

# The formation and development of Chinese zooarchaeology: A preliminary review

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**ABSTRACT:** Taking as its starting point a review of the present situation and past experience of Chinese zooarchaeology, the development of Chinese zooarchaeology since the 1950's can be divided into two major periods: the initial period (1950's through 1970's) and the formative period (from the 1980's onwards). In this paper, the author summarizes and evaluates the zooarchaeological research of those two periods using materials from the Neolithic period onwards, in terms of theory, method, and concrete practice. The main trends, themes, and issues, many of which have historical roots, are identified, and future directions are indicated whereby the current need of Chinese archaeologists is communication with the international zooarchaeological world.

**KEY WORDS:** ZOOARCHAEOLOGY, CHINA, ARCHAEOLOGY, CHINESE HISTORY, ASIAN ARCHAEOLOGY

**RESUMEN:** Tomando como punto de partida un repaso a la situación actual y experiencia pasada de la arqueozoológica china, el desarrollo de esta disciplina en el país puede ser desglosado en dos etapas: el periodo inicial (desde los años cincuenta a los setenta) y el formativo (a partir de los años ochenta y hasta la actualidad). En este trabajo se resume y evalúa la investigación arqueozoológica de ambos periodos, usando materiales desde época neolítica, revisando teorías, métodos y prácticas. Se identifican las principales tendencias, problemas y aspectos, muchos de los cuales con claras raíces históricas, al tiempo que se señalan futuras líneas de actuación dentro de las cuales, y para la arqueología en general, la comunicación con el mundo académico internacional resultaría clave.

**PALABRAS CLAVE:** ARQUEOZOOLOGÍA, CHINA, ARQUEOLOGÍA, HISTORIA DE CHINA, ARQUEOLOGÍA ASIÁTICA

## INTRODUCTION

Zooarchaeological research started in Europe as early as the nineteenth century. After more than a hundred years of development, with the contributions of scholars from many countries, zooarchaeology has established its own research objectives, methodology and theories, and has produced a wealth of valuable results through research

carried out in many parts of the world (Qi & Yuan, ms; Yuan, ms). As a discipline devoted to the investigation of ancient society, history, environment and human behavior, zooarchaeology continues to make positive contributions. However, the capacity of Chinese research in this regard, when compared to zooarchaeology elsewhere in the world today, is still rather weak. There are many shortcomings, and even some blank spots, as

regards theory, method, and concrete practice. Taking as its starting point a review of the present situation and past experience of Chinese zooarchaeology, and in the hope of contributing to the further development of zooarchaeology in China, this article forms an attempt to summarize and evaluate the history of Chinese zooarchaeological research using materials from the Neolithic period onwards.

As early as in the 1930's, Yang Zhongjian, Pei Wenzhong, De Rijn (Teilhard de Chardin) and other Chinese and foreign scholars conducted zooarchaeological research in China. The work on the mammalian fauna of Anyang published by De Rijn and Yang Zhongjian in 1936 (Teilhard de Chardin & Young, 1936) can be said to form the beginning of Chinese zooarchaeology. Because very little research of this kind was undertaken at the time, because there was little further positive development in the 1940's and because it did not continue beyond that time, in the following paper I will mostly explore developments after the establishment of New China. I divide the developments since the 1950's into two major periods: the initial period and the formative period.

## 1. THE INITIAL PERIOD (1950'S THROUGH 1970'S)

*The Skeletal Remains from the Neolithic site of Banpo at Xian, Shaanxi Province* (Li & Defen, 1959) by Li Youheng and Han Defen is a work that can be taken as representative of the initial period. This research report, both in its format and in the perspectives it adopts regarding the problems at hand, constituted a new beginning in the zooarchaeology of New China, and it can be said that the zooarchaeology of today still has not completely broken out of this framework. Overall, this work had five interesting characteristics:

a) The identification of the species of excavated animal skeletal remains. In reporting the material, emphasis was laid on the morphological description of the specimens, summarizing their characteristics.

b) The researchers were aware of the relationship between the animal remains and human activities, and, on the basis of the identifications, divided the materials into three large groups: domesticates or probable domesticates, hunter's

prey, and those that may have invaded the area in later times.

