DOI：10.16359/j.cnki.cn11-1963/q.2003.04.003

山东细石器遗存以及对“凤凰岭文化”的重新认识

沈 辰[1,2,3]，高 星[2]，胡秉华[3]

（1.加拿大皇家安大略博物馆，多伦多；2.中国科学院古脊椎动物与古人类研究所，北京 100044；
3.中国社会科学院考古研究所，北京 100710）

摘要：本文对山东南部地区出土于4个旧石器时代晚期遗址的石制品进行初步的类型学观察，发现其石制品工艺技术比我们过去所认识到的要复杂的多。凤凰岭、青峰岭和望海楼3处遗址带有明显的细石器工艺特点，而望海楼的石制品与前二者在原料使用和制作技艺等方面又有所不同。尤为重要的是，新的研究表明黑龙潭遗址的原生文化层位表现为以特有的石片石核为主的石制品工艺，并非过去认为的细石器遗存。2001年秋季对黑龙潭遗址的补充发掘证实过去在该遗址发现的细石器遗物来自次生堆积。因此几种明显不同的石器技术传统可能共存于这一地区，“凤凰岭文化”已不足以概括鲁南旧石器晚期的石器文化，需予以重新审视。

关键词：细石叶；石器技术；凤凰岭文化；山东

中图法分类号：K871.1　　**文献标识码**：A　　**文章编号**：1000-3193（2003）04-0293-15

山东的细石器遗存自上世纪80年代初发现于沂沭流域之后，至今已逾100处遗址或地点(图1)。有学者曾将这批遗存归纳为“凤凰岭文化”，以此代表分布于山东汶泗流域、沂沭流域以及马陵山地区一带具有细石器工艺特点的文化因素。然而，对“凤凰岭文化”的认识至今只是基于一批缺乏可靠地层关系的地表采集标本，仅有凤凰岭、青峰岭与黑龙潭进行过科学的发掘，且大量的石制品没有经过系统的研究。因此可以说，我们对“凤凰岭文化”的认识至今仍是不完整的，尤其是缺乏绝对年代的断代依据。

2001年秋，中国社会科学院考古研究所山东队对黑龙潭遗址做了补充发掘，目的之一是确定石制品的原生层位，之二是获取骨骸样品以供质谱加速器碳－14测年。在调查中，我们发现黑龙潭遗址(图2)地处陡峭山坡的低处，而高处马陵山坡有细石器文化遗存。鉴于黑龙潭的石制品工艺与典型细石器技术相去甚远，因此认为黑龙潭遗址中的细石器遗物可能是后期的“二次堆积”，2001年的发掘证实了这一推测。该遗址有3个含石制品的文化层(第2、3、4层)，上部两层均为因风蚀和水流搬运而成的再生堆积，第4层为原生文化层。本次发掘认识到原生文化层中并没有典型细石叶或细石叶石核。由此可以肯定，过去在该遗址发现的细石器遗物应出自次生堆积层，系从高处搬运而来。对这次发掘出土的石制品的初步观察发现，黑龙潭石器制造技术与其它几处遗址极为不同。

收稿日期：2002-12-02；　**定稿日期**：2003-06-12

基金项目：加拿大社会科学与人文基金研究项目；中国科技部基础研究重大项目前期研究专项(2001CCA01700)

作者简介：沈辰（1964－），男，博士，加拿大多伦多皇家安大略博物馆近东与亚洲文明部研究员、中国科学院古脊椎动物与古人类研究所客座研究员、中国社会科学院考古研究所客座研究员，主要从事旧石器时代考古和史前研究。

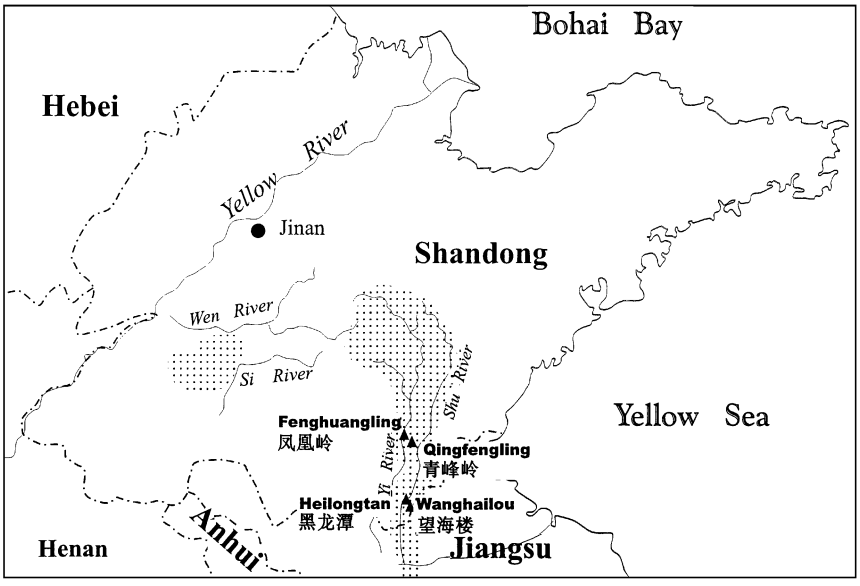

图 1 山东细石器遗址地点的地理位置

Map showing locations of archaeological sites under study (dotted shaded areas indicating concentration of the Upper Palaeolithic sites identified so far)

