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New observations on Paleolithic in China reflected by three sites

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ABSTRACT – *This paper provides some new research results by three representatives Paleolithic sites in the North, South and Southwest China, which are very potential in answering some important questions relevant to the human culture in East Asia. New theories of human evolution are expected to be reconsidered here.*

POVZETEK – *V članku objavljamo rezultate novih raziskav treh reprezentativnih paleolitskih najdišč iz severne, južne in jugozahodne Kitajske. Z njihovo pomočjo bomo verjetno lahko odgovorili na nekatera pomembna vprašanja o kulturnem razvoju človeka v vzhodni Aziji. Predvidevamo tudi, da bodo sprožila razmislek o novih teorijah evolucije človeka.*

1.INTRODUCTION

In finding clues of human dispersal on this globe, China occupies a good geographic position and provides excellent archaeological evidence recently discovered to make questions clearer. They might lead to another myth of human cultural evolution. After the first recorded Palaeolithic tools were discovered in 1920, in loess deposits in Qingyang County, Gansu Province, in north-western China, Palaeolithic archaeology in China developed well in the 1920s', thanks to some western archaeologists. The most significant discovery was 'Peking Man' (*Homo erectus pekinensis*) (*Jia & Huang 1990*), which established China's important status in human evolution. After the foundation of the new China in 1949, more and more cultural remains and human fossils that involve each of the main stages of hominid evolution have been uncovered in the vast territory of the country, not only in the north and west, but also in the north-east, south and south-west, even including many parts of the Qinghai-Tibetan plateau. The last two decades have been a new, significant period, in which new discoveries and research work have advanced dramatically. The three sites introduced here are representative and outstanding in their archaeological contents (Fig. 1). They would play great roles in providing some new explanations of their own developmental stages and shaking our minds very much. Some relevant discussions will be displayed in the following introductions to each site. The other reason that I chose these three sites for presentation here is that they are actually synonymous with of close concerning work that I have been doing since 1991.

2. TOPOGRAPHY AND QUATERNARY SEDIMENTS OF CHINA

The topography of China is divided into three steps, from west to east, according to the characteristics of their different elevations. The Qinghai-Tibetan Plateau is the first step, with an average elevation of 4000–4500 m above sea level. The second step is eastward to the chain of the Daxinganling Hills, Taihangshan Mountains, Wushan Mountains and Xuefengshan Mountains, with an average elevation of 1000–2000 m. It contains some plateaux (such as the Inner Mongolia Plateau, the Loess Plateau) and basins. The third step is the most easterly, with an average elevation below 500 m, and this lowest step contains the main eastern plains of the country. This higher western and lower eastern topographic

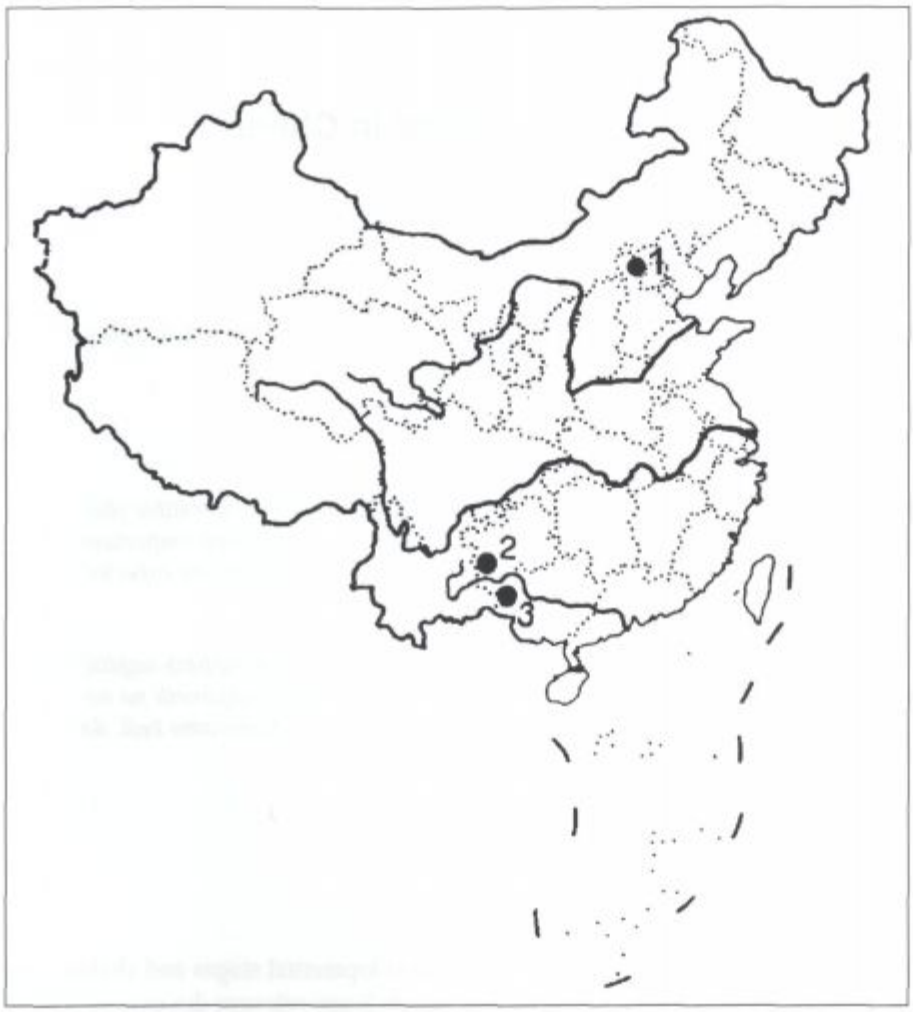


Fig. 1. Location of three sites mentioned in the text. 1. Nihewan Basin 2. Panxian Dadong 3. Bose Basin.

structure makes the two great rivers, the Yellow River, and the Yangtze, flow downwards from west to east.