c) Although the features of excavated pig bones were largely the same as those of wild boar, the age structure indicated that the pigs at Banpo were overwhelmingly infant or young pigs, and there were very few adults. Death in infancy or in young age is not characteristic of the wild boar, and therefore this pattern was taken as proof that the pigs were domesticates. This was the first time in the history of Chinese zooarchaeological research that the age structure of pigs had been taken into account as proof for the presence of domesticated animals.

d) The impact of human behavior on human skeletal remains was noticed, such as in the marks from worked deer antlers as was also the fact that the excavated animal skeletal remains did not contain any whole limb bones, but only fragmented parts (where, however, the two ends in joints were frequently preserved). Since there were marks from crushing on these bones, it was thought that ancient people may have crushed the bones to eat the marrow, and so forth.

e) Through knowledge of the ecology of bamboo rats, it was concluded that there must have been bamboo forests in the area, and it was estimated that the temperatures of the area in antiquity must have been warmer and wetter than at present. Furthermore, through the ecology of other species, the researchers also arrived at an understanding of the topography and geomorphology of the site's surroundings.

From these five points it can be seen that the scope of the research at the time included identification of animal species, exploration of the activities of the people of Banpo, and an understanding of the natural environment of the time. One might say that zooarchaeological research in New China from the start was concerned with some of the main aspects of current zooarchaeological research interests.

Here, however, it must also be pointed out that the animal skeletal materials used to prepare the research report from Banpo had been through a process of selection, and all derived from among those that were comparatively well preserved. They did not consist of the entire excavated assemblage of animal remains. Furthermore, while originally each bone was inscribed with its stratigraphic position, unit of provenance, etc., the researchers determined this was not of much inte-

rest to them, and pooled all of the specimens. Because the research at Banpo did not include the identification of the entire excavated assemblage of animal remains, and because there was no attempt of analysis of the bones using data on their provenance, the scientific quality of the report was affected. However, we cannot demand too much of our predecessors; we cannot ask that they possess the insights we now have. We must acknowledge that as the first research report with a detailed analysis of animal remains prepared in New China, produced by the end of the 1950's, it still represented an impressive achievement. Moreover, the format of this report and the research methods used deeply influenced Chinese zooarchaeological research for decades to come, and it thus forever secured a special place in the history of Chinese zooarchaeology.

Later, Li Youheng and Han Defen, in their work *The fauna from the site of Zengpiyan at Guilin, Guangxi province*, put forward new concepts. For example, they went beyond the former three categories and made a more detailed division of excavated animal remains: 1) extinct or vanished animals; 2) animals raised by people; 3) main prey animals; 4) occasional prey animals; and 5) cave-dwelling animals. At the same time they also put forward some conjectures and hypotheses regarding certain phenomena observed in the animal skeletal remains. For example, the ages of the pigs unearthed at Zengpiyan were generally high; because the date of the site was early, this was taken as an indication that the techniques for raising pigs had been only poorly mastered, even when pigs had been raised to the age of one or two they still were not very big, and so they were raised beyond three years of age. Furthermore, since no dog remains were found at the site, they conjectured that the people of the site, dwelling in caves, did not have any great need for dogs (Li & Defen, 1978).

There is another aspect of the initial period that is worth mentioning here. In the report *Dawenkou*, which was published in the 1970's, the report on the identification of animal remains mentions the discovery of dipinggui turtle (*Terrapene cultura-lia*). This was the first find of this turtle in our country, and represented a breakthrough in the earlier understanding that its distribution was limited to the Americas (Ye, 1974). This can be regarded as a major achievement in the work on identification of animal species.

Judging from the dozens of reports on animal remains published during the initial period, we can say that the reports on zooarchaeological research in China from the 1950's onwards basically fall into two large categories: one is represented by the report on the animal skeletal remains from Banpo, where, in addition to the identification of animals, there is a certain amount of exploration of ancient environment and human activities. The other is where the results of the identification of animal remains are simply listed, without any further discussion. This research tradition, with these two kinds of research reports, persisted for several decades.

Another component of the background must be highlighted here. The main emphasis in Chinese archaeology during a fairly long period after the establishment of New China remained the determination of the chronology of Chinese archaeological cultures, and the delineation of differences and similarities between the types of archaeological cultures of each area. This work reconstructing the chronological and spatial framework of ancient cultures, for us necessarily came before anything else. Thus, archaeologists invested large amounts of effort in comparing the characteristics of ceramics, stone tools etc. excavated from various areas. In this context, zooarchaeology in our country remained confined to a relatively subsidiary position, and excavated animal remains did not receive the attention they deserved, thus the identification of these remains was mainly undertaken by paleontologists.

