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On the Bailiandong Culture

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ABSTRACT – *The Bailiandong cave site was discovered in 1956, and was excavated and a preliminary study made of it by Beijing Natural History Museum and Liuzhou Municipal Museum from 1980 to 1982. A supplemental study from 1991 to 1993, funded by the Chinese National Science Foundation, found that its deposit included five continuous cultural strata from the Late Palaeolithic to the Neolithic with a transitional phase, and established a new framework for the Bailiandong Cultural Series. The Bailiandong cave site has incalculable value in attempts to explore how the Palaeolithic was transformed into the Neolithic in Southern China.*

IZVLEČEK – *Najdišče v jami Bailiandong so odkrili leta 1956, ga izkopali in med leti 1980 in 1982 pod vodstvom Prirodoslovno-zgodovinskega muzeja iz Pekinga ter Mestnega muzeja iz Liuzhouja objavili preliminarne rezultate. Nadaljne raziskave med leti 1991 in 1993 je financiral Kitajski nacionalni sklad za znanost. Odkrili smo, da je med jamskimi depoziti pet kontinuiranih kulturnih plasti od poznega paleolitika do neolitika, ki vključujejo tudi prehodno fazo. Izdelali smo nov okvir za bailiandongško kulturno zaporedje. Jama Bailiandong je neprecenljive vrednosti pri raziskovanju preoblikovanja paleolitika v neolitik na južnem Kitajskem.*

KEY WORDS – *China; Guangxi Province; Bailiandong cave; Palaeolithic; Neolithic; transition*

INTRODUCTION

Bailiandong (White Lotus Cave) is located 12 km southwest of the city of Liuzhou (109°20' E, 24°15' N) and 2 km from the famous Liujiang Man site in Guangxi Province (Fig. 1). The Bailiandong cave is situated on Mount Baimian (White Face) and was discovered in 1956 when Pei Wenzhong (Pei Wenchung) was surveying near the Gigantopithecus cave site. Isolated cultural remains were found in disturbed layers in Bailiandong cave, and were classified as late Palaeolithic by Jia Lanpo (Chia Lan-po) and Qiu Zhonglang in 1960 (*Chia and Qiu 1960*). The Liuzhou Municipal Government designated it in 1961 as being among the key relics under municipal protection.

From 1973 to 1980, Liuzhou Municipal Museum studied the relics several times and made a number of small-scale excavations, which recovered both, cultural and fossil mammalian remains (*Zhou and Yi 1982*). In 1980 and 1982, the Beijing Natural History Museum and Liuzhou Municipal Museum jointly conducted excavations and a preliminary study, which led to the conclusion that the cave site includes five continuous cultural strata from the late Palaeolithic to the early and middle Neolithic, with a transitional phase. The archaeological materials from the cave are referred to as the Bailiandong Cultural Series (*Zhou 1984; 1986*). In 1985, the Bailiandong Cave Science Museum was founded and opened.

In 1991 funding was secured from the China National Natural Science Foundation (CNNSF) for further investigations over three years in an effort to explore the dating and ancient ecological environment of

the cave's sediments and to establish a new framework for the Bailiandong Cultural Series. These investigations have resulted in a number of breakthroughs (*Yi et al. 1994; Zhou 1994*).

THE GEOLOGICAL STRATIGRAPHY

The cave is located on the southern slope of Mount Baimian, 152 meters above the erosional plain of the ground surface. It has a half-hidden entrance facing south and a long inner passage to the north. The 3 metre thick deposits can be divided into eight layers in the eastern part of the cave and ten layers in the western part (*Liu and Xie 1994*). Layer 7 of the eastern deposit is a thick calcareous concretion. In the western deposit, Layer 3 and the upper part of Layer 4 form another thick calcareous concretion, which merges with that of Layer 7 of the eastern deposit in the centre of the cave. This concretion has been dated to 18 500–20 000 BP based on ^{14}C dates, and represents the driest and coldest period of the Late Glacial period (Figs. 2–4).

By means of uranium-series and ^{14}C, especially AMS ^{14}C determination, a number of quite valuable dating figures have been obtained (*Yuan and Gao 1994*) which amply prove that the deposit inside Bailiandong cave is composed of regularly successive strata (Tab. 1).

