A Paleolithic-Neolithic Sequence from South China Jiangxi Province, PRC

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What is to be presented here is a preliminary report on a newly defined Paleolithic to Neolithic sequence from Jiangxi province in south-central China (PRC)(see Figure la, map). The relationship of these materials to the origins of the Japanese—the theme of this conference—seems somewhat nebulous. However, the basic problem confronting the Sino-American Origin of Rice project (SAJOR) was the origin of paddy rice agriculture—a fundamental aspect of Japanese culture. To attack this problem we dealt with the late Paleolithic and/or Epi-Paleolithic and early Neolithic and/or Epi-Neolithic, which are distinguished by microblades, early pottery, early arrowpoints, and other aspects, all of which have connection to early cultural developments in Japan. The data from China are still so limited that showing cultural connections to Japan is problematical at best. Nevertheless, they are sufficient to serve as the basis for establishing hypotheses.

In 1992 the national Bureau of Cultural Relics of the People's Republic of China devised a cooperative project under the leadership of Dr. Yan Wenming, head of the Department of Archaeology of Beijing University, and Dr. Richard S. MacNeish, Director of Research of the Andover Foundation for Archaeological Research (AFAR). Professor Peng Shifan, the director of the Jiangxi Museum and Institute of Archaeology, as part of the Chinese team, was to be in charge of the fieldwork and logistics, while the Americans were to supply the interdisciplinary scientists.

The basic Chinese archaeological data are based upon only two unsuccessful tests and two excavations of stratified cave sites and one of these, Xian Ren Dong (initially undertaken in the 1960s), was limited in the 1990s because of permit problems.

The major Sino-American excavations in 1995 continued the work at Wang Dong and Xian Ren Dong. Under the direction of Geoffrey Cunnar, the 1993 test trench at Wang Dong was expanded from 3-by-6 meters and about 1.5 meters deep to 42 square meters about 2-meters deep (Cunnar, in MacNeish and Libby 1995). One square was dug to a depth of 5 meters (but never reached the rock

Fig. 1a Map of south China (PRC) showing location of SAJOR PROJECT

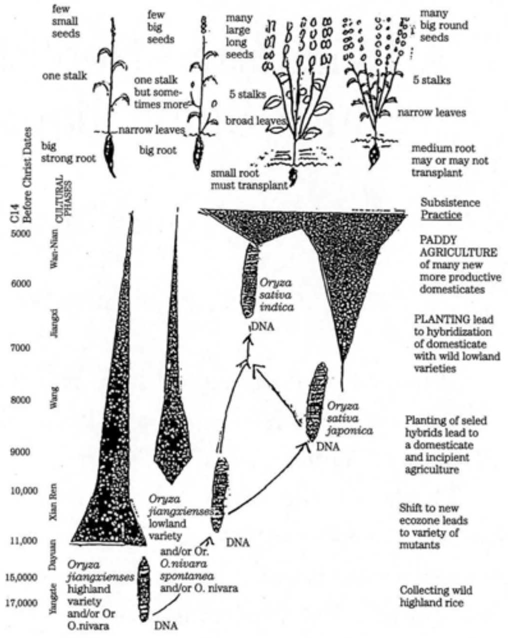

Fig. 1b Hypothetical model of development of rice based upon DNA studies.

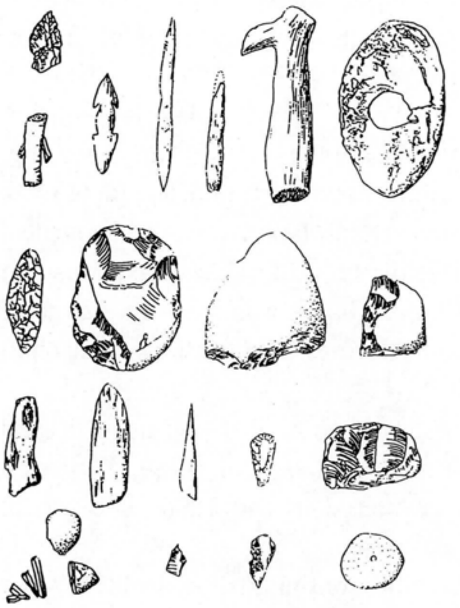

Fig. 1c Diagnostic types of the Yangtze phase

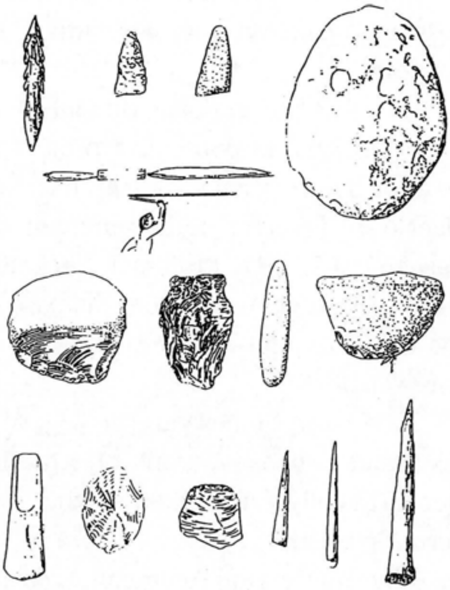

Fig. 1d Diagnostic types of the Dayuan phase.

floor of the cave). We identified 21 zones at Wang Dong, 18 of them belonging to the late Paleolithic and Neolithic periods. Zones N, O, and P of the deepest unit had no cultural remains, but did contain bone and charcoal. Zone M, with two side scrapers, and zone L, with 9 side scrapers, 2 blades, and a spokeshave, may belong to the late Paleolithic. Zones K, K1, upper K, J, I, H, and G, which were traced over most of the excavation, did have sufficient artifact types to be assigned to the late Paleolithic Yangtze phase. In addition to lithics, shell, and bone, these zones all contained pollen and phytoliths. The ashy-yellowish zone K had a single activity area, a hearth, and 45 lithic artifacts, including microblades. Zones G and H had many phytoliths of wild rice. However, zone F, a sandy loam, had few rice phytoliths, and its diagnostic artifacts indicate it marks a new phase (Dayuan), the final Epi-Paleolithic period. Another phase, Xian Ren, begins with zone E, which has the first ceramics in the Dayuan Basin. The diagnostic artifacts of Zones D2 and D1 again mark a new phase, Wang, and many of them appear to be connected with rice planting and harvesting. The final Neolithic components of the Jiangxi phase had phytoliths of domesticated rice in two activity areas in zone C2, and zone C1 had four activity areas and many artifacts associated with rice planting. The top two zones of Wang Dong, A and B, had mixed Shang and later materials.

