Hokkaido), which is resulted in the hypothesis "Obsidian Road in North". Certain tendency about application to obsidian is seen in this area, for example at Kami-Nitaira site. Using round obsidian pebble is remarkable and utilization rate of Shirataki obsidian is higher than local one. Easy acquisition but improper size is presumed. And more than this the primary source might be unknown. In Shirataki it could make large scale of sites group but source was supposed to bear different historical and geomopholocical situation in Tokachi.

During the 3rd stage of industry marked by tanged point mass consumption of obsidian diminished and acquisition within each one of area was coming to be standard. Therefore the long distance dispersal of obsidian seems to be downsized. But at Ogonki 5 site obsidian from Shirataki is identified (Kimura 1995, 2012, Vasilevskii 2003, Archeological Institute of Meiji Univ. 2009). This suggests transportation of obsidian from Hokkaido as product is still going on.

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BLADE ARROWHEADS CULTURE OF NORTHEN-EAST ASIA ISLANDS WORLD (SAKHALIN, KURIL ISLANDS, HOKKAIDO) – THE VIEW FROM XXI CENTURE

The study of the Early Neolithic Islands of the Sakhalin, Hokkaido and Kuril archipelago began in the 30-40s of the 20th century, in the framework of studying the "Blade Arrowhead Culture (BAC)" [Kimura, 1976]. For the first time the materials of this culture were published by the Japanese amateur archaeologist Saito Y. In 1943, commenting on the finds made by the blade technology with the ceramic vessel at the Shin-Yoshinodai site (Urahoro town, East Hokkaido) , he suggested that this assemblage, possibly, spread from the Asian continent through Sakhalin to Hokkaido [Saito, 1943]. In the second half of the twentieth century, this idea was developed in the works of Kato S. [Kato, 1963], Kimura H. [Kimura, 1976, 1999], Kitazawa M. [Kitadzawa, 1999], AA. Vasilevsky [Vasilevsky, 2008]. During the expeditions and laboratory investigates of the Sakhalin State University (headed by A. Vasilevsky, V. Grishchenko) and the Tokyo University (headed by Onuki Sh., Fukuda M.) in 2005-2013, the study of this problem was resumed [e.g., Grischenko, 2011; Fukuda, 2015]. As a result, stratified BAC complexes on the islands are studied and radiocarbon dated (from the North to the South): Left Creek 2 (Early Neolithic Horizon), Ado Tymovo 2 (Early Neolithic Horizon), Pugachevo 1, Slavnaya 5, Slavnaya 4, Gornozavodsk 2 (Early Neolithic Horizons) on Sakhalin island; Malokuril'skoe 2 – Shikotan Island; Yubetsu-Ichikawa – Hokkaido. The obtained results allow us to consider that archaeological objects as basic BAC sites in the zone of transition from the mainland to the islands land of North-East Asia.

The stone industry of this culture is characterized by the dominant value of blade splitting, based on the reduction of the conical cores, with the presence of bifacial points and knives in the complex, as well as tools on flakes. An important distinctive feature of the stone industry is the presence of a representative series of various types of woodworking tools (axes, adzes, chisels), various in size, shape and ways of making, made in the technique of percussion and polishing the surface, as well as the presence in the inventory of parking lots and original polish tools – stone poles (components of fishing hooks and weights) and raw or with a small fraction of the treatment of pebbles for networks. From the point of view of the characteristics of the ceramic complex, the BAC ceramics are distinguished by considerable heterogeneity. In the early Neolithic layers, ceramics with organic and mineral admixture, with different wall thicknesses and the quality. Also, the temperature regime of roasting and ways of ornamentation differed. This feature is vividly illustrated by the earlier distinguished numerous ceramic types of BAC on the island of Hokkaido [Kitadzawa, 1999].

As a result of the works of Sakhalin State University and the University of Tokyo, on Sakhalin, Kuriles and Hokkaido, an array of 55 radiocarbon dates from carbonized residues from the walls of ceramic vessels and wooden charcoals from the cultural layers of the BAC sites was obtained, which essentially clarifies the chronology of culture, allowing one to critically refer to dating according to samples of unclear archaeological origin. As a result of the analysis and calibration of the received dates, three chronological stages of BAC on the Sakhalin, Kuriles and Hokkaido in the interval 9600-7800 years ago (cal. BP) are singled out (fig.1).

As the dominant adaptation strategy of the BAC, a comprehensive economy with an orientation to aquatic biological resources is being considered. This strategy was implemented in conditions of settling the coast of the islands by sedentary (perhaps seasonally) human collectives. An important element of the BAC economy is the movement between the islands, that is, the use of transport resources of the aquatic environment, an obvious marker of this type of activity is the transportation of volcanic glass from the Hokkaido obsidian outcrops.

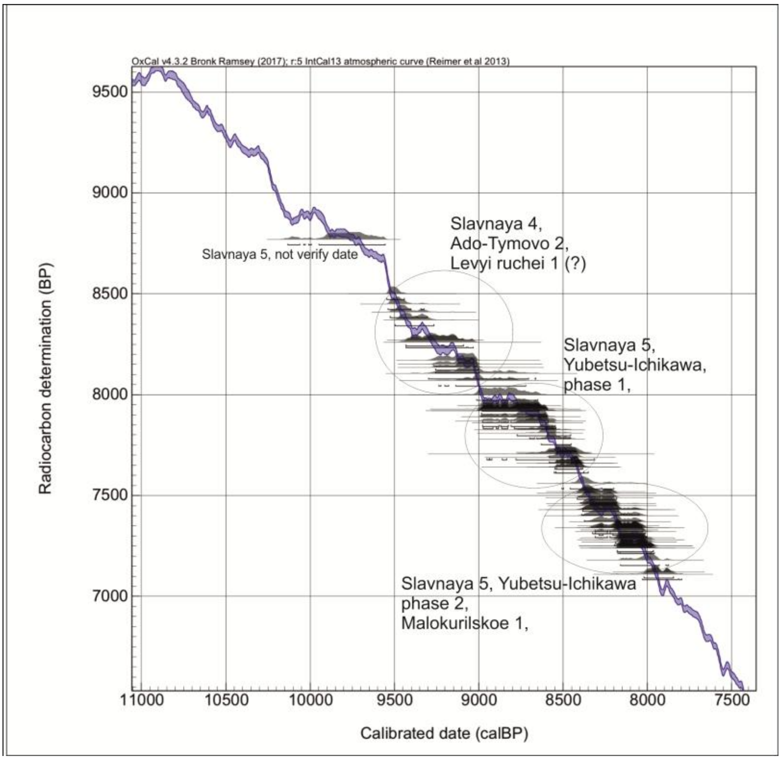

Fig. 1. Radiocarbon chronology of the Blade arrowhead culture of the island world of Northeast Asia

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NEOLITHIC FLINT MINE IN KRZEMIONKI AS AN EXAMPLE OF THE POPULARIZATION METHOD OF THE ARCHAEOLOGICAL SITE

Despite the importance of memory of the past and the strong human union with a local and historical patriotism, large commercialization of historical events in the form of festival (e.g. historical and reconstruction events) and presentations of the sensational discoveries in the media, on the one hand archaeology seems to be an attractive and thrilling science, and on the other hand incomprehensible and intricate, sometimes monotonous. Typically, a non-distant events (historical period) are usually eagerly received and fervently discussed, not only because they are interesting, but also because the potential interlocutor has some knowledge of the historical subjects he acquired during school education. The possibility of dialogue on prehistoric topics is worse. The curiosity and fascination of the old times is accompanied by the great ignorance of negligence and marginal treatment of prehistoric times in primary and secondary education.