To summarize, the initial period was characterized by three features:

1. After the establishment of New China, zooarchaeological research in our country contained some research reports on animal remains that were produced at a rather sophisticated level, and so could incorporate some exploration of the relationship between people and animals. The contents of some animal remains research reports at the time included certain major concerns of zooarchaeological research, such as species identification of animals, conjectures regarding ancient environments, and certain aspects of human behavior.

2. The archaeological community did not yet pay sufficient attention to zooarchaeology, and did not necessarily collect and analyze excavated animal remains from every site. If they did collect and sort excavated animal remains, the methodology was not necessarily scientific enough. Also, the

researchers did not realize the importance of collecting all animal remains, nor did they understand the necessity of undertaking any analysis of animal remains on the basis of their unit of provenance.

3. As for the people engaged in research on animal remains, they did not have a sufficiently unified concept of their research objectives. This was reflected in the whimsical organization of some research reports of the time, and in the scope of the issues they addressed.

## 2. THE FORMATIVE PERIOD (FROM THE 1980'S ONWARDS)

The work that heralded the formative period was that of Qi Guoqin (*On the subject matter of zooarchaeology and the problems it must solve and Analysis of the fauna from the Neolithic site of Jiangzhai*) (Qi, 1983), and Wei Feng, Wu Weitang, Zhang Minghua, and Han Defen, *The fauna from the Neolithic site of Hemudu, Yuyao, Zhejiang province* (Wei; Wu; Zhang & Defen, 1990).

Qi Guoqin, after several years of research and investigations in zooarchaeology in the United States, raised the following nine points concerning the subject matter and the methodology of the treatment of data, in her 1983 article: 1) To recover and reconstruct the natural conditions of the surroundings of the habitation sites of ancient people, including ancient climates and the ecology of ancient environments; 2) To investigate hunting prey and the hunting methods of ancient inhabitants, as well as the selection of food items and food processing methods; 3) To investigate evidence for continuous or seasonal occupation of sites; 4) To investigate the structure of ancient society and other aspects of site occupation; 5) To investigate ancient religion, animal sacrificial offerings, and tabooed objects; 6) To investigate aspects of ancient trade; 7) To investigate handicraft products and the sources of raw materials; 8) To investigate the raising of domesticated animals; and 9) To consider the methods of treatment of animal bone in the course of excavation and analysis.

This article introduced the current features of European and American zooarchaeology fairly well, and contributed positively towards the understanding among Chinese archaeologists of developments in zooarchaeology in the present world.

Furthermore, Qi Guoqin, in her research report *Analysis of the fauna from the Neolithic site of Jiangzhai*, for the first time introduced the statistical method of calculating the minimum number of individuals (MNI). This was applied to the animal remains from Jiangzhai, which were thus subjected to quantitative analysis. Clear-cut conclusions were reached regarding the proportion of each animal species within the total assemblage and Chinese zooarchaeology finally emerged out of the earlier practices of recording the quantities of each animal using fuzzy terminology like "fairly many," or "relatively few." This represented a meaningful step forward in the process of connecting with the global mainstream of zooarchaeological methodology. Qi Guoqin also attempted to reconstruct the original positions of the recovered animal remains within the site, and to explore the implications. She discovered that 40% of the animal remains from Jiangzhai Period I were concentrated in the southern portion of the site, and inferred that either the clans occupying this area had been more populous, or the area had been inhabited for a longer period.

The fauna from the Neolithic site of Hemudu, Yuyao, Zhejiang province was the first publication since the liberation of our country solely devoted to zooarchaeology. Already, this indicates that its importance went beyond the ordinary. This special report described sixty-one individual species, and included line drawings. The discussion of the finds addressed the nature of the Hemudu fauna, the exploitation and alteration of the environment by the ancient inhabitants of the site, the domestication of animals, the utilization of animal bone, the investigation of popular customs using animal bones as data, the human-made artificial marks on mandibles, etc.