The Qinling Range of eastern China (ca. 34°N latitute) is a physiographic boundary between north and south China and Quaternary deposits differ in these two regions. In the north, the principal sediments are composed of well-developed, fluvio-lacustrine basin formations and widely distributed thick loess deposits. The latter is deposited 300 m at its thickest. It refers complete geological records since ca. 2.5 Ma, and is one of the three environmental measurements of the global chronology sequences beyond deep sea and ice core records. Chronologically, loess deposits is defined three formations of Wucheng, Lishi and Malan loess deposits corresponding to the Lower, Middle and Upper Pleistocene respectively. Each of these is characterised by a definite fauna group. In the south, there are earlier Pleistocene fluvial and fluvio-lacustrine formations, cave deposits and widely distributed lateritic sediments.

3. THREE RECENT REPRESENTATIVE SITES

3.1. The early Palaeolithic sites of Nihewan Basin in North China

History and Geological Background

The Nihewan Basin is 150 km north of Beijing, in the Sanggan River valley of Northern Shanxi province and Northwest Hebei Province. It occupies 9000 km^2 and is 800 m above sea level. The basin deposit is more than 1000 m thick, and consists of fluvial-lacustrine sediments overlapped by sequences of clay, sandy clay, fine-sand, sand and gravel in varying thickness and appearance, such as grey, yellow-green, yellow-brown, reddish brown, etc. In the eastern end of the basin, Pleistocene outcrops of 100 m have been exposed by fluvial erosion. It was famous for its Plio-Pleistocene mammalian fossils and geological deposits in the 1920s and 1930s (*Barbour 1924; 1925; Barbour et al. 1926; Teilhard de Chardin & Piveteau 1930*) and was further regarded as the standard Lower Pleistocene fossil sequence

in North China. Its Palaeolithic archaeological evidence was defined after new China, even though the discovery of a faceted stone by Licent and Teilhard de Chardin was recognised as human modification by Abbe Breuil, but was dismissed as a natural specimen (*Movius 1948*). In the past three decades, the area containing a large number of archaeological sites spanning the Lower through Middle to Upper Pleistocene and Holocene in the Nihewan Basin, especially some older early Palaeolithic sites (1Ma–2Ma) (*You et al. 1978; Tang et al. 1995*) has become recognised as one of the key regions for understanding early hominid evolution in Asia. Research shows that the Pleistocene Nihewan Basin experienced an evolution of "lake formed-lake recede-gorges and valleys cut through-erosion, fluvial, aeolian sedimentation" and its geological development is strikingly similar to the famous Olduvai Gorge of Tanzania (*Wei 1997*) (Fig. 2). Evidence that is more recent is gradually strengthening the realisation that the Nihewan Basin could be the "Olduvai Gorge" of China or East Asia. Among those early Palaeolithic sites in the basin, Donggutuo is the most attractive.

Donggutuo site was found in 1981 (*Wei 1985*) in the Nihewan Formation which was attributed to the Lower Pleistocene within the Nihewan Beds. It is one of the most extensively excavated and prolific sites yet studied in the Nihewan Formation. The site lies about 120 m above the Sanggan River, and more than 45 m below the surface of a platform that was intermittently capped by the Malan loess overlying the Nihewan Beds in the region. Five trenches were worked as a trial excavation in the year. T1 is the largest of them, and follow-up excavations continued there in 1991, 1992 and 1997. A total of more than 10 000 stone artefacts have been recovered, as well as large numbers of mammalian bone fragments and teeth (*Jia & Wei 1987; Wei 1985; 1988*). The 1991 and 1992 excavations were part of a joint Sino-American project and were concentrated on T1 (Pl. 1). The cultural sequence of the site was divided into five layers, A to E, according to the different geological characteristics of the deposits in situ. Palaeomagnetic analysis has shown a long sequence of reversed and normal strata. A normal strata above the site has been linked to the Jaramillo Subchron, which would fit the Donggutuo site into the Matuyama Chron, just prior to the Jaramillo ca. 1 Ma (*Cheng et al. 1978; Li & Wang 1982*). This polarity results and time was corroborated by American scientists in 1990 (*Schick et al. 1991*) and fitted well with the stratigraphic interpretation of previous research (*Yuan 1995*). So, the Donggutuo site is indicated at an age of approximately 1 Ma.

Industry

The stone assemblage of the Donggutuo[1] site appears obvious small-tool character that belongs to one of

Pl. 1. Dongguo site in the 1992 excavation.

1 The excavations at Donggutuo site in 1991 and 1992 were financed by the Luce Foundation and carried out in collaboration with Prof. J. D. Clark of the University of California at Berkeley, and Profs. N. Toth and K. D. Schick of Indiana University by IVPP. The 1997 excavation was supported by Chinese Academy of Sciences SEPP.