In response to the declining interest in archaeology as a science, the public archaeology seems to be a rescue. For many years there is a rapidly growing field of archaeology in western countries, but in Poland, it is only recently that in the scientific world, a movement related to this field emerged.

For a better understanding of the idea of public archaeology I will use the quote:

"The term "public archaeology" is: any method of presenting to the public the achievements of archaeology, ways of interpreting the past and any activities aimed at public understanding of the activities of archaeologists and the involvement of society in their activities" [Pawleta 2015; translation mine].

During the course of my studies, I have visited many of the leading institutions showing the excellence of popularization of the archaeology. I had the opportunity to stay at some of the finest open-air museums and archaeological reserves in my country, where I have come across all sorts of "Public Archaeology". However, this article does not focus on describing the various aspects of this field, but it focuses on the presentation of the popularization methods, on the one of the most representative archaeological reserves in Poland, "The Archaeological and Natural Reserve and Museum in Krzemionki".

The Archaeological Reserve "Krzemionki" is located near the Magonie village, in Ostrowiec Świętokrzyski district, Świętokrzyskie voivodeship [Bąbel 2015]. The reserve area is about 20 kilometers west of the Vistula river.

The "Krzemionki" site was discovered by a Polish geologist and paleontologist Jan Samsonowicz. This discovery took place on July 19, 1922. An archaeological care for the Neolithic Striped Flint Mine in Krzemionki was held by Stefan Krukowski.

"Krzemionki" is the world's largest complex of prehistoric flint mines. The mines were created during the Neolithic and Early Bronze Age, and were associated mainly with two Neolithic cultures – Funnel Beaker culture and Globular Amphora culture, and one from the Early Bronze – Mierzanowice culture. As a result of the mining activity, there is a huge mining field, with an area of nearly 80 hectares, where about 4.5 thousand prehistoric mines were discovered. The Striped Flint was mined with stone picks and levers made of antlers [Boguszewski, Sałaciński 1992; Migal, Sałaciński 1996].

The entire area of the field of exploitation has been successively bought out by private hands since the 1920s. Neolithic flint mine was officially recognized as a monument on September 28, 1945, thus forming an archaeological reserve. By order of the President of Poland, on September 16, 1994, “Krzemionki” was declared as a National Monument of history. To this day, everyone associated with the “Krzemionki” Reserve is guided by the idea of entering this facility on the UNESCO World Heritage List [Bąbel 2015; Gediga 2014].

To the popularization of the “Krzemionki” Reserve, a huge amounts of work and money were put in. Thanks to this, the public archaeology in this place is leading example for the other similar facilities. Starting with the journey of several hundreds of meters of underground corridors, ending with learning about the Neolithic life of the inhabitants in the reconstructed prehistoric village. The didactic methods in “Krzemionki” are very diverse. There are three basic types: verbal (story, conversation, lecture), viewing (shows, demonstrations) and practical (experiments). For children from primary schools, numerous of museum activities are also organized. For the older ones, the museum organize educational workshops and demonstrations of experimental archaeology. Such forms of education raise the awareness of young people and give a possibility to get familiar with ancient times. Maybe this is a chance to get to know the prehistory better?

Despite such a remarkable and unique place on the world scale, “Krzemionki” are constantly struggling with misunderstanding of the role of this place. From the very beginning of the discovery of the ancient mine, this remarkable object was devastated and riddled by people wishing to obtain Striped Flint. The problem of illegal extraction of flint was and is still valid, and the knowledge of the local inhabitants about the archaeological reserve is overshadowed by the knowledge about the attractive raw material – Srtiped Flint.

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WANG NINGSHENG'S CONTRIBUTION TO CHINA'S ETHNOARCHAEOLOGY

Prof. Wang Ningsheng dedicated himself to surveys and studies on the ethnic groups in the Southwestern China for several decades, and his main research interests are the ancient history and archaeology of China with the reference to the ethnographic data collected by himself, the scope and methodology of which closely coincided with that of ethnography popular in the West. The main characteristics of Prof. Wang Ningsheng can be concluded into the four following aspects: first, he emphasized on the fetching the primary data through the field work; second, he paid high attention on international academic communication; third, he put forward the triple-evidence method with intergrates the archaeological data, hitoric literature and ethnographic data in the researches; fouth, he paid high attention on the theories and methods of ethnoarchaeology and made great efforts on the constraction of ethnoarchaeology discipline.

Key words: Wang Ningsheng, Ethnoarchaeology, Southwestern China.

Wang Ningsheng(1930.5~2014.2) is one of the key figures in the development of Chinese ethnoarchaeology. Wang Ningsheng made a great contribution to ethnoarchaeology in southwest China, he was well respected as the editor-in-chief of the 4th to 11th issues of *Journal of Ethnic Studies.*

In his early article"The Sheep Scapula Oracle of the Talu People and a Study on the Oracle Bone Custom of Ancient China"(Wang, 1964), Wang investigated the oracle tradition of the Talu people of Yunnan, who used a sheep scapula as an oracle bone, and Wang found that their tradition is similar, in many aspects, to the tradition of ancient China. He suggested that the origin of the oracle bone customs in China may lie with ancient tribes in the southwestern region.

In his article "The Sheep Scapula Oracles of the Yi and Naxi Nationalities; with a Further Study on the Oracle Bone Customs of Ancient China" (Wang, 1986), Wang investigated the oracle tradition using sheep scapula practiced by the Yi (Lolo) people of Sichuan and the Naxi of Yunnan, and discussed problems concerning the oracle-bone customs of ancient China.

In"Fire-Making Methods of Minorities in Yunnan, with a Study on Ancient Chinese Fire-Making" (Wang, 1984), Wang described primitive fire-making methods such as drilling, striking-a-light and the fi re pistol methods still used by minority ethnic groups of Yunnan Province in their daily life, as well as in ceremonies. The primitive fire-making of ancient China was then discussed with comparisons to these primitive methods.

Internationally, the word "ethnoarchaeology" emerged in the early 1900s, but as an academic subject it came into being only by the end of the 1950s and in the early 1960s, in America and Europe, Given how ethnoarchaeology was developed in the isolated situation of China in that time, we can say it was also developed independently in China.

Wang Ningsheng focused on topics such as pottery-making (Wang, 2003), fire-making (Wang, 1980, 1984), architecture (Wang, 1983), burial customs (Wang, 1989), the invention of writing systems (Wang, 1981), auspication (Wang, 1964, 1986), and the usage of some articles unearthed by archaeologists (Wang, 2001). From the 1960s to the 1980s, Wang Ningsheng conducted ethnoarchaeological fieldwork on contemporary Dai pottery-making in 12 villages in Yunnan province.