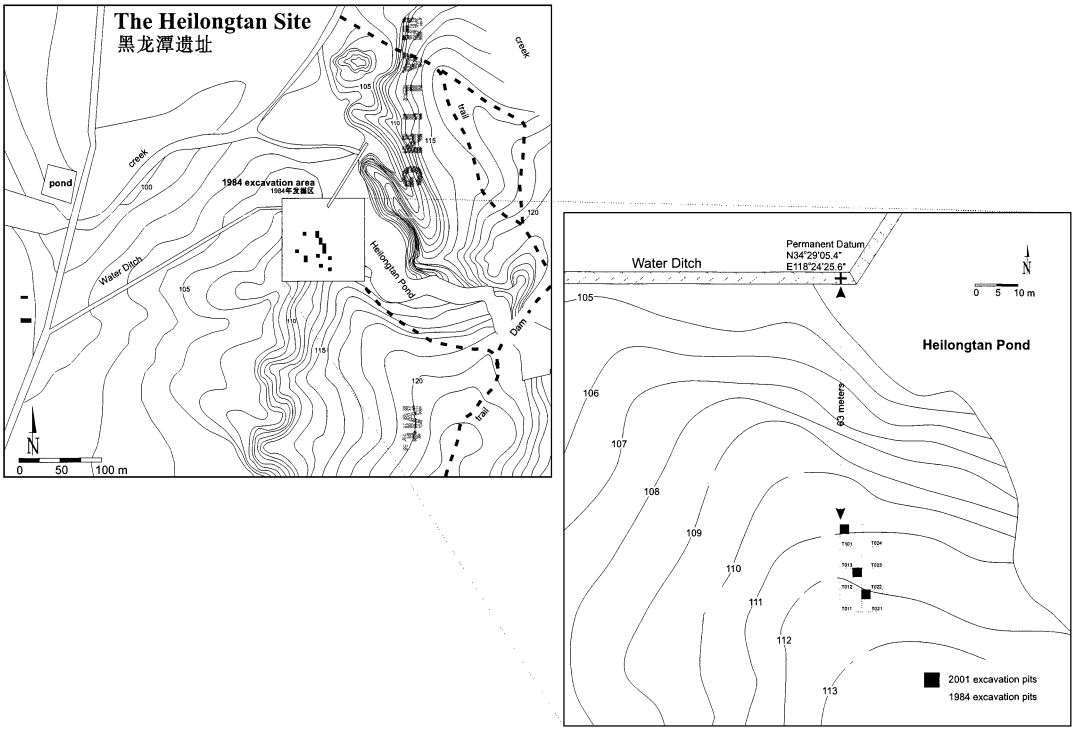

图 2 黑龙潭遗址

The Heilongtan site

2001 年田野调查的另一主要收获是发现并发掘望海楼原生文化层。该遗址于 1982 年和 1984 年进行过调查，采集的石制品标本上千件，包括大量的典型细石器遗物及各类石片与废品。遗憾的是由于风蚀严重，地层关系不清。本年度的调查在主峰东南侧发现有一处原属唐宋至民国时期的土庙遗址，有唐宋时期的瓷片和红烧土渣堆积。为此开了一条 1×3 m 的探沟，发现在历史时期遗存之下有旧石器原生地层，厚约 1.8m，出土了典型的细石叶、细石叶石核以及刮削器等石片石器。正是该遗址原生地层的发现与发掘，确定了远古人类在这一山岭地区的存在，上千件采集的石器标本有了可靠的地层依据。故我们可将望海楼、凤凰岭、青峰岭和黑龙潭的石制品一并进行分析与对比。

本文将 4 个遗址出土的 8000 余件石制品分为五大类(石料、石核、石片、石器和废品)，进行初步的类型学分析(详细数据见正文及表 1—3 和图 3—6)，结果表明山东旧石器时代晚期可能存在几种不同的石器工艺技术体系。

黑龙潭遗址发现有一定数量的石料，主要以脉石英为主，石核主要为一般锤击石片石核，工具类以修理石片为主，兼有刮削器与两面器。石片中 80% 以上是锤击石片，此外还有大量的断块废品。该遗址代表的是这一地区非细石器工艺的以石片石核为主的石器工业(图7)。从类型学上看，凤凰岭与青峰岭石器技术十分接近，代表的是山东地区可能具