Excavation at Xian Ren Dong was complicated by its designation as a cultural heritage site. That status had limited the 1993 investigations to a couple of 20 cm slices along a 3-meter front in the baulk between the original test trenches 3 and 4 and in 1993 only a 1-meter wide and deep 20 cm slice on the north end of trench 4 (in the exhibit area) in the west part of Xian Ren Dong. In 1995 a similar slice was taken out of the west end of trench 6 in the east of the cave, but we were not allowed to deepen this trench in the two meters to the cave floor or connect the east trench with the west trench to clarify the stratigraphic relationship between the two. Even the stratigraphy of these tests, as well as those of the 1961 and 1964 excavation, was clear cut. The top zones 1A-1B and 1 B of the west trench were later than anything in Wang Dong and zone 2 here as well in the east trench was culturally similar to those of zone C of Wang Dong. In the west trench zones 3B1 and 3B2 were like those of Wang Dong's zone D, while zones 3B1a and 3B1c were like zone E. Zones 4, 5, and 6 of the west trench, as well as zones 3 and 4 of the east trench, were late Pre-ceramic or Epipaleolithic, like zone F of Wang Dong (see Table 1).

The analysis, much of it ongoing, of the materials recovered from the major 1995 excavation involved scientists from many disciplines. After materials were catalogued by Yan Wei and her assistants and curated by Jane Libby, they were analyzed by a bevy of interdisciplinary scientists: MacNeish—lithics and shells, John Peterson—bone tools, David Hill and Pamela Vandiver—ceramics, Richard Redding—zoology, Zhijun Zhao and Debbie Pearsall—phytoliths, Qinhua Jiang—geomorphology, Wang Xianzeng—palynology, Bruno Marino—isotopes, and R. E. Taylor, Chen-Tiemei, and Li Kun—radiocarbon assays, and Dr. Sato is analyzing rice DNA (see Figure 1b).

Completion of the typology of the bone, shell, lithic, and ceramic remains has allowed us to align the various zones in Xian Ren Dong and Wang Dong in chronological order and classify them within six phases—that is, Yangtze, Dayuan, Xian Ren, Wang, Jiangxi, and Wan-Nian, which we will now describe (see Table 1).

Yangtze Phase (see Figure 1c). The earliest phase, Yangtze, belongs to the late Paleolithic and is represented by 12 stratified zones containing lithics, bone tools, shell tools, many phytoliths, and animal bones. Among the lithics are microblades. Except for some specimens from mixed deposits near Guangzhou, these are the only microlithic components that have yet been found in China south of the Yangtze River. It is possible that they are intrusive from the north, where many microlithic sites have been found, but at this point it would be premature to make unequivocal statements about their origin. The earliest zones at Wang Dong—L, M, N, O, P—were uncovered in one 1-by-1-meter unit and had few artifacts and little carbon. The remaining zones of the Yangtze phase - G, H, I, J, upper K, K, and K1—cover from 9 to 13 square meters of the shelter. Comparative data suggest the phases could have lasted a long time, but as of now we have radiocarbon determinations only for zones G and H, 17,040±270BP (BA-93180), and zone H, 19,770±362BP (BA-179). Another carbon sample, from zone K, has been dated at 24,540±430BP (BA-95137) by the Beijing University laboratory. This suggests the phase existed from 17,000bp and comparative data (Table 1) suggests it began before 40,000 years ago.

Although we recovered no feces or human skeletons for isotopic analysis, we did obtain an abundance of animal bones, some phytoliths, and limited materials from flotation that provide hints of the people's diet during the Yangtze phase. These data, taken in conjunction with artifacts and use-wear studies, have allowed us to begin to reconstruct ancient subsistence activities. The picture that is emerging is a rather different view from the traditional belief that the peoples of the late Paleolithic were predominately hunters.

Of the 12 zones analyzed, the dominant bones (10:1) are those of large deer (*Elaphurus davidianus*) as against two smaller deer types (*Mantiacus reevesi nippon and*/or *Capreolus capreolus*), with an even smaller proportion of felids and wild pig. These bones occurred in association with many projectile point fragments (about 10 percent of which have impact fractures), suggesting hunting was a major subsistence activity.

Evidence that the Yangtze peoples were not just hunters is provided by the bones of smaller animals—rabbit, canines, (wild?) chicken, and other birds—which suggest collecting and/or trapping. Also abundant in these early zones at Wang Dong were large and small mollusk shells, suggesting shellfish collecting. Although some of the barbed bone points resemble ethnographic fishspears, no fish bones were recovered.

Somewhat to our surprise we also found extremely good evidence of plant collecting. Not only did seeds occur in the floated materials, but there were abundant phytoliths of wild rice, bamboo, acorns, and other plant remains. Use-wear study of the large single-pierced mollusk shells, as well as ethnographic analogy with similar materials from Japan, suggest these tools were used for plant threshing. In other words, the earliest Yangtze peoples were foragers, not just hunters.

Redding's preliminary studies of the abundant bones recovered from each zone reveal considerable evidence that whole animals were brought back to the cave to be butchered.

A number of tools also show evidence of working skins.

Other Yangtze activities seem to have been bone working (indicated by the flake graver and burins as well as bone tools), woodworking (spokeshave and antler adze), and shell working (to make shell tools). Evidence of flintknapping includes pebble and antler hammers, pointed antler tine retouches, tongue-shaped and conical cores, chips, and flakes, as well as the chipped stone tools themselves. The tongue-or boat-shaped cores and microblades are evidence of a very specialized flintknapping activity during this phase.

Dayuan Phase (see Figure 1d). Starting about 17,000 years ago, the distinctive microblade industry as well as much of the rest of the Paleolithic tool types disappeared and a new complex, the Dayuan phase, evolved. This phase belongs to the Epi-Paleolithic period.