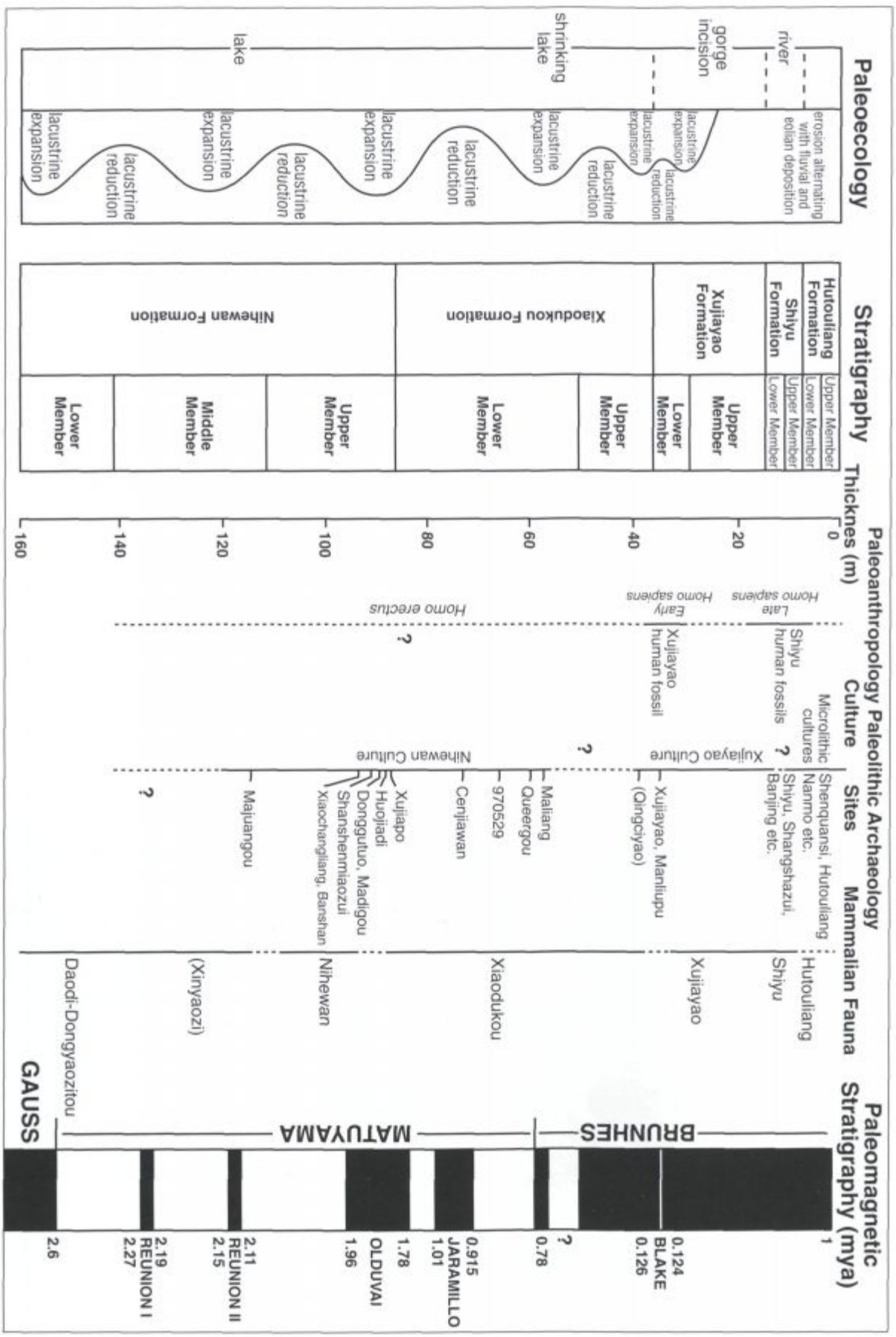


Fig. 2. The framwork of archaeological geology of the Nihewan Basin (Wei 1997).

the two development lines of stone industry in North China. Here it is characterised by rather small flakes and flake tools, marginal scars has often happened on flakes. The cores flaking were thought simple and casual (*Schick & Toth et al. 1991*), and the modification does not seem very standardised. Denticulates are a kind of characterised tool typology here. Scrapers are not in good formation. There are also some end-scrapers. Points (Fig. 3) and burins are quite well developed, some are trimmed carefully and look very nice. They both are the dominant typology of the site. Some new materials from the 1997 excavation show again of most impression mentioned above. However, new phenomenon may convert our constructed concepts. For example, together with casually flaked cores there are several prepared cores named as "Donggutuo-shaped cores" (Fig. 4) that were identified for the first time (*Hou et al., in press*). They all have a very similar shape, having a rough line of wedge-like cores of the Upper Palaeolithic period, although they do not have the same regular shape as the latter ones. These cores have clear, prepared platforms for further flaking by shifting to another angle to work. They sometimes have two pointed ridges on the lateral and the bottom. Donggutuo man shows their definite idea for shaping such kind of shaped cores: they wanted to produce flakes by more regular and effective methods and they were trying to achieve this aim. Evidence of such shaped cores including crested flake has been recently observed from stone assemblage of 1981 excavation. Moreover, these discovered cores can be recognised in the different position of "chaîne opératoir" and vary in their materials and sizes. This new evidence of shaped cores can break through conventional views on Dongguttuo materials that there are "extremely" casual cores (*Schick & Toth et al. 1991; Schick & Toth 1993*). Careful research into these special cores may provide clues to the origin of the microlithic and its developments in the basin. North China is regarded as an original site of microlithic culture in North Eastern Asia and North America. Nevertheless, such earlier clue is first to be known in this area. A brief reported paper on new materials from the 1997 excavation of Donggutuo will be published soon by the present author (*Hou et al. in press*).

Stone artefacts are very well preserved. Raw material for making stone artefacts at the Donggutuo site are supposed to come from local outcrops of bedrock stratigraphically below the sediments, and some-

