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# On the origin of China's agriculture viewed from the evidence of farm tools

Jia Lanpo, Huang Weiwen, Wei Qi and Chen Chun

On the happy occasion of the 65th birthday of my great friend and venerable colleague, Prof. Dr. H.-G. Bandi, my pupils and I jointly wrote this article to express our warmest congratulations and wish him and his family long life and happiness.

Jia Lanpo

Research on the origin of agriculture has become a topic of increasing concern in archaeology on account of the fact that such a conscious activity as agriculture played a decisive role in human subsistence and settled habitation. The most interesting problem is when and where agriculture originated. Domestic plants, however, only make up a small part of the botanical world. Like animals, plants are perishable, and as time goes on scarcely anything can be found to serve as conducive evidence. It is difficult to clarify the history of the domestication of plants as well as animals, because the shift from wild species to improved varieties might have been a process of gradual change over a long period of time. Furthermore, no obvious distinction could be made between wild plants and domestic ones at an earlier stage. Transitional species in domestication are also hard to discover. This is another reason why research on the origin of agriculture has not achieved satisfactory results. At present, discussion of this subject is usually centered on farm tools.

From our point of view it seems beyond doubt that China is one of the original centres of agriculture in the world. We have good reason to believe that all crops must have been domesticated independently at several centres and that they then gradually spread to other places. According to archaeological discoveries, wheat, barley, lentil and pea originated in Western Asia, as the earliest finds were reported in this area.

In the 1940s and 1950s the ruins of ancient villages of about 8700 years B.P. were found at Jarmo, northern Iraq, yielding traces of primitive agriculture as well as clay buildings. The ancient people in the area had already started to grow barley and wheat with two and one fertile kernel rows. Some scholars held that this could represent the transitional period from wild to entirely domesticated crops.

In the middle 1960s an ancient hamlet composed of closely-built houses was uncovered at Tell Murebat, on the

Euphrates River, Syria. Judging from the discoveries, the ancient villagers lived mainly from hunting, but seeds of many wild plants were also found in their food.

*Sataria italica*, or millet, could rightly be regarded as a special crop in China with a cultivation history of more than 6000–7000 years along the Yellow River valley. In the Banpo village site, on the eastern outskirts of Xian, the capital of Shaanxi province, not only a large number of farm tools such as the stone hoe, stone spade, stone saddle-quern and stone roller but also rotten millet grains were found. One pottery jar of millet was discovered in the dwelling-place, and another, being a sacrificial object, was found in the grave-yard. The age of this site is about 5000–6000 years B.P. Husks of millet were also unearthed at many neolithic sites in Shaanxi, Shanxi, Henan and Hebei provinces. The radiocarbon date is  $7355 \pm 100$  years B.P. Millet was the earliest crop domesticated in China. It is still widely cultivated today in North China, especially along the Yellow River, and is one of the staple foods that local people consume.

In the Shang Dynasty, c. 16th–11th century B.C., the pictographic characters for such crops as standing grain, wheat, Chinese sorghum and paddy or rice had already appeared in oracle-bone inscriptions. The character “plough” was designed as an ox hauling a plough, indicating that the ox-hauled plough was commonly used in the Shang Dynasty. The verses in *The Book of Songs*, written in the Spring and Autumn Period, 770–476 B.C., may also prove that standing grain, wheat and glutinous millet had gone through a long period of cultivation; especially wheat was frequently mentioned in these lines. Although wheat had made its earliest appearance in Western Asia, it was planted over vast areas along the Yellow River at least 3000 years ago.

In recent years, the most important breakthrough in agricultural history in China is the discovery of the Hemudu culture site, at Yuyao county, Zhejiang province. It is a kind of early neolithic culture in the area on the middle and lower reaches of the Yangtze River. Owing to its abundant and diversified finds, some historians have asserted: “In the past, the Yellow River was regarded as the cradle of Chinese civilization, but now we should say that both the Yellow

and Yangtze Rivers are the birthplaces of Chinese civilization.”

“One of the most important finds at Hemudu is the remains of cultivated rice. A large quantity of rice and rice husks, rice stems, wood crumbs and the dust of reeds was found mixed in the earth at almost all parts of the excavated area. Some of these rice grains and their stalks were scorched and some were so well preserved that the leaf veins and root hairs were clearly visible. Even the hairy coatings of husks were discernible and the colour of the husks was like new, with the spikes remaining intact. These grains were clearly cultivated, according to the appraisal of the Institute of Botany of the Chinese Academy of Sciences, and are the earliest remains of cultivated rice so far discovered in China.”<sup>1</sup> In addition to rice grains, other plants have also been unearthed, including large quantities of acorns, water chestnuts, peaches, wild jujube, goured seeds and so on.

