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New achievements in the study on the transitional period from the Palaeolithic to the Neolithic in China

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ABSTRACT - *The archaeological data on transitional period from Palaeolithic to Neolithic in South and North and South China are presented. In South China in the transitional period from 21 000 BP to 12 000 BP, the primitive pottery, polished blades, microliths and plant opal phytoliths similar to cultivated rice appeared in the context of chipped pebble flake tools, polished bone and antler tools, and foraging and hunting subsistence economy. In North China the transitional period is embedded in time span from 16 000 BP to 11 000 BP. In stone tool assemblages, the flake tools and microliths prevail. The pottery appeared in the Hutouliang cultural context 10 000 BP. There are the evidences of foraging and hunting subsistence economy only.*

POVZETEK - *V članku predstavljamo arheološke podatke o prehodnem obdobju med paleolitikom in neolitikom v severni in južni Kitajski. V severni Kitajski se v prehodnem obdobju med 21 000 BP in 12 000 BP pojavljajo primitivna keramika, glajene kline, mikroliti in rastlinske mlečnosteklene okamnine, podobne gojenemu rižu, v kontekstu z odbitkovnimi orodji, glajenimi kostmi in orodji iz rogovja ter lovsko-nabiralniškim gospodarstvom. V severni Kitajski prehodno obdobje obsega čas med 16 000 BP in 11 000 BP. Med kamnitimi orodji prevladujejo odbitkovna orodja in mikroliti. Keramika se pojavi 10 000 BP v kulturi Hutouliang. Glede gospodarstva imamo dokaze le za lov in nabiralništvo.*

INTRODUCTION

The transitional period from Palaeolithic to Neolithic, identified as Mesolithic by some scholars and, because of some important changes in the history of human development still attracts pretty much attention in prehistoric archaeology and quaternary environmental science. Thanks to the continuous progress in natural sciences, technology and in other interdisciplinary studies, Chinese archaeologists provide remarkable research results in recent years. Several research projects and field activities in Wannian, Xianrendong (Jiangxi Province), Qinshui, Xiachuan/Jixian, Shizitan (Shanxi Province), Liuzhou, Bailiandong (Guangxi Province) and Yangchundushizi (Guangdong Province), Diaotonghuan, Daoxian, Yuchanyan (Hunan Province), Yangyuan, Hutouliang (Hebei Province) have been carried out to establish Mesolithic stratigraphic and chronological sequence; to identify palaeoclimatic changes and to provide palaeoenvironmental reconstruction; to analyse process of animal domestication and agriculture origin; to identify the appearance of pottery production and polish stone-tool technology.

Bailiandong (Fig. 1-3)

Bailiandong is a cave site. The tuff seems to divide the cave accumulation into east and west part. The Museum of Liuzhou and the Natural Museum of Beijing and some other research groups excavated the cave deposit in the period from 1973 to 1993. The assemblages of charcoal, burnt bones, calcium slice, spiral shells, and fossil bones and, pollen samples have been collected in correlation with their stratigraphic positions from different cultural and natural layers (*Yi Guangyuan et al. 1994; "Excavation report..."1987*). The chrono-stratigraphic sequence and the sequence of superimposed layers, artefact and bone assemblages from both parts of cave deposits are presented on Tables 1 and 2.

Yuchanyan

Yuchanyan is a cave dwelling site located in Daoxian, Hunan Province. The entrance into the cave looks like a 12-15 meters wide, 6-8 meters long, and approximately 5 meters high hall. The catchment area is flat and reach with fresh water sources.

The Institute of Cultural Relics and Archaeology of Hunan Province excavated this site in 1993 and 1995. Artefact assemblage mainly consists of chipped stone tools, bone, antler and, shell tools and a large amount of animal bones was deposited in 1.2–1.8 meters thick deposit. There were also a few pot-sherds with pointed and round bottoms found. The pottery is thick, heavy, and mingled with coarse sands and organic material (Fig.4). Coiling was used as manufacturing technique, namely coils of clay