In his work An Ethnoarchaeological Study on the Pottery - Making of the Dai People in Yunnan (Ningsheng, 2003) he combined participation in pottery-making activities with interviewing potters, inventorying their tools and other pottery-related objects, and observing the distribution and burying of discarded pots and sherds on the ground and in garbage pits near pottery-making households, markets, and firing places or kilns.

According to Wang Ningsheng's investigation, the Dai pottery-making can be classified into four categories: (a) a simple coiling method, with open-air firing; (b) coiling on a potter's wheel by the potter's feet, with firing in a fuel oven (dung oven); (c) small vessels made by a throwing force using a quick rotation of the potter's wheel and fired in a roof less earth kiln. All three of these categories of pottery are made by women in their spare time. (d) The final method comprises coiling on a small potter's wheel turned by the potter's hand, with firing in a roofed brick kiln.

Full-time male craft specialists control the work in this case.

In this project the six major issues of pottery studies in archaeology were discussed:

(a) producers and users; (b) distribution and exchange; (c) specialization; (d) standardization; (e) pottery and ethnic identification; and (f) pottery and social change.

In his article "Large Houses Discovered in Archaeological Excavations in China" (Wang, 1983), Wang stressed that the building of large houses was quite a common practice in remote antiquity. Such houses might have had many different functions, such as communal houses, meeting houses, men's houses, women's houses, tribal chief's houses, etc. However, we cannot take any of them as indicating the characteristic architecture distinguishing any particular culture or ethnic group. Wang has also analyzed the use of several large houses discovered at prehistoric archaeological sites in China during recent years, with reference to the uses of various types of such large houses among minority ethnic groups both inside and outside China. Wang concluded that the original house built on House Foundation No.1 at the Neolithic site of Banpo in Xi'an and that of House Foundation No. 201 at Quanhucun in Huaxian County were used as meeting houses; that the five large houses at Jiangzhai in Lintong County, Shaanxi Province, were possibly used either as men's houses or as meeting houses; that the house on House Foundation No.6 at Qinglongquan in Yunxian county, Hubei Province, was possibly a chief's house; and the large houses found at Hemudu in Yuyao County, Zhejiang Province, as well as at Dahecun Village in Zhengzhou, Henan Province, at Haimenkou in Jianchuan County, Yunnan Province, and at Maojiazui in Qichun, Hubei Province, were all used as communal residences; namely, the so-called longhouses known from ethnology. In the current studies of primitive society in China such large houses are often interpreted as being a symbol of a certain kind of social organization; namely, the communal houses of a matriarchal clan, but this may be incorrect.

In another study, "From Primitive Record-Keeping to the Invention of Writing" (Wang, 1981), Wang pointed out that once there were many kinds of primitive record-keeping methods, and these could be grouped into three major categories: drawing pictures; making symbols through knot-tying or wood-notching; and using material objects to suggest the shape of certain things, or suggest the sound of the thing's name or the meaning implied . This third method was often neglected previously in studies of the origins of writing. Basing his account on archaeological findings and the primitive record-keeping methods that some of the Chinese minority nationalities have used until recent times, Wang presented some of the materials from his own investigations, adding to the interest and appeal of his account. Recent archaeological findings have included marks and designs on pottery; engravings on wood; totem images on bronze artifacts; and the images seen in cliff paintings in Yunnan, Guangxi and Sichuan Provinces and also the images seen in cliff carvings in the Xinjiang Uyghur and Inner Mongolian Autonomous regions, as well as those from Gansu Province (Wang, 2008).

Identifying a general principle in the evolution of writing, Wang holds the idea of writing developed from the drawing of pictures is neither accurate nor comprehensive; rather, he believes that writing is derived from all the three of the above record-keeping methods. For instance, some ideographic characters and numbers probably evolved from marks carved in wood.

Wang has also maintained that certain principles of writing were engendered by the record-keeping method making use of material objects. He is of the opinion that there has been a long period of continuous development from primitive record keeping to the invention of writing; but only those marks that became phonic symbols and were recognized and understood by a fairly large number of people could properly be called writing. Wang insists that it is this very form of writing, and not the irregular simple marks or drawings that were used as memory aids, that marks mankind's transformation into civilization.

In his work "From Primitive Measures to the Formation of Length, Volume, and Weight Systems" (Wang, 1987a , 1987b), which was completed on the basis of information gathered from primitive measures that are still being used among primitive minority nationalities, as well as on the basis of data from ancient documents and oracle-bone and bronze inscriptions, Wang Ningsheng pointed out that the formation of length-volume-weight systems was preceded by a very lengthy evolution of primitive measures from which later measuring systems gradually developed.

The three elements of measurement; namely, length, volume and weight, were not devised and developed simultaneously. Generally speaking, length-measuring came first and was followed by the emergence of capacity and weight measurements. Primitive people measured by length what should have been measured by volume or weight before such measurements were invented. The earliest units of measurement were associated with various parts of the human body. For example, the ancient standard units of length are the lengths of some human body parts, or the distance between them. Certain standard units of volume were derived from the holding capacity of the

palm of the human hand and, similarly, some units of weight were first derived from the weight an average man could carry on his shoulder, or in the hands. Because these parts of the human body are limited in size or strength, units of length, volume or weight based on them might be limited; even so, most of them were in common use in later periods. All the later multitudinous larger and smaller units were added to these basic ones one by one, as time went on.

Some special small units of weight that appeared early in Chinese historical times, such as the Lue and Zhu , equal to six Liang and 1/24 of one Liang, respectively (the Liang is the Chinese weight unit corresponding to the British ounce), were created to meet the need to weigh precious metals such as gold, silver, etc. On the other hand, as the primitive units of measurement were based on various parts of the human body, they had no fixed proportion in relation to one another. Moreover, in ancient times there were no specially designed devices for measurement. With the development of exchange, certain fixed measuring devices came into being; after the emergence of the state, the government introduced legal instruments for length, volume and weight measurements.

Professor Wang Ningsheng has pointed out that the methodology of ethnoarchaeology can be divided into three steps: analogy, hypothesis, and testing (experimentation), the last being an important link (Wang, 1987a , 1987b). Wang's own research mainly relied on his investigations in southwestern China, over several decades. He also used many materials from other ethnographic sources, both from China and other countries, to compare them with the objects found in archaeological sites (Wang, 2008 : 237–242; 243–250). For example, he made reference to Inuit women's knives to explain the use of triangle stone knives found in China's Neolithic sites (Wang, 2008 : 237–242). He also referred to Native American turtle shell percussion musical instruments to explain the turtle shell instruments found in the Dawenkou site in Shandong Province (Wang, 2008 , 243–250).

Wang Ningsheng has advocated the general comparative analogy method in ethnoarchaeology. The materials drawn on for the analogy might be obtained from any place and from any society. But he also insisted that while referring these results to prehistory and ancient society, the analogy had better be made with objects from pre-industrial societies. In contrast, some Western scholars have studied the formation of city rubbish dumps in contemporary societies to explain the formation of archaeological sites; other scholars have drawn on the phenomena of rapidly changing "hippies" or punk clothes, to explain the style changes in ancient objects excavated

from archaeological sites (Hodder, 1982 : 196–209). Wang Ningsheng disagreed with such analogies, indicating that the relation between the objects drawn on for the analogy was arguably too weak (Wang, 1987a , 1987b). Although it is true that ethnoarchaeology should pay more attention to prehistoric societies and the cultural remains that reflect them, in historically recorded

civilizations there are also problems that demand the use of ethnoarchaeological methods for solving them. China has a long history that is very rich in documents.