表 1　石器分类表

Lithic artifact classification

石器类别 Lithic Class		凤凰岭遗址 Fenghuangling		青峰岭遗址 Qingfengling		望海楼遗址 Wanghailou		黑龙潭遗址 Heilongtan	
		N	%	N	%	N	%	N	%
Nodule	石料	0	0.00%	0	0.00%	1	0.10%	24	1.60%
Core	石核	115	6.50%	175	5.50%	108	6.50%	179	12.20%
Formal Type	器类	160	9.10%	530	16.70%	288	17.20%	93	6.40%
Debitage	石片类	878	49.90%	1296	40.80%	736	44.10%	447	30.60%
Debris	废品类	605	34.40%	1172	36.90%	537	32.20%	720	49.20%
Total	总计	1758	100%	3173	100.00%	1670	100.00%	1463	100.00%

表 2　不常见石器器类在四遗址中出现率

Presences of rare tool types in the four lithic assemblages

		凤凰岭遗址 Fenghuangling	青峰岭遗址 Qingfengling	望海楼遗址 Wanghailou	黑龙潭遗址 Heilongtan
Chopper	砍砸器	No	No	No	Yes
Notch	凹形刮器	No	No	No	Yes
Drill	锥器	Yes	Yes	Yes	No
Uniface	单面器	Yes	Yes	Yes	No
Back microblade	截面细石叶	No	little	Yes	No
Biface preform	两面器雏形	No	No	Yes	Yes
Perforator	钻头形器	No	No	Yes	Yes

表 3　废品分类表

Frequencies of debris at the four sites

		凤凰岭遗址 Fenghuangling		青峰岭遗址 Qingfengling		望海楼遗址 Wanghailou		黑龙潭遗址 Heilongtan	
		N	%	N	%	N	%	N	%
Chip	石屑	336	55.50%	863	73.60%	202	37.60%	159	22.10%
Chunk	断块	269	44.50%	309	26.40%	335	62.40%	561	77.90%
Total	总计	605	100%	1172	100%	537	100%	720	100%