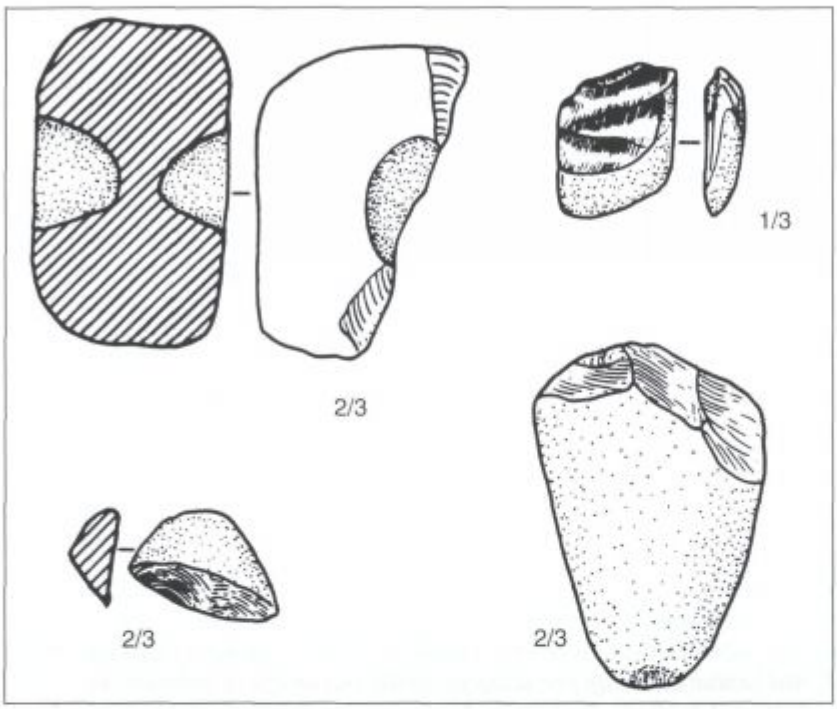

Fig. 1. Bailiandong. Layer 2, western part. Stone tools. M 1:3 – 2:3.

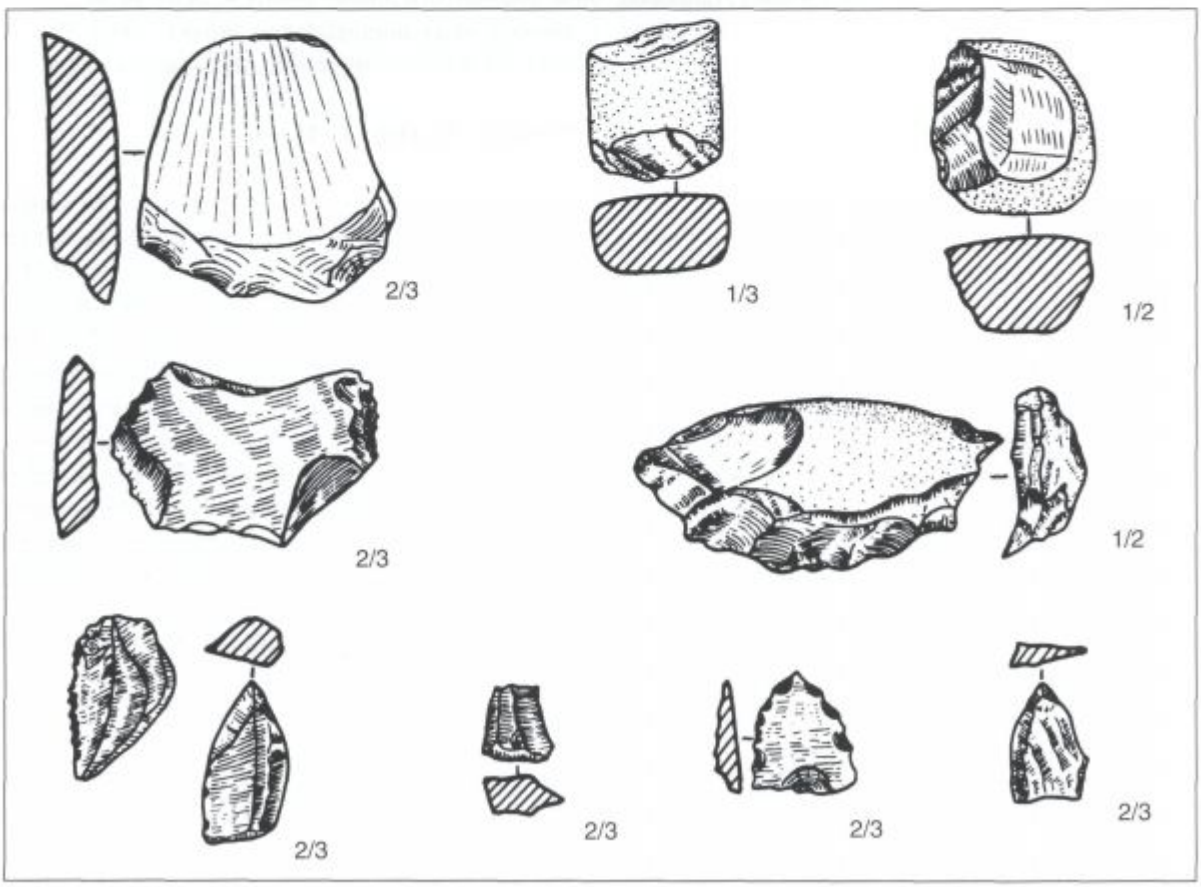

Fig. 2. Bailiandong, layer 3, western part. Stone tools. M 1:3 – 2:3; 1:2.