Almost all of the 24 historical dynasties' histories include records of the so-called barbarian tribes. China also preserves many early books that specifically address minority ethnic groups in border areas. Although these materials cannot be directly used for the purposes of ethnoarchaeological analogy, they can still provide some clues that may be helpful for field ethnography. They could also be used as reference materials to explain or confirm archaeological finds. This is why Chinese ethnoarchaeologists are always quoting historical documents in their research. Some scholars have suggested that the ethnography recorded in historical documents belongs to ethnohistory, and that ethnoarchaeologists should avoid relying on such documents (Guo, 2009). However, it would be unwise to avoid using historical documents entirely while studying China's archaeology, and the use of historical documents remains an important characteristic of Chinese ethnoarchaeology.

When obtaining materials for use in the form of ethnoarchaeological analogy, most Chinese archaeologists have focused on archaeological sites in the Central Plains, the center and origin of ancient China's civilization. Although some ancient customs still survive even there, and might conceivably be used to pursue analogies, most of these areas have long since entered modern society. Thus, scholars have had to use materials from southwestern minority ethnic groups, even though these, in turn, may have no direct relationship with the Central Plains peoples of ancient times.

Western ethnoarchaeologists have recognized two different kinds of analogy. One is the direct historical approach, which means that the materials on which an analogy is based should be derived from the ethnic groups which have inherited the original culture. The other is a general comparative analogy. This means you can use any materials from any ethnic groups, anywhere. Scholars have engaged in protracted discussions of such methods (Chang, 1967 : 3; Kramer, 1979 : 2–3; Longacre, 1991 ; 234–237). Most Chinese ethnoarchaeologists have used general comparative analogy, and this is similar to the mainstream of Western ethnoarchaeology. For example, to reveal Paleolithic European life, Binford did research among the North American Inuit (Binford, 1978). The idea was that you can use any materials of whatever ethnic groups from anywhere. There has been intense discussion on these methods in Chinese ethnoarchaeology (Chang, 1967 : 3), but it has not led to great successes.

In the past, the scope of ethnoarchaeology research in China was overly limited to the use and meaning of excavated objects. Ethnoarchaeology has currently been widely applied in studies on technology, life styles, social systems, religion and art.

It has even contributed to the improvement of methodologies applied in Chinese archaeology. For example, in the past, the existence of a matrilineal society was treated as orthodoxy in archaeology and history. It was simply declared that matrilineal societies preceded patrilineal ones. But then Wang Ningsheng refuted most of the evidence for the existence of such a social stage in China's prehistory (Wang, 1985 –1987).

The theory of the "Yangshao matrilineal society" is mainly based on the discoveries of collective, secondary burials in Yangshao culture sites from Yuanjunmiao in Huaxian County, Jiangzhai in Lintong County, and Shijia in Weinan County and etc.. Taking it as an absolute truth to L. H. Morgan's view, expressed in his work *Ancient Society* , that all persons related by blood would never be parted from one another even after death, many scholars in China believed that all the dead buried in a common, secondary burial must represent one and the same descent group, probably following the female line. But Wang Ningsheng studied the burial customs of people in less complex societies, such as the Ma'anyan in Borneo, the Merina in Madagascar, and the Iroquois and Huron among the North Native Americans and found that secondary burial was usually practiced by an entire village or community, and that the dead were not necessarily belong to blood relatives. Thus there is no sound basis for regarding Yangshao culture secondary collective burials as a definite miniature display of a matrilineal kin group (Wang, 1985–1987). Judging from the number and size of dwellings discovered in some sites and the level of agricultural technological development at that time, consanguineous groups with large populations could not have existed in the Yangshao culture. Secondary, collective, burials discovered in the above-mentioned sites usually contained scores of skeletons, so it could hardly be said that they belonged to the dead of one family, or even one kin group. They must represent the dead of an entire village, accumulated over many years. Their skeletons had been collected together in a common ceremony of secondary burial.

Wang Ningsheng has also examined other assumptions regarding the theory of"Yangshao matrilineal society", such as how children and adult women were buried together. Statistical data showed that among nearly 1,000 Yangshao graves, there were only three such cases. But secondary collective graves typically included children and women, as well as men. Thus, he argued, there is no clear evidence to connect multi-person collective burials and secondary burials with a matrilineal family. He pointed out that too much emphasis was placed on collective burials, and that there were many problems associated with an analysis that posits a superior position of women based only on a small number of girls'graves with many burial goods. He pointed out that at least one rich grave of a male infant was also found (Grave M22 at Jiangzhai); and that many infant females did not receive preferential burial treatment. He further argued that rich grave goods in infant burials were not related to their sex, but to the status of their family (Wang, 1985–1987). His argument was further reinforced by publications that challenged the accuracy of sex determination for infant skeletons.

In the opinion of Wang Ningsheng, some of the views about primitive society expressed by L. H. Morgan in his book *Ancient Society* have been disapproved by an overwhelming amount of evidence from anthropological research gathered over the past 100 years. From now on the study of the prehistory of China can only rely on the rich materials provided by new archaeological research. To provide new explanations, our study must not be hampered by any ready-made formulas.

It may seem that China's ethnoarchaeology started not too late, but nevertheless it still remains at the introductory level. In the Western world, up to now, numerous ethnoarchaeology books have been published and almost every archaeology textbook has a chapter introducing ethnoarchaeology. Some universities offer ethnoarchaeology courses; there is also an increasing number of ethnoarchaeology journals.

Ethnoarchaeologists hold frequent meetings to discuss their field investigations, as well as theoretical and methodological issues. But until very recently in China, only several dozen articles about ethnoarchaeology have been published, and there is no specialized ethnoarchaeologial journal. Few scholars teach ethnoarchaeology as a part of general archaeology courses at universities.

A few scholars at Zhongshan University pay considerable attention to ethnoarchaeology. In fact, it was these scholars who first introduced the term ethnoarchaeology in China (Liang & Zhang, 1983). A monograph on the field has been published (Rong et al., 1992) and one foreign book has been translated (Guo, 2009). However, unfortunately, even in Zhongshan University, scholars have rarely had a chance to do field work in ethnoarchaeology.

If Chinese archaeologists pay more attention to the methodology of ethnoarchaeology, progress will certainly be made in the debates over the origin of civilization and the formation of early states. Given the large amount of data available in Chinese archaeology and the fact that some of the nation's minorities still live as hunters and gatherers, or as swidden farmers, thereby providing potential comparative materials, Prof. Wang Ningsheng believe that ethnoarchaeology will have a very brilliant future in China.