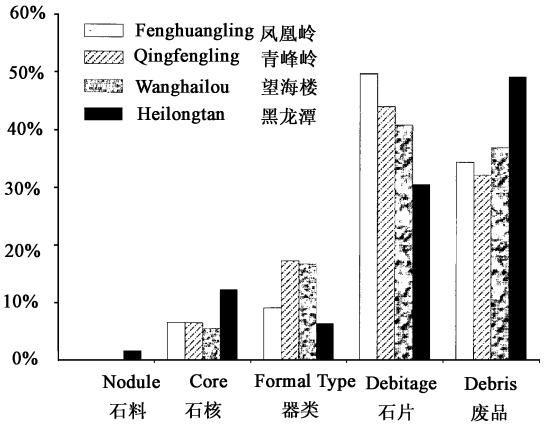

图 3　石制品分类统计图示

Distribution of lithic artifact categories

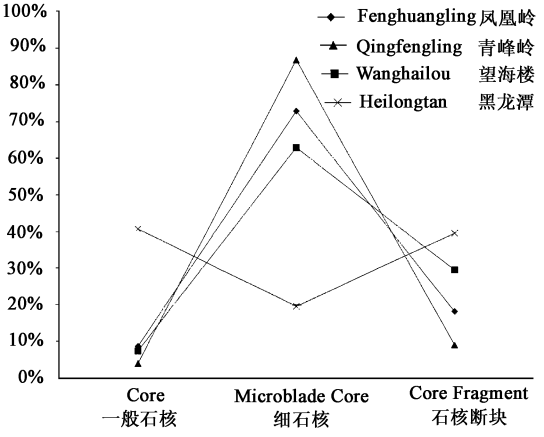

图 4　石核类统计图示

Distribution of core type frequencies

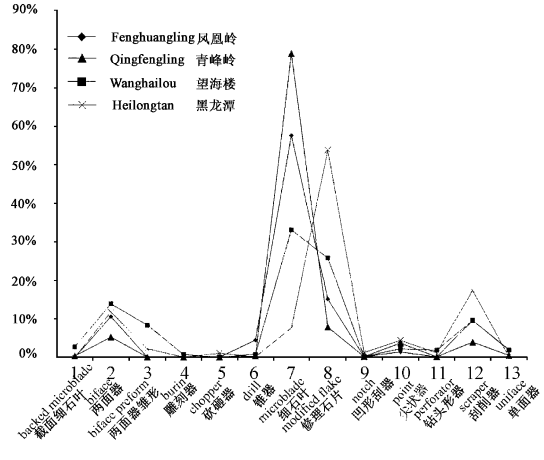

图 5　器类统计图示

Distribution of formal type frequencies

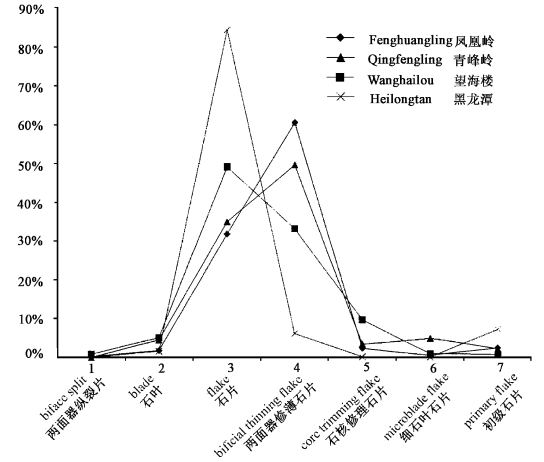

图 6　石片类统计图示

Distribution of debitage frequencies

图 7　黑龙潭遗址出土的石制品

Artifacts from Heilongtan site

图 8　青峰岭遗址出土的细石叶

Microblades from Qingfengling site

有当地风格的细石器工艺。石料多为燧石，少有脉石英。石制品以大量的典型细石核与细石叶为主。石片中多见两面器修薄石片，说明这两个遗址所代表的石器工艺是以两面器制作技术和由此产生的细石叶为特点(图 8、9)。

望海楼的石器工艺似乎是介于上述两种风格之间，虽然代表的是典型的细石器工艺，但在制作技术上与凤凰岭和青峰岭有一定差别，特别是望海楼石制品中发现有典型的大中型两面器(图 10)，为别处遗址所不见。其石料的选用与其它遗址也有所不同。望海楼细石器工艺可能与苏北一带的细石器传统有一定关联。

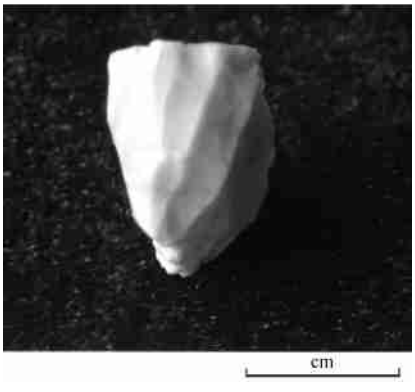

图 9 凤凰岭遗址出土的细石核
Microblade core from Fenghuangling site

图 10 望海楼遗址出土的两面器
Bifaces from Wanghailou site

通过对这批石制品的初步研究，我们认为山东旧石器晚期的文化传统远比我们过去的认识要复杂的多。仅用“凤凰岭文化”概括是不全面的。在更新世末期和全新世初期，山东地区可能有几种文化传统共存，有细石器工艺与非细石器工艺的交流。现在看来，汶泗流域的石器有别于沂沭流域的石器工业，是一种非细石器技术，是以微型石片石器工艺为代表的文化传统。

对山东细石器工艺技术的深入研究，探讨其来龙去脉和分布范围，是认识山东地区旧石器时代晚期石器技术复杂性的关键，也将为诠释中国旧石器时代文化的地区变异和东北亚地区远古人类的迁徙、交流和生存行为提供重要的材料依据。

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SHANDONG MICROBLADE INDUSTRIES AND RE-EVALUATION OF FENGHUANGLING CULTURE

SHEN Chen[1,2,3]　GAO Xing[2]，HU Bing-hua[3]

（1. *Royal Ontario Museum of Canada and the Institute of Archaeology，Chinese Academy of Social Sciences*；
2. *Institute of Vertebrate Paleontology and Paleoanthropology，Chinese Academy of Sciences*；
3. *Institute of Archaeology，Chinese Academy of Social Sciences*）

Abstract：This study examines lithic artifacts recovered from four Upper Palaeolithic sites from southern Shandong，and the preliminary results suggest that lithic industries in the study region are more complex than we previously thought. Different techniques can be recognized，which make it apparent that the concept of a “Fenghuangling Culture” is no longer relevant. Microblade technology was clearly defined based on three sites：Fenghuangling，Qingfengling，and Wanghailou. At Wanghailou the use of raw materials and reduction techniques are distinctive，possibly indicating a variation of the Shandong microblade industries. The Heilongtan site represents a flake-core reduction technology，resulting in a non-microblade tradition at the site，a finding which contradicts previous arguments that this site has yielded a microblade assemblage. Investigations from additional fieldwork at the Heilongtan site indicate that microblade remains previously collected from this site derive from secondary deposits，as a result of erosion from upland microblade locations，such as Wanghailou.

Key words：Microblade；lithic technology；Fenghuangling Culture；Shandong

1 Introduction

The microblade technique is a unique flintknapping method of manufacturing thin and slender small tools (microblades) by fabricating cores into so-called wedge-shaped or other related forms. The significance of studying this prehistoric technology lies in the interrelationship of early hunter-gatherers in northeastern Asia and northwestern North America, because this technology is considered to be compelling evidence for the peopling of the New World at the end of the Late Pleistocene epoch (15 000—10 000 BP)[1,2]. From a regional perspective, the microblade technique reveals a technological innovation or diffusion that illustrated development of human adaptation. However, the exact place(s) where this technology originated in northeastern Asia (north-central China, northeastern China, eastern Siberia, or Japan) is still under debate. The relationships among people in these various cultural regions in regard to this particular technology remain unknown. This study will thus focus on microblade industries from the Shandong Peninsula of Eastern China.

