The Source, Types and Distribution of Chinese Plows

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The plow is one of the most important tools in farming, and animal-pulled plows mark the highest level of traditional farming technology. A number of academic studies on plows have been conducted within and outside China, and it is one of the most well studied areas in the field of agricultural tools. In China, there are written descriptions on the use of iron plowshares as far back as the Spring and Autumn Period and the Warring States Period. In the following Han Dynasty, plowing skills were greatly refined and popularized, as mentioned in historical texts [1]. The "Lei Si Jing" ("Book of Plows"), written by Lu Guimeng during the Tang Dynasty, is one of the oldest texts about ancient farming tools, and gives the names, dimensions, structures and functions of parts of the Jiangdong Plow (used around the lower reaches of the Yangtze River) [2]. Later documents, such as the "Gengzhitu" ("Pictures of Farming and Weaving") by Lou Chou in the Song Period and "Treatise in Agriculture" by Wang Chen in the Yuan Period include drawings of the plows along with descriptive text. As such, there is a history of research on plows in China.

Today, numerous texts are available on the study of Chinese plows. "Illustrated History of Ancient Chinese Agricultural Technology" (China Agriculture Publishing House, 1989), "Chinese Encyclopedia on Agriculture: Volume on Agricultural History" (China Agriculture Publishing House, 1989), and "Chinese Agricultural Equipment Atlas" (China Agriculture Publishing House, 2001) are large encyclopedias with detailed descriptions of the source and development of Chinese plows, and present a number of works, documents, and graphic data on archaeology, history and folk history. In academic magazines such as the *Journal of Chinese Agricultural History* and *Agricultural Archaeology*, numerous dissertations on the studies of plows have been published. In my work, "The Material Culture of Yunnan Farming" (Originally published by Yunnan Education Publishings, 1996: Japanese translation by Li Yuan published as "Origins of Yunnan Agriculture – Study on Farming Tools of Ethnic Minorities," Daiichi Shobo, 1999), I did not follow traditional research methods, which focus on archaeological and historical texts; instead, my research was based on extensive field studies, and a number of detailed data on plows and cattle-pulled plows were collected from all over Yunnan Province. Based on this study, I would now like to go one step further and examine the source and types of Chinese plows and their distribution.

The Source of Chinese Plows

It is a common understanding among researchers of Chinese agricultural history that machetes, then spades, then plows were used in the early stages of agriculture. Machetes were used in primitive "machete-and-fire seasonal farming" followed by spades, or actually spades with heads, which were initially stamped into the ground, then pulled by men, with the square blades gradually changed into the triangular shape of current plows.

In terms of materials used, machetes, spades, and plows all developed in the same three stages; starting

from stone (including wood and bone) to bronze, and finally iron. The earliest knives were stone axes and stone knives, the earliest spades with heads were made of wood, stone and bone, and the earliest plows were made of stone. Stone axes and stone knives were found in Stone Age sites throughout China, whereas spades with heads made of wood, stone or bone are not so widespread. Many stone-head spades have been unearthed at the Wuan Xian Cishan ruins of Hebei Province and the Xinzhen Xian Peiligang ruins of Henan Province, as well as sites in Liaoning and Inner Mongolia, some of which date back as far as 8,000 years. Wooden-head spades and ample amounts of bone-head spades have been found at the Yuyao Xian Hemudu site and Heluojiajiao site of Zhejiang Province, dating back around 7,000 years.

The earliest plows were made of stone, and triangular stones plow dating back 5,000 years have been unearthed from the Neolithic site of Wuxingqiucheng in Zhejiang Province [3]. In the past forty years, similar flat stone plows with blades on the two isometric sides of an isosceles triangle have been found throughout Zhejiang, and now total some 100 pieces. Furthermore, stone plows from the Neolithic era have also been found in Henan Province [4]. The sheer volume of stone plows found is enough to suggest that plows in China originated in the southern and northern regions [5]. Unfortunately, as only the stone spade heads were discovered and not the bodies, there is no way of knowing the entirety of the plow structure at the time; however, it can be assumed that the plow of those days was a combination of the pole spade and spades with heads , or what developed from this combination.