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CHIROPTERA REMAINS FIRST DISCOVERED IN CHINA'S URBAN ARCHAEOLOGY AND RESEARCH

Chinese Neolithic Age and subsequent historical periods archaeological excavations, Chiroptera material is very rare. 2012, Chongqing Southern Song Fuya site (also called Old Gulou Yashu site, geographical coordinates 29º33'13"N, 106º34'46"E) archaeological excavations, in original courtyard of landscaped pool sediments, by using water-washing method with the purpose of tiny bone specimens, obtained 2 lesser brown horseshoe bat (Rhinolophus sthen) mandible specimens. Mandibular dental formula is 1·2·3·3, lower dentition length of 7.82 ~ 7.87mm. Bone material belong to horseshoe bat (Rhinolophidae) small type. Mandible p3 highly degraded, growth position completely at the central axis outside of lower dentition; p2 and p4 dental crown direct contact. Molars m1~m3 dental crown structure are identical, dental crown bottom of the front - the outside - the back, there is obvious growth cingulum (the front is high, the back is low); endoconid weaker than hypoconid; 3 molars from front to back, showing weak regularity smaller phenomenon (m3 not exhibit particularly degradation phenomenon). Lesser brown horseshoe bat extant living area, mainly from the equatorial zone along Malay Peninsula, Indochina distributed to near the Tropic of Cancer, living area mainly are tropical rainforest climate zone and tropical monsoon climate zone. Chongqing Southern Song Fuya site lesser brown horseshoe bat found, confirmed that the Song Dynasty of southwest China gorge low altitude area, there may be have similar natural environment characteristics of tropical monsoon climate zone. Since these specimens appeared in the ancient city site, display this kind tropical small type horseshoe bat, or have possibility to dwell accompanied with the human in house buildings (horseshoe bat generally live in the forest environment, not dwell with human). This finding also reflect Chongqing city grow flourishing trees in the Song Dynasty, the city existed a good wildlife ecological chain. Chongqing Southern Song Fuya site landscaped pool (H43) washing method of archaeology experiment, demonstrated in ancient city site of pool, ditch and like ancient relics units, should use a special method to extract tiny bone specimens. The general is not easy to find in archaeological layers of tiny bone specimens, for us from a deeper level and a wider angle to study ancient sites of ecological environment, cultural connotation and so on provide important basis research materials.

Key words: Chongqing, Urban archaeology, Song dynasty, Lesser brown horseshoe bat.

Chiroptera in the class of mammals is the second largest order (the type and number only second to rodents), is the only true flying mammals in nature (Mead and Robert, 2005). China since ancient human appeared, their living environment has been accompanied by bats. As about 200 million years ago early Pleistocene of Hubei Jianshi-Man site (Zhang, 2004), Anhui Fanchang Renzidong site (Jin and Liu, 2004), were found to have horseshoe bat (*Rhinolophidae*), Hipposideridae, Vespertilionidae and a variety of Chiroptera. Middle Pleistocene of Beijing homo erectus site (Zhang, 2004), Anhui He county homo erectus site (Zheng, 1983), Liaoning Jinniu mountain early homo sapiens

Fig. 1. Lesser brown horseshoe bat (*Rhinolophus sthen*) distribution area and site location

site (Liu et al., 2014), late Pleistocene of Hubei Huanglongdong late homo sapiens site (Wu et al., 2006), Chongqing Xinglongdong late homo sapiens site (Gao et al., 2003) etc., also found a variety of Chiroptera fossils. But, in our country Neolithic Age and later archaeological work, due to the lack of Chiroptera zooarchaeology professional researchers, so this phase of archaeological work Chiroptera research materials extremely rare. In Chinese ancient city site archaeological work, not previously found to have reported one case Chiroptera study materials.

In 2012, was rated China's top ten archaeological discoveries of Chongqing Laogulou Yashu site, in archaeological excavations, revealed the Song Dynasty Chongqing Fuya old site. The site unearthed the Southern Song Dynasty of house foundation, wall brick, eaves tiles, porcelain, ceramics, metal utensils and other artifacts, also unearthed a variety of animal bones, and a number of bone products have human special processing traces (Wu et al., 2015). It is particularly important, to obtain a variety of Chiroptera research materials in the excavations. This paper reports the discovery process of material, and to identify and study one of Chiroptera bones.

1. Unearthed remains introduction

Chongqing Southern Song Fuya site (Laogulou Yashu site) (Fig. 1), was once Sichuan and Chongqing military and political center during the Song and Yuan war period - Sichuan of military commission and Chongqing of local government (geographic coordinates 29º33'13 "N, 106º34 '46 "E). After Yuan army occupied the Yashu, discarded a lot of garbage and other derelict etc. in Yashu courtyard of landscape pool (excavation number: H43) (Wu et al., 2015). In the winter of 2012, when the archaeological excavations, we extracted tiny bone specimens experimental work from landscape pool sediments by using screening method and washing method.

Through detailed field experiment in archaeological site, we recognize that the use of screening method extracted tiny bone specimens from sediments containing water is very difficult (sediment viscosity is big , easy to become soil lump, unfavorable to find tiny bone specimens), but using washing method is very suitable to extract specimens from sediments containing water. Therefore, in excavations adopted the washing method to extract tiny bone specimens, get a lot of small mammals bones specimens. After specimens extraction, collected in Chongqing Normal University archaeometry laboratory. Since tiny bones specimens is small, fragile, some bone partial surface adhered tiny mineral cements. In the case of protection of the specimen can be observed and identified, bone surface cements is not wholly removed. From the first half of 2014, we have specialized research on these bone materials respectively.

2. Specimen identification

2.1. Lesser brown horseshoe bat

Horseshoe bat family (*Rhinolophidae* Lesson, 1827)

Horseshoe bat genus (*Rhinolophus* Lacepede, 1799)

Lesser brown horseshoe bat (*Rhinolophus sthen* Andersen, 1905)

Found 2 left mandible specimens, respectively numbered YSH43: X20 (Fig. 2, A1, A2), YSH43: X21 (Fig. 2, B1, B2). Lower teeth formula is 2·1·3·3.

YSH43: X20 specimen description: the mandible of horizontal branch, coronoid process, condyle and angle process all are damaged. The mandible of front end mandibular joint surface morphology is intact. Attached canine and subsequent mandibular teeth (c ~ m3), of which, the canine (c), the fourth premolar (p4) the top of dental crown is damaged, the rest of mandibular teeth are intact. Mandible missing two lower incisors (i1, i2), both within the alveolar residual part of the tooth root (Fig.2, A1, A2). Observation from the residual tooth root, i1 slightly thicker than i2. Mandible rostral side is arcuate (growth have i1, i2), horizontal branch below the praemolares of bottom edge is slightly concave, molars bottom edge is slightly convex. Mandibular foramen is obvious, and is oval, located below P3 tooth root (Fig.2, A2), growth position is very low. Mandibular teeth tightly packed, no space. Observation from the remnants of canines, dental crown is thick, dental crown bottom edge has significant lower cingulum. The first, third premolars of the main cusp is sharp, position between two premolars near buccal side, the growth of a small second premolars (P3). This premolars completely grown on the outside of the tooth socket axis wire, the first (p2), third (p4) premolars of dental crown closely packed. Observation from residual p2, p4, p4 much thicker and taller than p2 (Fig. 2, A1). On molars triangular seat, have a sharp paraconid (pad.), protoconid (prd.), metaconid (med.), talonid have a sharp entoconid (end.), hypoconid (hyd.). At the bottom of molars dental crown, all have cingulum from the front via lip side extend to the back (the front cingulum is high, the rear cingulum is low). 3 molars structure is the same, the front teeth is slightly larger than the back teeth (m1> m2> m3) (Table 1). In lower cheek teeth of horizontal branch, m1 protoconid is the tallest and biggest.