Microblade remains in Shandong were first recognized in the early 1980s, when three archaeological sites were excavated: Fenghuangling, Qingfengling, and Heilongtan, in the south of the province (Fig. 1). Subsequently, a large number of sites with some degree of microblade context were identified in the region, but all of these findings were from surface collections. Since then, a new "Fenghuangling culture" complex was proposed to characterize this regional manifestation[3—6]. However, the foundation for this definition is weak because none of the lithic artifacts from the excavated sites have been analyzed and systematically studied.

In 2000, a China-Canada collaborative research project was set up to investigate the Shandong microblade industries. The purpose of this research is to undertake a complete analysis of the archaeologically recovered lithic collections, now housed at the Institute of Archaeology, Chinese Academy of Social Sciences (CASS). The on-going research has carried out site surveys and a small-scale excavation. The 2001 fieldwork excavated an additional important site——Wanghailou, an upland locality about 2 km away from Heilongtan. Over 8000 pieces from the four excavated lithic collections have now been classified and studied, while further technological and functional analyses are being carried out. This paper presents the results of this initial examination.

2 Early Discoveries and the Concept of the "Fenghuangling Culture"

During an archaeological salvage investigation in the suburban area of Linyi City in 1982, microblade artifacts were found in the backfills of Han Dynasty tombs at a mound called Fenghuangling (literally "Phoenix Hill"). The site was subsequently excavated by archaeologists from the Institute of Archaeology, CASS. The site, situated 1.5 km east of the Yi River, yielded microblade artifacts from a loess deposit. It was the first time that a microblade industry was recognized in Shandong province[7]. In the following year, a series of surveys were carried out, focusing on recovering more microblade sites. As a result, thirteen localities were identified as archaeological sites with microblade remains[4].

Two of these sites, Qingfengling in Linyi County and Heilongtan in Tancheng County, were excavated in 1984[7−10]. The lithic artifacts which were excavated and collected from these sites clearly revealed a microblade context. These discoveries triggered subsequent surveys in adjacent areas, searching for more microblade sites in the region. Up to the early 1990s, archaeological surveys resulted in the discovery of more than 100 sites or localities that were claimed to be microblade sites based on surface collection of lithic artifacts[4−6,11]. Based on these discoveries, a concept, the “Fenghuangling Culture” complex, was proposed to define the cultural affiliation of these newly discovered lithic assemblages in Shandong.

In the previous studies, the proposed “Fenghuangling Culture” includes almost all of the archaeological sites dated to the end of the Late Pleistocene, regardless of whether or not they contained microblade assemblages. According to Luan[4], these Upper Palaeolithic sites are concentrated in three areas: the Wen and Si River Valleys in central Shandong, the Middle-Upper Valley of the Yi and Shu Rivers, and the Mt. Malingshan Region in southern Shandong (Fig. 1). Recently, Xu[6] has suggested that the Fenghuangling complex is represented by 100 assemblages from the Yi and Shu River Valleys (including Mt. Malingshan). Most of these sites are located on the alluvial plains and in hilly areas. The lithic assemblages from Fenghuangling are represented by microblade cores, small tools, including, among others, scrapers, drills, and perforators, as well as flakes. Large flakes and tools are rarely found, and it was especially noted that ground stones or pottery were not identified. Raw materials are predominantly chert and quartz, with low frequencies of agate, crystal, and sandstone. These studies suggest that the “Fenghuangling Culture” represents a hunting-gathering-fishing economy which existed at the end of the Pleistocene and the beginning of the Holocene in the region.

3 Research Problems

The above generalization of the Fenghuangling culture was based on very limited observations. No detailed studies of cultural materials from excavated sites have been conducted. However, the materials available to date provide us with a sketchy outline of what is known and what needs to be known about lithic industries of the Upper Palaeolithic in Shandong.

First, we know that since at least 30000 or 20000 BP, there was a sudden cultural change in the region, with the emergence of a large number of archaeological sites. The distribution of these sites is, however, not clearly defined because the survey data suggests that none of the artifacts were found in primary context. Especially previous studies have not clearly discriminated microblade assemblages from non-microblade assemblages, leaving the character of many of these sites unclear. There are other sites without any microblade elements, but the relationship between those with a microblade context and those without have not been explored yet.

Next, the date of the Shandong microblade industries is also a research problem, because the chronology of all of these sites was estimated based on biostratigraphic and geological formation subjectively pointing to a rough time range of the Late Pleistocene. We do not in fact know when exactly these people developed the microblade technique in Shandong, and how. We need to know under what

circumstances (ecologically or culturally) microblade industries were introduced to Shandong: diffusion or migration?