The most convincing finds are farm tools. The tool used to plant rice, called *Si*, was a sort of shovel-shaped implement made of wood or bone. Scapulae of big mammalian animals were often used to make *Si*. Some of them, when unearthed, still kept the lower part of the *Lei*, a name given to the haft of the *Si*. It was tied to a square hole in the upper part of the *Si* with a rattan, the remnant of which still remained.<sup>2</sup>

Some of the discoveries are peculiarly fascinating. In addition to many delicate and elegant handicraft articles, several thousands of well-preserved components of wooden buildings were excavated. The buildings were rather large in scale with well laid-out rows of wooden piles. These balustrade buildings could reach 20–30 m in length. This is a rare discovery in which we can see how mortise and tenon joint technique was applied to the construction of such buildings more than 6000–7000 years ago. This will also serve as very important material in research into architectural history.

These, however, are not the earliest proofs to show the origin of agriculture in China. From the cultural remains found at Emaokou in recent years, it could be reasonably inferred that agriculture in China might have started to develop much earlier than at Hemudu as is mentioned above. Emaokou is a large stone tool-making site, about 10 km to the west of Huaiyuan county, northern Shanxi province (N. 39° 53', E. 110° 00'). The Emaokou River, a tributary of the Shanggan River, flows through the northern end of Emaokou village. For about 2 km along the left bank of the Emaokou River, there are two small coombes called respectively the Big and Small Guadigou. The Emaokou site, about 80–100 m above the Emaokou River, is located on several connected domes near the source of these two coombes.

After its discovery in 1963, a preliminary inspection was made in 1973 and a re-examination in recent years.

After several investigations, the site has been found to cover about 20 000 square metres with a wide distribution of flaking stone tools. Due to the long erosion of the hills, most stone artifacts are exposed on the surface and can be found everywhere. In the vicinity of the site, a large amount of intrusive lamprophyric dike rock, silt and tuff bed in the coal-bearing rock formation of the Triassic period, provided the ancient tool-makers with inexhaustible raw materials. These aborigines, taking advantage of this favourable condition, mined raw materials and retouched them into various types of tools.

Two-terrace land stretches extensively along the Emaokou River and its tributaries. The upper terrace is composed of a gravel layer at the bottom, a sand layer in the middle and a silt layer on the upper part. This constitutes a cyclical deposit, and could be considered as belonging to the upper Pleistocene in comparison with the other cultural sites. There are two more layers on the silt layer. The lower one is humus and the upper one is recent drift deposit. Stone artifacts were found in these two top layers.

Stone artifacts are stone cores, chopper and chopping tools, short-body points, thick points, various kinds of scrapers, biface tools, axes, sickles, hoes and soil-looseners. In the following, let us concentrate our discussion on farm tools.

Most neolithic farm tools so far discovered in China were stone sickles (fig. 1). They were mostly polished and had two types, rectangular and semicircular, with one or two holes bored through in the middle part of the tools. Just as J. G. Andersson has mentioned, these stone sickles were similar to hand iron sickles now used by farmers<sup>3</sup>. However, the sickle is not a convincing evidence to prove the origin of cultivation, because it could also be used to reap edible wild plants. But matters are quite different in the case of the hoe, which was a tool to loosen soil with and no doubt was used only in cultivation. Some scholars considered that besides the stone hoe, the stone axe was also a kind of farm tool, as pointed out by Fan Wen-lan: in the neolithic period almost every site yielded stone axes or stone mattocks, which apparently were farm tools<sup>4</sup>.

<sup>1</sup> XIN WEN, The remains of a 7000-year-old society at Hemudu village. *Recent Discoveries in Chinese Archaeology*. Beijing 1984, 8.

<sup>2</sup> “Chopping wood to form *Si* and cutting wood to make *Lei*” was recorded in Chinese ancient books. *Lei Si* was a kind of farm tool to loosen the soil in ancient China.

<sup>3</sup> J. G. ANDERSSON, An early Chinese culture. *Bulletin of the Geological Survey of China*, No. 5, Part 1. Peking 1923, 3, pl. 1 and 11.

<sup>4</sup> FAN WEN-LAN, *The outline of Chinese history*, Part 1. Peking 1953, 8.

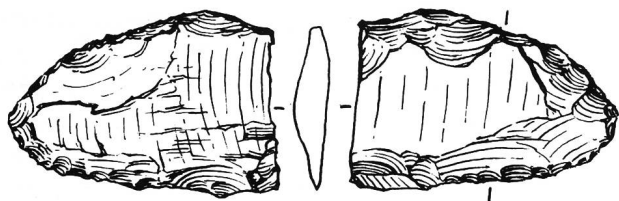


Fig. 1. Sickle from Emaokou site (scale 1:2).

The stone hoes from Emaokou are bifacially retouched and show a rectangular shape (fig. 2). Their bodies are thinner and broader than those of stone axes. They occupy a large proportion in the Emaokou assemblage and show identical striking technique and feature. The big specimen is 193 mm long, 90 mm wide, 32 mm thick and 793 g in weight; the small one is 106 mm long, 50 mm wide, 19 mm thick and 147 g in weight. The big specimen, represented by N. 0081, appears thick and somewhat narrow at the butt, and its bilateral edges are blunt and symmetric. The cutting edge is broad, being flaked longitudinally to form a bevelled shape. The shape of these hoes is somewhat similar to that of the long-body iron hoe now still used by farmers in Henan province. Flaked hoes were also found at Xijiaoshan (fig. 3), a late neolithic site in Nanhai county, Guangdong province<sup>5</sup>. The neolithic sites along the banks of the Yangtze River in the eastern part of Sichuan province also yielded such flaked and slightly polished hoes<sup>6</sup>.