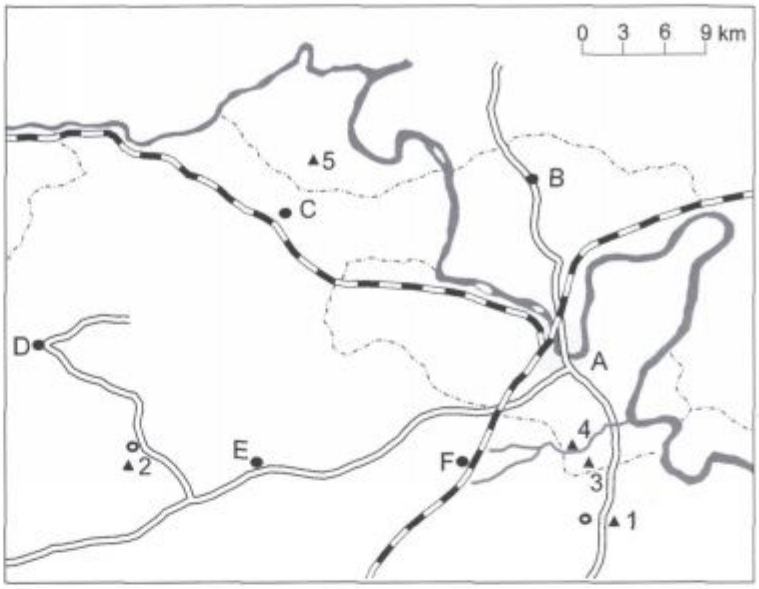

Fig. 1. The Localities of Fossil man in the Liuzhou Region: 1. Gigantopithecus Cave Site of Liucheng, 2. Liujiang Man Site, 3. Bailiandong Cave Site, 4. Douledong Cave Site, 5. Ganqianyan Cave Site, A. Liuzhou, B. Saikwan, C. Lonmon, D. Tobo, E. Shantu, F. Qinde.

The stratigraphic study and a spore-pollen analysis (*Kong et al. 1994*) have fully revealed the tendency of changes in the ancient ecological environment and climate of Liuzhou region since 30 000 BP which was synchronised with global changes in the ancient climate (Tab. 2). In fact, the Bailiandong deposits and relics have clearly demonstrated that the cave is a type of rare reservoir of global climatic information in the southern subtropics since the Late Pleistocene Glacial period. The recovery of data on the ancient ecological environment of Bailiandong cave is actually a background to the research of exploring the birth of agriculture in South China.

		East 1	7080±125 BP	Holocene		Atlantic Time
		East 2	9520±90 BP			Boreal Time
West 1	10 310±290 BP	East 3	11160±580 BP		Late Glacial	Alerød Time
		East 4	13 550±590 BP		Epoch	Bolling Time
West 2	12 775±180 BP	East 5	13 905±250 BP			
		East 6	14 650±230 BP	Late		Würm II
West 3	18 450±410 BP	East 7	19 645±200 BP	Pleistocene		
West 4	19 910±180 BP	East 8	20 240±660 BP			
West 5					Würm	Paudorf
West 6	28 000±2000 BP					
West 7						
West 8						Würm I
West 9						
West 10	37 000±2000 BP					

Tab. 1. Dating Figures of the Main Layers of Bailiandong Cave.

Age	Western Deposit		Eastern Deposit	Ancient Climate and Ecological Environment	
Late Pleistocene / Holocene	West 1 (0.2–0.56 m) Greyish-brown mildclay Upper 10310±290 BP	West 2 (0.4 m) Milk-yellow flowstone Top Layer 12780±180 BP	East 1 (0.2-0.32 m) Flowstone with pottery flakes Calcareous mildclay 7080±125 BP	Great warm epoch of the Holocene. The appearance of many subtropical evergreen broadleaf forest, graminaeceous, fern and water plants.	Atlantic Time
			East 2 (0.3 m) Milk-white flowstone 7140±60 BP and calcareous mildclay 9520±90 BP		Boreal Time
Late Pleistocene / Late Glacial Epoch			East 3 (0.3–0.37 m) Greyish-yellow mildclay 11160±580 BP	Subtropical evergreen broadleaf forest, the climate was beginning to turn warm and humid.	Alerød Time
			East 4 (0.38 m) Yellowish-brown mildclay 13905±250 BP		Bolling Time
			East 5 (0.01–0.04 m) Greyish-white flowstone 13905±250 BP		
	Lower 17680±300 BP West 3 (0.15–0.35 m) Yellowish-brown thick flowstone (upper sideward stone dike) 18450±410 BP	Bottom Layer 19145±180 BP	East 6 (0.48 m) Brown mildclay 14650±230 BP	Appearance of the subtropical evergreen broadleaf forest and modern fauna.	
			East 7 (0.44 m) Yellowish-brown thick flowstone (upper-sideward stone dike)		Würm II
Late Pleistocene / Würm	West 4 (0.5 m) Yellowish-brown thick flowstone (lower sideward stone dike) Top Layer 19910±180 BP 21575±150 BP Bottom Layer 26680±625 BP		11670±150 BP 19645±200 BP		
			East 8 (>1 m) Red-brown mildclay 20240±660 BP	The climate was cold and dry and characteristic of the maximum period of the Late Glacial epoch. Mixed forests of temperate mountain conifer and subtropical broadleaf in the low lands. Cold or temperate conifer forest in the mountains. Warmth-loving mammals migrate to the south.	
	West 5 (0.3-0.5 m) Redish-brown mildclay		(Bedrock not yet reached)		Paudorf
	West 6 (0.1 m) Yellowish flowstone 28000±2000 BP				
	West 7 (0.18 m) Yellowish-brown mildclay			The climate was beginning to turn cold. Temperate broad leaf forest. Stegodon-Ailuropoda fauna.	
	West 8 (0.1 m) Greyish-yellow flowstone				
	West 9 (0.12 m) Brown mildclay				
	West 10 (0.15 m) Milk-yellow flowstone 37000±2000 BP (Bedrock not yet reached)				Würm I