YSH43: X21 specimens Description: the mandible of horizontal branch is intact. Attached p3~m3. Mandible and lower cheek teeth morphology is consistent with described above YSH43: X20 specimen. Due to the cement filling, this specimen of mandible pore, not clear in the photograph. Its measurement data is slightly smaller than the specimen YSH43: X20.

Analysis and comparison: according to the lower teeth formula of these two specimens, and its p3 of highly degradation characteristics, they should belong to the horseshoe bat family (*Rhinolophidae*). Our country horseshoe bat family, according to their body size characteristics can be divided into large, medium and small three different types. Large type such as greater horseshoe bat (*R. ferrumequinum*), Pearson's

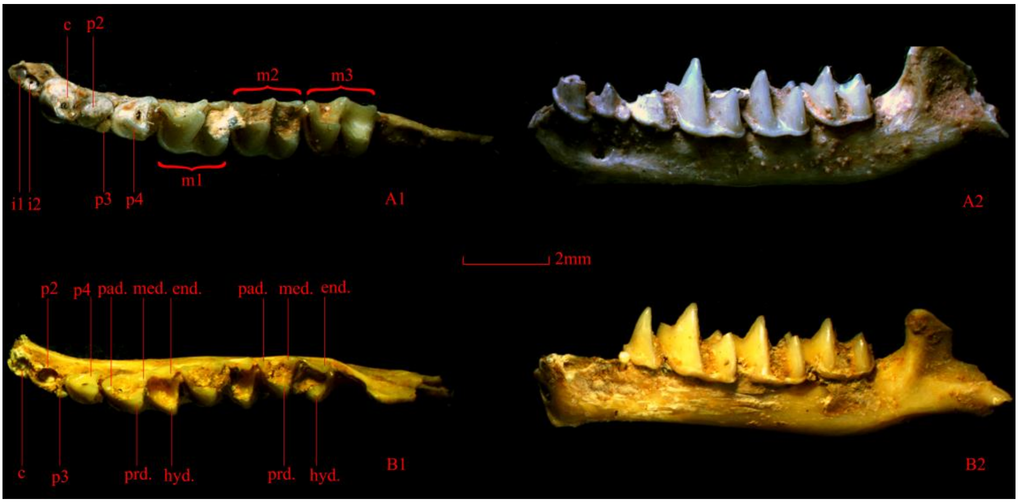

Fig. 2. Lesser brown horseshoe bat *Rhinolophus sthen* mandible (A1, A2, YSH43:X20 mandible dental crown surface flat view and cheek side view; B1, B2, YSH43:X21mandible dental crown surface flat view and cheek side view) (i1, i2: the first, second incisor; c: canine: p2, p3, p4: the second, third, fourth praemolares; m1, m2, m3: the first, second, third molars; pad.: paraconid; prd.: protoconid; med.: metaconid; end.: entoconid; hyd.: hypoconid)

horseshoe bat (*R. pearsoni*) (Liu et al., 2006), etc., medium type such as intermediat horseshoe bat (*R. affinis*), marshalli horseshoe bat (*R. marshalli*) (Wu et al., 2004), etc., small type such as this article below comparison of a variety of horseshoe bat etc. Observation from the overall shape of specimens, Chongqing Southern Song Fuya site specimens should belong to small type.

In small type horseshoe bat, Chongqing Southern Song Fuya site specimens compared with Rufous horseshoe bat (*R. rouxi*), has significant difference in p3 and molars growth characteristics. Rufous horseshoe bat p3 degradation is not very serious, its growth position in the dentition of lower cheek teeth, separated p2 and p4 (Wang et al., 1999). But the specimen described in this article, p3 special degradation, its growth position completely exit outside of lower teeth dentition axile wire, p2 and p4 dental crown direct close contact. Seen from molars, Rufous horseshoe bat m3 degradation is obvious, and Chongqing Southern Song Fuya site specimens m3 degradation is not obvious. Chongqing Southern Song Fuya site specimens compared with least horseshoe bat (*R. blythi*), has difference in molars growth characteristics. Lesser horseshoe bat molars of entoconid height and thickness, is consistent with hypoconid (Xu et al., 2008). But Chongqing Southern Song Fuya site specimens of entoconid obvious weaker than hypoconid. Lesser horseshoe bat m1 is big (dental crown significantly lengthen), its shape size is much stronger than latter two molars, and m3 degradation is obvious (the talonid is weak). Chongqing Southern Song Fuya site specimens has large differences with least horseshoe bat in molars growth rule. Chongqing Southern Song Fuya site specimen have a greater overlap in terms of body size with little Japanese horseshoe bat (*R. cornutus*), but there are differences in the growth characteristics of premolars. Little Japanese horseshoe bat of the first premolar dental crown (p2) is very low; although the second premolar (p3) is very degraded, but its growth position near to dentition axle wire; the third premolar (p4) is quite significant (strong and high) (Csorba and Ujhely, 2003). Chongqing Southern Song Fuya site specimen of p3 is fully grown in the dentition lateral, although p2 is slightly low, but the gap between it and p4 is not significant relative to little Japanese horseshoe bat. If Chongqing Southern Song Fuya site specimens compared with lesser brown horseshoe bat (*Rhinolophus sthen*), found that they should belong to the same species. Lesser brown horseshoe bat also belong to small type horseshoe bat, the lower dentition length between 7.42 ~ 8.14mm, Chongqing Southern Song Fuya site specimens data included in the world scope (Table 1). Its mandibular features, also has the following characteristics: the first premolars (p2) of dental crown although is lower, but dental cusp is sharp; the second premolars (p3) is seriously degraded, grown in the dentition lateral; the third premolars (p4) has sharp and high dental cusp. m1 ~ m3 dental crown structure are exactly the same, and in the bottom of the dental crown has significant cingulum (cingulum growth form: mainly in the front - the outside - the back, the front is high, the back is low); 3 molars appear very weak regularly smaller phenomenon from the front to back (Zhang et al., 2005). Chongqing Southern Song Fuya site specimens, is completely consistent with these characteristics of lesser brown horseshoe bat.