Third, lithic artifacts have so far not been examined, and what is unfortunate is that some of the lithic artifacts were not properly classified in the previous studies. Abundant lithic artifacts (both microblades and non-microblades) from both collected and excavated contexts at the Upper Palaeolithic sites enable us to do a thorough examination of lithic technology. However, we do not know the specific manufacturing techniques and functions of these microblade tools until qualitative and quantitative analyses are carried out. We need to investigate the characteristics of the Shandong microblades and the extent to which they are similar to their counterparts from surrounding areas (for example, Shanxi, Hebei, and Inner-Mongolia).

4 The Shandong Microblade Research Project

4.1 Objectives

These research problems may justify a need for a systematic study of the Shandong Upper Palaeolithic. It is clear that Shandong offers a great opportunity for a long-term project with promising goals of understanding microblade technology and human behavior. In 2000, a research project was launched in collaboration between the Institute of Archaeology, CASS, and the Royal Ontario Museum of Canada with the assistance of Shandong University. This long-term research program aims at investigating the origin and development of microblade industries in Shandong. As for its initial stage, this study would focus on examining the lithic technology of microblade techniques in stratigraphic context. The specific objectives are:

1) to investigate the nature and distribution of Upper Palaeolithic sites by conducting archaeological surveys, especially in the upper-and-middle Yi-Shu Valley and in the Wen-Si Valley;

2) to recover a sufficient body of artifactual data to fully characterize the material cultures of the Upper Palaeolithic in the study region through test excavation or small scale excavation at selected sites containing microblade remains;

3) to understand lithic technology in general, and microblade techniques in particular, of the Upper Palaeolithic in the study regions by conducting a detailed analysis of lithic artifacts from previously collected materials as well as from our own survey and excavation collections;

4) to establish the chronological timeframe of the Upper Palaeolithic in the study regions by obtaining suitable samples for AMS C^{14} dating and/or other archaeometric methods.

4.2 The 2001 fieldwork

A small re-excavation was carried out at the Heilongtan site, which was first excavated in the fall of 1984. The site is located on a hilly slope of the west side of Mt. Malingshan Ridge running north-south, four km east of the Shu River. The 1984 excavation exposed 224 square meters of deposit (15 test pits in total), recovering a large number of lithic artifacts (Fig. 2). During the initial examination, I suspected that the lithic materials from the Heilongtan site display a great deal of technological distinction from the other two excavated sites, Fenghuangling and Qingfengling, located about 50 km

north in the middle of the Yi-Shu river valley. In addition, the site's topographic features might have caused a series of secondary deposits at the site, which would result in some complication or difficulties in defining the nature of the microblade context at this particular site. Therefore, the test excavation had two purposes: firstly, to clarify the primary deposit of the palaeolithic remains at the site, and secondly, to obtain suitable samples for AMS radiocarbon dating.

The 2001 excavation exposed three 2 by 2 meter squares, along a hilly slope from south to north. Consistent with the early excavation, three depositional layers contained archaeological materials. However, sediment deposition as well as artifact distribution observed in the three stratigraphic layers pointed to a suspicion that only the lowest cultural layer (layer 4) is likely to be in primary context, where a large number of artifacts were densely distributed *in situ*. Artifacts from layers 2 and 3 are rare and scattered in fluvial sediments. These materials were probably transported and eroded upland from the site and re-deposited at the current places at a much later time in prehistory. It may indicate that the artifacts from the two upper layers probably belong to the same period represented by layer 4. Therefore, this fieldwork season has indicated that the three cultural layers identified during the early excavation are not indicative of chronological differences, but of secondary versus primary deposits only. The artifacts from the three layers can thus be treated as one assemblage, although those from layer 4 should be primary objects of study.

Most importantly, the 2001 excavation revealed that the lithic assemblage from Heilongtan is distinct typologically and technologically, suggesting a possibly different cultural context from that represented by Fenghuangling and Qingfengling. The following section will provide more details on this matter.

The 2001 fieldwork also included a small test excavation at the Wanghailou site, which is located on a hilltop (the peak is called Wanghailou), about 1.5 km southeast of Heilongtan. This site was first identified during the 1984 survey, and more than one thousand lithic artifacts, among which are microblade cores and flake tools, were collected. The lithic assemblage is very representative in terms of its quality and quantity, because a lot of small debitage and debris were also collected. It is unfortunate that the stratigraphic provenience of the artifacts was unknown. During the 2001 excavation at Heilongtan, our field crew also conducted another survey at Wanghailou, and recovered a large number of lithic artifacts representative of the microblade technology. The survey confirms that lithic artifacts, collected primarily from gullies, were eroded from loess deposits about 0.5—1 meter deep on the hilltop surface. Most of such surfaces were eroded completely to the bedrock, and thus the original context of the artifacts was not well known.