Apart from the representative works cited above, this period also saw the publication of other interesting reports and articles. The research reports include Zhou Benxiong's *The animal skeletal remains from the Neolithic site of Cishan, Wuan, Hubei province*. In this report, he pointed out that the morphology of present-day chicken and the chicken bones recovered from the Cishan site were relatively similar, and that there possibly were domesticated chicken already at this time. This would mean that the domestication of chicken occurred earlier in our country than anywhere else in the world, and could be traced to 7,000 years before the present. This must be regarded as a major discovery. Moreover, because the identified

chicken bones were largely male, he believed that male chickens were slaughtered, perhaps for religious reasons, or, like in recent times, mainly to keep egg-laying hens. He also discovered that the pig bones at this site did not, as they did at Yangshao and Longshan culture sites, dominate the assemblages. Bones from wild boar represented more than half of the pig bones, so he inferred that hunting was still important at the time (Zhou, 1981). In *The animal skeletal remains from the site of Shishanyu, Weixi county, Anhui province: Identification and research* (Anhui sheng wenwu kaogu yanjiusuo [The antiquities and archaeology research institute of Anhui province], 1992), Han Ligang calculated the number of skeletal remains, described their morphology, and also discussed the artificial marks on bones and bone implements. Zhang Xingyong, Geng Deming, and Liu Hui, in *The early Holocene mammalian fauna from Tangzigou*, suggested the term "Tangzigou fauna" for the fauna of the Yunnan area during the Neolithic period. They gave fairly detailed descriptions of the morphology and characteristics of unearthened animal remains, calculated MNIs for all animals, and made inferences regarding ancient climates and economic life (Zhang *et al.*, 1992). This is a very valuable report as regards the animal remains from sites in border areas. Cheng Qingtai, in a *Report on the identification of fish bones and fish scales from Sanlihe*, identified and analyzed excavated fish bones, and made comparisons with present-day fish species. He also discovered that the fish bones and fish scales excavated from the site derived from two different locations, and inferred that the people at the time knew how to remove the fish scales (Cheng, 1988). This is one of the most detailed zooarchaeological reports we have on excavated fish bones.

One very interesting article is that by Lü Zun'e and Huang Yunping, *The characteristics of skeletal remains chewed by large carnivores and of bone fragments deriving from bones crushed for marrow extraction*. They used experiments on bone for their analysis, and indicated the differences between marks left on skeletal remains that have been chewed, and those crushed for the purpose of marrow extraction (Lü & Huang, 1990). Another is that by Long Fengxiang, *An analysis of the surface marks on the fragmented bones from the Ma'anshan site*. He examined the surfaces of excavated bones, and distinguished natural from human-made marks (such as those deriving from bone-crushing for the sake of marrow extraction,

from the manufacture of bone implements, etc.) (Long, 1992). From the perspective of world zooarchaeology, the issues explored in these two papers place them in a rather forward position.

It is worth mentioning Li Tianyuan's translation of the *Illustrated guide to animal bones*. This work, originally in English, contains line drawings of the bones of selected common animals, comparing them with the same bone from other species and adding simple explanations that make the work comparatively easy to use and very helpful in the identification of animal skeletal remains.

Also, during this period, a number of articles introducing zooarchaeology and foreign zooarchaeology have been published: Zhou Benxiong's *The domesticated animals of Neolithic China* and *Archaeozoology*; An Jia'ai and Long Fengxiang's *Zooarchaeology in the U.S.*, and the translations by Yuan Jing, Jiao Nanfeng, Qin Xiaoli and others (*The present situation and current issues in Japanese zooarchaeology*, *A history of European and American zooarchaeology*, *Determining age structure from the condition of excavated Sika deer teeth*, *On the determination of the age of Japanese wild boar unearthened in archaeological sites*, and *On the domesticated pig of the Yayoi period*) (Yuan, trans., 1992a; Yuan, trans., 1992b; Yuan, trans., 1993; Yuan & Jiao, trans., 1993; Yuan & Qin, trans., 1994).