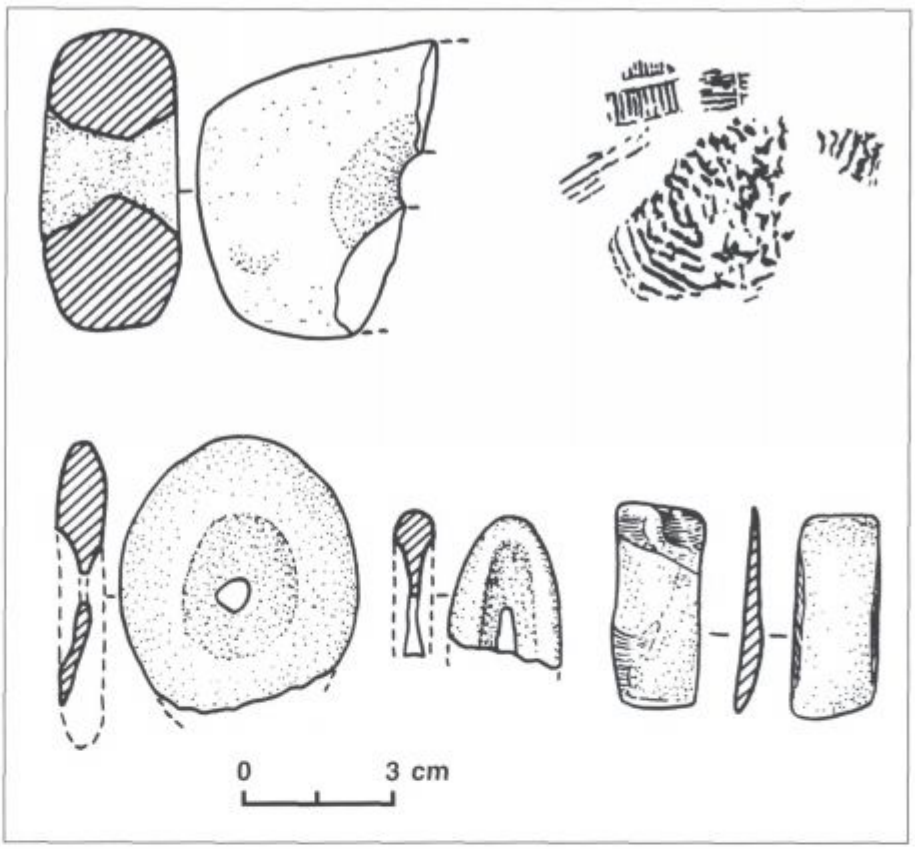

Fig. 3. Bailiandong. Layer 3, eastern part. Stone tools and implements.

were built up to establish the vessel. There are traces of prints on the pottery identified. Some bone tools are polished, and shell tools are perforated. Bone assemblage consists of remains of deer's, birds, mammals, fish, tortoises, and molluscs such as snails and shells. Deer's and birds bones prevail. Flotation and dry sieving produced dozens of seeds and kernels. We can conclude that the subsistence strategies were based on hunting and gathering. But, the analyses of rice species confirmed that some groups are wild and the other cultivated showing all characteristics of a wild *indica* and *japonica* species. It is believed that the later group belongs to an ancient type of rice, which has been cultivated approximately 10 000 BC, just before splitting in two species (*Yuan Jiarong 1996; Yan Wenming 1997*).

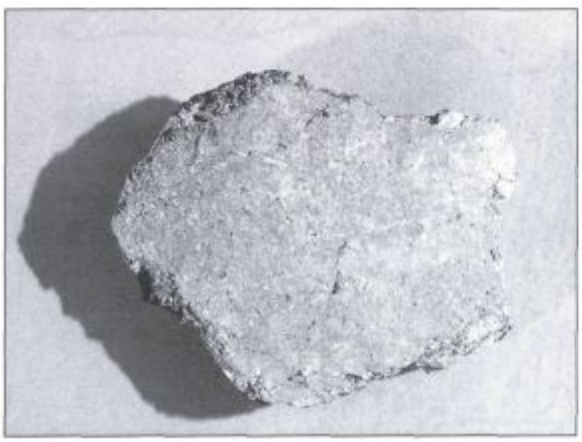

Fig. 4. Yuchanyan. Pottery fragment.