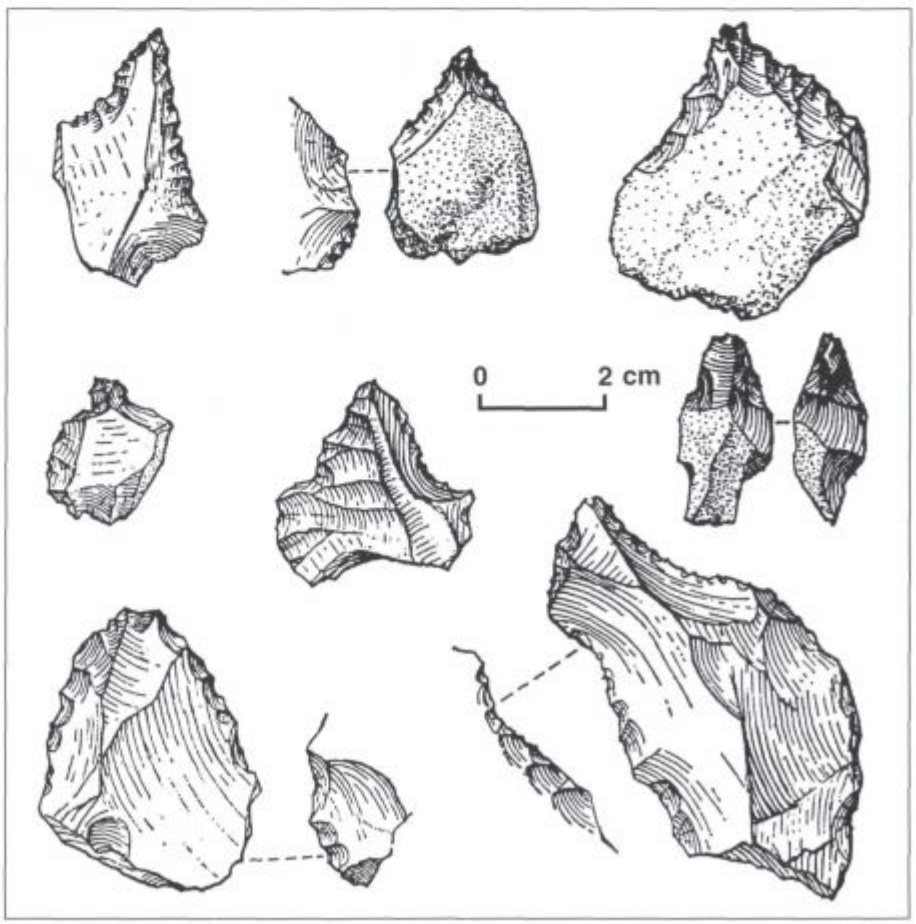


Fig. 3. Some points of Donggutuo site from 1981 excavation (Wei 1985).

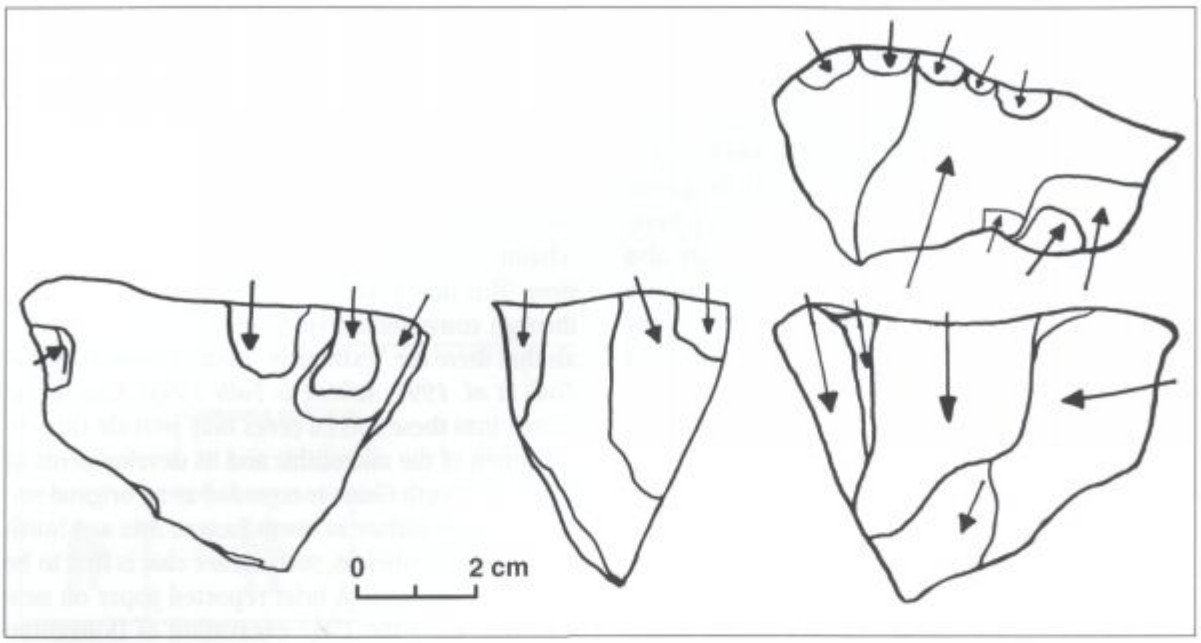


Fig. 4. Diagram of "Donggutuo-shaped core" (No. 97 DGT 576) from 1997 excavation of Donggutuo.

times at elevations above the archaeological horizons. They are mostly fine-grained siliceous materials, fine-grained quartzite and a few volcanic rocks, limestone or some other materials. Some fine-grained, raw materials are apt to microscopic observation for use wear polishes. Except for the coarsest chert, there are rare crystals and opals for making tools. Most of the fossil bones excavated from the site are highly fragmented and only a few are identifiable as shaft fragments, ribs, cranial fragments or vertebrae, teeth and so on. Bone materials are in various conditions to identify as much weathering, disintegration, evident cracking, trampling damage or excellent preservation. A small proportion of bones showed probable evidence of carnivore modification, gnaw marks, punctures. Cut marks and teeth marks are few and in very small proportion. The reason for this requires further research.

3.2. The Bose Basin sites in South China

Stratigraphy and Chronology

Bose Basin[2] is one of the Cenozioc basins in Southeast Asia; it slopes from the Yunan-Guizhou plateau in the Northwest and faces the Indo-Chinese peninsula in the south. It covers an area of roughly 800 square kilometres, and lies at an elevation of 80–100 m above sea level. Beneath the basal part of the basin lie 3000 m of Tertiary lacustrine deposits capped by lateritized fans which consist of about 15 to 20 m of basal gravel overlain by about 10 to 15 m of mottled brick-red clays and sandy clays (Pl. 2). The Youjiang River, which is a tributary of the Pearl River system, flows through the whole basin from Yunnan and joins the Zuojiang River to the Youjiang River. Influenced by a humid, subtropical, monsoon climate, the basin has long, hot summers, and obviously differs in the dry and wet seasons. There are some lower hills of Triassic sandstone in the southwest, and Paleozoic limestone karst landscapes and valleys in the south-east. It was filled in a Tertiary lacustrine sandstone, sandy-siltstone, and siltstone 3000 m thick yielding coal and oil. Through long erosion it received a laterite group consisting of thick gravel in the lower, and fine grainy sand, sandy clay, and clay in the upper until the Quaternary. Since about the later Middle Pleistocene this deposit has been eroded by the Youjiang River and shaped the highest lateritized terrace, which is widely distributed in the margin or in the centre of the basin. Meanwhile, the Youjiang River has constantly created its own, younger terraces at two or three levels. The four excavations since 1988 have shown that the Bose Palaeolithic is from the upper part of the lateritized terrace.

