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Early Paleolithic Cultures in East and Southeast Asia: Reevaluating the Movius Line

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Abstract: In the 1940s, Hallam Movius, Professor at Harvard University, put forward a hypothesis about the existence of two large Lower Paleolithic cultural provinces in Eurasia: a handaxe complex and a chopper-chopping-tool complex. The former was said to be progressive while the latter involved "cultural retardation". This hypothesis, later known as "Movius Line", has had a profound influence on the study of paleoanthropology and Paleolithic archaeology in East and Southeast Asia. In the last two decades, its validity has been hotly debated in the international academic community. Based on available data, the authors comment on this hypothesis, pointing out that handaxes together with picks and cleavers which characterize the Acheulean culture are widely distributed in East and Southeast Asia. It is concluded that the bifacial industries in this region are Acheulean-like and belong to the Acheulean Techno-Complex. The Movius Line has no validity for the Paleolithic archaeological data from East and Southeast Asia, and should be set aside.

Keywords: Movius Line, Paleolithic, East and Southeast Asia.

Subject classification: Archeology.

1. Introduction

East and Southeast Asia are of great importance in paleoanthropological and Paleolithic archaeological research. It is the first place in the world where fossilized

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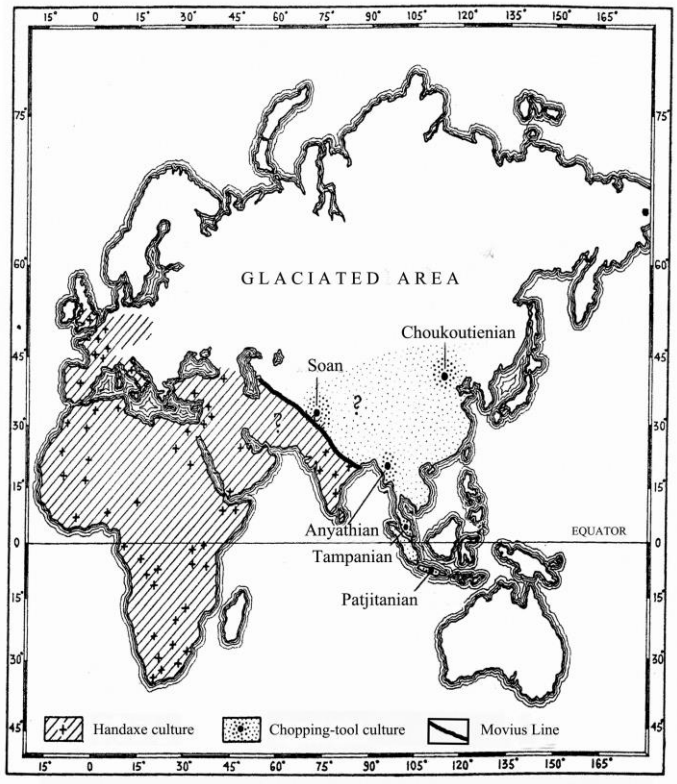
Homo erectus was found. Quite a quantity of well-known human fossils has also been unearthed in this region. Numerous Paleolithic localities are widely distributed, covering the early, middle and late periods of the Paleolithic Age. Such an abundance of Paleolithic materials is undoubtedly a valuable source for the study of prehistoric cultures in Asia and even around the world. The Early Paleolithic cultures in East and Southeast Asia could be divided into two systems: the flake tool industry and the core tool (pebble/cobble tool) industry. The flake tool industries were mainly distributed in North China, while the cobble tool industries largely occupied South China and Southeast Asia.

Although East and Southeast Asia is of vital importance in the Paleolithic archaeological research worldwide, many fundamental problems concerning the Paleolithic cultures of this area are not yet clear. In particular, the classification of heavy-duty tools and their attribution to certain cultures or traditions have long been debated, which is rarely seen elsewhere in the Old World. Such problems remaining unsolved may seriously hinder the in-depth study of the Paleolithic cultures in East and Southeast Asia. A major reason for this situation could be that for a long time, the Early Paleolithic archaeological research has been deeply influenced by the Movius Line. In the 1940s, Hallam L. Movius Jr. from Harvard University divided the Early Paleolithic cultures of the Old World into two traditions/zones, namely the Handaxe complex and the Chopper-chopping-tool complex. The former zone covers Africa, the middle, southern and western part of Europe, the Middle East and South India, while the latter one contains Southeast Asia, North India and China (Movius, 1948) (Map 1). Over the past few decades, Paleolithic archaeological discoveries in East and Southeast Asia have greatly increased, but so far, the Paleolithic archaeological research concerning this area remain affected by the Movius Line.

There have been various discussions on the Movius Line by many scholars in China and abroad. Some scholars suggest that the Movius Line is inconsistent with the facts that there existed handaxes in East and Southeast Asia (Huang,1987; Huang,1993; Wang et al., 2005; Yi and Clark, 1983; Gamble and Marshall, 2001; Dennell,2014a; Dennell, 2014b; Dennell, 2016; Wang, 2005; Kuman et al., 2016; Yang et al., 2014). While some others acknowledge certain rationality of the Movius Line, as only a few handaxes were found in this area (Gao, 2012; Lycett and Bae, 2010; Norton et al., 2006; Derevianko, 2014). Other scholars argue for the Movius Line that the dominance of chopper/chopping-tools but lack of handaxes in the Early Paleolithic cultures of East and Southeast Asia, may be due to a widely use of bamboo tools in this area (Boriskovskii, 1968; Pope, 1989; Watanabe, 1985; Harrison, 1978; Ikawa-Smith, 1978; Schick, 1994), or that the number of people equipped with handaxes was sparse (Schick, 1994; Lycett and Norton, 2010), or a failure of diffusion of the Acheulean technology possibly hindered by geographical

barriers(Aigner, 1978; Groves, 1989; Clark, 1992. However, most of these explanations were based on the knowledge of archaeological materials from early years. The first author used to make a brief discussion on the Movius Line (Xie, 1991; Xie et al., 2003), but in view of increasing discoveries of new materials in East and Southeast Asia over the last 20 years, it is necessary to review and re-evaluate the Movius Line.

Map 1: Two Cultural Areas/Zones Divided by Hallam L. Movius, Jr (Revised from Movius, 1948)



Source: Hallam L. Movius Jr.