Tab. 2. Schematic Chronology based on Geological Stratigraphy and Paleoenvironmental data of Bailiandong Cave Site

THE ARCHAEOLOGICAL DATA

Large quantities of mammalian fossils have been found in the cave's deposits. The bones are very fragmentary and may represent the food remains of the prehistoric occupants. One thousand five hundred bones and teeth were found in the eastern deposits and 2000 in the western. Most of the teeth are isolated specimens: 150 derive from the eastern deposits and 240 from the western. The mammalian fossils identified were from 23 species. These are: *Rhizomes sp.*, *Hystericss subcristata*, *Macaca sp.*, *Homo sapiens sapiens*, *Martes sp.*, *Paguma larrvata*, *Vulpes cf. vulgaris*, *Ursus sp.*, *Arctonyx collaris*, *Ailuropoda melanoleuca*, *Sus scrofa*, *Bubalus sp.*, *Pseudaxis sp.*, *Muntiacus sp.*, *Cervus sp.*, *Lijiangocerus speciosus*, *Ovis sp.*, *Rusa unicolor*, *Rhinoceros sinensis*, *Stegodon sp.*, *Elephas sp.*, *Muridae gen. et sp. indet* and *Vespertilionidae gen. et sp. indet*.

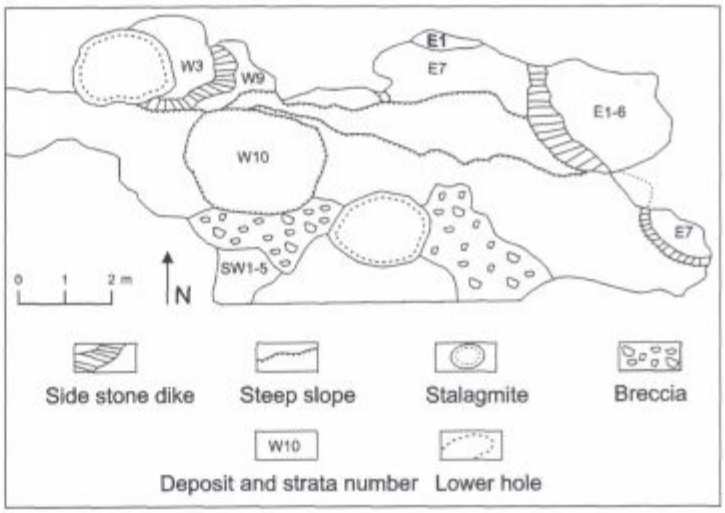

Fig. 2. Plan of the Bailiandong cave Site.

A number of extinct species and two isolated human teeth were recovered from Layer 7 of the western deposit. The human teeth, which comprise the right molar of a young female and the left third molar of a middle-aged male, are attributable to *Homo sapiens sapiens*.