After the stone plow, the bronze plow appeared [6]. In China, the casting of bronze started during the Xia Dynasty, but the use of bronze plows decreased in the later Xia, Shang (Yin) and Zhou dynasties. This decline is clearly due to most of the bronze having been used for making festive and ceremonial vessels. The only bronze plowshares to be found were the two found at the gravesite of Xinyu Xian Dayangzhou in Jiangxi Province, dating back to the Shang Dynasty. As the upper surface of these plowshares is cast with decorative trimmings, they must be closely examined to determine whether they were made for utility or for religious purposes [7]. Iron plowshares were developed in the Spring and Autumn Period and the Warring States Period, when the plowshare finally evolved from stone to iron.

In discussing the source of plows in his book “The Cultures of Plows and Agriculture,” Japanese researcher Yasumitsu Ienaga introduces the theory of E. Werth,[8] who believed that plow farming originated in northwest India, which he calls the primary center. According to Werth, plow farming spread from this primary center to the east, west and south, and formed three secondary centers: China, the Mediterranean and North Africa. In his theory, the first plow in China supposedly arrived from India. But as mentioned, stone- and bone-head spades were already in use throughout China 8,000 years ago, and stone plows 5,000 ago. It is clear that the metal ages started with bronze, then later made a transition to iron plowshares. From this standpoint, the origin and development of the plow in China is quite obvious, whereas Werth’s hypothesis that plow farming originated in India and spread to China lacks evidence. Besides, the types of plows that originated in China and India belong to completely different systems, as will be explained. From these points, it is clear that Chinese plow farming originated in the northern and southern areas, and that the hypothesis that plow farming spread to China from India is merely an assumption.

In exploring the source of the plow, we cannot overlook the matter of the tractive powers it requires in order to be pulled. As there has been no evidence to date on whether the plows found at Neolithic sites were pulled by animals, it can be assumed that men pulled the early stone plows. In fact, man-pulled plows can still be seen throughout Guizhou, Inner Mongolia, Gansu and Shanxi. It is a matter of course that plows are pulled by men in places where animals cannot be used. Cattle were first used for farming during the Spring and Autumn Period, and cattle-pulled plows were popularized during the Warring States Period. Horses were used as well as cattle, and in Yunnan Province, even sheep were used [9]. Stone plows from the Neolithic era have not yet been found in Yunnan, but they are known to have been in use since ancient times throughout the Eruanxishan areas in Dali. These, however, seem to have been pulled not by cattle or men, but rather by sheep, and are described as "goats pulling the stone plow." In "Dianhaiyuhengzi" by Tan Cui, there is a similar reference: "In Yunnan, there are many sheep, which are kept for farming the land." Cases of sheep being used for agriculture are unheard of except in the Yunnan area.