2. Background and the main contents of the Movius Line

2.1. Background for the Movius Line

In 1937, Movius participated in an expedition in Burma, conducted by the Joint American Southeast Asiatic Expedition for Early Man led by the geologist

Helmut de Terra. Among team members, there was Teillhard de Chardin, who was prestigious in then East Asian Paleontology and Paleolithic archaeology, while Movius was an associate researcher in the Peabody Museum, Harvard University. During 1937-1938, they spent five months in conducting fieldwork along the Irrawaddy River. During the expedition, Movius found 16 Paleolithic localities and collected nearly 600 lithic artefacts. This lithic collection was named as the Anyathian culture, which could be divided into early and late period. The early period of the Anyathian could be further divided into three phases, while the late period could be divided into two. The early Anyathian was estimated to be from Middle Pleistocene to early Late Pleistocene (Movius, 1948).

Through this expedition in Burma, Movius published a research report in 1943, namely *The Stone Age of Burma*. Then he extended his research horizon to East Asia, Southeast Asia and northern Indo-Pakistani subcontinent. Soon in 1944, Movius published *Early Man and Pleistocene Stratigraphy in Southern and Eastern Asia*, wherein he mainly discussed the stratigraphy and chronology of major Paleoanthropological and Paleolithic sites in East and South Asia from the perspective of geology and paleontology. Also in this 1944 publication, a glimpse of the Two Cultures/Traditions theory was first seen. On this basis, Movius published *The Lower Paleolithic Cultures of Southern and Eastern Asia* in 1948, where he made systematic and further discussions on the Two Cultures/Traditions theory.

After Movius put forward his Two Cultures/Traditions theory, which has had a profound impact on the East and Southeast Asian Paleoanthropologcial and Paleolithic archaeological study, numerous scholars have also been influenced by his theory over the past few decades. In 1965, American anthropologist Carleton S. Coon first referred to the dividing line between the two cultural zones as the Movius Line (Coon, 1965; Ikawa-Smith, 2014). Thereafter, the Movius Line has become a synonym for the precedent Movius theory.

2.2. Main contents of the Movius Line

The Movius theory (namely the Movius Line) was first systematically described in his publication *The Lower Paleolithic Cultures of Southern and Eastern Asia* in 1948. Being one of the most important reference books on East and Southeast Asian Paleolithic archaeology, it is quite rare to see that it has been quoted and discussed so much and for such a long time, since its first publication was more than half a century ago. This book contains nine chapters. Chapter 1 is a brief introduction for book contents. Chapter 2 introduces a chronological framework for the East and Southeast Asian Pleistocene, based on the results of geological and paleontological research. Chapter 3 is for terminology definition.

From chapter 4 to chapter 8, Early Paleolithic cultures in Java, Burma, Northwestern India, Choukoutien (China), Malaya, Thailand and some other nearby areas are described and discussed respectively. Chapter 9 is a concluding remark.

In his 1948 publication, Movius made detailed discussions on the Early Paleolithic cultures in Java (Indonesia), Burma, northwestern India and Choukoutien (China). The Patjitanian (or Pacitanian) culture was discovered in the Baksoka River Valley, middle to southern Java, in 1935. The age of the Patjitanian was estimated to be from late Middle Pleistocene to early Late Pleistocene (Movius, 1948, 1955; Bartstra, and Basoeki, 1989). But some other scholars assumed that it might extend to Late Pleistocene (Hutterer, 1985; Simanjuntak et al., 2010) or Middle-to-Late Pleistocene (Bellwood, 2017). The raw materials of the Patjitanian lithic artefacts are mainly silicified tuff and siliceous limestone pebbles/cobbles. The Patjitanian tool types include choppers, picks, handaxes and scrapers, wherein choppers are of dominance, while picks and handaxes are in a certain number. In Movius' view, the Patjitanian culture was obviously not the same as those true handaxe culture-complexes in Europe, Africa, the Middle East, or the Peninsular India. Instead, he thought that the Patjitanian culture shared more common with the chopper-chopping-tool complex of East and Southeast Asia, as he noted in his 1948 publication that *its affinities here are far stronger than any that can be demonstrated on the basis of present evidence with the Madrasian of southern India on the one hand, or with the Abbevillian (Chellean) of Europe on the other* (Movius, 1948). Movius did admit that there existed proto-handaxes and handaxes in the Patjitanian assemblage. And before his recognition, some western scholars had pointed out that the Early Paleolithic assemblage of the Patjitanian contained handaxes, which was also a main feature of the Patjitanian culture, indicating its close relationship with the Acheulean culture (von Koenigswald, 1936; van de Hoop, 1940; Movius, 1948). However, the Patjitanian handaxes are few in numbers and do not have a large proportion of the stone tools collection (153 pieces, 6.34%). There is also a distinctive feature for the Patjitanian handaxes, which are usually struck vertically/longitudinally from an oval or pointed end of cobbles, thus the flaking of a Patjitanian handaxe is normally parallel with the long axis of the tool. On that account, Movius suggested that the Patjitanian handaxes evolved from choppers or chopping-tools, without any Acheulean handaxes' characteristics. They were thought to be independently developed in Java and did not seem to have any affinities with those typical handaxes found in Europe, the Near East, India or Africa.

The Early Anyathian culture was discovered by Movius in the 1930s, distributed on high river terraces along the Irrawaddy River Valley, northern Burma. It was geologically dated to the Middle Pleistocene and lasted until the early Late

Pleistocene. The raw materials of its lithic artefacts are mainly fossil wood, silicified tuff and quartzite. Most of the stone implements are shaped from pebbles/cobbles. The Anyathian tool types include choppers, picks, scrapers and burins, wherein choppers are dominant in numbers (Movius, 1943, 1948). Movius regarded the Early Anyathian in Burma as a chopper-chopping-tool-hand-adze complex, for it is totally lack of bifaces/handaxes. Thus, he concluded that the Early Paleolithic people in Burma did not use handaxes. Instead, chopping-tools, hand-adzes, and choppers constituted main parts of the stone tool assemblage utilized by those who inhabited in the Irrawaddy River Valley. All these stone implements were so primitive that, whatever they were made of silicified tuff or fossil wood, very little had changed from beginning to end.

The Soan culture was distributed in the Punjab area of northern Peninsular India, across both countries of India and Pakistan. It could be divided into five periods. The age of the Early Soan culture was estimated to be Middle Pleistocene. The stone implements are mainly made of quartzite pebbles/cobbles. The majority of stone implements are core tools, while flake tools are only in a small number. The Early Soanian tool types include choppers, handaxes, cleavers, scrapers and picks, wherein choppers are of dominance, while handaxes and picks are secondary (Movius, 1948; Sanklia, 1978; Ray and Ghosh, 1979; Ghosh, 1971). Movius divided the northwestern Indian Early Paleolithic cultures into two series. One is an assemblage containing handaxes, which is partly contemporaneous with basically oriental cultures. The handaxes in this assemblage are relevant to those Abbevillian and Acheulean handaxes found in typical sites in the Madras area, southern Peninsular India, which belongs to the Paleolithic cultures/traditions covering Peninsular India, the Near East, Europe and Africa. The other is Early Soan culture, consisted of cobble choppers and flake tools, which has a strong affinity with the Paleolithic cultures of the Far East-northern China, northern Burma and Java, and could be attributed to the chopper/chopping-tool complex.