The laterite is a kind of red clay appearing reticular and mottled character, which is present in the south of East Asia (south to the Yangtze) and some valleys

2 Recent geological work in the Bose Basin was supported by Chinese Academy of Sciences SEPP and Smithsonian Institution, co-organised by Dr. Richard Potts, and is part of a collaborative project between two institutions.

of Southeast Asia. It is the most significant sedimentary process in the Late Cenozoic of South China. This Cenozoic deposit was formed some nuclear by a long period strong chemical weathered and accumulating oxides inside by decomposing clay minerals and de-silicifying procedure. Geologists called it vividly "vermiculate laterite" or "reticular mottled red clay". It was yet hard to give a definite age for this deposit because of the absence of its fauna evidence. These formations are the most strongly leached of the red beds and clays in the south (Pl. 3). This characteristic condition is therefore a sure criterion for distinguishing the Bose sediments from many younger formations. By observation on lithology, palaeoecology and geohydrography it was ever compared with the Nihewan Beds in North China (*Teilhard de Chardin et al. 1935*), i.e. earlier than Zhoukoudian. However, the absence of fossil evidence from this kind of highly acidic sediment makes any kind of bio-stratigraphic correlation very difficult. The chronometric dating of this area has therefore been very controversial. In recent decades, paleomagnetic and isotopic dates show that their judgement was basically right (*Huang 1991*). A primary result by fission track method on tektite from the Bose Palaeolithic layer puts the age at 0.73 Ma BP (*Guo et al. 1996; 1997*). Some other methods are continuing to do.

Cultural Remains

The Palaeolithic tools of the Bose Basin were first discovered in 1973 (*Li and You 1975*). Localities yielding 600 pieces of collected stone artefacts increased to numbers of hundreds by constant work done by IVPP and Guangxi region museums. But only few of them were from definite deposits, all others were collected from the surface, and it is difficult to determine their strata and time. Original reports classified them, as Upper Palaeolithic because of their geomorphic characteristics and because of no associated ground stone artefacts, pottery. Some other researchers later accepted this view.

Since in the spring of 1986 Huang Weiwen has taken charge of a long-term investigation in the Bose Basin, the primary aim of which is to look for the strata and chronology of those collected stone artefacts. They had ever induced that artefacts were probably from a terrace, which is equal to a period of Peking Man's period - Middle Pleistocene (*Huang et al. 1988*). In the last season of 1988 a definite strata of yielding stone artefacts was found from excavation. This new discovery corrected some old opinions and put "Bose artefacts" back to "at least the early time of Peking Man's period; moreover, it could be earlier than later". In other words, it could be in the early Middle Pleistocene or late Lower Pleistocene. The same evidence was proved again in the excavation of 1989 (*Huang et al. 1990*). In the excavations at two localities conducted by the author in the spring of 1993, from the same strata of involving stone artefacts we found tektites that we had noticed before in the surface. The tektite is good material for isotope dating. So, we used it for determining the date of the site after establishing which stra-

Pl. 2. View of laterite section at Gaolingpo site of Bose Basin.

ta the artefacts are from. In the 1995 spring field season a lot of work on geology and the environment including palaeomagnetism, collecting deposit samples for pollen or chemical analysis, plotting profiles and statistics on pebbles was done and a better basis constructed for the next stage of systematic, multidisciplinary work (*Hou and Huang 1998a; Hou in press*).

Stone Industry

The lithic raw materials consist of quartzite, quartz, sandstone, conglomerate and siliceous rocks. The tools are made mainly on cobbles, with some made on heavy flakes. Most exceed 10 cm in length. Picks, choppers, handaxes, heavy scrapers, and hammer stones are all major categories, with picks being the most common. More than 100 handaxes have been found that being the largest number from any single Palaeolithic site in China. The edges of most tools are constituted by deeply depressed scars appearing zigzag and kept thicker dimension, which shows hard hammer stone was perhaps the most popular technique used. However, fewer specimens with shallow scars, relative thinned shape can make us easily think that if they had materials that are more appropriate and improved technique could have been adapted to make tools that are more elegant.

The Bose industry is a kind of "pebble tool industry". It seems that the phenomenon of melting primitive and progressive characters can not be explained as mingled products of different periods. For new discoveries so far from the basin, constantly strengthen the judgement that there was only one cultural period here. Bose stone artefacts consist of picks, choppers, and handaxes, besides fewer, indeterminate cleavers. Picks are in the larger scale and respectively not more than 10% in either handaxes or choppers. Whether in picks or choppers, unifacial pieces account for the overwhelming majority of the assemblage compared to bifacial made tools. The handaxe is not the popular type, but occupies a better position in absolute numbers. Moreover, some of them have possible western Acheulean affinities (*Huang & Hou 1997a*) (Pl. 4a-b).

Conclusion

In China's domestic Palaeolithic industries the most similar to the Bose industry is the pebble tool industry discovered in the last two decades in the middle-lower Yangtze River district, including Hunan, Hubei, Jianxi, Anhui provinces and southern Shaanxi province. They are of similar materials, made with similar flaking techniques and are of similar assemblage compositions, with picks in the majority. The

Pl. 3. Laterite deposit and excavated area at Gaolingpo site in Bose Basin.

Pl. 4a–b. Both sides of handaxe excavated in Bose Basin (photographed by Huang Weiwen).

single difference is that spheroid, which is not found in Bose is a higher portion typology and cleaver is obvious in these areas. There are more choppers, but a lower proportion of handaxes than in Bose.