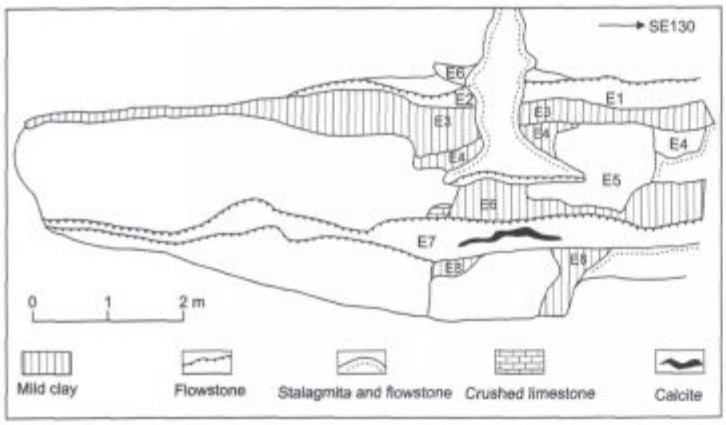

Fig. 3. Section of Eastern Deposits of the Bailiandong Cave Site.

The faunal assemblage from the western deposit represents the fauna of Stegodon-Ailuropoda with *Homo sapiens sapiens*, while the eastern deposit consists solely of modern mammalian specimens. Shells from five species of snail (*Viviparus dispiralis*, *Bellamys leei*, *Helix sp.*, *Semosulcospira sp.* and *Unio douglaside*) were found in the upper layers of the cave. Layers 5 and 7 in the western deposit contain only a few snail shells. In addition, two species of fish (*Cyprinus carpio* and *Mylopharyngodon*

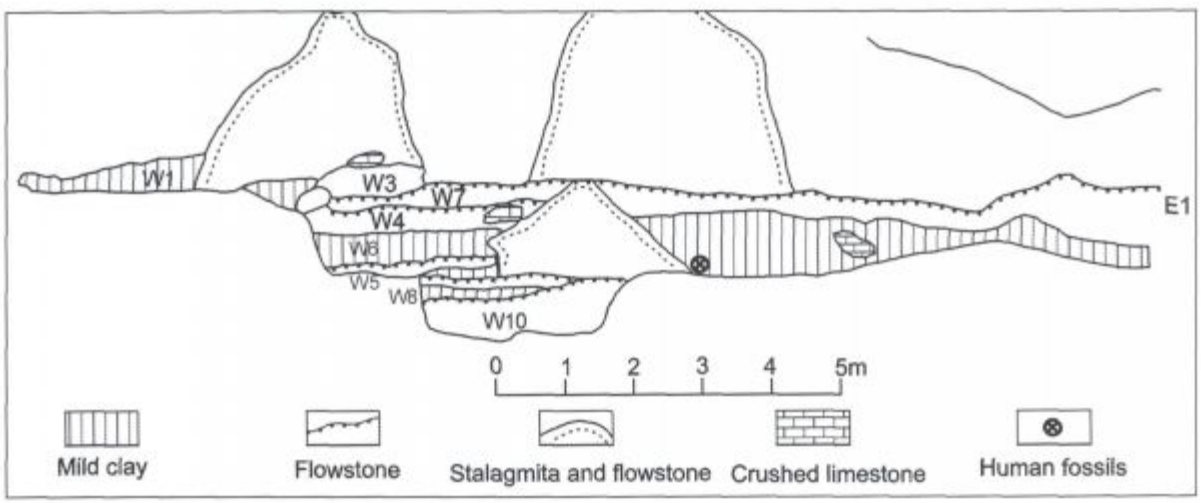

Fig. 4. Section of Western deposits of the Bailiandong Cave Site.

piceus) were also found along with frog (*Rana sp.*), turtle (*Testudinidae indet.*) and bird limb bone remains (*BSCM and BNHM 1987*).

Of the 500 chipped stone artefacts found at the site, 258 have been studied in detail. These specimens comprise cores, unused and used flakes and modified tools. The large tools were made on cobbles and pebbles, while the small tools were manufactured on flakes of black flint. Most of the small tools were found below the western thick calcareous concretion and a few pieces derive from the snail shell layers in the eastern part of the deposit. Bone, antler and polished horn tools have also been recorded. Three ground stone tools, including two completely ground and one ground only at the edge, and two perforated decorative objects were found in the upper layer of the eastern deposit. In the eastern deposit a few fragments of crude cord-marked pottery were found in the top layer.

The small flint tools were not made with the typical indirect percussion manufacturing technique (*Chen 1983; Chia 1978; Zhou 1974*), but with the anvil technique applied in the Danawu tradition in Yunnan (*Zhou and Zhang 1984*). There are three broken weight stones – perforated pebbles that were found separately in Layer 1 of the western deposit, Layer 6 and Layer 3 of the eastern deposit. One specimen in Layer 3 is completely ground. Two hearths were found in Layer 5 of the western deposit (Figs. 5–9).