The Peking Man site at Choukoutien is one of the most important sites in East Asia where Middle Pleistocene human fossils were uncovered together with knapped stone tools. Over 100,000 pieces of lithic artefacts were collected in total. These lithic artefacts are mostly made of quartz, applied with bipolar technology. The stone implements are normally unifacially retouched with hard hammerstones. The Choukoutien tool types include scrapers, points, choppers, and burins, wherein scrapers are of dominance. Most of the stone tools are small and were made on flake, thus it could be attributed to flake tool industry (Jia, 1956, 1964; Pei and Zhang, 1985; Zhang, 1987). There used to find a few handaxes (bifaces) in the Choukoutien site (Jia, 1956, 1964), though in very small number. Nevertheless, when discussing the Peking Man lithic assemblage, for its totally lack of handaxes

(bifaces), Movius thought it reminiscent of the Early Soan culture in northwestern India and the Early Anyathian in northern Burma, which could be together attributed to the chopper-chopping-tool complex. As he noted in his 1948 publication, *the evidence from the early archaeological horizons at Choukoutien, taken as a whole and compared with the already more progressive "West", indicates that Middle Pleistocene China "seems to have represented (on account of its marginal position) a quiet and conservative corner amidst the fast-advancing human world"* (Movius, 1948).

Movius also referred to Early Paleolithic cultures elsewhere in Southeast Asia, but due to sporadic discoveries as well as sparse materials, he did not make further discussions on them. However, he did give his opinion on the Tampanian culture previously found at Kota Tampan, Malaya. The Tampanian was discovered in 1938, estimated to be Middle Pleistocene (Movius, 1948, 1955). The Tampanian stone implements were normally made of quartzite pebbles/cobbles. Most of them were directly shaped from pebbles/cobbles, either unifacially or bifacially. When knapped unifacially, they tended to retain quite a proportion of cortex. The Tampanian tool types include choppers, picks, handaxes and scrapers, wherein choppers are of dominance. Considering the Tampanian handaxes, Movius regarded them the same with the Patjitanian ones, applied with vertical/longitudinal flaking technology, which were independently developed and did not have any affinity with those handaxes/bifaces from the West.

Through his investigation of Early Paleolithic cultures in the above-mentioned areas, Movius had reached the following conclusions:

(1) Handaxes were totally absent in northern Burma, China, as well as the Early Soan culture in northwestern India. Even though there existed a few handaxes in the Patjitanian and Tampanian cultures, they were obviously different from those true Acheulean handaxes, as they were independently developed without any external influences.

(2) The Early Paleolithic cultures of East and Southeast Asia belong to chopper-chopping-tool complex. Little has changed throughout its development.

(3) The reason why the Early Paleolithic cultures of East and Southeast Asia are different from those of other areas might be that ancient people inhabited in this area belonged to different branches of human ancestry.

(4) There also found cobble choppers and chopping-tools in Africa and Peninsular India, however, with the emergence of handaxes, choppers and chopping-tools were soon replaced by handaxes. While in southeastern Asia and China, the indigenous chopper-chopping-tool complex continued to develop, rarely affected by contemporaneous technological innovation of other areas.

(5) The Early Paleolithic cultures in the Old World could be divided into two categories. One is the Western Type, located in the west side of the Old World, characterized by double-edged, bifacially worked cutting tools or handaxes. The other is the Eastern Type, distributed in the east side of the Old World, featured on single-edged cutting tools or chopper-chopping-tools.

(6) East and Southeast Asia was less likely to be a culture-developed area, but *a region of cultural retardation*, as he noted in his 1948 publication. Thus, Early Man in the East seemed very unlikely that they *could ever have played a vital and dynamic role in early human evolution* (Movius, 1948).

3. Discovery and distribution of the handaxes in East and Southeast Asia

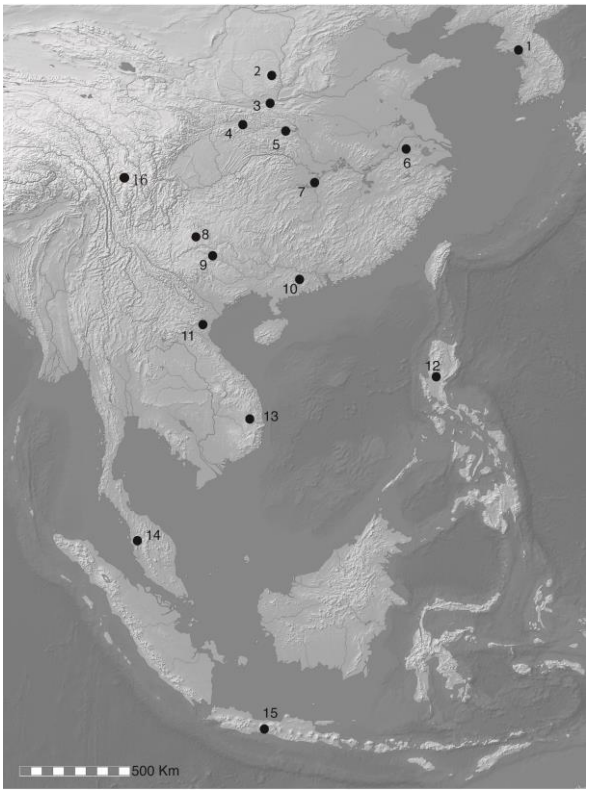
3.1. Discovery of handaxes

The handaxe is regarded as the earliest standardized form of implement for mankind, which is also one type of artefact highly representing the Acheulean culture. There are four designations for it in the West, namely the handaxe, boucher, coup-de-poing, and biface, bearing different meanings respectively. Handaxe means a tool shaped like an axe but untanged. Boucher means it relevant to butchering. Coup-de-poing means a capability of being held in hand and used to strike. Biface means a tool bifacially worked. Handaxes were first discovered at the Abbevile site, northern France, in the end of 1880s. In Europe, there used to be several appellations for early types of handaxes, namely the Abbevilian handaxes, the Pre-chellean handaxes, and the Chellean handaxes. All these appellations were not terminated until the 1960s. Thereafter, they were altogether addressed as the Acheulean handaxes (Bordes, 1968), and were temporally divided into three stages: early, late and terminal (Clark, 1994).