It is interesting that the laterite beds and similar kinds of stone industry are widely distributed in the valleys of many main rivers in Southeast and South Asia. Comparisons can be made between the Yangtze River and Pearl River in South China, the Chao Phraya River in Northern Thailand, and the upper Irrawaddy in Burma. Among them, the Anyathian culture of Burma (*Movius 1943*) appeared some particular character in technique and typology that is closely to its raw material (the fossilised wood) and should not emphasise its speciality too much. The primitive heavy-duty tool industry in this large area mentioned above is not much different in technique and typology from the "pebble tool industry" in East Africa in substance (*Huang 1993*). It could be thought of as archaeological evidence that the spread and migration of *Homo erectus* to the Old World happened in the later Lower Pleistocene and the beginning of the Middle Pleistocene.

3.3. The Panxian Dadong cave site in southwest China

Geographic Situation, History and Chronology

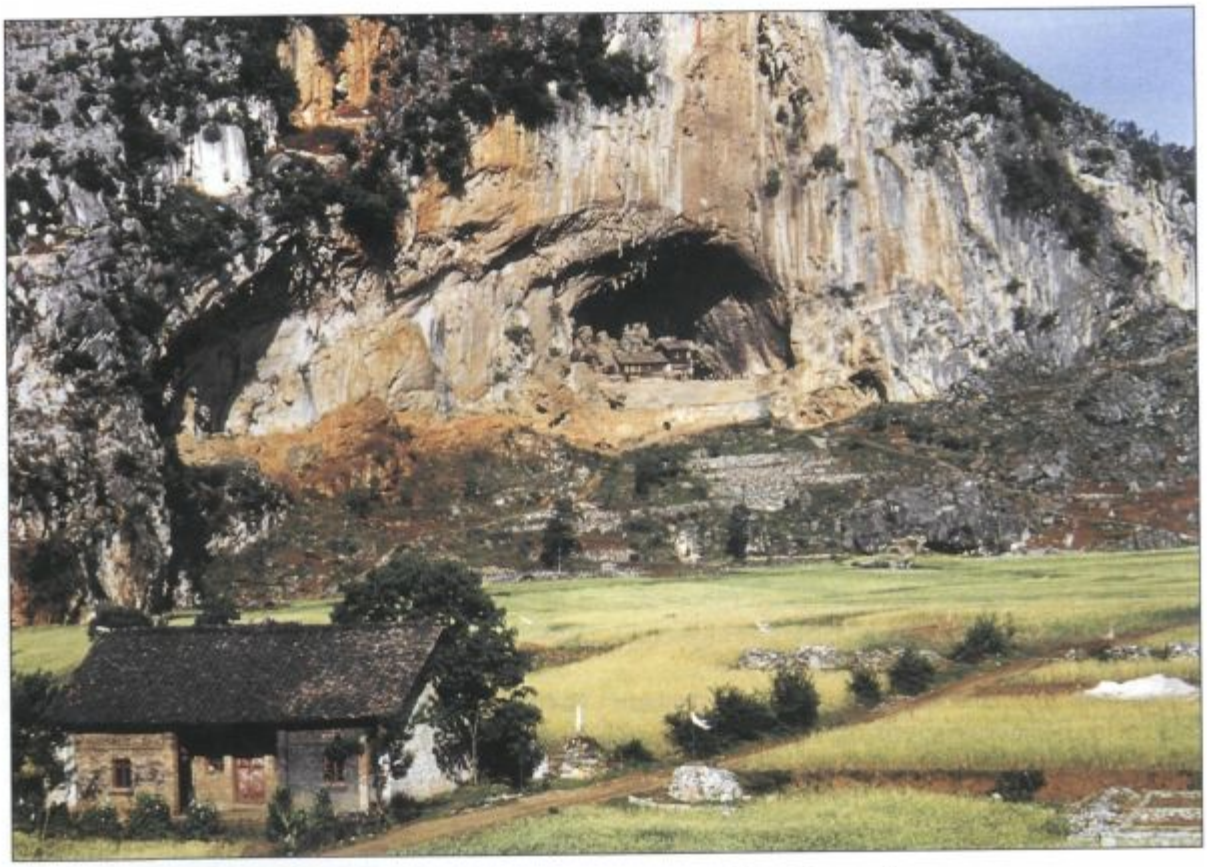
Panxian Dadong[3] is located in the western part of the Guizhou Plateau, which is part of the prevailing karst topography of the south-western region of East Asia. The cave was first brought to the attention of geologists and paleontologists in the 1970s because of its mammalian fossils from deposits. Dadong's potential as a Palaeolithic site was established in 1990. Thus far, excavations have been organised in 1992, 1993 (*Si et al. 1993; Huang et al. 1995*), 1996 and 1998.

Dadong is the middle-level cave in a series of three interconnecting caverns stacked within a 230-m-high hill. The hill itself is situated in a small valley whose floor is at an elevation of 1,630 m above sea level. The cave entrance is 55 m wide and 50 m high, faces east, and lies at an elevation of 31.4 m above the valley floor (Pl. 5). Dadong is really a massive cavern, as its Chinese name implies. The main hall measures 220 m from its back wall to the opening, and covers an area of roughly 9000 m^2.

Inside the cave (Pl. 6), there are two large stalagmites and one immense stalacto-stalagmite with a diameter of approximately 200 m. Samples taken from the stalacto-stalagmite for radiometric dating (uranium-series) provide a minimum age of 300 000 BP for this portion of the cultural sequence, and the latest deposit sequence in the cave extends to the Holocene period (*Shen et al. 1997*). In 1998, ESR dating was adopted here to establish a precise chronology of the Dadong stratigraphy, which is a top priority for the project, as this will facilitate the interpretation of the site within the broader context of East Asian prehistoric cave sites. Numbers of samples are being analysed by Dr. W. Jack Rink at the Geology Department of McMaster University in Canada.

The sediments inside the cave consist of brownish-yellow clays, sandy travertines, breccias, and a large limestone block dislodged from the cave roof. The presence of well-bedded, sandy travertines that de-

3 Panxian Dadong project has been supported by both Wenner-Gren Foundation for Anthropological Research and China National Relics Bureau.