The 80 tools we recovered make up a distinctive complex. Similar tools have been found in San Jiao Yuan Cave in Hunan Province to the west. At present we have but two radiocarbon determinations for this phase—15,180±90BP (UCR 3300) on a piece of skull from zone 3C2 from Xian Ren Dong, and 16,720±130 BP (UCR3434) from charcoal from zone 4. Until we have firmer data, we can estimate that the Dayuan phase occurred from roughly 17,000BP (or later) to 12,600BP or 14,000BP. The 12,600 date comes from a component contemporary with this phase in San Jiao Yuan Cave in Hunan.

Analysis of the materials collected at Wang Dong and Xian Ren Dong in 1993 showed 23 samples have pollen as well as phytoliths with few rice grains but many samples of bamboo, suggesting the climate was cooler and drier than at present, although the animal bones differ little from those of Yangtze times. More specific conclusions may be drawn after Professor Wang Xianzeng analyzes the pollen and soil samples collected in the 1995 season.

In spite of the deficiencies, we do have some distinctive data on the subsistence system of this Dayuan phase. The bones recovered suggest Xian Ren Dong was a base camp occupied year round and Wang Dong represented a wet-season foray by a microband or task force group. Zone F of Wang Dong shows a dominance (10:1) of large deer over small deer, with but a few small deer, pig, and felids. Artifacts reflecting hunting are dominated by lenticular diamond cross-section atlatl dart foreshaft tips, with serrated base multi-barbed antler points and bilateral unibarbed points; triangular shell, ground stone, and antler points are rare. A notched piece of basal fragment of an atlatl dart suggests throw sticks and atlatl darts were important weapons. Collecting was indicated by bones of small animals—lepus, canid, mustelid, bird, and gallus (chicken)—and by large and small mollusks. Marino's analysis of a skull fragment from Xian Ren Dong attests to wild rice eating. Single-and double-pierced large mollusk shells may have been used for plant threshing.

Many of the bones recovered attest to butchering activities. Interestingly, the Wang Dong collection included bones from all parts of an animal (usually deer), while the bones from Xian Ren Dong were mainly long bone fragments, suggesting the Dayuan peoples there selected only those portions of the animal to carry to the cave. Chipped choppers similar to those of the Yangtze phase still occurred. Many tools seem connected with skinworking, shell and bone tool making, possibly woodworking, and flintknapping.

Xian Ren Phase (see Figure 2a). Equally poorly documented is the Xian Ren complex, which was only found in zone E of Wang Dong and zones 3C1b and 3C1a in the west baulk of Xian Ren Dong. Thus far no evidence of this phase has been uncovered in Hunan Province. However, in spite of its limited number of tools, its distinctive ceramics attest to the fact it is a valid entity. Radiocarbon determinations of 12,530±140BP (BA-95145) and 14,160±140BP (UCR3440) on charcoal from zone 3C1a and feature 3 of that zone at Xian Ren Dong and of 11,840±150BP (BK95138) on charcoal from zone E of Wang Dong suggest the phase dates between 11,200 and 14,000BP. Pollen collected in 1993 from zone E of Wang Dong suggests the climate was becoming colder and drier. A decrease in the proportions of large deer (from 10:1 to 3:1) tends to confirm this shift to a more Holocene-like environment.

The projectile point complex is almost identical to that of the Dayuan phase.

Large mollusk shells, three single-pierced and one double-pierced, were perhaps used for threshing and might indicate plants were being utilized. Rice phytoliths from zones 3C1b and 3C1a of Xian Ren Dong and zone E of Wang Dong have been identified as mainly wild rice. If the Xian Ren peoples used domesticated rice, it is doubtful that they planted it in paddies.

Again, tools and use-wear studies indicate butchering, shell, bone, woodworking, and flintknapping activities much like Dayuan.

The Xian Ren phase marks the beginning of the use and manufacture of pottery, at this stage very crude flowerpot-shaped storage jars that we have designated Xian Wiped. The raw clay was mixed with large pieces of quartz for temper. In 1995 experiments by Pamela Vandiver and David Hill suggested the Process that might have been followed. After a disk-shaped base was formed, slabs were added around the edges and were welded together by being wiped or scored with some sort of blunted object with teeth like a fork. The slabs were built up in tiers to the desired height. In some vessels the lip was notched; in some, punctates from the inside created nodes around the rim. The ceramics were fired at a low heat, probably under 200°F, and no artificial draft seems to have been used. At present little or no comparable pottery is known for the rest of China or East Asia.

Wang Phase (see Figure 2b). The subsequent phase, Wang, has more well-documented components—zones D2 and D1 in Wang Dong, and zones 3B2 and 3 B1 in the west baulk of Xian Ren Dong. More important, zone 6 of Hama Cave in Hunan Province produced identical tool types as well as three sherds belonging to three diagnostic Wang types.

Dating of the Wang phase is at present very poor, and only the poorly documented 1964 sample, which yielded a radiocarbon date of 10,870±240BP (ZK39) may be relevant. This phase is tentatively placed between roughly 11,200 and 9600BP.

Analysis of three human bones as well as the shells, phytoliths, floated plant remains, and bones tell us something of the ancient sustenance patterns. These data, when taken in conjunction with artifacts and use-wear studies, give evidence concerning the subsistence activity. Double-pointed bone or antler projectile points of atlatl darts seem to be the dominant weapon used in hunting deer, pig, and felids; other weapons were a pointed base bilateral multi-barbed antler point and a ground stone triangular point. Bones of small animals—rabbit, canids, turtle, and birds-indicate animal collection; shells, although increasingly rare, might point to shell collecting. It is harder to interpret the evidence for plant collecting. Some phytoliths of wild rice and of other plants do suggest collecting, but they are equalled by domesticated rice phytolith evidence of food production, that is, rice planting and harvesting. The pierced shell tools that might have been