In areas other than Yunnan province, there is a history of "elephant farming". In the chapter of "Nanmanchuan" in "Tangshu," areas southwest of Yunnan are described as "the land of elephant-back riding." In the text on "Mangman Village," which is included in the fourth book of the "Manshu" and describes areas southwest of Yunnan, it is mentioned that "the elephants are roughly the size of buffalo," and that "the people keep elephants for farming." Researchers who do not fully understand the concept of "keeping elephants for farming" tend to doubt this story and take it as a mistake for "keeping cattle for farming," but this is not so. As mentioned before, a culture of "keeping sheep for farming" actually existed in the Yunnan area, so why would the same not be possible with elephants? Farming with elephants would not only be limited to having the elephant pull the plow, but also having them stomp on the ground. In regard to elephant farming, the "Yuejueshu" states that "Shun was buried in Cangwu, where elephants farmed the land. Yu was buried in Hui Ji, where birds weeded the land." In "Shuxu" of "Lunheng," Wong Ch'ung interprets this phrase by stating that "Cangwu is actually an area with many elephants, and Hui Ji is an area where the birds gather ...naturally, elephants stomp the ground and birds peck at the weeds, so that the ground is turned over and weeds are removed, and the land is cultivated." The interpretation that "elephants naturally stomp the land" (Xhishuangbanna) is easy to understand, and may be called "stomp farming." During research in Xhishuangbanna, I had the opportunity to conduct hearings on how the Thai people used to have elephants stomp in the rice paddies to break down the grains of mud, which is one proof that "stomp farming" exists. Moreover, during a tour of the Guangxi Zhuangzu Autonomous Region Museum in Nanning in 1996, I came across a photograph showing a herd of cattle in the process of "stomp farming," which assured me that this form of farming does indeed exist. In 1998, I was lucky enough to see a long-sought herd of cattle in the midst of "stomp farming" in the rice paddies of the Thai people along the Honghe River while conducting research in the area. From this discovery, the two questions of whether "elephant farming" exists and whether "stomp farming" existed in the Yunnan region were solved simultaneously.

Stomp farming differs from plow farming in that it is a method of refining the mud in rice paddies, but in fact, "farming" takes on various forms. For example, the Lisu people of the Nujiang River area are known to

let loose a herd of pigs after first scattering a small amount of corn, and then seed the fields afterwards; the pigs' turning up the earth to eat the corn serves to softens the soil. After obtaining this "cultivated" effect to some degree, the seeds are sown [10]. Another form of cultivation is "knife-and-fire farming," which is farming with fire, or slash-and-burn agriculture, in which weeds and insects are burned to the ground, and the soil is turned fertile and soft. The abovementioned stomp farming using elephants and cattle, along with "sheep farming," "pig farming" and "fire farming," are all traditional methods of agriculture, and there is room for discussion on whether these methods are in some way related to the source of plow farming, and whether they are primitive methods that existed prior to the emergence of plow farming. These difficult questions are worth serious deliberation.

Types of Chinese Plows and Their Distribution

By integrating data from historical documents and my field research, Chinese plows can be grouped into the following five categories: large quadrangular-frame curved-beam, non-brace long-beam, quadrangular-frame long straight-beam, triangular-frame long straight-beam, and triangular-frame curved-beam. The following describes the structure and distribution of each category.

1. Large Quadrangular-Frame Curved-Beam Plow

Plows of this category are also called Jiangdong plows, a name given by academics after the plows' distribution around the lower reaches of the Yangtze River. This type of plow is described in the "Lei Si Jing" ("Book of Plows"), written by historian Lu Guimeng during the Tang Dynasty, and marks the point where the Chinese plow was first stereotyped. This plow, however, is only one of many types seen around the Yangtze River, and does not represent all types within China. The body of the Jiangdong plow is not made from one piece of wood, but is rather a combination of the plow sole and handle, each a separate piece of wood. The handle is short whereas the sole is quite long, the beam is short and curved, the handle, sole, beam and brace form a large quadrangular frame, and a large plowshare and mould board are attached. This type of plow is suitable for farming rice paddies in a flat area with a thick layer of soil. (Figure1) (Photo1)

2. Non-Brace Long-Beam Plow

The most distinct characteristic of this type of plow is its lack of brace, and therefore a lack of a frame structure. The body is often shaped in a wide sheet, to which the beam is attached so that it also works as a mould board to rake up the soil. This type of plow is suited for farming in dry areas with thin rocky soil, and is widely distributed in western areas of China, from northern Gansu Province to the Gansu-Qinghai Highlands region in southwest Yunnan Province. (Figure2) (Photo2)