Pl. 5. Outside view of entrance of Panxian Dadong cave site (Hou, in press).

Pl. 6. Inside view of Panxian Dadong cave site (Hou, in press).

velop during moist, mild climatic regimes suggests a sequence of environmental changes during the occupation and formation of the site. While the full depth of the deposits within the central portions of the cave has yet to be determined, the thickness of sediments near the cave entrance is estimated to be 19.5 m. The section of the deeper excavation in 1998 shows a clear event of cave breakdown in Guizhou Plateau that could be closely correlated to the uplift of Qinghai-Tibetan Plateau in the middle Late Pleistocene (*Huang 1998*).

Archaeological Evidence

There is plentiful evidence of the use of fire (charcoal, burnt bone, and ash) and four fragmentary hominid teeth. The fauna recovered from Dadong is representative of the Pleistocene *Ailuropoda-Stegodon* fauna suite of south-eastern Asia. The condition of these materials provides evidence for both hominid and carnivore activities in Dadong. There is also evidence of carnivore gnawing on some of the specimens. Most of the individual *Elephas sp.* teeth in the assemblage are from immature individuals, while the *Rhinoceros sinensis* teeth are from old individuals. The hypothesis that the taphonomic distinctions between these two large mammal species indicates a hunting strategy for the Dadong inhabitants will be tested, as larger samples become available.

Two human teeth (one upper right incisor and one lower left canine) were discovered from the excavation in 1992 and 1993, appearing to have the morphological features of *Homo erectus*. But the main characteristics of the two teeth are closer to those of early *Homo sapiens* (*Liu et al. 1997*). Another two hominid teeth were found from archaeological layers in the spring of 1998.

In four field seasons, almost 3000 stone artefacts were collected from Dadong The raw materials are chert and basalt from local hillside out-crops and ancient river gravels, and blocks of limestone from inside the cave The tool assemblage includes side scrapers, end scrapers, notches, borers, denticulate tools, choppers, hammer stones, anvils, a few burins, and a small handaxe, including a few possible bone scrapers from the latest excavations. A number of small, exhausted chert cores show secondary use as scrapers. The borers and notches vary greatly in size. The technology is primarily hard-hammer direct percussion. A noteworthy feature of the assemblage is the prepared core technique, which is discernible on several specimens This is the most extensive reported evidence for the prepared core technique in the Palaeolithic of southern China. Some flakes and cores remind us of the Levallois technique (Fig. 5, 6) (*Huang & Hou 1997b*) The large number of limestone artefacts, which are big cores and flakes, were unexpectedly uncovered from lower archaeological sediments.

Several excavations confirm the rich potential of the Dadong site for Palaeolithic achaeologica1 investigation. The abundance of artefacts, fauna remains bearing evidence of hominid manipulation, charcoal, burnt bone, and ash found in situ attest to an extensive record of hominid habitation at Dadong. The concurrence of these elements in the Dadong deposits will enable us to investigate a broad array of hypotheses concerning site formation, resource exploitation, and behavioural complexity. In addition, the large dimensions of the cave permit horizontal excavation strategies for studying within site spatial patterns.

The prepared core technique of high proportion in the Dadong stone assemblage is an important feature of lithic technology for regional comparative studies within China (*Olsen and Miller-Antonio 1992*). While not well documented in Asia, when the prepared core technique has been described in China it has generally been from sites in North China. The Dadong assemblage therefore represents a rich resource for understanding variability in the operational sequence of the Chinese Palaeolithic. Dadong will also provide an interesting contrast for contemporaneous localities such as Zhoukoudian and Bose, a series of open-air sites in neighbouring Guangxi Province.

4. DISCUSSION

I would like to point out some common significance in the presented three sites. Each of them was new discovered in the last ten to three decades and occupies an important part of China in different geographical and morphological environments. They are all connected with longer and complete sediments in each district.

Each stone industry has some interesting characteristics that embody the direction of its cultural development and retain some traces of former practices. They have good condition to connect the past and future in their own side or wider parts. Their cultu-

res might have been influenced by some other, more or less distant cultures, but we do not have enough evidence to rule out the possibility of local origin. They all own the large special and temporal margin to play important role in understanding neighbouring cultures. The driving forces stimulating these cultures are the backgrounds of palaeo-ecological elements in the Quaternary period in each region.

The Donggutuo site is only one of the excellent Early Palaeolithic sites in the Nihewan Basin: there are some other comparable sites to consider along the same geological sequence. Researching these early Palaeolithic cultures and their paleo-ecological backgrounds must be helpful in touching the pulse of the early people who lived in the basin for such a long period. Although having "Donggutuo-shaped cores", the general appearance of the industry is still in primitive stage. But they are not the lowest. The similarity between Donggutuo stone artefacts and that early culture in East Africa will reveal some reason that we are trying to know. The problems hide many important function of the nature happened in the far past time. And questions are still going on. Tool technology at the site is quite advanced and difficult to classify as a primary product of early people. Jia Lanpo says that these technologies must have had a period of development before these known dates. In accordance with this view, he supposes that there exist much earlier hominid traces than 1 Ma in China. Regarding human origins, he supports the possibility of 4 Ma as the earliest beginnings for hominids.

The Bose site is the key to understanding contemporaneous cultures in south-eastern Asia, perhaps even South Asia in some degree. The "Movius line" has played a "great" role to know the East and West divided by so called extremely different culture area. The Bose industry is a lesson to those who still keep "mode I" and "mode II" in mind. We have to change our mind in time according to discovered facts and reconsider some old problems. The Bose stone artefacts indicate that *Homo erectus* in Bose knew much better technology than mode I (*Gibbons 1998*). We may redefine a new standard for them, but we have known it is not model I 's voice again for this large area of Asia. Tool-making traditions are not as simple as we once thought.