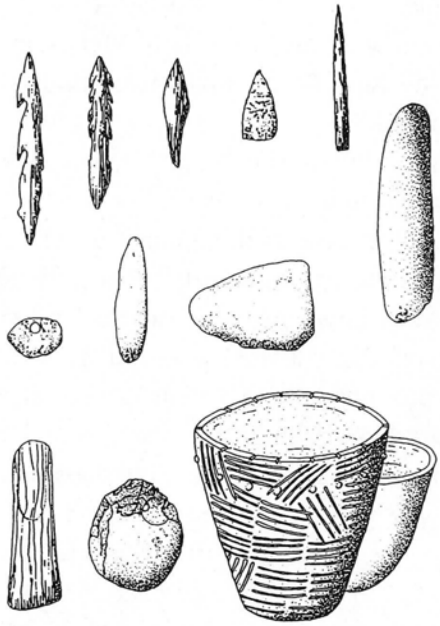

Fig. 2a Diagnostic types of the Wang phase

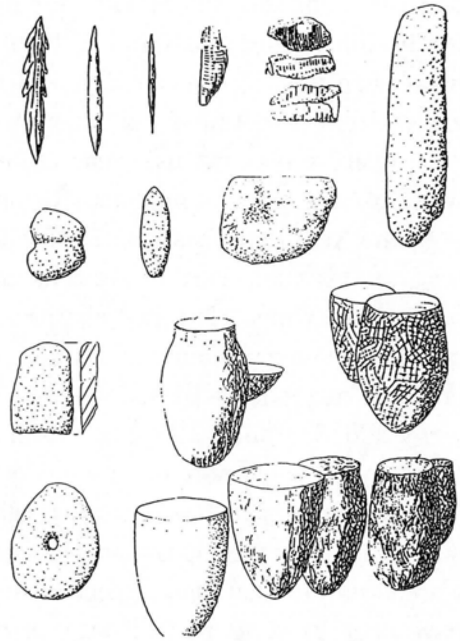

Fig. 2b Diagnostic types of the Jiangxi phase

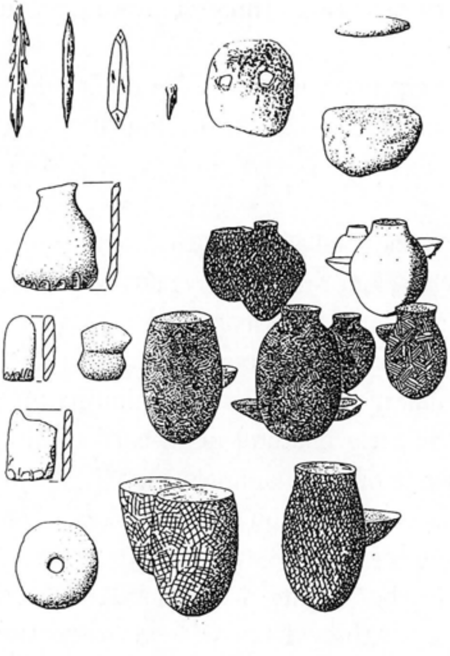

Fig. 2c Diagnostic types of the Jiangxi phase.

Fig. 2d Diagnostic types of the Wan-niar phase,

used for harvesting have decreased in number and they were associated with flat hoes and adzes that might have been used to till the soil, while notched mollusk shells, notched flat pebbles, and doughnut-shaped ground stones might have served as weights for digging sticks used to make holes for planting rice seeds. We have no way at present of knowing whether the rice planted was dry rice or wet rice, but we suspect the former.

A dominant activity in the activity areas of Wang Dong's three components appears to have been butchering. Skinworking seems on the wane and being replaced by textile working. Also, shell, bone, and flintknapping activities seem less important.

During the Wang phase ceramic technology developed further. Although much of the pottery was still heavily tempered with quarts (Xian ware), some had a temper of fine broken sherds (Wang ware). Both types were made of wide thick coils of clay formed into conical or eggplant-shaped vessels. While still wet, these vessels were patted with paddles wrapped with wet cord or yarn. This process not only welded the coils together, but also thinned the walls of the vessel and expanded its overall size. According to Vandiver, the vessels were then fired in a crude kiln with an artificial oxidizing draft.

Jiangxi Phase (see Figure 2c). The Jiangxi phase marks the initial rise of village rice agriculture and the focus of our investigations of the Neolithic and late Paleolithic. It is even better represented than the Wang phase, encompassing zones C1 and C2 of Wang Dong, zones 2A, 2B, and 2C in the west end of Xian Ren Dong, and zones 2A, 2A1, 2A3, 2B, 2B1, 2B2, and 2B3 in the east area of Xian Ren Dong. Preliminary pollen studies and analysis of faunal remains suggest the climate was much like that of the present, or perhaps slightly more humid. At present the only date we have—8825±210BP (ZK-92)—on charcoal in poor context comes from the 1964 excavation. The sherds, however, suggest that this phase is closely related to that of Pengtoushan in Hunan Province, a site with over a dozen dates between 7550±90 and 8445±90BP. Still pending are radiocarbon determinations on carbon samples from Xian Ren Dong. Two human bones and hundreds of phytoliths from all zones also have the potential for yielding dates. Until we have firmer dates, we can only estimate the Jiangxi phase as occurring between 7700 and 9500BP.

Data for reconstruction of population and settlement patterns are meager. We have evidence of possible wet-season encampments in Wang Dong and base camp encampments in Xian Ren Dong and survey suggests large village sites.

Subsistence hunting practices continued in this phase, as evidenced by bones of deer, pig, and felids recovered in conjunction with atlatl projectile point fragments. Lozenge-shaped bone and/or antler points seem to dominate the weapons, and there were also two unbarbed unilateral tips, an engraved bilateral multi-barbed asymmetrical antler tip, and two notched atlatl dart bases. Bones of small animals, shells, and phytoliths show the Jiangxi peoples were also collectors of animals, shells, and wild plants. Many of the phytoliths from zones C1 and C2 of Wang Dong, however, were of domesticated rice as were those collected from Xian Ren Dong, where we also found some pollen of sesame. Supporting this supposition was an increasing number of tools that might be connected with rice planting and harvesting—pebble adzes, pebble hoes, notched flat pebbles, doughnut-shaped pebble digging stick weights, and many large shell threshers.

Evidence of butchering included six flake choppers, side scrapers, and abundant pebble hammers and semi-lunar pebble cleavers. These tool types, however, like those used to work skin—anvils, needles, bone fleshers—had diminished by the Jiangxi phase. Evidence of bone working and of working wood and flintknapping had also decreased.