3. Quadrangular-Frame Long Straight-Beam Plow

This is another major type of plow used in northwest China. It is known for its relatively long brace, and its body and sole are made of the same material. The body, sole, beam, and brace form a quadrangular frame,

and it is equipped with a large triangular share and a large mould board. The plow is equipped with a fixture that adjusts the depth of plowing, the beam is long and straight, and the plow is used with a two-cattle yoke method. These plows are often used for farming dry land and for plowing rice paddies. (Figure3) (Photo3)

4. Triangular-Frame Long Straight-Beam Plow

This type of plow does not have a sole, and its body, brace and long, straight beam form a triangular frame. Pulled by either one or two cattle, it is capable of plowing rice paddies as well as dry land, and is distributed in the southwest, south and mid-south areas. (Figure4) (Photo4)

5. Triangular-Frame Curved-Beam Plow

This type of plow differs from the previously mentioned type in that its beam is curved. As the curve of the beam, as well as the shape and structure of the triangular frame, is not constant, there are many variations in form. This plow is generally classified into two types, for rice paddies and for mountainous fields, and is mainly distributed in the southwest and southern regions of China. (Figure5) (Photo5)

As detailed above, I have classified the Chinese plow into five categories. Category one is the Jiangdong plow, one of the oldest types of common plow to be detailed in Chinese historical documents, and distributed mainly in the middle and lower reaches of the Yangtze River, which have a long history of rice farming. The second category is the non-brace long-beam plow, typically seen in the arid high plains of western China, its structures similar to plows in India and western Asia. The third category is the quadrangular-frame long straight-beam plow, another important plow with a long history and distributed widely throughout western China, its form similar to a combination of the first two categories. The fourth category is the triangular-frame long straight-beam plow, mainly distributed in areas between northwest and southwest China. Most ethnic groups that use this type of plow are believed to have moved from the northwest to the southwest, from which we can deduce that this type is a refined result of the third-category plows' gradual spread southward. The fifth category is the triangular-frame curved-beam plow, often seen in southwest and southern China as well as Laos, Vietnam, Thailand and Myanmar. From these facts, we can see that the style of each type of plow is formed by the climatic and agricultural conditions of its local origin, and that the movement of ethnic groups, resulting in the spread of culture, also greatly affects the formation of plow styles in each area.

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1 "Illustrated History of Ancient Chinese Agricultural Technology," compiled by the China Agriculture Museum, Department of Agricultural History（China Agriculture Publishing House, 1991）, pp.106-111.

2 "Iron Plowshare and Mould Board of the Han Era Found in Shanxi Province"（from "Cultural Relics", 1996, Phase 1, pp.23）

3 Article by Chen Wenhua（from "Agricultural Archaeology," published by Cultural Relics Publishing House, 2002, Phase 1, pp.83）

4 "Stone Plows and Soil Breaking Tools in Jiangsu - Jiaxing—An Essay on the Source of Chinese Plow Farming" by Mou Yonkang・Song Zhaolin（from " Agricultural Archaeology," published by Cultural Relics Publishing House, 1981, Phase 2, pp.75）

5 "An Essay on the Source of Plow Farming Agriculture in China" by Yu Fuwei et al（from "Agricultural Archaeology," published by Cultural Relics Publishing House, 1981, Phase 1, pp.33）

6 "History of Chinese Agricultural Economy" by Cao Guanyi（Chinese Social Science Documentation Press, 1989, pp.8）

7 Article by Chen Wenhua（from "Agricultural Archaeology," published by Cultural Relics Publishing House, 2002, Phase 1, pp.83）

8 "The Cultures of Plows and Agriculture" by Yasumitsu Ienaga（published by Kokon Sho-in, 1980）, pp.16-18

9 "Illustrated History of Ancient Chinese Agricultural Technology," compiled by the China Agriculture Museum, Department of Agricultural History（China Agriculture Publishing House, 1989）, pp.106 - 111.

10 According to Professor Wang Lianfang, the methods of "pig farming" were observed when he was involved in ethnic maneuvers around the Nujiang River in the 1950s.