It is well worth stressing the importance of the Chinese-American archaeology fieldschool of 1992 (jointly organized by the council for American-Chinese academic exchanges of the American Academy of Sciences, and the Institute for vertebrate paleontology and paleoanthropology), and especially the invitation of Dr. Ji Daina (Diane Gifford-Gonzalez) of the University of California-Santa Cruz, and her lectures on zooarchaeology during three weeks at Zhoukoudian. Dr. Ji Daina mainly lectured on mammalian osteology, the food structure of prehistoric people, the seasonality of their activities, on butchering patterns, the identification of various marks on bone surfaces, the regularities of bone fragmentation and deterioration, etc. This was intended to spur the development of zooarchaeology in our own country by inviting experts in zooarchaeology from abroad. One result was that archaeologists in general began to engage consciously in zooarchaeological research. One representative example of this is Chen Quanjia's study, *The animal skeletal remains from the site of Zuojiashan, Nong'an: Identification and study of*

*marks*. In this article, he identified the species encountered, calculated the numbers of even the smallest fragments, and also discussed the importance of hunting and fishing, the taming and raising of animals, the period of occupation of the site, the manufacturing of bone tools, etc. (Chen, 1993). In his article, we can observe something of great interest: there is a wealth of details on the manufacture of bone tools and artificial marks on the bones—this is something rarely encountered earlier. This seems to indicate that the zooarchaeology practiced by archaeologists and that practiced by paleontologists is indeed different: relatively speaking, in their explorations, archaeologists tend to emphasize relating the animal bones with human behavior.

Compared with the initial period, the research undertaken during the formative period is much more lively and varied. But, it must also be pointed out, that in the latter period, many of our reports on animal skeletal remains still have numerous defects. For example, the researchers do not yet have any firm grasp of the cultural features that are reflected in the animal remains, they do not collect all the animal bones during the process of excavation, they do not calculate and compare the MNIs, and they do not refer to the stratigraphic provenance and position of the remains when sorting and analyzing them. Furthermore, the reports on animal remains still figure as appendices, added at the end of the archaeological reports. Actually, the animal remains excavated from a site, like the ceramics, stone tools, and bone tools, were all discarded after use by people, and each in their own way reflect certain activities on the part of ancient people. For this reason, after the species, age, quantities, sex, and provenance of the animal remains of each unit have been clarified, and after the regularities in their presence and the underlying reasons have been meticulously explored, these remains can prove useful for the reconstruction of the behavior of ancient people, and also constitute an indispensable part of the understanding necessary for the integrity, richness, and scientific quality of the synthesis of the excavation report. This point has not yet been fully grasped. Of course, this also has to do with the quality of the zooarchaeological reports. Even in the 1990's, some zooarchaeological reports retained the tradition of merely reporting the species identification of the animals. And, sure enough, if it is just a list of animal species, it does not fit into the main text of the report.

In sum, the formative period has three characteristics:

1. The aims and methods of current world zooarchaeology have been introduced to China, through both “going out” and “inviting in.” Also, some of the methods current in international zooarchaeology have begun to be applied in research at home. The zooarchaeology of our country finally has taken the first steps towards integration with international zooarchaeological research.

2. The number of researchers in zooarchaeology has increased. Archaeologists have also begun to take part in zooarchaeological research, a very positive development. Compared with the initial period, both the quality and quantity of the results of zooarchaeological research have clearly increased.

3. There is not, like there was in the initial period, any universal agreement regarding the objectives or theory and methods of zooarchaeology; also, some defects already present in the initial period have not yet been overcome.

## CONCLUSIONS

Summarizing what has been said above, over several decades of efforts, Chinese zooarchaeology has achieved many results. For example, we have learned about the animals present in each of the cultural types of the Neolithic period, and have begun to encounter the domesticated animals of South and North China in ancient times; through the animal remains excavated from a site, we have discovered the climate and environment of ancient times, and compared them with the present conditions at the site; we have attempted to study the techniques of bone tool production and the artificial marks left on animal bones, and so forth. But it must also be pointed out that our zooarchaeology has always developed in a comparatively isolated environment and the guiding ideas and methods of execution have not been up to a par with the current international guiding ideas and methods. If we undertake a sustained comparison with the research in Europe, America, and Japan, we can clearly appreciate that there are shortcomings on our part. This is to say, we should have been able to arrive at a much better understanding on the basis of the animal remains that were excavated. However, only if we are able to see clearly the

gap which persists between us and zooarchaeological research in the world, and if we start now, with clear guiding ideas and appropriate methods, and work diligently, I believe our treasured materials will surely provide us with many, many research achievements, and the future of our Chinese zooarchaeological research will surely be bright and splendid.

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