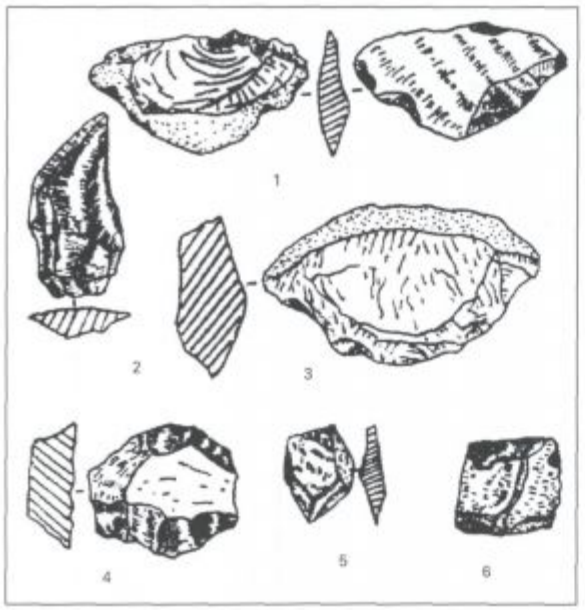

Fig. 6. Stone tools from West layer 5: 1. and 3. sra-pers; 2., 5. and 6. utilized flakes; 4. thumbnail scraper (black flint).

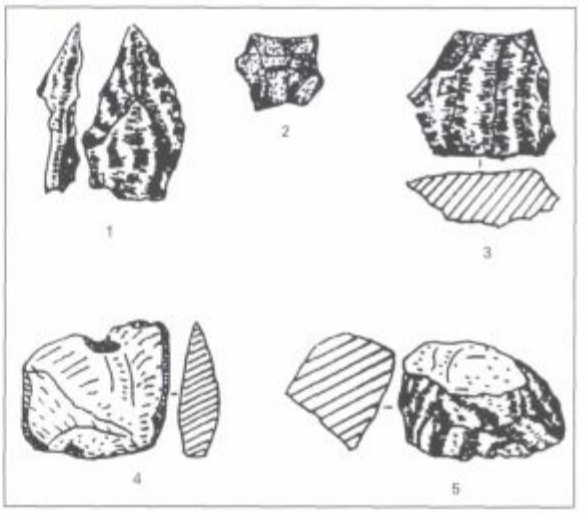

Fig. 5. Stone tools from West layer 7: 1. arrow-head (black flint); 2. utilized flake; 3. scraper; 4. sraper; 5. chopper.

The artefact layers of the cave can be subdivided into five cultural strata as follows:

Cultural Stratum 1 – Layers 1 and 3 of the eastern deposit are grayish-yellow mildclay and flowstone and contain pottery flakes. They also contain snail shells, ground stone tools, perforated decorative objects, weight stones and pottery. Between Cultural Stratum 1 and Cultural Stratum 2 there is a thin calcareous concretion in Layer 3 dated to 11 160± 580 BP.

Cultural Stratum 2 – Layer 4 of the eastern deposit is yellowish-brown mildclay. It contains snail shells, stone tools and horn tools with polished edge and point.

Cultural Stratum 3 – Layer 6 of the eastern deposit is a brownish mildclay. It contains snail shells, ash, red burnt clay, burnt bones and stones. This layer also includes one crude weight stone, crude pebble tools and hematite powder. This layer is always found overlying thick, hard travertine and overlain by another distinct travertine (calcareous concretion).

Cultural Stratum 4 – Layer 4 of the western deposit is a shallow yellowish-brown mildclay; the upper portion is a calcareous concretion. Large numbers of very small flint tools, including an arrowhead, a small crude polished cutting tool and some spokeshaves were found here as well as crudely made pebble tools.

Cultural Stratum 5 – Layers 5 and 7 of the western deposit are red-brown and yellowish-brown mild-

clay. Layer 5 contains a few snail shells. Very small flint artefacts and pebble tools in Layers 5 and 7 are typical of the Late Palaeolithic.

The artefacts found in the deposits of the cave can be put in the following order, from the oldest to the most recent: (a) Typical Palaeolithic stone tools, (b) Small and very small flint tools, (c) Crude pebble tools, (d) Crude weight stone, (e) Crude ground tools and (f) Crude pottery. According to the lithic, faunal, spore-pollen analyses and the stratigraphic dates, the Bailiandong Cultural Series may be divided into three cultural phases.

Phase I – Late Palaeolithic (Cultural Stratum 4 and 5): The lithic artefacts are predominantly characterised by specimens typical of the Late Palaeolithic. The main subsistence mode was hunting large game and gathering plant food.