A bone disk that might have been a spindle whorl for making yarn and cord and impressions on the ceramics hint at a textile industry. In addition to impressions of nets, Hill and Vandiver found impressions of crude and fine-twined fabrics that may have been made on some sort of loom. Preliminary analysis suggests some of the older style crude ceramics with large quartz temper continued to be made, but were used in smaller amounts than the sherd-tempered ceramics. Vandiver's studies suggest that the coil-made vessels were not only better made, using a temper of fine sherds or sand and cord-wrapped paddles, but they were fired in fairly sophisticated kilns. Perhaps the most noticeable characteristic of Jiangxi phase pottery is its decoration—zoned cordmarked paddling, incising, and punctation—and its variety of new vessel forms—necked ollas, hemispherical bowls, hemispherical bowls with flanged rims, recurved rim jars, and conical jars.

Wan-Nian Phase (see Figure 2d). The final horizon of the Neolithic, the ill-defined Wan-Nian phase, occurred only in zones 1A-1B and 1B in the east trench of Xian Ren Dong and in the mixed zone B levels in Wang Dong. The limited remains we recovered seem related—via the shell-tempered ceramics—to Hemedu (6000-7070BP) to the east and Ba Shi Dan (7300-7700BP) and Hujiawochen (6800-7300BP) in Hunan province to the west. In Jiangxi province, in the region of Poyang Lake to the north of the Dayuan Basin, surveys have identified tells that seem to start in this period.

Some major changes seem to have occurred. Ground stone spear points and arrowpoints replaced the older bone and/or antler and chipped atlatl points of earlier phases and ground stone hoes, celts, and adzes came into use. During this period chickens may have been domesticated. Wan-Nian pottery is mainly shell tempered and has many new forms, including tripod feet; some painted ceramics

—indicated by black, red, and red-on-buff sherds—also occur. Investigations by Peng Shifan indicate these middle Neolithic materials developed into the Shan Pei, Hu Kuo, and Shi Shan Tou phases of the late Neolithic, characterized by sand-tempered pottery, complex vessel forms, and more sophisticated painted, punctated, and incised decorations. In future years we hope to further define these phases, although they fall out of the framework of the origin of rice agriculture.

RELATIONSHIPS

Although prelimainary, this definition of the late Paleolithic-early Neolithic cultural phases in Jiangxi allows us to talk about how these data relate to those for other parts of China and to Korea, Siberia, and Japan. We will make such comparisons on a region-by-region basis, starting in South China and ending in North Japan.

In Guangdong province, to the south of Jiangxi, Bailiandang site in Guangzhou has a number of beautiful tongue-shaped cores, both of the boat-shaped and Shirataki variety; unifacial gravers and points; and narrow thick microblades identical to the Yangtze phase materials in Jiangxi. Unfortunately, these lithics come from mixed ceramic deposits with highly questionable dates of 19,900-37,000 years BP. Despite the poor dates, these lithic indicate that microblade cultures occurred as far south as Hong Kong and future archaeology may well recover other microblade sites all over these southerly regions of China.

Guangxi province southwest of Jiangxi has a stratified cave, Zengpiyan, with early artifacts. The lower levels, Zengpiyan 1, have thermoluminescence dates of 10,370±870, 9550±1100, and 9240±620BP and radiocarbon dates at 11,360BP (we were not given more exact data). These levels have much in common with the Jiangxi phase—chipped adzes, doughnut-shaped digging stick weights, elongate pebble hammers, ulna awls, split bone awls, flake pebble choppers, single pierced shell threshers, mid-eyed needles, and asymmetrical bilateral multi-barbed flat antler points. Vandiver, who has studied both sets of ceramics (Zengpiyan has only about 40 sherds), claims these levels have Wang Paddled, Wang Double Paddled, and Xian Paddled sherd types in common with Jiangxi. The upper levels have shell-tempered pottery with slab vessel feet and pedestaled vases that bear a general resemblance to the Wan-Nian phase sherds. Unfortunately any later artifact types were not available for comparison. Be that as it may, these two areas seem closely related on the 7000-10,000 year level. Later cultures in Guangxi-Jinlansi, with painted pottery and slab tripod feet vessels, and Shixia, with mammiform tripod feet, are later than the defined phases in the Dayuan Basin but also seem related to its late phases from 4000 to 7000BP.

Even closer are sites in Hunan province to the west of Jiangxi. Although no microblade sites have as yet been found on the early levels in Hunan, the preceramic materials and a Beijing radiocarbon date of 12,600 from Sanjiaoyuan Cave seem related to the Dayuan Basin materials. Artifacts in common include elongate pebble hammers, flat pebble choppers, semi-lunar chopper knives, pebble peckers, unifacial side scrapers, scraper plane-cores, and a possible chipped disk. Much the same lithic complex exists in levels 1 to 6 of Hama Cave. Level 6 only had, according to my observations, about 25 Xian Paddled and Xian Double Paddled sherds; Vandiver and Hill thought the fired clay objects from Hama Cave were not really parts of vessels and saw no such relationships, although they may have not been shown the same materials I studied. Thus on the early levels (15,000-10,000BP) there are tantalizing hints of relationships between Hunan and Jiangxi. On the middle level there are relationships that suggest these two regions probably belong to the same culture area. Pengtoushan 1 (8500-8000BP), though dug in a limited number of cubic meters, has, in common with the early Jiangxi phase, Wang Paddled, Wang Double Paddled, Xian Paddled, and Xian Double Paddled ceramics, as well as doughnut-shaped digging stick weights, multi-barbed antler points, chipped adzes, chipped hoes, and a mixed bag of wild and domesticated rice phytoliths. Pengtoushan 2, which has mainly domesticated rice phytoliths, has more Wang Paddled, Wang Double Paddled, Wang Incised, and Wang Punctate sherds as well as chipped adzes and hoes like the late Jiangxi phase components. The following phases in Human—Bashidan, Chengbeixin, and Hujiawochen-have shell-and grit-tempered pots with slab feet, pedestal bases, and other complex vessel forms, much like the Wan-Nian phase. The later Neolithic phases in Hunan—Tangjiagong, Tahe, and Kuihuashei—also seem similar to the Hu Kuo and Shishantou phases in Jiangxi province. It may well be that, in the late Epi-Paleolithic and early Neolithic, Hunan and Jiangxi could be considered as belonging in the same culture area. Obviously more research is needed; future plans include digging a cave near Feng Yi in western Jiangxi near the eastern Hunan border and connecting these results with the fine research being done by Yuan Jiarong, Pei Anping, and others in Hunan.