Table 1. Lesser brown horseshoe bat mandible material measurements and comparison (unit: mm)

Specimen Source	Lower dentition length (c-m3)	p2 Length/ Width	p3 Length/ Width	p4 Length/ Width	m1 Length/ Width	m2 Length/ Width	m3 Length/ Width
Thailand[1]	7.42-8.14						
Yunnan[2]	7.8						
YSH43:X20 (this article)	7.87	0.63/0.57	0.26/0.21	0.75/0.62	1.43/0.89	1.38/0.88	1.29/0.79
YSH43:X21 (this article)	7.82	0.61/0.56	0.24/0.20	0.71/0.61	0.41/0.87	0.37/0.87	0.27/0.77

Note: 1, (Lekagul and Mcneely, 1988) ; 2, (Zhang et al., 2005)

3. Discussion

3.1. The important role of Chiroptera remains in archaeological research and specimen extraction method

In nature, Chiroptera is an important member of the ecological chain, on vegetation regeneration, fauna relationship and human real society (medicine, bionics, ideology and culture, etc.) and other aspects have a certain effect (Cheng et al., 2009). In Chinese traditional culture, Chiroptera (bat) is considered a symbol of blessing, long life, morality, goodness, beauty, benevolence, and so on (Cao, 2007). In human habitation, some Chiroptera is associated with human habitat. Chiroptera because of its migration autonomy and habitat selection is strong, therefore, we can in terms of Chiroptera presence or absence in human dwellings, population characteristics and the individual number, etc., to analyze the ecological characteristics of human residence (Luo, 1984). Chinese Neolithic Age and later historical stage of archaeological work, although has unearthed a large number of ancient culture sites, but so far, only in a few locations found Chiroptera remains (Wu et al., 2014). This situation are extremely inconsistent with ancient human actually dwelling environment and living conditions. The main reason, is probably related to the lack of specialized researchers in our country zooarchaeology and not widely used tiny bone specimen extraction method in archaeological excavations.

Chiroptera remains due to tiny, so in traditional archaeological excavations, is difficult to find and extract such specimen. Modern field archaeological excavations of technology experiments show, extract detailed various types of specimens in stratigraphic deposits, in addition to required excavate deposits layer by layer and full extract large samples, also need to adopt screening, washing method, etc., with the purpose of finding and gathering tiny plant remains (seeds), small animal remains (Rodents, Chiroptera, Insectivora, etc.) in deposits (Wu et al., 2015). However, due to the huge amount of work in the field archaeological excavations (especially large ancient cultural sites), the excavated cultural layer deposits are fully screened and washed, in funding, staffing and time requirements and so on is not appropriate. Therefore, we suggest that can according to the different deposits of inclusions and buried background, selective use of screening and washing method, have a purpose for tiny specimen extraction work. Through we carried out screening, washing method experiment in excavations of Chongqing Southern Song Fuya site landscape pool (H43), prove that pools, ditches, and similar sites in ancient sites, can be used as work object of we use the screening and washing method to extract tiny specimen. From such ancient site units, get tiny specimens that are not easily discovered in general field excavations, for us from various aspects and angle to study ancient culture sites of ecological environment and cultural connotation, provide important basis research materials.

3.2. Chongqing Southern Song Dynasty Fuya site lesser brown horseshoe bat (*Rhinolophus sthen*) found significance and research value

The natural living areas of lesser brown horseshoe bat, literature records mainly from the equatorial region along the Malay Peninsula, Indochina distributed to near the Tropic of Cancer, including Malaysia, Thailand, Laos, Vietnam, Sumatra, Java Island and other tropical rainforest climate zone and tropical monsoon climate zone (Fig.1) (Csorba et al., 2003). China recently discovered biological specimens proved, Xishuangbanna (22º36’N vicinity) does have the distribution of such Chiroptera (Zhang et al., 2005). Lesser brown horseshoe bat is a small regional species in Southeast Asia, currently, a lot of biology information about this animal is still not clear, especially its evolution process, distribution and change of historical periods etc., are many unknown (Corbet and Hill, 1992). Therefore, to discover its remains in China historical period ancient site, there is no doubt that to discuss the evolution process of this animal and Chinese historical period of ecological environment and so on has important significance.

For a long time, people always think Indonesia, Java, and other southeast Asian fauna are migrating from southern China (Koenigswald, 1939). Java Pleistocene ancient fauna compared with south China fauna, of which more than 70% of the members are the same (Tong, 2002). Zoology, climatology research results show that, since the Quaternary, southern and central China there have been many warm climate period, occurred many times oriental realm animals spread to northern China phenomenon (Tong, 2007). In southern China animal fossils, found a variety of characteristic animal species as tropical environment for their habitat. More famous such as Mr Qiu Zhuding found a variety of southeast Asian arboreal squirrels (*Tamiops sp., Callosciurus sp., Dremomys sp.*) in Lufengpithecus site (Qiu, 2002), Mr Jin Changzhu through materials found in Guangxi confirmed, southwest China was once southeast Asian modern Sumatra short-eared rabbits (*Nesolagus*) origin (Jin et al., 2010), and so on. Chongqing since the Pleistocene, has been the climate was warmer than the same latitude, gorge of ecological environment have similar with southeast Asia natural characteristics. Important evidence includes: Wushan Longgupo site found southeast Asia tropical animal petinomys electilis (Huang, 1991), Wanxian Yanjinggou site found living in China’s Hainan island and Indochina peninsula of Hapalomys delacouri (Zheng, 1993), Fengjie Chuanlongdong site found distribution between southern China and southeast Asia Hipposideros armiger (Wu et al., 2014), and so on. Therefore, analysis of fauna evolution relationship between southwest China and southeast Asia, and research southwest China’s ancient residents living environment and historical development background, we should not only pay attention to the local fauna materials, also need link local fauna with southeast Asia and other places of animal material for comprehensive research.

Lesser brown horseshoe bat found in Chongqing Southern Song Fuya site, is the first time appear this animal specimen in Chinese archaeological site. To study southwest China ancient ecological environment, especially southwest China ancient city environment, provides a very important physical information. Lesser brown horseshoe bat is tropical rainforest and tropical monsoon climate zone as for their habitat of animal. This animal found in Chongqing Southern Song Fuya site, confirmed that the Song Dynasty of southwest China of gorge low altitude area, should be have a natural environmental that is similar to the tropical monsoon climate zone. Its environment characteristic if compared with modern China climatic regionalization, may be similar to the environment of Xishuangbanna (lesser brown horseshoe bat currently only found in Xishuangbanna in China). Of course, due to the diverse terrain in southwest China, so ecological environment is more complex, we can't put approximately this environment to most of the area of southwest China. According to the current found materials, we have to carefully think, this environment similarity may exist in the southwest of local low altitude area.

Chiroptera materials has a very important role in the research on ancient ecological environment changes and fauna evolution (Qiu and Qiu, 1995). Chiroptera species in southwest China is rich, is oriental realm Chiroptera distribution area as the dominant species (Wang and Zheng, 1985). Three Gorges region extant Chiroptera of distributed regularity, most of them have a feature of avoiding human activities and nature glare, mostly inhabit in the low altitude, humid climate, less human disturbance of cave environment (such as Rhinolophidae, Hipposideridae, Pteropodidae, Megadermatidae etc.) , as human buildings for their habitat is only a few members of Vespertilionidae (Such as Eptesicus serotinus, Pipistrellus pipistrellus) (Liu et al., 2001). Lesser brown horseshoe bat belong to Rhinolophidae, is feed on various mosquito of species, perch in the shade during the day, prey on mosquitoes, gnats, moth, flies, moths and so on in forest at night, its habitat are mainly cave, tree hole in forest or the back of giant plant leaves (palm, banana leaves, etc.), there is currently no report of horseshoe bat inhabit with human in houses buildings (Han and Hu, 2002). Chongqing Southern Song Fuya site found lesser brown horseshoe bat, on the one hand, shows that the possibility of this tropical Chiroptera inhabit with human, on the other hand, also reflects the Song Dynasty of Chongqing city, there should be more prosperous trees, human activities have little impact on Chiroptera habitat, in addition to human inhabited in the city, but also exist a good wildlife ecological chain (Kong et al., 2005).