However, it is fortunate that during the 2001 survey at the site, one original deposit of palaeolithic context on the hilltop was identified, and our team immediately carried out a test excavation at the edge of this location. This place was not eroded because of a historical structure in place since about the 7th century AD (Tang Dynasty); a shrine was built here for local ritual worship. According to local elders, the historic structure was destroyed in the 1950s, and now the site is a crop field, where historical remains, such as Tang (AD 618—907) and Song (AD 960—1279) dynasty porcelain shards and coins, were found. A 1 by 3 meter test square revealed that the palaeolithic deposit was located

under a 30—50 cm deep historical deposit. A half dozen of microblade cores and a few microblades were found in situ in the palaeolithic deposit. As a result of this field investigation, we have located the primary context for over a thousand lithic artifacts collected previously from the site. Clearly, analyses of the Wanghailou lithic assemblage now has the same contextual significance as that of the three other excavated sites. Therefore, in this article we present a lithic analysis of four lithic assemblages from sites that are so far the only sites with an archaeological context of Upper Palaeolithic industries in Shandong.

In the following section, I will present the initial observations and comparisons of the four lithic assemblages in order to offer some directions and suggestions for future study.

5 The Lithic Assemblages

Over 8000 lithic artifacts from the four sites have been catalogued, and detailed technological and functional analyses are now being carried out (Table 1). The artifacts were first sorted into five categories: nodules (raw materials with traces of human modification), cores, formal types (or what are conventionally known as 'tools', objects which are considered to have been modified into certain shapes and to be used as tools), debitage (tool blanks and by-products of core reduction), and debris (flaking waste such as chips and chunks).

Among the four sites, Heilongtan is the only one with a representative number of nodules. The Qingfengling and Wanghailou sites were close in frequencies of lithic class distribution (Fig. 3). At both sites, formal types (or 'tool') comprise about 16%—17% of the entire assemblage, while debitage flakes are more numerous with a frequency of over 40%. Clearly, the Heilongtan lithic assemblage is characterized by its relatively high percentage of cores (compared to the other three sites) and the predominance of debris (especially chunks). Compared to Qingfengling and Wanghailou, the Fenghuangling assemblage has a relatively lower percentage of formal types and a higher percentage of debitage flakes, but has the same frequency of cores. Thus, from this insight, the distribution of lithic classes among the four assemblages indicates a possible departure of Heilongtan from the other assemblages. This difference is confirmed by a close examination of the lithic types within each of the categorized classes.

Cores are further sorted into three sub-types: generalized hard-hammer flake cores, specialized microblade cores, and core fragments. The distribution of the core assemblages from the four sites clearly indicates that Heilongtan is not even close to the other three sites in terms of microblade core presence (Fig. 4). At the Heilongtan site, only 20% of cores are classified as microblade cores, while flake cores account for over 40%. In contrast, the other three sites have a consistent frequency of flake cores with a frequency of about 10%. The Qingfengling assemblage contains the highest frequency of microblade cores: 85% of the entire core class. Although microblade cores are relatively less at the Wanghailou site, they still account for over 60%. Both Wanghailou and Heilongtan have a relatively high frequency of core fragment sub-type: between 30%—40% of the core assemblages. The presence of microblade cores at Heilongtan, as I will explain below, was possibly the result of site re-

deposition.

Within the formal types, the typological examination also suggests that Heilongtan has a substantially different toolkit from the other three sites (Fig. 5). At Heilongtan, tools (Fig. 7) were predominantly modified flakes (54%), followed by scrapers (17%) and bifaces (12%). At both Fenghuangling and Qingfengling over half of the toolkit comprises microblades (Fig. 8,9), accounting for 78% and 57%, respectively. The two sites show similar frequencies of the other types of tools, although the Fenghuangling assemblage displays higher frequencies of bifaces and scrapers.

The distribution of tool type frequencies of the Wanghailou lithic assemblage seems to be between Heilongtan and the other two assemblages. It has relatively fewer microblades (33%) compared to Fenghuangling and Qingfengling, but a much higher number than Heilongtan. However, modified flakes have a higher frequency at Wanghailou compared to Fenghuangling and Qingfengling. In addition, Wanghailou has the highest presence of bifaces (Fig. 10) among the four assemblages, accounting for 14%. It is worth noting that there are substantial numbers of biface preforms (unfinished products of biface manufacture) at the Wanghailou site compared to the other three sites, suggesting bifacial tool production at the site.

It appears that there are more varieties of tool types at Heilongtan and Wanghailou than at Fenghuangling and Qingfengling (Table 2). Some other tool forms, although occurring in low numbers, are also indicative of a unique characterization of specialized toolkits at each of the sites. Choppers and notches are only seen at Heilongtan, although there is only a single specimen of each in the assemblage. Again, it is apparent that the Heilongtan toolkit is different from the others in its lack of drills and unifaces. More backed microblades are found at Wanghailou than at Qingfengling, and these do not occur in the other two assemblages. Both biface preforms and perforators appear only at Wanghailou and Heilongtan. Therefore, typological examination suggests three possible toolkit groups: Fenghuangling and Qingfengling are very similar, while Wanghailou and Heilongtan are likely to represent a different cultural context.