In Southeast Asia, handaxes were first found at the Patjitan site in Java, Indonesia (von Koenigswald, 1936; Mulvaney, 1970). Mr. H. C. Collings from the Raffles Museum, Singapore, also discovered a few handaxes at the Tampan site in Kota Tampan, northern Malaya, in 1938 (Movius, 1948). Till the end of the 20th century, handaxes had been collected from an amount of Paleolithic sites, for example, the Arubo site on the Luzon Island, the Philippines (Pawlik, 2002), the South Sumatra, Bengkulu, Lampung, Bali, Lombok, South Sulawesi (Simanjuntak et al., 2010), Tegal, Semedo (Bellwood, 2017) sites in Indonesia, the Bukit Bunuh site in Peninsular Malaysia (Saidin, 2006), and the Núi Đọ site in Vietnam (Ciochon and Olsen, 1986; Olsen and Ciochon, 1990). In recent years, there have been reported numerous

handaxes from the An Khê site in southern central Vietnam (Nguyễn et al., 2015; Nguyễn, 2017; Derevianko et al., 2016; Derevianko et al., 2018). As for the case in China, according to JIA Lanpo's report, there were handaxes found at the Peking Man site in Choukoutien in the 1930s. Soon after that, handaxes were also collected from the Dingcun site in Shanxi Province in the 1950s (Jia, 1956), which were acknowledged by western scholars (Pei and W.Z, 1965; Freeman, 1977). Thereafter, there has been an increasing number of handaxes discovered in different areas in China. To date, besides Choukoutien and Dingcun, Paleolithic handaxes-containing localities or site groups in China are as follows: the Lantian (Laochi River and Pingliang) and Qianxian area (Huang, 1987) in Shaanxi Province, the Hanzhong Basin (Yan, 1981; Huang and Qi, 1987; Tang et al., 1987) and Luonan Basin (Wang et al., 2005; Wang et al., 2014; Wang, 2007; Wang, 2005) also in Shaanxi, the Sanmenxia area (Huang, 1987) in Henan province, the Fenhe River Valley (Jia, 1956; Huang, 1987; Yang et al., 2014) in Shanxi province, the Bose Basin (Huang, 1987, 1993; Xie, 2002; Xie et al., 2003; Hou, 2000; Xie and Bodin, 2007; Wang et al., 2008; Wang et al., 2014; Xie and Feng, 2020) in Guangxi Zhuang Autonomous Region, the Jieyang area (Qiu and Deng, 2005) and the Nanjiang River Basin (Liu et al., 2015; Liu, 2017) in Guangdong province, the Liaohe River Valley (Li, 1991) in Jiangxi Province, the Shuiyangjiang River Valley (Dong, 2020) in Anhui province, the Danjiangkou Reservoir area (Li et al,. 2009; Li et al., 2012; Li et al., 2017; Li et al., 2014; de Lumley et al., 2011; Kuman et al., 2014) in Hubei province, the Lishui River Valley (Xiang, 1990; Yuan, 1996; Tan, 1999) in Hunan province, the Panxian Dadong cave site (Huang et al., 2012) in Guizhou province, the Garze Tibetan Autonomous Prefecture (Tong, 1989; Zheng et al, 2021) in Sichuan province, the Jiaohe Xinxiang area (Chen, 1996) in Jilin province. In the Korean Peninsula, as many as 21 sites where handaxes have been found (de Lumley, 2011), mainly concentrating in the Imjin/Hantan River Basin (IHRB) (Feng 1990; Norton, 2000; Norton et al., 2006; de Lumley et al., 2011; Pokee, 2009). Handaxes have also been discovered in Mongolia (Derevianko et al., 2016; Derevianko et al., 2018). Given all such evidence, it could be said that handaxes have been collected from most of those major Early Paleolithic sites in East and Southeast Asia. Among them, those handaxes definitely of the Early Paleolithic age were found in areas as follows: the Hanzhong Basin and Luonan Basin in Shaanxi province, the Fenhe River Valley in Shanxi province, the Bose Basin in Guangxi Zhuang Autonomous Region, the Nanjiang River Basin in Guangdong province, the Shuiyangjiang River Valley in Anhui province, the Danjiangkou Reservoir area in Hubei province, the Lishui River Valley in Hunan province, the Panxian Dadong cave site in Guizhou province, the Imjin/Hantan River Basin (IHRB) in Korea, the An Khê in Vietnam, the Bukit Bunuh site in Malaysia, and the Patjitan in Indonesia (Map 2).

Map 2: Distribution of Main Locations Where There Found Handaxes in East and Southeast Asia



Notes: 1. Imjin/Hantan River Basin (IHRB) in Korea; 2. Dingcun site in the Shanxi province, China; 3. Luonan Basin in Shaanxi province, China; 4. Liangshan site in Shaanxi province, China; 5. Danjiangkou Reservoir area in Hubei province, China; 6. Shuiyangjiang River Valley in Anhui province, China; 7. Lishui River Valley in Hunan province, China; 8. Panxian Dadong cave site in Guizhou province, China; 9. Bose Basin in Guangxi Zhuang Autonomous Region, China; 10. Nanjiang River Basin in Guangdong province, China; 11. Núi Đọ in Vietnam; 12. Arubo site on the Luzon Island, the Philippines; 13. An Khê in Vietnam; 14. Bukit Bunuh in Malaysia; 15. Baksoka Valley in Java, Indonesia; 16. Piluo in Sichuan province, China.

3.2. Distribution and age of handaxes

Since the initial discovery of handaxes in Indonesia in the 1930s, after over half a century of archaeological research, hundreds of Paleolithic localities containing handaxes have been found in a vast area covering East and Southeast

Asia, through the west to the Tibetan Plateau, China, the east to the Korean Peninsula, the north to Mongolia and the Jilin province in China, and the south to Java, Indonesia. Among these localities, handaxes were distributed intensively in the Bose Basin in Guangxi Zhuang Autonomous Region, the Nanjiang River Basin in Guangdong province, the Luonan Basin in Shaanxi province, the Lishui River Valley in Hunan province, the Danjiangkou Reservoir area in Hubei province, the Shuiyangjiang River Valley in Anhui province, the Imjin/Hantan River Basin in Korea, the An Khê in Vietnam, the Tampan in Malaysia, and the Patjitan in Indonesia. Particularly in the Bose Basin, the Nanjiang River Basin, the Luonan Basin, the Lishui River Valley, the Danjiangkou Reservoir area, the Imjin/Hantan River Basin, An Khê, and Central Java, multiple, even as many as dozens of handaxes-containing localities were concentrated respectively.