To the northeast, in Zhejiang and Jiangsu provinces, good work has been done in the ceramic levels, but no Paleolithic or early Neolithic materials have yet been uncovered. The earliest remains so far found are at Humedu, which has its fabulous preserved wood and plant materials and seems to connect to the Wan-Nian phase in terms of pottery, bone tools, arrowpoints, and ground stone artifacts. In fact, one gray shell-tempered sherd from zone 1A-1B of Xian Ren Dong even looks like a trade sherd from the Hemedu area. The late Neolithic phases of this lower Yangtze River area—Majiabang, Songze, and Liangzhu—are well-defined in Zhejiang, but poorly defined in Jiangsu. The relationships are vague and unsatisfactory, and more investigation is needed in both the middle and lower Yangtze River areas.

Comparisons with North China complexes in this crucial period are even more problematic, although part of this region on the Yellow River is considered the "Heartland of the Neolithic" (K.C. Chang 1989). In fact, with the possible exception of Nan Zhuangfou site with its poorly reputed fourteen sherds like Xian Wiped and Jabbed and Bailingang level in Gansu, we have little comparable to our Dayuan and Xian Ren Wang or Jiangxi phases and the earliest of most sequence is middle Neolithic after our basic chronology. These are however a number of microlithic sites related to our Yangtze phase.

In this group of possible related microblade sites would be Salownsu in Inner Mongolia with a date of 35,340±1900BP (PU177), Bailingang 2 in Gansu, Janziyuan in Henan with dates of 16,375±900BP (ZK-494) and 16,500±480BP(ZK-497), Shiyu in Shanxi with dates of 28,945±1325BP (ZK-109-0), and Xianchuan with BP dates of 16,400±900 (ZK-385), 20,700±600(ZK-393), 21,700±1000 (ZK-384), and 23,900±1000(ZK-417).

To the north of Jiangxi are the materials from Henan province; to the northeast, those of Shandong. The microblades and tongue-shaped cores, spherical and flat pebble choppers, blades, flake endscrapers, and gravers from Xiaonanhui in Henan are similar to artifacts of the Yangtze phase in Jiangxi; however, the conical cores, backed blades, burins, ax-like tools, and bifacial leaf points of Xiaonanhui, dated at 15,500±150 and 13,550±150, seem to belong to the microblade types of the northern Siberian tradition, not to those of the southern, Chinese one. Let me hasten to point out, however, that many of the diagnostics of the Yangtze phase are bone and/or antler and shell tool types and such types have not yet been reported for Xiaonanhui. Two radiocarbon determinations, 13,075±500 (ZK-170-0) and 24,100±500 (ZK-645), seem to suggest the two are roughly contemporary. Often the Upper levels of Zhoukoudian (south of Beijing) are said to date to this period, but really are much earlier.

Microblade sites in North Korea, Jilin, Manchuria, and elsewhere are also more like this Siberian microblade tradition than our Chinese one found in the Yangtze phase.

Recent excavations in Siberia have produced surprising results that bear distant relationships to the Jiangxi materials. Along the Amur River the Busse assemblage of microblades belongs to the Siberian microblade tradition of about 15,000 years ago. Possiby developing out of it at 13,200 are materials from Khummy and Ustinovka with crude wiped pottery. Although I have seen only a few sherds and illustrations of these materials and Vandiver has studied more of them briefly, we both are of the opinion they are somehow related to the earliest Xian Wiped pottery from the early levels of Xian Ren Dong. Not only are the surfaces wiped with some sort of blunt comb-like object, but it would seem that the purpose of this wiping was to weld rectangular slabs with large temper together to build up the walls of a roughly flowerpot-shaped vessel which was then fired in an open hearth, not a kiln. If this hypothetical relationship holds up, and some Japanese materials to be discussed shortly suggest it will, then the whole problem of the beginning of prottery in East Asia is up for grabs and exciting finds are promised for the future.

Across the Sea of Japan in this crucial 24,500-4000BP period there seem to be some very distant relationships to the Jiangxi materials. Before turning to these relationships, I must express my thanks to Fumiko Ikawa-Smith for arranging this very stimulating introduction to Japanese archaeology. Everywhere—from Osaka to Sendai to Tokyo to Yokahama and now Kyoto—I received fabulous courtesy and cooperation. Everyone I have met has made this a thoroughly stimulating visit. They have showed me dozens of collections, explained them to me, discussed them with me, and allowed me to make up my mind about the late Paleolithic-early Neolithic—pre-Jomon, If you will. Because I have no reputation in Japanese archaeology to lose, I have no misgivings about my initial impressions on the Japanese Paleolithic and Neolithic, or perhaps I should say Epi-Neolithic, for although the pre-Jomon materials have pottery, they have no agriculture, little or no polished stone, and few signs of villages, which Childe gave as the characteristics of the Neolithic (Childe 1942).

We can begin with the relevant finds in northern Japan. Here I must thank Chosuke Serizawa, Takashi Sutoh, Kaoru Akoshima, and Naoto Tomioka of Tohoku University for their outstanding professional courtesy. In four days I saw more artifacts, all beautifully organized, than I had seen in China in four years.

On the earliest level were the flakes and hearths of the beautifully preserved Tomizawa site in downtown Sendai, which dates to 19,500 to 23,870BP and thus relates to the bone and blade tools of upper cave Zhoukoudian rather than to the Jiangxi materials. Next come the Araya and Yadegawa materials, which belong to the Epi-Paleolithic in north-central Japan. Yadegawa has a radiocarbon date of about 14,500BP, and the lower levels of Araya were dated at 13,200BP. Both have large samples of microblades, from both tongue-shaped and conical cores, many burins and burin spall tools, and bifacial leaf points. Sophisticated microwear studies suggest both had a major bone and/or antler industry, but so far it has not been found. The assemblages strongly suggest an invasion of North Japan by peoples of the Siberian microlithic tradition. Yoshizaki's work in Hokkaido suggests similar connections.