Xianrendong and Diaotonghuan (Fig. 5)

The Xianrendong site and the Diaotonghuan site are two cave dwelling sites at a distance of 800 meters in Wannian, Jiangxi Province. A Sino-American archaeological team excavated there in two seasons – 1993 and 1995. In second season they found 625 pieces of stone tools, 318 pieces of bone tools, 26 pieces of perforated shell tools, 516 pieces of potsherds, dozens of fragments of human bones and ten of thousands fragments of animal bones. The artefact assemblages, documented in cultural layers provide important sources for the study of cultural chronology, the settlement pattern changeability, the emergence of pottery production and rice cultivation in the transitional period from the Late Paleolithic to the Early Neolithic in southern China. Small flake tools of flint and quartz, such as scrapers, side-scrapers, gravers, end-scrapers, points, and a few pebble-choppers represent the Late Paleolithic stone tool assemblage. The number of small stone tools significantly decreased in the beginning of Early Neolithic. In the stratum that has been correlated to the transition from the Paleolithic to the Neolithic,

perforated shell tools, bone, and antler shovels, polished stone tools and primitive potsherds were found. The date of the earliest potsherds from the Xianrendong site is earlier than 14 000 BP. The pots with round bottoms are mingled with quartz sands, and most of them were made by means of attaching clay-piece sticks, while some others were made by accumulating layers of clay strips. The main decoration is an impressed pattern. A large number of plant opal phytoliths of wild rice were unearthed in strata from F to H in the Diaotonghuan site, while some plant opal phytoliths of semi-cultivated rice were found in strata from E to C. The excavators consider that the strata from F to P belong to the Late Paleolithic, while the strata from E to C belong to the Early Neolithic. Animal bones comprised several species, including deer, pigs, tortoises, birds and so on, among which deer are the major type, accounting for about 80%, and pigs and birds are the second. The Diaotonghuan site was recognised as a temporary camp and slaughterhouse for the inhabitants living in Xianrendong at the time (*Zhang Chi, Liu Shizhong 1996*).

Miaoyan

The an Miaoyan site is a cave site in Guilin, Guangxi Province. Trial excavation yielded a cultural sequence stretching from the Late Palaeolithic to the Neolithic. Cultural deposits are divided into six strata: the earliest potsherds were found in the middle of the fifth stratum. They are coarse and tempered with sand, surface colour varies in tones of brownish-grey to reddish-brown. Pots were probably fired at a low temperature. Potsherds are dated to 14 000 cal BP, which is one of the earliest dated pottery assemblage found in China so far (*Yuan Sixun 1997*).

Stratum & Sample* (Lab No.)		^{14}C age (yr Bp)
2	BA92030-1	12730 ± 370
3M	BA92033-1	12630 ± 450
4M	BA92034-1	13710 ± 270
5L	BA92036-1	18140 ± 320
6L	BA92037-1	20920 ± 430

^{14}C Ages of the Miaoyan Site.

As it was mentioned above, the study of archaeological cave deposits dated to the period from 21 000 to 12 000 BP provides some insights into the processes of transition from Palaeolithic to Neolithic in South China. Transition period is marked by the appearance of pottery, polished blades, perforated heavy stone tools, microliths, and arrowheads. The pots are coarse and simple shaped with round or pointed round bases. Fabric was tempered with sand