The stone artifacts of Emaokou are scattered about the humus layer on the second terrace. The layer is about 2 m thick and looks greyish black and brown in colour. There is a marked undulating erosional surface between the humus layer and the underlying upper pleistocene silt layer. The humus layer contains a large amount of stone tools. Going up river along the Big and Small Guadigou, we may see more and more stone artifacts and piles of them at the source of the two coombes. It is beyond doubt that the age of the humus layer on the erosional surface belongs to the early period of the Holocene, and the stone tools therein must be remains of the early neolithic age. So this site should be earlier than Hemudu. Furthermore, a layer of diluvial and drift soil, about only 0.5 m thick, can be seen on hills near the site. Abundant stone artifacts were discovered in this layer. No vertebrate fossils have been found together with the stone remains, nor were any other cultural



Fig. 2. Hoe from Emaokou site (scale 1:2).

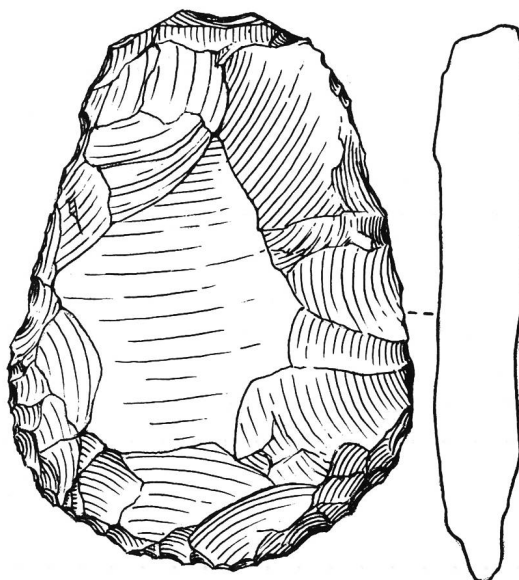


Fig. 3. Hoe from Xijiaoshan site (scale 1:2).

<sup>5</sup> HUANG WEIWEN, LI CHUNCHU, WANG HONSHU and HUANG YUKUN, Re-examination of a microlithic site at Xijiaoshan, Nanhai County, Guangdong. *Current Anthropology*, Volume 23, No. 5. Chicago 1982, 490.

<sup>6</sup> Brief report on the investigation of the neolithic sites along the Yangtze River, eastern part of Sichuan Province. *Museum of Sichuan Province, Kao Gu (Archaeology)*, No. 8. Sichuan 1959, 394.

relics found within the scope of the site, except that three small pieces of potsherds, which were not from the top layer of the drift soil, were redeposited by subsequent erosion of the soil through rainwater.

The distinct feature of the paleolithic culture so far discovered in China allows one to distinguish two cultural traditions. One is called "The Kehe – Dingcun Tradition" or "The Big Chopper-Chopping Tool – Big Triangular Point Tradition", and the other is called "The Zhoukoudian Loc. 1 (Peking Man Site) – Zhiyu Tradition" or "The Keeled Scraper – Burin Tradition". The former is represented by various types of big chopper and chopping tools made of large flakes. Small tools sometimes exist in the assemblages but are relatively limited in type and quantity. The latter is represented by small tools made of irregular small flakes, and small tools are the major component in the assemblages, varied in type and delicate in technology<sup>7</sup>. We agree with the following assessment:

"In the small-tool or microlithic tradition, people subsisted mainly by hunting and fishing and supplementa-

rily by gathering and other methods. Flaked arrowheads appeared in the upper paleolithic period (for example at Zhiyu site in Shanxi province). Later on, arrowheads increased greatly in microlithic assemblages, showing that hunting became much more important in people's lives. At the same time, animal rearing started to emerge from these advanced hunting groups. Judging from the types of stone tools from 'The Big Chopper-Chopping Tool – Big Triangular Point Tradition', the economy of the tradition is mainly represented by gathering and supplementarily by hunting and other methods. We can conclude that the origin of agriculture must have derived from a developed gathering economy."<sup>8</sup>

<sup>7</sup> JIA LANPO, GAI PEI and YOU YUZHU, Stone tools and fossil remains from Zhiyu, Shanxi. *Kao Gu Xue Bao (The Chinese Journal of Archaeology)*, Volume 1. Beijing 1972, 54. – JIA LANPO, On the origin of microlithic industries in East Asia. *Union Internationale des Sciences Préhistoriques et Protohistoriques, 19<sup>e</sup> Congrès, Colloque XVIII*. Nice 1976, 7–9.

<sup>8</sup> JIA LANPO and YOU YUZHU, The remains of a stone work-shop at Ngo-mao-kou (Emaokou) in Huai-jen, Shanxi. *Kao Gu Xue Bao (The Chinese Journal of Archaeology)*, Volume 11. Beijing 1973, 25.

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