From the perspective of chronology, handaxes of East and Southeast Asia could be dated as early as 0.8 Mya, and lasted late until tens of thousands of years, though there has been reported a 1.8-Mya-old handaxe from the Bukit Bunuh site in Peninsular Malaysia. Those handaxes of the Early Paleolithic age were found in areas as follows: the Bose Basin in Guangxi Zhuang Autonomous Region, the Nanjiang River Basin in Guangdong province, the Lishui River Valley in Hunan province, the Danjiangkou Reservoir area in Hubei province, the Shuiyangjiang River Valley in Anhui province, the Luonan Basin in Shaanxi province, An Khê in Vietnam, Patjitan in Indonesia, the Bukit Bunuh in Malaysia, and the Imjin/Hantan River Basin in Korea. In addition, a specific age of handaxes found in some localities remains unclear due to a lack of stratigraphic layers or not yet dating.

4. Reevaluation of the Movius Line

4.1. Materials studied by Movius could no longer fully reflect nowadays archaeological research situations in East and Southeast Asia

As mentioned above, Paleolithic materials of East and Southeast Asia were quite limited when the Movius theory was put forward. Besides the previously introduced lithic implements of the Anyathian in Burma, the Patjitanian in Indonesia, the Soan culture in northwestern India, the Tampanian in Peninsula Malaysia, and the Choukoutien site (Locality 1, Locality 3, Locality 15) in Beijing, China, there also found a few lithic artefacts possibly belonging to the Pleistocene at the Bhan-Kao site in northern Thailand, which was named as the Fingnoian by Heekeren (Movius, 1948). All these Paleolithic materials as a whole made up the East Asian chopper-chopping-tool complex declared by Movius. Even though

Movius suggested that there existed handaxes independently developed in this region, where handaxes were only found in Patjitan and Tampan, a vast area covering the Indo-China Peninsula, China, Mongolia and the Korean Peninsula were still blank in handaxes record. However, after over half a century of archaeological research work, today much more Paleolithic materials have been gathered in East and Southeast Asia. Handaxes alone have been collected from hundreds of localities across a wide range of areas. Therefore, former materials studied by Movius are far from reflecting nowadays the reality of archaeological discoveries in East and Southeast Asia. What he has concluded is no longer applicable for recent Paleolithic archaeological research in this vast area.

4.2. Movius may not have a proper understanding of the materials he adopted

First of all, the thing that the lithic assemblage of Peking Man at Choukoutien was categorized as a chopper-chopping-tool complex by Movius is inconsistent with the facts. The chopper-chopping-tool complex defined by Movius was characterized by unifacially worked choppers and bifacially worked chopping-tools. It belongs to the cobble/pebble tool industry or core tool industry, while the Peking Man lithic assemblage belongs to the flake tool industry. When the East Asian Paleolithic cultures were discussed, those of the Peking Man at Choukoutien were then the only lithic industry that could be confirmed as an Early Paleolithic one in East Asia. Movius did spend quite a lot in systematically describing the stone implements of Peking Man. However, in his conclusion, the lithic assemblage of Peking Man was classified as a chopper-chopping-tool complex together with other pebble/cobble tool industries, such as the Anyathian and the Patjitanian. As a matter of fact, the lithic assemblage of Peking Man is quite special. About 80% of the raw materials are quartz. Over 70% of the stone tools are retouched from flake blanks, while there appeared only 6.54% of cobble tools. Scraper is a dominant tool type, while point is a secondary one. The proportion of choppers and other heavy-duty tools is very low. That's to say, the lithic artefacts of Peking Man are normally small, wherein the stone implements tend to be tiny and lightweight (Jia, 1956; Pei and Zhang, 1985; Zhang, 1987). On the other hand, the chopper-chopping-tool complex classified by Movius, such as the Anyathian, the Patjitanian, and the Soan cultures, is featured on core tools (pebble/cobble tools). Their stone implements are mostly directly worked on pebbles/cobbles, quite large and coarse, and are heavy-duty tools. Choppers are in large numbers, being the main type of tools in lithic assemblages. Whether from the perspective of knapping technology or tool type, tool size and tool kits, the lithic implements of Peking Man are in great difference from those of the Early Paleolithic industries in Southeast Asia. They belong to

different techno-typological complexes. The former one is of flake tool industry, while the latter one is of core tool or pebble/cobble tool industry. However, Movius mixed the two together, and put the lithic assemblage of Peking Man into the chopper-chopping-tool complex, which seems obviously incorrect. Just as what the prestigious scholar PEI Wenzhong has noted, it was improper to address the *Sinanthropus* culture as a pebble/cobble tool culture (Pei and Zhang, 1985).

Secondly, there was a misconception on handaxes of the Patjitanian and the Tampanian. Movius has pointed out that there existed a few handaxes in the Patjitanian and the Tampanian cultures, but he thought these handaxes different from those western ones, thus they were not true handaxes. The reason he gave was that the way these handaxes were made was different from that of those western ones. As the flaking and retouching of these handaxes' tips were normally vertical/longitudinal, which means their striking directions parallel with the long axis of handaxes themselves, while those of western ones were usually perpendicular to or intersected the long axis of handaxes. However, that was not the case. Vertical/longitudinal flaking or retouching for the tip of handaxes was not unique to those of the Patjitanian or the Tampanian. Such a manner of tip working also existed in some handaxe industries on the western side of the Movius Line. For example, handaxes of the Gadeb site in East Africa (Clark and Kurashina, 1980), the Tabun cave site (Gisis and Ronen, 2006) and the Revadim Quarry site (Marder et al., 2006) in Israel, also appeared vertical/longitudinal retouching on tool tips, so did the case in the Ever site and the Bramford Road site in Britain (Roe, 1981). Although there was no text description, the illustrations of specimens have shown vertical/longitudinal retouching on tool tips for some handaxes from these sites, which were all Acheulean handaxes. In fact, prior to Movius' publications, von Koenigswald had pointed out that there existed Acheulean handaxes in the Patjitanian lithic industry, and it's *complete Chellean* (von Koenigswald, 1936). However, in an attempt to justify himself, Movius insisted that the handaxes of the Patjitanian and the Tampanian were different from those western Acheulean ones. The only reason he gave for distinguishing between the two was the longitudinal/vertical retouching on the tip end of a handaxe. Bordes, a prestigious French scholar on Paleolithic archaeology, has also mentioned that there existed handaxes in China, and the Patjitanian belongs to a handaxe industry. He noted that according to Movius' saying, the Patjitanian handaxes were not true handaxes, and the Patjitanian belonged to a cultural complex without handaxes. However, on the contrary, he thought that the Patjitanian lithic industry contained handaxes bearing a whole set of representative features. If the Patjitanian was found in India, it would undoubtedly be classified as a typical Acheulean cultural complex, let alone that there also found flake tools exhibiting Levallois technique (Bordes, 1968). Even

there existed some handaxes with vertical/longitudinal retouching on tips, as Movius has mentioned, they did not share a high proportion. For the rest of handaxes, the flaking directions of their tip ends appeared perpendicular to the long axis of tools (Simanjuntak et al., 2010). When Movius classified the Soan culture of northwestern Indo-Pakistani subcontinent as a chopper-chopping-tool complex, he has also noticed that there did exist handaxes in northern Punjab, just as the case at Chauntra in the Potwar area, and at Pahalgam in Kashmir (Movius, 1944). Therefore, it is evident that Movius' perceptions of Patjitanian and Tampanian handaxes were inconsistent with the facts.