Slightly further south is the stratified Yanigmoto site. Strata 1 to 5 have microblades, conical and tongue-shaped cores, burins, and backed blades like those of Araya, but strata 6 has microblades, bifacial leaf points, and pottery with linear relief applique decorations of the Epi-Neolithic stage 3, roughly 11,000-12,600BP. The subsequent strata 7 there has no microblades but does have cordmarked pottery like that of early Jomon or its ancestor and dates somewhere in the 8000 -9000BP range. None of these sites seem to relate to the Jiangxi material, so let us turn to the central region of Japan.

In the undated Pirika site the assemblage includes burins, conical cores, burin spall tools, and leaf points that also seem related to the Siberian microlith tradition. A number of stratified sites in central Japan, however, seem to fill the gap to Jomon. Of key importance, in my amateurish opinion, are the materials of the Katsusaka site in the Yokahama region. It has microblades from tongue-shaped cores, bifacial leaf points, half-moon bifaces, and a possible burin and seems to be a mixture of the Chinese and Siberian microblade traditions associated with quantities of ignored but important pottery. My cursory examination revealed it was fiber tempered, made of rectangular poorly kneaded clay slabs welded together by scoring them with a blunt fork-shaped object, and then poorly fired—all characteristics of the Xian Ren phase materials in Jiangxi. If further study shows that the Xian Ren (and Siberian Utsinovka) relationship is valid, then the problem of early pottery in East Asia deserves more scrutiny. Dates are needed for Katsusaka, but one might guess it is in the 13,000-14,000BP time frame and belongs to Japanese Epi-Neolithic stage 1.

This plain or wiped pottery seems to be followed by plain pottery with rim punctates from the Terao site and from strata 1 and 2 of the Gin site. Both have microlith tools, lenticular bifacial points, and tongue-shaped cores. Although both lack dates, I believe they belong to the hypothetical Japanese Epi-Neolithic stage 2, which falls in the general period from 12,000 to 13,000BP.

Our third stage, with materials much like those of Yanigmoto of north Japan and Fukui level 3 of southwest Japan, is characteized by pottery with horizontal linear relief and more finely impressed appliques. Stratum 1 of the stratified Kamino site has a similar complex and it also is associated with tongue-shaped cores, microblades, large and small lenticular bifacial points, plano-convex end-scrapers, back semi-lunar knives, and, surprisingly enough a ground rectangular celt (that is perhaps intrusive). Again there are no dates, but the similarity of this complex to Fukui Cave suggest it existed from 11,000 to 12,700BP.

Both Kamino 1 and Gin 1-2 in this central area are overlain by strata, Kamino 2 and Gin 3, with new kinds of artifacts like those of the nearby Hanamiyama site, which has dates of 10,250 and 11,300BP. Like Fukui Cave 2, there is pottery characterized by fingernail impressions and horizontal grooved rim linear applique, but in the lithic assemblage the microliths have been replaced by small stemmed arrowpoints, thumbnail scrapers, ground and chipped adzes, and there are bone and/or antler tools. I consider these characteristics represent the Japanese Epi-Neolithic stage 4 that dates from roughly 10,000 to 9600BP. Shells and fish bones suggest there was a shift from inland hunting and gathering to aquatic subsistence exploitation, but much more study of this economic facet is needed. The large Jomon shell mound at Torihama west of Kyoto contained similar materials in level 10, while level 9 had stage 5 materials transitional to Jomon.

Stage 5, the final Japanese Epi-Neolithic stage, dates from 9000 to 8000BP and occurs both at Torihama and Nakibuyai. It is characterized by both cord-marked and grooved pottery, stemmed and triangular points, ground celts and adzes, and a shift towards an affluent forager marine-oriented economy. This transition is still not well understood, but it is a transition to the following Jomon stages—Initial Jomon (8000-6000BP), Early Jomon (6000-5000BP), Middle Jomon (5000-3500BP), and Late Jomon (3500-2000BP), which have been extremely well studied. This whole Japanese development is totally unlike that of China because skill as affluent foragers meant the people did not have to develop agriculture. *Oryza* and, very surprisingly, gourds (*Lagenaria siceraria*, from West Africa) were imported about 4000BP. Real paddy rice agriculture, however, did not occur in Japan until Yayoi times, about 2200BP, well after our major developments in Jiangxi, or, for that matter, China.

This brings us to final area—southwestern Japan; here the key materials come from Serizawa's meticulous excavation of stratified Fukui Cave (Serizawa 1979). The earliest level of this cave, horizon 15, dates to 31,900±600BP (GAK-952) and produced choppers and flesher tools like those of upper cave Zhoukoudian and the Ordos industry. Undated horizon 9 with a couple of flake choppers is similar, and if there are any relationships to China they are vague and unsatisfactory. Fukui 7, however, with a date of 13,600±600BP (GAK-951) and horizons 4, 5, and 6 have tongue-shaped cores, microblades, flake endscrapers and gravers, and all seem to be related to the Yangtze materials. Even though they lack the crucial bone/antler types and shell tools, the Fukui assemblages suggest an invasion by the peoples of the Chinese microblade horizon—albeit a couple of millennia after this horaizon appeared in the Yangtze phase of Jiangxi province.

There then appears to be a gap in the sequence for southwest Japan until the Epi-Neolithic stage 3, when microblades and linear relief applique pottery occur at 12,400±350BP (GAX-919) and 12,700±500BP (GAK-950). These materials relate to those in other parts of Japan and have diverged from any relationship with mainland China. Later horizons in horizon 2 of Fukui Cave and the Tazawa site, with nail and grooved pottery and stemmed arrowpoints like the other manifestations in the Japanese Epi-Paleolithic stage 4, reflect even further divergence.

In summary, there appears to be a connection between the Chinese microlithic and the Japanese Neolithic between 13,000 and 17,000BP, and there may be ceramic influences between 12,000 and 14,000BP. After that time, the Chinese Neolithic in Jiangxi reflects the development of rice agriculture, and Japan moves toward affluent foraging. These cultural developments cannot be explained by a single series of causes and circumstances, even in the same general culture area. As we learn more of the Neolithic period, when the transition to agriculture began, we will better understand how and why this process took place.

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ACKNOWLEDGEMENTS

In China, Professor Yan Wenming, Peng Shifan, and the Bureau of Cultural Relics for supporting the 3-year research project in the People's Republic of China.