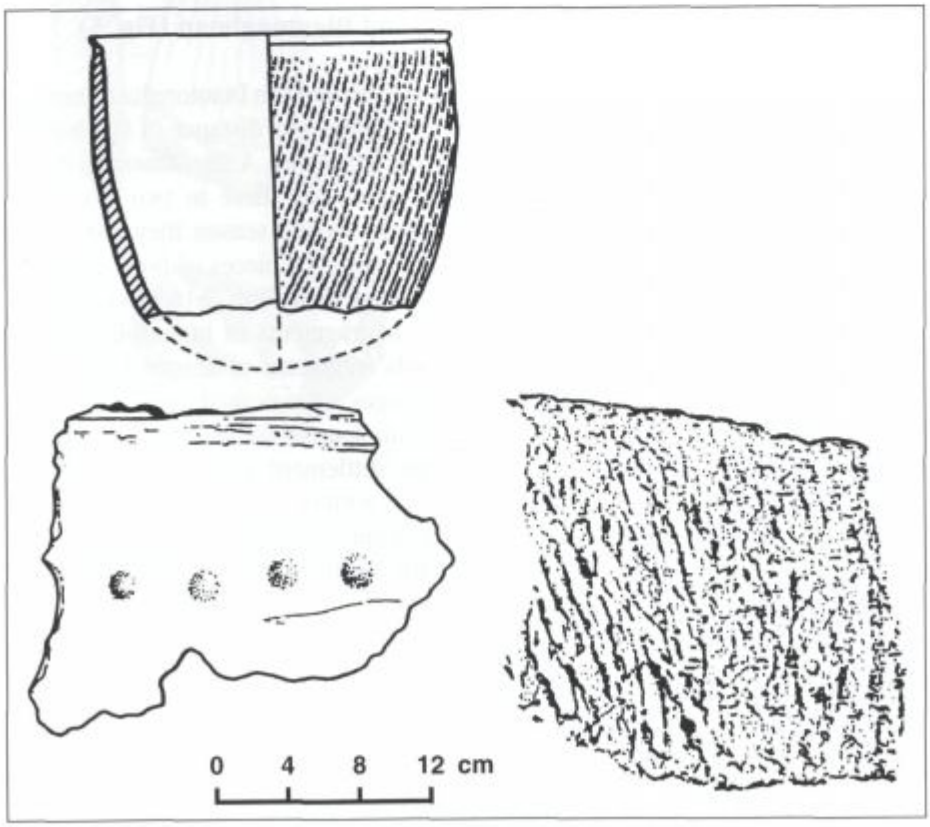

Fig. 5. Xianrendong. Neolithic pottery.

and fired at low temperatures. Although economy was based on hunting and gathering, presence of plant opal phytoliths similar to those of cultivated rice indicates the initiate stage of agriculture.

Shizitan (Fig. 6)

The study of transition from Palaeolithic to Neolithic in northern China is still at the beginning. The research projects are currently running on Shizitan site in Jixian, Shanxi Province and on Hutouliang site in Yangyuan, Hebei Province.

The Shizitan site is situated near the Qingshui River, a tributary of the Yellow River. The size of the area excavated in 1980 campaign was more than 100 m^2 and yielded 10 m thick stratigraphical sequence stretching from the Late Palaeolithic to the Early Neolithic. Many important cultural remains and some animal bones were unearthed during this excavation. In 1994, the Department of Archaeology at Peking University and other institutes re-examined the original stratigraphic section and collected carbon and soil samples from each stratum. Samples are still being processed.

About one half of all stone tools from the cultural strata dated to 16 000–11 000 BP are flaked stone tools (including scrapers, points, arrowheads, etc.), made of flint and quartz, the other half are typical