In addition, when Movius discussed the difference between Paleolithic cultures of the East and those of the West, he only concentrated on the handaxe industries on the western side of the Movius Line. He understated other contemporaneous non-handaxe industries coexisting in this region, particularly ignoring those lithic industries located east to the Rhine River in Europe, that were lack of handaxes but were not regarded as primitive or backward as their counterparts in East and Southeast Asia (Dennell, 2016).

4.3. The handaxes/Acheulean industry on the eastern side of the Movius Line

Movius suggested a lack of handaxes in East and Southeast Asia. *The occurrence of hand-axes… are completely absent in Upper Burma, China, and the true Early Soan of Northwestern India*, as he stated in his 1948 publication (Movius, 1948). However, as mentioned above, since the Movius Line was issued over half a century ago, numerous handaxes have been discovered broadly in this vast region. Today, handaxes have been uncovered in a majority of main Early Paleolithic sites in China. Even for the Choukoutienian lithic industry, where quartz is a main type of lithic raw material, there also found handaxes and cleavers (Jia, 1956, 1964; Lin, 1992; Gao, 2001), let alone the Dingcun handaxes that have been acknowledged by scholars both in China and abroad. Jia Lanpo first reported a discovery of handaxes at the Dingcun site in 1956 (Jia, 1956). Soon after reading the excavation reports of the Dingcun site, Henri Breuil, a prestigious French archaeologist, confirmed that handaxe implements existed in the Dingcun assemblage (Pei, 1965). Besides, American anthropologist Freeman also clearly stated that the Dingcun handaxes were perfect and typical enough, after he looked over the Dingcun lithic specimens in the 1970s. He proposed that there might be handaxe industries in China, further predicting that with the addition of archaeological materials, the Movius Line would no longer exist (Freeman, 1977). Moreover, although the raw materials of the Anyathian lithic artefacts are quite special, there existed handaxes. When visiting the Harvard University in 1990,

Huang Weiwen recognized several pieces of handaxes among the Anyathian lithic specimens collected in the Peabody Museum (Huang, 1993). Indian scholar Khatri has also found quite a few early handaxes specimens admist the same collection (Bartstra, 1976). Although the number of handaxes is very small, it should be factually true that the Anyathian culture contained handaxes. Unfortunately, these facts were not reflected in Movius' 1948 publication. A similar situation could be seen as well for the Soan culture in northwestern Indo-Pakistani subcontinent. When Movius classified the Soan culture as a chopper-chopping-tool complex, he should have noticed that there existed handaxes in the northern Punjab area. But in his mind, they were brought in from elsewhere, and he insisted that the Soan people did not make or utilize handaxes by themselves (Dennell, 2014).

4.4. Handaxe/bifacial industries of East and Southeast Asia and those of the West

There is no fundamental difference between the handaxe/bifacial industries of East and Southeast Asia and those of the West. They both belong to the Acheulean Techno-Complex. The Acheulean culture is also known as the Acheulean technology or the Mode Ⅱ technology, which is a type of Early Paleolithic lithic industry characterized by handaxes. It was first discovered in France, and named after the typical St. Acheul site. The Acheulean culture extended from about 1.7 Mya to 0.2 Mya, spanning a wide range of time, and could be divided into three stages: early, late and terminal (Clark, 1994). The bifacial industries vary considerably on knapping technologies, tool forms and tool kits from region to region, as well as from period to period. The proportions of heavy-duty tools, such as the handaxes, cleavers and picks, in different bifacial industries also vary markedly. In some lithic industries, the number of handaxes is small, while it could be quite large in some others. So did the case of cleavers and picks. There could be even an absence of cleavers or picks in some lithic industries. In fact, for handaxe-containing large cutting tool kits on both sides of the Movius Line, there exist quite large variance on geographic distribution and knapping technologies (Petraglia and Shipton, 2009). Nevertheless, if a lithic assemblage contains bifaces (handaxes), as well as cores-flakes components of different proportions, then it would be able to be classified as an Acheulean culture (Clark, 1994). A novel type of flaking technology emerged during the Late Stage (around 0.3 Mya) of the Acheulean culture, namely the Levallois technology, which was not yet seen in the Early Stage (Clark, 1994). Even for the Late Acheulean, not all of the bifacial industries contained this technology either (Misra, 1987).

Amongst the Acheulean Techno-Complex, bifacial industries might be different from region to region, just as the case that there might be various cultural

types of Neolithic archaeological cultures. The bifacial industries of East and Southeast Asia could be regarded as a regional type of the Acheulean Techno-Complex. During the Paleolithic, through long-distance migrations, when ancient people arrived in an area surrounded by a different environment, their livelihoods might have changed in order to adapt to a new environment, and the tool kits adapted to it might also have changed. On the other hand, Paleolithic lithic implements were normally versatile and for multi-purposes. For the same type of implement, it might be mainly utilized for one purpose in this region, while it might be used for another purpose in another region. In Europe, handaxes were found associated with large animal skeletons, thus some scholars assumed that handaxes were utilized for butchering as large cutting tools (Clark, 1970). Some others have studied the function of handaxes in India, indicating that handaxes are multi-functional and particularly suitable for digging (Sankalia, 1978; Ghosh and Das, 1966). The results of experiments have shown that handaxes are quite effective in butchering large animals, disarticulating bone joints, cutting toeholds in trees for climbing, and processing woodwork (Clark, 1994). According to different uses, the shape of handaxes may vary. For example, in Southeast Asia and southern China (the Lingnan area), the tips of handaxes are mostly rounded or tongue-shaped, but other East Asian handaxes, except those in the Lingnan area, are mostly sharp pointed.