In Japan, Fumiko Ikawa-Smith, who arranged my introduction to Japanese archaeology, Professor Omoto Keiichi of the International Reseach Center of Japanese Studies, who made this report possible. In addition, I am deeply gratified to the archaeologists of Tohoku University in Sendai —Chosuke Serizawa, Takashi Sutoh, Kaoru Akoshima, and Naoto Tomioka—and to Professor Kobayashi of Kokugakuin University in Tokyo, all of whom so generously sbared their collections and ideas with me.

Table 1 Comparison of Radiocarbon Dates and Phases in Jiangxi and Hunan Provinces

JIANGXIPROVINCE				HUNAN PROVINCE				
Dates BP	Stratified Components XR-E XR-W W	Radio-carbon Dates BP	Jiangxi Archaeological Phases	Hunan Archaeological Phases	Radio-carbon Dates BP	Stratified Components	Sites	Other Cross-dated Radio-carbon Dates
4000			Shang	Shang	4800			
				Quialing	5300			
				Shijiune				
5000			Shishantou	Kuihuashei				
				Daxi	5300			
					6300			
			Hu Kuo	Tahe 1				
6000				Tahe 1				
6500			Shanpei					5300
				Tangjiagong	6550	Level 1		5940
7000							Hemedu	6240
	1A-1B			Hujiawochen	7170	Level 1	(Zhejiang)	6510
7500	1B		Wan-Nian				Zengpiyan 2	6000
	2A 2A			Bashidan	?	Level 1	(Guangxi)	7630
	2A1			Late Pengtoushan	7815	Level 1		
8000	2A2				7890			
	2A3				7995	Level 2		
	2B			Early Pengtoushan	8200			
	2B							
	2B1				8240			
	2B2 C1				8455	Level 3		9240
	C2						Zengpiyan	9550
	2C	8800?	Jiangxi				(Guangxi)	10,370
9600	3A							11,360
						Zone 1		
						Zone 2		
10,000	3B1			?		Zone 3		
						Zone 4		
	3B2	10,800?	Wang			Zone 5		
	D1							
	D2			Hama		Zone 6		
11,000								
12,000	E	11,840						
		12,530						
13,000		14,160		?				
14,000	3C1b		Xian Ren				Kummy	13,260
							(Siberia)	
	3C2	15,500						14,260
	F		Dayuan	Sanjiaoyuan	12,600	Zone 2		15,350
	4A	16,720					Dushizai	
	3						(Guangdong)	17,170
	3xA							17,700
	4B							
17,000	4 5							
	G	17,040		?				
	6 H	19,770						
	I							
	J		Yangtze					
	K	24,540						19,910
	L						Bailiandong	26,680
	M						(Guangxi)	37,000
	N							
	O							

XR-E: Xian Ren Dong, east area; XR-W: Xian Ren Dong, west area; W: WangDong

Table 2 Late Paleolithic-Neolithic Cultyral Sequence of East Asia (as of 1996)

CULTURAL STAGES	*Uncalibrated ^{14}C dates BC*	Quizhou Yunan	Hunan	JIANGXI	Jiangsu Zhejiang	Guangdong Guangxi	Taiwan Fujian	Henan Shandong	Inner Mongolia
	2000								
CHINESE									
TRANSITIONAL					Liangzhu		Tans shi shan	Longshan	
NEOLITHIC 7			Shijiune						
		Baiyangcun		Shishantou		Shi Xia			
			Kuihuashei						
			Quialing						
	3000				Sung tze				
CHINESE									
FINAL									
NEOLITHIC 6			Tahe	Hu Kuo					
			Daxi						
	4000					Jin lan si		Dawenkao	
CHINESE				Shanpei	Majiabang				
LATE			Tangjiagong						
NEOLITHIC 5									
			Hujiawochen		Hemedu				
	5000					Zengpiyan 2			
			Chengbeixin					Beixin	
CHINESE				Wan-Nian					
MIDDLE			Bashichan						
NEOLITHIC 4			Pengtoushan 2						
	6000								
			Pengtoushan 1						
CHINESE				Jiangxi					
EARLY									
NEOLITHIC 3	7000								
						Zengpiyan 1			
	8000								
				Wang					
	9000								
CHINESE									
INITIAL									
NEOLITHIC 2									
	10,000		Hama						
CHINESE									
INCIPIENT				Xian Ren					
NEOLITHIC 1	11,000		Sanjiaoyuan						
FAR EAST				Dayuan					
EPI-PALEOLITHIC								Xuegan	
	21,000			Yangtze		Bailiandong		Xiaonanhui	Salawasu
FAR EAST									
PALEOLITHIC	42,000							Upper cave	Ordos
	98,000							Zhoukoudian	

Ningxia Gansu	Shaanxi	Shanxi	Hebei Liaoning	Northeast Jilin Heilongjiang	Korea	Southern Siberia	North Japan	Central Japan	Southwest Japan	^{14}C *dates BP*
										4000
						Kinpo				
Qijia				Xiaozhushan 3				Late Jomon		
	Longshan	Longshan	Xiaoheyan							
Majiayao										5000
				Xiaozhushan 2						
								Middle Jomon		
	Chi Chia									6000
			Hongshan			Osipovskoyu 2				
				Xingkailiu						
								Early Jomon		
	Miaotikou			Xiaozhushan 1	Chabui					7000
	Pan Po 2 ?									
		Yangshao						Initial Jomon		8000
Bailingang 3										
	Pan Po 1 ?		Xinglongwa							
		Cishan					Yanigmoto 7			9000
								Nakibuya	Fukui 1	*JAPANESE*
									Tazawa	*EPI-NEOLITHIC 5*
			Nan Zhuangtou							*JAPANESE*
								Gin 3	Fukui 2	*EPI-NEOLITHIC 4*
								Kamino 2		
										11,000
										JAPANESE
							Yanigmoto 6			*EPI-NEOLITHIC 3*
								Kamino 1	Fukui 3	
										JAPANESE
						Khummy		Terao 1		*EPI-NEOLITHIC 2*
						Ustinovka 3		Umi 1-2		13,000
								Katsusaka		*JAPANESE*
							Araya		Fukui 4-9	*EPI-NEOLITHIC 1*
								Pirika		
							Yadegawa			
Bailingang 2	Janziyuan	Xianchuan	Hatouliang	Yushu		Yab				23,000
		Shiyu				Busse				
									Fukui 15	44,000
Bailingang 1										100,000