When we look at the typology of debitage flaking products, which may or may not be technologically indicative of core reduction strategies, the diagram trends suggest a similar division among the four assemblages (Fig. 6). Both Fenghuangling and Qingfengling are similarly dominated by bifacial thinning flakes (50%—60%), followed by flakes (30%—40%), which indicates bifacial tool production. In contrast, Heilongtan has the highest flake and the lowest bifacial thinning flake frequencies, suggesting a very different lithic production system, probably flake core reduction. Similar to the toolkits, the Wanghailou debitage distribution falls in between these two production systems, having roughly equal percentages of flakes and bifacial thinning flakes. The Wanghailou debitage assemblage is distinctive also by its relatively high percentage of blades and core trimming flakes. The presence of bifacial splits and microblade flakes at Fenghuangling, Qingfengling, and Wanghailou, strongly indicates that microblades were made by bifacial core reduction.

The flake core reduction strategy at Heilongtan was also indicated by an overwhelming presence of chunks instead of chips in the debris category (Table 3). The higher frequency of chunks at Heilongtan may stem from the shattering process during quartz tool manufacture; quartz is the primary raw ma-

terial at the site. Chips, possibly the products of pressure and soft-hammer reduction waste, are more frequent in the other three assemblages, which clearly represent microblade production as a main strategy.

6 Discussion and Conclusion

This typological examination of the lithic artifacts from the four sites points to lithic technological variability in Shandong at the end of the Pleistocene. Clearly, from the data presented above, the four sites under investigation represent at least two different technologies. The Heilongtan assemblage does not manifest microblade technology at all, but the other three assemblages are affiliated with microblade industries. These two technological traditions are represented by different core reduction strategies: hard-hammer flake core reduction at Heilongtan and soft-hammer bifacial tool production at the other three sites. Of course, detailed technological analyses are needed to verify this hypothesis.

Furthermore, while the three microblade assemblages show strong elements of a microblade context, they reveal different uses of raw materials and toolkits. From the evidence detailed above, it is suggested that the Fenghuangling and Qingfengling assemblages appear to have the same cultural affiliation, based on the toolkit and on core reduction. However, differences in the use of raw materials are obvious: the people at Fenghuangling employed quartz, which is unknown at Qingfengling. Given the fact that both sites are only less than 2 km apart and within the same environment, these different strategies of raw material procurement need to be further explored, especially the temporal relationships of these two sites.

In particular, it seems that Wanghailou represents a regional variation of microblade industries: the assemblage is characterized by some degree of different tool use, core reduction and use of raw materials compared to the other two microblade assemblages in the Middle Yi-Shu valley, about 50 km to the north. The Wanghailou assemblage probably shares close relations with assemblages found in the southern part of Mt. Malingshan in northern Jiangsu province[12—14].

In addition, cultural materials from other surface collection sites (or localities) may also be indicative of other manifestations in the region. Lithic artifacts collected from a few dozen localities in the Wen-Si River Valleys appear to be from non-microblade industries[11], but represents an unknown small flake tool industry, utilizing the locally available black chert, in northern China during the Late Pleistocene. Whether or not a microblade technique similar to that in the Yi-Shu Valleys was employed in this region needs to be further investigated.

The preliminary results suggest that the Late Upper Palaeolithic in Shandong at the end of the Pleistocene is more complex than we previously thought. All of this evidence suggests that a variety of cultural interactions existed in this region. Although we still cannot ascertain whether the Shandong microblade industries were an indigenous development or a foreign invention, the current evidence seems to indicate a migration hypothesis. But when and how this new technology was introduced to Shandong, and where the people who produced it went afterwards, are subjects which remain to be explored. The production and functions of the Shandong microblade industry has to await future research, but so far

this study suggests that a re-evaluation of the “Fenghuangling” concept is needed. In other words, the use of “Fenghuangling Culture” to characterize the Shandong Upper Palaeolithic industries with a microblade context in general disregards the cultural variation of lithic technologies in the region. Only after a more detailed understanding of Shandong microblade industries, on the basis of their technological and functional features, will we be able to learn more about the relationships of microblade technology within Northeast Asia in general.

Acknowledgement: This research project is supported by the Social Science and Humanity Research Council of Canada (Grant 410—2000—0020 awarded to Shen), and partly supported by the Fundamental Basic Research Project (China Ministry of Science and technology) awarded to Gao. We would like to thank Chen Xingcan, Liang Zhonghe, Fang Hui, Luan Fengshi, and Su Zhaoxiu for their assistance and collaboration. Thanks also to Lou Jing and Liu Xiemei who assisted Shen in Qufu Working Station lithic lab. We thank Susan Keates for her comments on this paper.