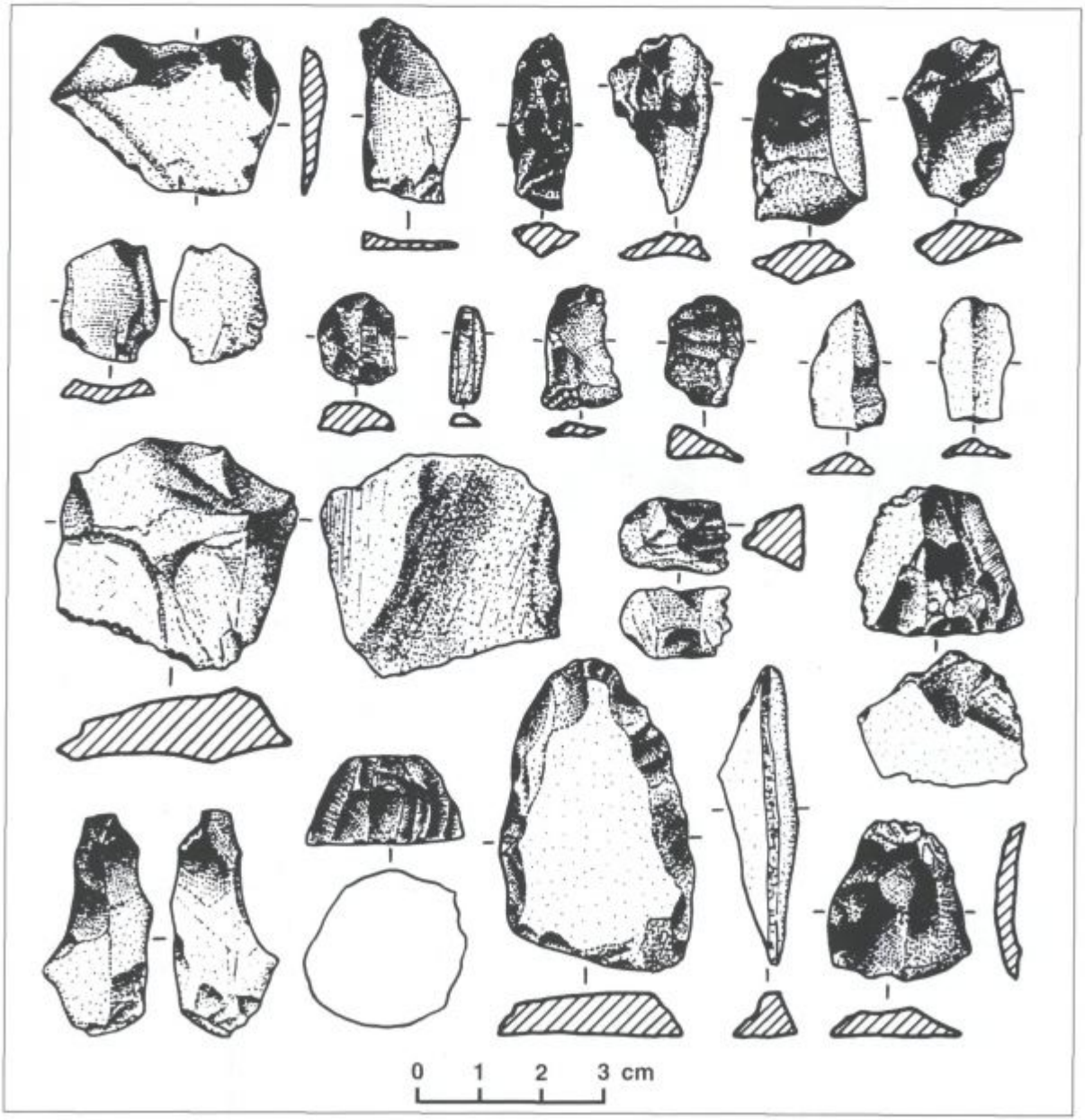

Fig. 6. Shizitan, central part. Microlithic stone tools.

microlithic tools, represented by a large number of micro-blades and variety of micro-cores (funnel-shaped cores, boat boff-shaped cores, wedge-shaped cores, etc.). Among microlithic tools micro-blades predominate by 70%. Generally, pressure flaking produces them.

Some features were also excavated, including irregularly shaped pits, filled with ashes and burned animal bones. Identified species include antelopes, pigs, oxen, mice, and so on. Antelope bones predominate and a large part of them had been burned. According to the data, economy was based mainly on gathering and hunting (*"Cultural Bureau..." 1998; Yuan Si-xun, Zhao Chaohong 1998*).

Yujiagou

From 1995 to 1997, the archaeological team of the Hebei Provincial Institute of Cultural Relics and the Department of Archaeology at Peking University excavated the Yujiagou site and some other locations of the Hutouliang group, in Yangyuan, Hebei. Cultural deposits from the Late Palaeolithic to the Early and Middle Neolithic were found, yielding a large number of stone artefacts, animal bones and primitive potsherds. Stone artefacts include micro-cores where wedge-shaped cores predominate, and a certain amount of composite tools such as arrowheads, spearheads and wedge-shaped tools (Fig. 7). Composite tools hold an important position in the Jiqitan and Hutouliang culture (*Liu Lihong 1998*); wedge-shaped tools were found in the Xiachuan site at Qinshui, Shanxi province (*"Ji Qi Tan microlithic..." 1993*), while in the Hutouliang group there were even more numerous. Some of them had been polished at the ventral side and use-wear polish is visible. Wedge-shaped tools from Hutouliang sites are dated earlier than their counterparts of the Xiachuan culture. From the upper stratum of the Xiachuan site come six dates, stretching from 23 900 ± 1000 BP (zk-417) to 16 400 ± 900 BP (zk-385). Latest phase of the Hutouliang group microlithic culture may be dated to about 10 000 BP according to the earliest