In general, there is a certain degree of variability in the bifacial industries of East and Southeast Asia, but they are much the same as those on the western side of the Old World. They all belong to the Acheulean Techno-Complex, which is a result of human migration and cultural transmission. Some scholars argued that handaxes were scarce in East and Southeast Asia (Norton et al., 2006; Norton and Bae, 2009; Gao, 2012), where cleavers were absent (Derevianko et al., 2016), but that's not the truth. At the Fengshudao site in the Bose Basin, the proportion of handaxes is fairly high, about 3.2% in the whole collection of Fengshudao lithic artefacts. Its proportion is even up to 45.5% in the tool kits, becoming a major type of lithic implements (Wang et al., 2014). Handaxes of the Luonan Basin are almost the same as those Acheulean ones in the West, and the proportion of handaxes in the Luonan tool kits is as much as 13.9% (Wang et al., 2005). There is also a large quantity of handaxes found in Java, Indonesia, particularly in the Baksoka Valley, where those lithic assemblages older than 0.3 Mya contained numerous handaxes (Simanjuntak et al., 2010; Mishra et al., 2010). Cleavers have also been found in quite a few Paleolithic sites in East and Southeast Asia, such as those in the Luonan Basin (Wang, 2006), Bose Basin (Xie et al., 2003; Xie, 2006), Locality 15 of the Choukoutien, the Dingcun stie, the Shuigou site in Sanmenxia, the Liangshan site in Shaanxi (Lin, 1992), China, as well as those in the Ngebung site (Simanjuntak et al., 2010; Mishra et al., 2010) in Indonesia, the Jangnamgyo, Juwol-ri, Geodu-ri, Singok, D'Unjeong, Geumpa-ri, Hwagok (de Lumley et al., 2011) and Sokchang-ni (Pokee, 2009) sites in Korea. The cleavers of the Luonan Basin are not only typical

but also large in number. Its proportion in the lithic assemblage could be as much as 14.2% in some localities (Wang et al., 2005). It also accounts for 5.42% of the total number of stone artefacts found at cleavers-containing localities (Wang, 2006). Therefore, the bifacial industries of East and Southeast Asia are not fundamentally different from those of the West, nor could the Acheulean cultures of East Asia be separated from those of Southwest Asia, India, Africa and Europe (Dennell, 2016).

As a matter of fact, the bifacial industries in the West also appear in regional variations. In Europe, handaxes are not common in some areas either, such as the Markkleeberg site, the Bilzingsleben site, and the Schoningen site in Germany, the Vertesszolos site in Hungary, the Korelevo site in Ukraine, and multiple sites in Britain, where handaxes were rarely found (Clark, 1994; Dennell, 2016). A well-known Acheulean site in Peninsular India, namely the Singhi Talav site and the Attirampakkam site, the proportion of handaxes unearthed from some stratigraphic layers is less than 2%, while the percentage of handaxes of many localities at the Ubeidiya site in Israel is less than 7% (Dennell, 2016). Even in France, there existed chopper-chopping-tool complex without handaxes, for example, the lithic assemblages of the Pech-del'Azé site in Dordogne and the Fontechevade site in Charente are mainly cobble choppers, lack of handaxes (Bordes, 1968). Furthermore, the cleaver is a common tool type in the Acheulean sites of Africa and Peninsular India, but in those Acheulean sites of Europe, other than in Spain, cleavers are rarely seen (Beyene et al., 2013; Santonja and Villa, 2006). Among the handaxe-containing localities in the Arabian Peninsula, cleavers are of scarcity, which are even absent at some sites (Derevianko, 2014; Derevianko et al., 2016). In light of this, there existed regional variations for the bifacial industries in the West as well, but they all belong to the Acheulean Techno-Complex.

The differences in Paleolithic cultures from region to region could have resulted from a variety of factors. In East and Southeast Asia, the variability of bifacial industries may be influenced by two main factors, one being the raw materials for making lithic implements, the other being the natural geographical environments. Raw materials are a major constraint on the knapping technology, tool types and tool kits of a lithic industry. Those of good quality could be worked and flaked in various ways, as they could be processed with both hard hammerstones and soft hammers. In Europe, due to a wide distribution and abundance of high-quality flint, stone knapping technologies are less constrained by raw materials, thus the European lithic knapping technologies appeared complicated and various. During the whole Paleolithic time, the manufacture of lithic implements was applied with both hard and soft hammer techniques, wherein the flaking and retouching methods involved freehand percussion, anvil technique, bipolar technique and pressure flaking. However, in many other areas of the world, particularly in East and Southeast Asia, there is not as rich and widespread raw

materials of high quality as in Europe. Prehistoric inhabitants could only use materials of lower quality for making stone tools. Such low-quality raw materials have largely limited the application of knapping technologies and the shaping of stone tools. For example, the primary raw material at the Peking Man site is quartz, which is very hard and has a lot of joint surfaces. The only method that is suitable for quartz flaking is the bipolar technique, which thus has become a primary flaking method for processing lithic implements at the Peking Man site. Raw materials also have great constraints on lithic tool types, tool forms, and the fineness of processing. The main tool type of the Anyathian in Burma is the hand adze. That's because the primary raw material of the Anyathian lithic industry is the fossil wood. It has a structure of wood fibers, which would be quite difficult to make a side-edged stone tool, whose edge would be parallel to the wood fibers. Therefore, almost all choppers of the Anyathian made on fossil wood are end-edged stone tool types (hand adzes). Moreover, handaxes of a Paleolithic site (the WK site) in the Olduvai Gorge in Africa were made on large flakes of basalt and quartzite. These handaxes were processed in a coarse manner, wherein few specimens are of symmetrical shape. While the handaxes of another contemporaneous site (the HEB site) in the same area were made on fine-grained phonolite, which exhibit delicate processing and symmetrical tool shape. All these differences are supposed to have mainly resulted from different lithologies and textures of raw materials (ones, 1979). Experiments have shown that, with the same kind of raw material, different forms of the raw materials would also have constraints on the shaping of tool forms. For example, handaxes made on quartzite flakes are usually thin, with a triangular cross-section, while for handaxes made on rock blocks, their cross-sections are less likely to be triangular, and tend to have a thicker body (Stiles, 1991). As for the bifacial industries of East and Southeast Asia, the raw materials of lithic implements are normally quartzite and sandstone, which are not regarded as fine-grained materials for manufacturing stone tools. Quartzite and sandstone belong to poor-quality materials in J.D. Clark's classification of lithic raw materials (Clark, 1994), for which the most suitable flaking methods are freehand percussion with hard hammerstones and the application of the anvil technique. Besides, the original form of lithic raw materials in the bifacial industries in this area is usually river pebbles/cobbles. Ancient people tended to select a pebble/cobble of a size and shape similar to that of the lithic implement to be made. Then this pebble/cobble only needs to be partially processed to become an implement. In this way, the body of a stone tool usually retain a certain degree of cortex, especially at the butt end of the tool. In addition, the natural geographical environments may also have a great impact on lithic industries, especially in the case of Southeast Asia and the Lingnan area of China. As this vast region is broadly tropical-subtropical, rich in faunal and floral resources, with a wide distribution of bamboo and wood, just like the people living in this region today, ancient inhabitants would have made full use of the organic

materials to manufacture and utilize bamboo and wood implements (Pope, 1983, 1989). Therefore, the tool kits of this region are so distinctive that the use of handaxes and picks might be different from that in Europe, and there might also occur some differences in the tool forms.