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THE FORMATION PROCESS OF THE PALEOLITHIC SITES IN IMJIN-HANTAN RIVER BASIN: ARTIFACT CONCENTRATION AND DIFFUSION IN THE UPPER SEDIMENTS OF BASALT BEDROCK

This Study was prepared for the purpose of revealing the change of formation process through the analysis of the artifacts distribution patterns and assemblages of upper sediments of the Paleolithic sites in Imjin-Hantan River Basin.

Recent geological research identified only two primary lava flows: the Chongok basalt and the Chatan basalt. The Chongok basalt was dated to 0.5 Ma by K/Ar and fission track dating analyses and the Chatan basalt was dated to 0.15 Ma by K/Ar analyses. Accordingly, it is apparent that the age of the sediments varies depending on which basalt the sediments lie. Alluvium on the top of the basalt bed was formed by a fluvial and lacustrine environment immediately after the basalt flows which filled in existing channels. It is buried by fine aeolian and colluvium sediment in higher elevation areas. Very few artifacts have been found in these sediments. Various contexts of accumulations have been observed at the Paleolithic sites in the Imjin-Hantan River Basin.

In general, loose and dense concentration of stone artifacts in fine clay sediments have been observed, while relatively high concentrations of artifacts were in sandy layers. The concentrations of artifacts, however, have been often found in shallow depressions formed in very fine grained sediments. It strongly suggests remains of human activity because diverse pieces were concentrated in a single horizon. It is questioned, however, that they are all evidence of human activity at the same time. Mostly it moved from exposed layers on slope on the bottom of depression. They may have moved from upper part of same deposits, but more often from different layers.

It is often said that heavy duty components represent the early Paleolithic sites while small tools late Paleolithic. However, continuous processes of erosion and post-deposition may result in very different assemblages which had been formed with materials from various sources possibly of different period. This result has been more often observed in late artifact layer compared to early artifact layer. In addition, normal size variation resulted by human activities tends to reduce to the small tools tend to be reduced in distorted proportion, or even in a single isolated piece at the site. Diverse processes of sorting may result in quite different patterns of distribution of artifact site in assemblages excavated from a single locality in a single layer, and sometime be resulted in dominance of heavy duty components while some other time dominance of small pieces such as occasion of stream of moderate energy.

In order to reconstruct human activities at the site, it is necessary to make special attention on post-deposition to avoid irrelevant explanations. It necessarily needs to be aware that ages obtained from sediment or other material in the sediment may not represent the age of industry at all. Original deposits from which some stone artifacts were derived do not exist anymore due to erosions occurred long time ago.

It needs to be very careful to explain functions of sites on basis of stone artifacts composition and presence of certain type of tools without understanding post depositional processes involved in contexts under consideration. More experimental and activating observation of geological and biological processes in field would be necessary for better understanding of archaeological contexts of Early and Late Paleolithic in the Imjin-Hantan River Basin.

Fumito AKAI

REDUCTION SEQUENCES IN THE MICROBLADE ASSEMBLAGE OF THE ISHIKARI LOW LAND, HOKKAIDO

Microblades have been widely recognized diagnostic class of stone tools in the late Upper Paleolithic in northern Eurasia and northern North America. The late Upper Paleolithic microblade cores from Hokkaido are well-standardized in their morphology, mainly because of systematic reduction sequences that were operated among the assemblages. The question of why distinctive microblade assemblages were emerged in Hokkaido is still under the debate. In this presentation I report recently accomplishments of microblade industry recovered from the Ishikari Low Land, central Hokkaido, northern Japan.

Recent investigations using tephra and radiocarbon dating have been conducted, so that nowadays it is generally accepted that microblade assemblages in Hokkaido can be divided into at least two periods: early and late. Microblade assemblages existed from the LGM to the Terminal Pleistocene in Hokkaido. The early period of microblade assemblages consists of the Rankoshi, Pirika, Tougeshita, and Sakkotsu microbladecore types. The late period of microblade assemblages comprises the Shirataki, Oshorokko, and Hirosato microbladecore types.

In the Ishikari Low Land microblade sites are all open sites located on river terraces or in inland paleo-dunes. The sites are buried in loam sediments related the marker tephras including Spfa-1 (50,000-40,000 cal yr BP) and En-a (21,000-19,000 cal yr BP). From the layers below En-a tephra the Kashiwadai-1(Rankoshi type, Pirika type), and above En-a tephra the Oruika-2, (Sakkotsu type), Yukannboshi-E10, Kiusu, Osatsu-16A (Tougeshita type), Meboshigawa-2, Marukoyama, Syukubai-jyousou, Osatsu-16B, Kiusu-5 (Oshorokko type) are discovered. In the Ishikari Low Land lithic raw materials which were major resource of obsidian and hard shale are not procured. That is to say in this area these “high-quality” lithic raw materials were transported far removed from Shirataki, Oketo, Tokachi-Mitsumata, Akaigawa (obsidian) and the Oshima Peninsula (hard shale).

The Rankoshi microbladecore type assemblages were composed of microblades, end scrapers, burins, sidescrapers. The Rankoshi-type microblade core technology is the part of the whole sequence of blade productions. Blades removed during the core reductions are likely used for shaping endscrapers and burins. The transition from the blade to microblade productions is continuous.

The Sakkotsu microbladecore type assemblages were composed of microblades, end scrapers, burins, side scrapers, drills. Bifacial cores made from obsidian served as the source for flake blanks used for the production of end scrapers, burins, side scrapers and finally the reduction of bifaces appears to have supplied microblade cores.

The Tougeshita microbladecore type assemblages were composed of microblades, end scrapers, burins, side scrapers, drills. The whole reduction sequence of Tougeshita microbladecore type assemblages has not been appreciated, but most tools are made on blades.

The Oshorokko microbladecore type assemblages were composed of microblades, end scrapers, burins, side scrapers, drills, bifacial leaf-shaped points, bifacial stemmed points, and axes. Most tools, such as end scrapers, burins, and side scrapers are made on blades, which are detached from prismatic blade cores. Bifacial cores did not serve as flake tools but supplied microblade cores or points.

From the facts above, although the particular of Tougeshita microblade core type assemblages are obscure, Rankoshi, Sakkotsu and Oshorokko assemblages differ widely from each other with the reduction sequences. It is important that we deliberate that what was behind these difference. Results of descriptions of reduction sequences will contribute to the study of human-artifact relationships in general, and the role of reduction strategy in the lifeways of forages in northeastern Asia in particular.

СОДЕРЖАНИЕ

SESSION 3: FROM UPPER PALEOLITHIC TO NEOLITHIC (PART II)