Phase II – Mesolithic (Cultural Stratum 2 and 3): This is a transitional phase (from Palaeolithic to Neolithic) characterised by unifacially worked pebble tools (choppers) and crudely made ground tools. The appearance of large numbers of snail shells and chopping tools, which may have been used to crush the shells, is evidence of the intensification of riverine resource procurement. The occurrence of a weight stone is related to primitive agricultural activities. This transformation of subsistence patterns occurred during the Late Pleistocene to the beginning of the Early Holocene, perhaps over a period of several thousand years.

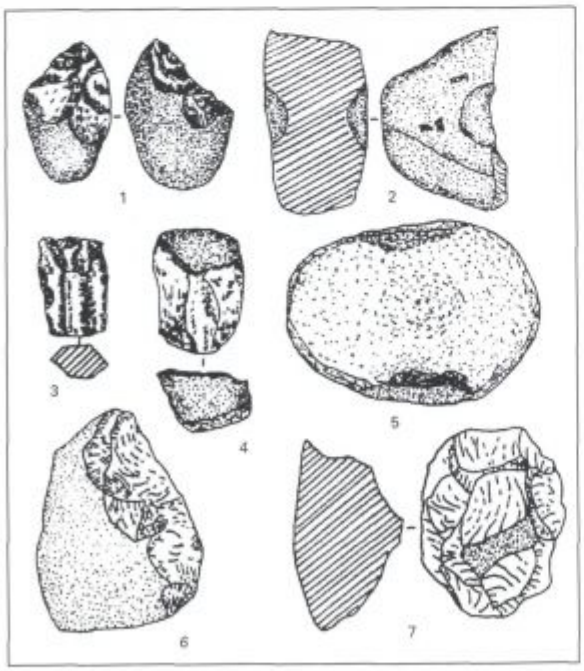

Fig. 8. Stone tools from East layer 2: 1. chopping tool; 2. perforated pebble (weight stone); 3. cores; 4. cores; 5. pebble for grinding hematite powder; 6. chopping tool; 7. chopper with high-back.

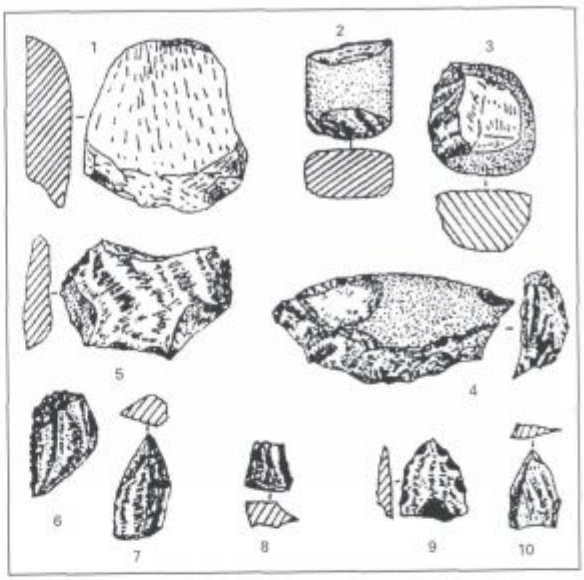

Fig. 7. Stone tools from West layer 2: 1. – 4. choppers (black flint artifacts); 5. and 6. srapers; 7. graver; 8. core; 9. arrowhead; 10. point.

Phase III – Early and Middle Neolithic (Cultural Stratum 1): In this phase riverine adaptation is still well developed, but the appearance of completely ground stone artefacts including weight stones and crude cord-marked pottery represents evidence of the Neolithic at Bailiandong.

The patterns of development of human adaptation shown in the cultural phases and data on the ancient climate and ecological environment at Bailiandong are of incalculable value in attempts to explore how the Palaeolithic transformed into the Neolithic. In addition to justifying the conclusions reached by former researchers, such as that the Bailiandong site contains continuous cultural strata from the Palaeolithic to the Neolithic with a transitional phase, using the most recent research results on the Bailiandong Cultural Series it has become possible to establish a new framework (Tab. 3).