Panxian Dadong is located in a critical plateau, potentially the site of the origin of humans. Close to it, there is the locality of *Homo erectus Yumouensis*, whose age is 1.7 Ma. Not only is this region the area in which the most prolific hominoid fossils were found, but also these fossils are at the closest position (ca. 5 Ma) to either pre-human or true human compared to those found in East Africa (13 Ma) or in Europe (10 Ma). The plentiful hominoid fossils found in Zhupeng-Xiaohedi of the Yuanmou Basin include one skull, seventeen maxillae, mandibles, and thousands of teeth. There are opposing opinions on the determination of "who they are" and "how old they are". Some accept them as human, others interpreting them as "ape", and these materials lay in the key period for the exploration of human origins (*Hou & Huang 1998*). In any case, Panxian Dadong is at a later place in the line. But it could help us to find a clue to the mystery in advance. Not to mention the south-western part of China is weak on nice discovery of Palaeolithic cul-

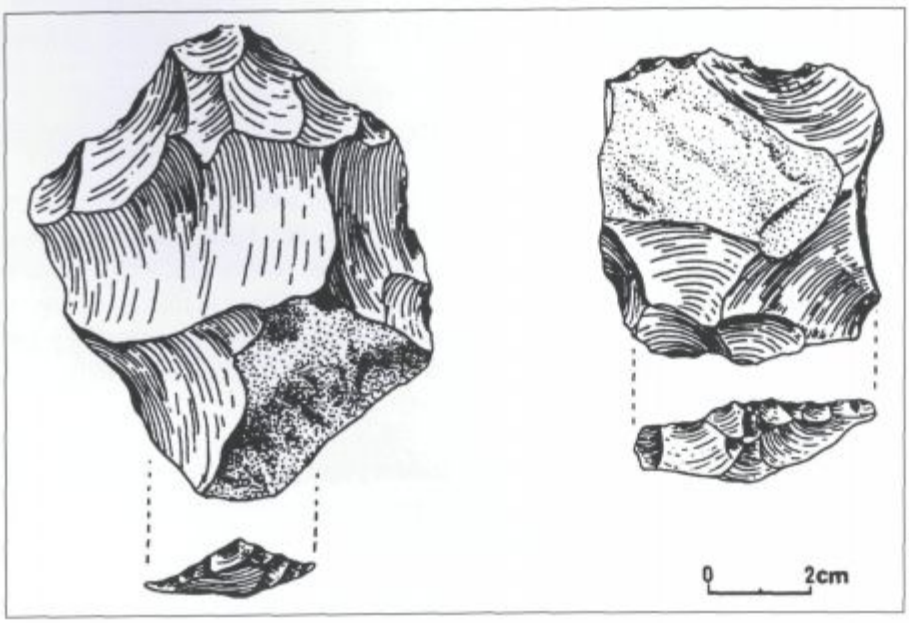


Fig. 5. Flakes with Levallois character from Panxian Dadong (Huang & Hou 1997).

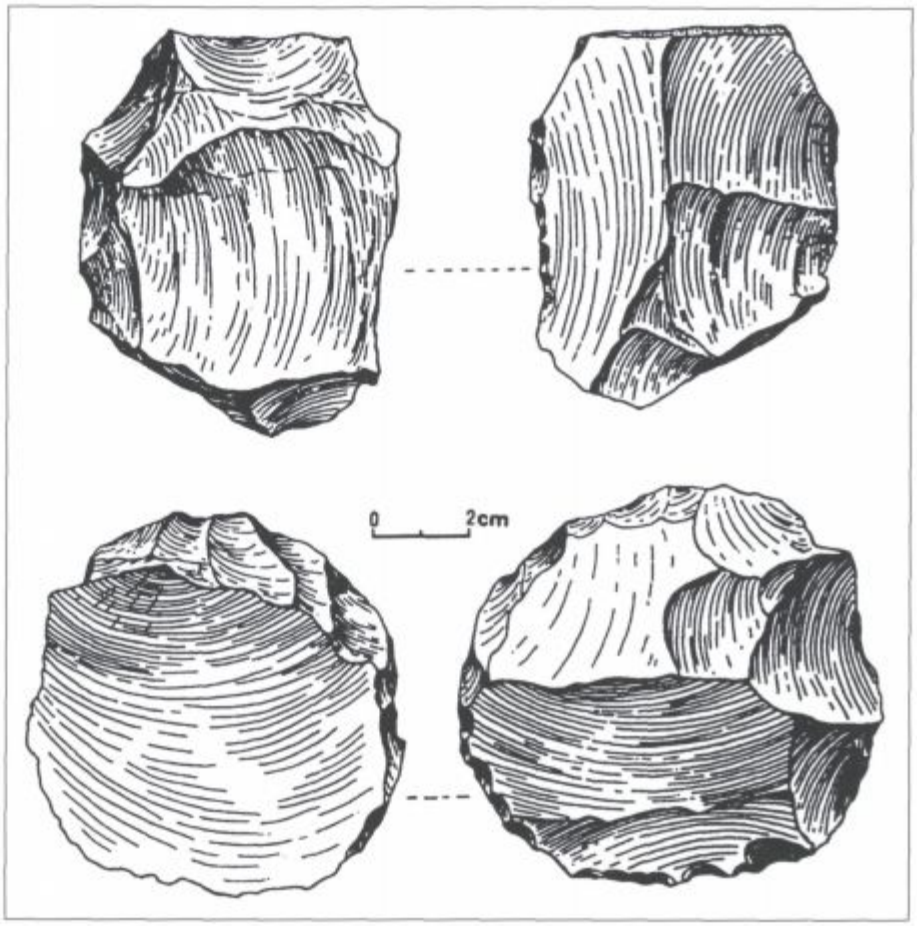


Fig. 6. Cores with Levallois character from Paxian Dadong (Huang & Hou 1997).

ture from complete deposit. Dadong has perfect conditions for developing and becoming a standard section in the region. Levallois is another interesting problem in this area. In North China, there is more evidence to consider this sensitive problem. But in the south, from a Palaeolithic site, it is the first to appear some probable clues. We hope that there will be more convincing evidence in future excavations.

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