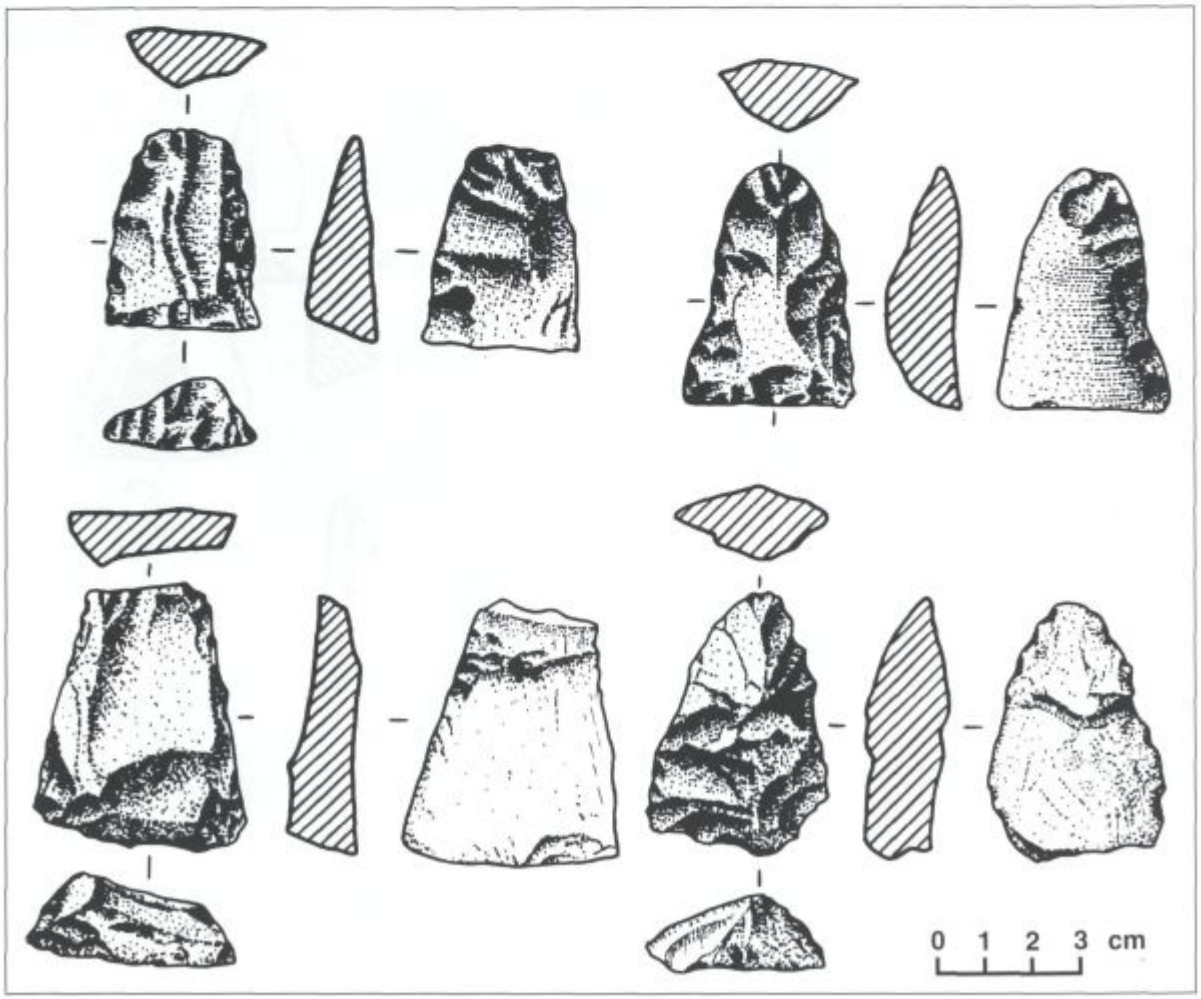

Fig. 7. Jiqitan. Wedge-shaped stone tools.

potsherds from Location 65039 (Yujiagou) of the Hutouliang group. Potsherds were found at the bottom of sandy loess and the upper part of the lower strata of fine soils, geologically dated to about 10 000 BP (*Wang Jian et al. 1978*).

The excavation and multi-disciplinary research are still in progress at present. Important factors to be considered are the climatic changes that took place during the last glacial stage of the Pleistocene. In this period, the ancient cultures of China had obviously different cultural characteristics due to the environmental differences and different cultural traditions. According to the available data, China can be divided into two areas: South and North, each with its own characteristics. On the whole, South China artefacts and remains are mainly found in caves and rock-shelters, with some locations on river terraces. Single-side retouched stone tools, some tools made of quartzes and flints, and perforated heavy stone tools are characteristic of that area. Mesolithic people also developed relatively advanced bone and horn polishing techniques and shell-drilling techniques. A few partly- polished stone tools and coarse sand-mixed pottery were also found in South China. On the other hand, North China sites from this period were mainly found along alluvial plains and some of them in caves. Microliths and composite tools are characteristic of the region, some partly-polished stone tools and sand-tempered pottery were also found.

Despite these differences, there are some synchronous developments in the economy and technology of both regions.

1. A few partly-polished stone tools were found in both areas. The blade-polished tools in South China are dated almost as early as 20 000 BP while in North China are younger, dated to 10 000 BP.

2. Primitive pottery appears. In South China, it probably appeared around 12 000 to 15 000 BP, while in North China it is dated to 10 000 BP. Pottery of both regions is similar, both being coarse, with about 1 cm thick walls, sand-tempered and fired at low temperatures. Shapes are simple with few varieties.

3. The subsistence was based on gathering, hunting and fishing. In some regions with favourable climate, natural resources and social conditions early agriculture and process of domestication might have begun.

4. There are open-air and cave sites. Features of the open air-sites include hearths, pits (natural recesses were often used), stone tool workshops, charcoal grains and animal bones, but so far no circular ditches or walls have been discovered.