4.5. The handaxe complex and the chopper/chopping-tool complex on both sides of the Movius Line

Movius suggested that handaxes were absent in East and Southeast Asia, and the Early Paleolithic cultures of this region all belonged to the chopper-chopping-tool complex. While in the West, with the emergence of handaxes, the leading position of choppers were then replaced by handaxes. In fact, the chopper-chopping-tool complex or the Mode technology was widespread in the Old World during the Early Paleolithic. During the Early Paleolithic, on the western side of the Movius Line, including Africa, Europe, the Arabian Peninsula and the Peninsular India, the handaxe complex did not completely replace the chopper-chopping-tool complex. There still existed the chopper-chopping-tool complex or the Mode technology (the core-flake technology) inside the distribution area of the handaxes (Bordes, 1968; Schick, 1994; Clark, 1994; Dennell, 2016). For example, in Africa, the Acheulean culture did not completely replace the Mode technology. Both of them had been coexisting for a very long period, which even lasted for several hundred thousand years (Schick, 1994). Besides, in many lithic assemblages of Africa, Europe, West Asia and South Asia, the elements of handaxes coexisted with those of the core-flake technology. In some Acheulean sites, such as the Elandsfontein site and the Lake Eyasi site in Africa (Clark, 1994), and the Nevasa site in the Peninsular India (Mishra et al, 2010), handaxes were revealed associated with other core-flake tools. The Oldowan core-flake tools even played a dominant role in the Early Acheulean industries of the Arabian Peninsula (Clark, 1994). Based on that, the coexistence of the handaxe complex with the chopper-chopping-tool complex did not only occur in the Early Paleolithic cultures of East and Southeast Asia, but also was widely seen in the so-called handaxe complex zones on the western side of the Movius Line.

4.6. The Early Paleolithic cultures in East and Southeast Asia not backward or stagnant

Movius suggested that ancient people on the western side of the Movius Line were dynamic with advanced cultures; while those on the eastern side were primitive and feeble-minded, whose cultures were conservative and outdated. What he indicated is in fact one-sided. Even in the 1940s when the Movius Line was put forward, the Early Paleolithic of East and Southeast Asia was not in a region of

cultural retardation as Movius had suggested. Especially, if he could have taken into account the inferiority of the raw materials of East and Southeast Asian stone artefacts compared to those of the West, which may have constraints on knapping technologies, tool types and tool kits when processing lithic implements, and if he could have realized the particularity of the natural geographical environments in this region, especially in Southeast Asia, then he should not have reached such a conclusion. As mentioned above, most lithic implements of the Peking Man site are so simple and coarse, unstable in tool forms, that some scholars have suggested that they are quite primitive. This is mainly because that the primary lithic raw material of the Peking Man site is quartz. The lack of high-quality raw materials for making stone tools made it difficult for stone knappers to manufacture a product to their satisfaction, resulting in a strong individuality of lithic implements, but of a homogeneous type. However, in the view of Jia Lanpo, if we looked at the stone tools made on flint, which made up a very small proportion of the raw materials, they were processed and retouched in a much more refined and standardized way, especially for the points, which were even comparable to those of the Mousterian culture (Jia, 1956). Therefore, Pei Wenzhong pointed out that the view of Movius that the Early Paleolithic culture of China (when there was only the *Sianthropus* culture) was stagnant and laggard was incorrect and obviously one-sided (Pei and Zhang, 1985). The situation was much the same for the fossil wood material of the Anyathian, which had largely limited the development of knapping technologies as well as the variety of tool types. What is more, southern China and Southeast Asia are in a tropical-subtropical region with an abundance of bamboo and wood resources, heavy-duty tools such as choppers/chopping-tools would be needed to cope with such a particular environment. In the meanwhile, just like the people living in this region today, Paleolithic inhabitants would also make and use piles of bamboo and wooden implements, in which choppers/chopping-tools would become fundamental tool types for processing those bamboo and wooden tools (Ikawa-Smith, 1978; Pope, 1989). If we stretch the timeline from the 1940s to the present day, the Early Paleolithic cultures of East and Southeast Asia would be a much more splendid and colorful picture. There not only are far more so-called chopper-chopping-tool complex sites than in the 1940s, but also appears a wide distribution of the bifacial cultures. It looks pretty much the same as the distribution of the handaxe complex in the West, which coexisted with other chopper-chopping-tool complexes. Although the Early Paleolithic cultures of East and Southeast Asia have some characteristics of their own, compared with those on the western side of the Movius Line, the commonalities between the two should be primarily considered, and the differences between them are mainly due to various natural environments. The Early Paleolithic cultures of East and Southeast Asia are not that *conservative* or *backward* as Movius has suggested.

5. Conclusion

The Movius Line is one of the most influential theories in the Paleolithic archaeology around the world. Since it was put forward, this theory has had a profound impact on the study of Paleolithic cultures in East and Southeast Asia. However, as few archaeological investigations or excavations were done in this region at the time, there were quite limited archaeological materials for research, which might easily lead to biased perceptions. What was then concluded would very much likely to be inconsistent with the facts even for the time.

Over the past few decades since the publication of the Movius Line, the Paleolithic archaeological research in East and Southeast Asia has achieved great progress. There is a large number of Paleolithic localities studied, exhibiting various types of lithic industries, which has greatly enriched our understanding of the prehistoric cultures in this region. According to current archaeological discoveries and research, there did exist numerous handaxes, cleavers and picks in East and Southeast Asia, which have been regarded as typical artefacts of the Acheulean in the West for a long time. The variations on handaxes and the differences between lithic assemblages are not only unique to East and Southeast Asia, but also to other areas in the West. Such variations are related to the environments and are a result of human adaptation to different environments. The bifacial industries of East and Southeast Asia are not fundamentally different from those on the western side of the Movius Line. They all belong to the Acheulean-Techno-Complex. Therefore, the Early Paleolithic cultures of East and Southeast Asia are not that conservative or backward as Movius has suggested, neither were their possessors feeble-minded. The Movius Line should be no longer suitable for studying the Paleolithic archaeology in East and Southeast Asia. It’s time for that page to be turned over.

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