After inspecting a number of other sites of similar age in South China, including Yunnan, (*Aigner 1981; Hu 1977; Lin and Zhang 1978; YPM 1977; Zhang et al. 1978*), Guizhou, (*Cao 1982a; 1982b; Li and Zhang 1981; Li and Cai 1986*), Guangxi (*Chang 1977; GZARM 1983; He and Qing 1985; Chia and Woo 1959; Li and You 1975; Li et al. 1984; Pei 1935; Pei 1965; Wang et al. 1982; Wu et al. 1962; Zhao et al. 1981*) Guangdong (*GPM 1959; Huang et*

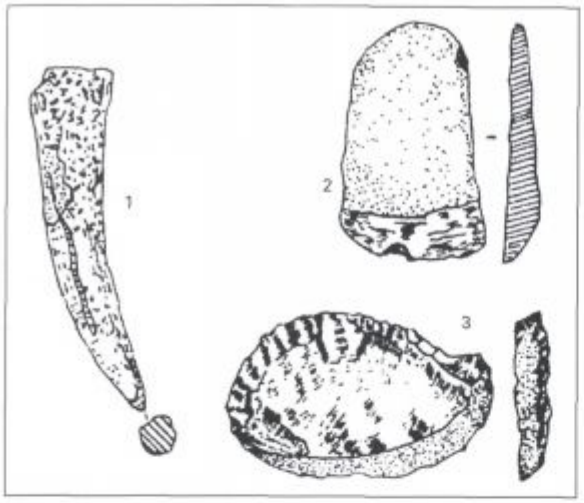

Fig. 9. Antler and stone tools from East layer 4: 1. end-ground antler; 2. edge-ground flat pebble; 3. chopper.

al. 1982; Qiu et al. 1986; Song et al. 1981), Sichuan, (*Pei and Woo 1957; Yang 1961; Zhang 1977*) and Jiangxi provinces (*JACR 1963*) (Tab. 4), it can be concluded that none of these contain evidence of three succeeding cultural phases beginning at more than 30 000 years ago.

CONCLUSION

Based on the cultural framework established for Bailiandong, the author has conducted a synthetic study of the relevant contemporary archaeological materials of South China and drawn up a possible picture of the Mesolithic age of this region:

❶ The faunal assemblages according to Layers 4 and 6 of the eastern deposit of the Bailiandong cave mainly consist of modern mammalian species such as deer and buffalo. The few extinct species include taxa such as elephant and rhinoceros. At the time of human occupation, the flora was temperate broad-leaf forest in the lowlands and boreal conifer forest in the mountains. This is also reflected in the colour of this deposit, which is brownish instead grey (like the upper layers).

❷ The lithic industry of the Mesolithic in South China was predominantly characterised by two types of technique. One technique was the manufacture of crude choppers and chopping-tools for which quartzite was the main material selected. The second technique produced finely made flint tools, axes with polished cutting edges and a number of terminal pieces of deer antler exhibiting traces of polish. Many of the tools were apparently used for specific functions, including crude agricultural tools (such as weight stones), tools for grinding food (seeds and roots) and crushing snail shells, and tools for grinding hematite powder. At a few sites (such as the Miaoyan - Temple Cave near Guilin) in South China, the earliest pottery is dated to 15 000 BP (*Yuan et al. 1995*)

❸ Based on the evidence from Phase 2 of the Bailiandong Cultural Series, the Mesolithic of South China is dated to 18 000–12 000 BP and it may be divided into two sub-phases: the first (earlier) is significantly characterised by the occurrence of crude perforated pebbles (e.g. weight stone), and the second (later) by partly polished stone, bone and horn tools. The palaeo-climate and environment varied dramatically during the terminal Pleistocene and the beginning of the Holocene, and witnessed the emergence of new subsistence patterns.

❹ The social economy began to transform during the Mesolithic from a hunter-gathering subsistence pattern to one of agriculture. During this transfor-

Cultural Phases	Phase 1	Phase 2	Phase 3
Components	5th & 4th Cultural Strata	3rd & 2nd Cultural Strata	1st Cultural Stratum
Layer	West 7, 5 & 4	East 6 & 4	East 3 & 1
Time Span	30 000–18 000 years ago	18 000–12 000 years ago	12 000–7000 years ago
Cultural Stages	Late Palaeolithic	Transitional (Mesolithic)	Early & Mid Neolithic
Periods of Each Cultural Phase	A. Subphase B. Subphase	A. Subphase B. Subphase	A. Subphase B. Subphase
Occurrence of Typical Articles of Each Subphase	A. Chipped stone implements with Palaeolithic traits & tiny flint stone artefacts. B. Primitive ground articles & arrowheads.	A. Roughly made pebble tools & primitive holed pebbles, and hematite powder. B. Edge- or end- ground tools	A. Overall ground stone tools & primitive pottery. B. Pottery flakes

Tab. 3. New Framework of Bailiandong Cultural Series.