At present, some achievements have been made in the multi-disciplinary research on the transitional period from the Palaeolithic to the Neolithic in China, but these studies are still elementary. In terms of research into the transition period, methods, means and theories need to be improved and strengthened. For example, the application of phytolith analysis method, pollen analysis and other dating methods need to be supplemented and perfected, and accuracy needs to be improved. Some new scientific methods need to be developed. In academic circles, the understanding of the interaction between humans and their surroundings in different natural environments needs to be deepened, in order that people can get closer to the objective reality of the social development of human societies.

Layer	Cultural relics	Ages			
		Lab number	sample material	^{14}C age	uranium-series age
the first layer calcium board	Ostracons with thick cord mark, fragmentary spiral shells	BK82092	calcium board	7080 ± 125 connected by tree-ring dating method bc5952-5630	
the second layer calcium board the total thickness of these two layers is about 5-25cm	spiral shells, animal bones	BK94044	calcium board, (upper) calcium board, (lower)	7140 ± 60 9520 ± 90	
the third layer Isabel clayey soil, cinereous (grayish white) and tawny (yellow-brown) in part the average thickness: 38cm	1 polished stoneware, 1 ground perforated gravel, 2 perforated stone ornaments, chipped stone stools, a few flint flakes; animal fossil, burnt bones carbon granules, lots of spiral shells	KBY82239 BA93016	osteolith (fossil bones) carbon slack	 11 160 ± 580 (AMS-^{14}C)	8000 ± 800
the forth layer tawny clayey soil, thickness: about 36cm	1 stone adze with polished blade (its lower part was ground into circular blade), chipped stone stools, a few flint flakes, ground bone artefacts and horn artefacts, animal fossils, a few spiral shells, carbon granules,	BA93017	carbon Slack	13 550 ± 590 (AMS-^{14}C)	
the fifth layer calcium board thickness: 1-4cm	spiral shells seen occasionally	PV-445	calcium board	13 905 ± 250 (AMS-^{14}C)	
the sixth layer and rock brown clayey soil, containing sand, thickness: 43cm	incompletely perforated gravel, chipped stone stools, plenty of spiral shells at the top of the accumulation, carbon granules,	BA92003	spiral shell	14 650 ± 230 (AMS-^{14}C)	
the seventh layer calcium board thickness: 44cm		BK94041	calcium board	19 465 ± 200	
the eighth layer ferruginous clayey soil, containing lots of breccia, exposed thickness: 1m, bottom unseen	black flint flakes, animal fossils	BA92013	burnt bones (AMS-^{14}C)	20 240 ± 660	

Table 1. Dating results of the layer's accumulation, and cultural relics (eastern part).

Layer		Cultural relics	Ages			
original layer	New layer		Lab number	sample material	^{14}C age (BP)	uranium-series age (BP)
accumulation of spiral shells above the main accumulation	1	gravel tools and flint fragments, spiral shells and primitive perforated gravels	BA94027	carbon slack (top)	10 310 ± 290 (AMS-^{14}C)	
calcium board	2		BK93033	calcium board (top)	12 780 ± 180	
the first layer Isabel clayey soil, thickness: 20–34 cm	3	animal fossils, burnt bones, spiral shells	BA92017	spiral Shell	18 450 ± 410 (AMS-^{14}C)	
the second layer calcium board thickness: 5–30 cm		ground gravel cutting-tool fossil bones, a few spiral shells	BK82097	calcium board	19 910 ± 180	
the third layer tawny clayey soil, thickness:: 18–36 cm	4	Chipped stone stools, among which black flints increase in amount and a considerable part bears the feature of microlith; metal arrowhead, animal bones, more spiral shells, carbon granules.	BK92039	tufa	21 575 ± 150	
the forth layer thickness: 4cm		carbon slacks	BK82098		26 680 ± 625	
the fifth layer tawny clayey soil, brown in part thickness: 30–34 cm	5	chipped stone stools, among which flinted stoneware covered a considerable part, gravel tools and some stone artefacts bearing the feature of the Palaeolithic period, animal fossils, very few spiral shells, fire piles, carbon slacks.				
the sixth layer stalactite thickness: 10 cm		fossil bones	BKY82141	fossil bones		28 000 ± 2000
the seventh layer black tawny clayey soil, containing breccia, thickness: 18 cm,		chipped stone stools, 2 fossils of human teeth, animal bones including rhinoceros, stegodons and giant pandas, no spiral shells				
the eight layer calcium board thickness: 10 cm						
the ninth layer tawny clayey soil, thickness:: 12 cm						
the tenth layer containing clay at the top of the calcium, unseen bottom		animal fossil fragments occasionally seen	BK82101		37 000 ± 2000	

Table 2. Dating results of the layer's accumulation, and cultural relics (western part).

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