Bailiandong Cave	Bailiandong Cultural Series					
	Phase I		Phase II		Phase III	
	Cultural Strata 5 and 4		Cultural Strata 3 and 2		Cultural Stratum 1	
	Upper Palaeolithic		Mesolithic		Early & Middle Neolithic	
Possible Corresponding Sites	LiuJiang	Liujiang Man	Laibin	Qilinshan	Wannian	Xianrendong
	LiuJiang	Gangqinyan	Liuzhou	Sidouyan	Wuyuan	Qingtan
	Duan	Jiulengshan	Liujiang	Chenjiayan	Guilin	Zengpiyan
	Guilin	Baojiyan	Chongzuo	Aidong	Liuzhou	Dalongtan
	Hanyuan	Fulin	Yangchun	Dushizidong	Xinyi	(Upper Cultural Level)
	Chenggong	Longtanshan	Fengkai	Huangyandong	Naihai	Maomaodong
	Tongliang	Zhangretan		(1-3 Sites)	Wannian	Hsichiaoshan
	Baise	Shangsong	Wuming	Baqiao		Xianrendong
		Village		Baxun		
	Leipin	Chilinshan		Tengxiang		
	Tongliang	Zhangrentang	Guilin	D-Cave		
	Changgong	Longtanshan		Miaoyan		
	Tzeyang	Wangshanqi	Liuzhou	Dalongtan		
	Tobo	Ganqiangyan		(Lower Cultural Level)		
			LiJiang	Mofaiqiao		
			Puding	Baiyanjiao		

Tab. 4. Bailiandong Cave and Possible Corresponding Sites.

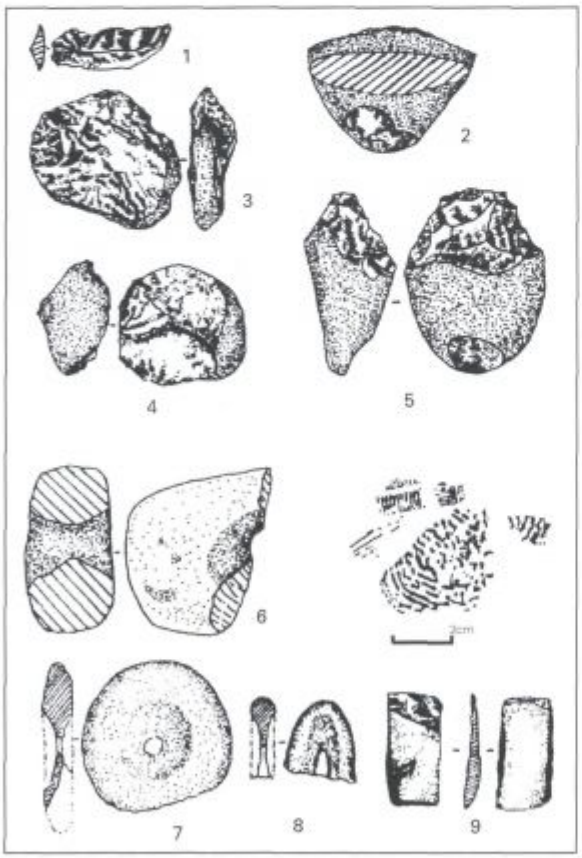

Fig. 10. Stone tools from East layer 3: 1. utilized flake; 2., 4. and 5. choppers; 3. chopping tool; 6. perforated pebble (ground weight stone); 7. and 8. perforated decorated objects; 9. ground cutting tool; 10. fragments of cord-marked pottery.

mative age of the Mesolithic, subsistence was still predominantly characterised by hunting and gathering, although the procurement of riverine food resources was well developed and incipient agriculture may have occurred.

❺ Mesolithic settlements were located near karst caves and rock shelters in the vicinity of streams or rivers.

❻ The human remains of the Mesolithic of South China often exhibit morphological features of the Oceanic Negritos. For instance, the Dalongtan hominids that lived in the Dalongtan shelter-like cave which consists of two cultural strata. The human fossils were excavated from the upper most layer of the lower cultural stratum, and have been dated to 12 000±220 BP, which means that the Dalongtan specimen represents a hominid transitional between Liujiang Man of the Late Palaeolithic (*Woo 1959*) and Zengpiyan Man of the Neolithic (*Zhang et al. 1977*). The Dalongtan cranium No. 2, which is relatively well preserved, belongs to a male about 30 years of age. Morphologically it displays the main traits of Mongoloids, and also shows some racial traits typical of Oceanic Negritos. Observation of the morphological features and analysis of the measurements have concluded that the traits of Dalongtan Man probably resulted from the genetic mixing of southern Chinese hominids with people from farther south (*Zhou and Zhang 1994*).

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