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RESEARCH ARTICLE

Research on the Chronology of Cupule-based Human-face Petroglyphs in the West Liao River Basin, Inner Mongolia

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ABSTRACT

Cupule-based human-face petroglyphs represent a specific category of petroglyphs and are widely distributed throughout the West Liao River Basin in Inner Mongolia. The defining characteristic of this type of petroglyph is that both the eyes and mouth are composed of small, circular cupules created by grinding. Some of these cupules are adorned with outer contours in circular, double-circular, or heart-shaped patterns. In a sense, these petroglyphs can be regarded as a distinctive category—specifically, a variant of cupule-based petroglyphs. The vast majority of these petroglyphs are crafted using pecking and grinding techniques on isolated boulders, while a minority are executed on cliff faces. In fact, many cupule petroglyphs found in association with human-face imagery can be classified as this type of cupule-based human face. Distinct from traditional cupule petroglyphs in the conventional sense, these were all created during the Neolithic period or later, and likely represent a relatively early category within the regional rock art tradition.

KEYWORDS

West Liao River, Cupule-based Type, Humanface Petroglyphs, Chronology

1. HISTORICAL REVIEW OF CHRONOLOGICAL RESEARCH ON CUPULE PETROGLYPHS

Prior to determining the chronology of cupule-based human-face petroglyphs, it is essential to examine the temporal context of cupule petroglyphs themselves. Cupule petroglyphs are of considerable antiquity. As R.G. Bednarik posits: "The earliest rock art we know consists of linear grooves and cupules, especially the latter. In three Old World regions, their origins may trace back to the Middle or even Early Paleolithic, predating the well-dated Upper Paleolithic rock art of Southwestern Europe by a significant margin." (Bednarik, 2001). Chinese scholars have also contributed specialized discussions on the chronology of cupule petroglyphs. Professor Tang Huisheng points out that cupule petroglyphs first emerged during the Lower Palaeolithic Acheulean culture, with representative sites such as Daraki-Chattan in Madhya Pradesh, India. The creation of cupule petroglyphs continued through the Bronze Age. However, Paleolithic cupule petroglyphs typically occur in isolation or alongside linear grooves. In contrast, cupules arranged into specific patterns or combined with circular motifs, horseshoe shapes, concentric circles, notched concentric circles, and human faces to form composite imagery appear to have emerged after the Neolithic period. Among these, human faces constitute the most prominent associated motif in cupule petroglyphs of this era (Tang, 2004). Additionally, the author has proposed a chronological framework and periodization for the major types of cupule petroglyphs discovered in China.

In recent years, the microerosion dating method has been gradually applied to the chronological determination of pecked petroglyphs. A leading figure in this field is the Australian rock art expert R.G. Bednarik. Chinese scholars such as Tang Huisheng and Jin Anni have also utilized this method to date domestic rock art, including cupule petroglyphs. Research by Tang Huisheng revealed that "the Jiangjunya Petroglyph site in Lianyungang, Jiangsu Province, includes cupules pecked into the bedrock, dolmens engraved with cupules, and prehistoric human-face petroglyphs. Microerosion dating indicates that the bedrock cupules date to approximately 11,000 years Before Present (BP); the dolmens engraved with cupules date to around 6,000 years BP; and the prehistoric human-face petroglyphs date to between approximately 4,500–4,300 years BP. The period from 6,000–4,500 years BP coincided with the marine transgression reaching its highest sea level. This suggests that the creation of the prehistoric cupules, human-face petroglyphs, and megalithic dolmens at Jiangjunya might have been undertaken on coastal rocks, a pattern consistent with the global distribution of megalithic structures along coastlines." (Tang, 2008).

In contrast, the cupule dates obtained by Jin Anni using the microerosion method are significantly later. She notes, "To date, the earliest and latest direct dating results for cupules in China both come from the Jiangjunya site in Lianyungang, Jiangsu, with dates of E11000 and E850 +210/−90 respectively. However, overall, the dates from the Central Plains region are generally earlier than those from the eastern and northeastern regions. A comprehensive statistical analysis of all 51 direct dating results available up to 2018 reveals that the highest concentration falls within the range of 1,000–1,999 BP, comprising 27 data points or 52.9%. The next largest group is from 2,000–2,999 BP, with 12 data points,

accounting for 23.5%. Combined, these two ranges constitute 76.4% of the total. This indicates that the period from 1,000–2,999 BP is the primary temporal range for the dated cupules, suggesting that, based on current data, the majority of cupules in China were likely created during this phase (approximately corresponding to the Western Zhou to Northern Song dynasties)." (Jin, 2019). However, it is crucial to note that, as part of humanity's cultural heritage, rock art must be studied in connection with relevant archaeological cultures. In other words, the scientific dating of rock art should be conducted within the framework of archaeological cultural contexts. In practice, scientific dating results and conclusions derived from archaeological research often differ for various reasons, some of which cannot yet be fully explained. Professor Giriraj Kumar, Secretary General of the Rock Art Society of India and a long-term practitioner of the method, cautions: "What we need to keep in mind is that this method provides the minimum age of the rock art being studied, as the result indicates the last time the rock art was worked on. A rock art panel could have been reworked multiple times after its initial creation. This implies that the actual age of the rock art could be much older than the result obtained by the microerosion dating method." (Kumar, 2016). Therefore, microerosion dating results must be analyzed within the overall archaeological context. Dates that show significant discrepancies or appear to fall outside conventional understanding should be applied with caution. It is precisely because Professor Tang Huisheng's microerosion dating results are grounded in comprehensive multidisciplinary research incorporating archaeology and paleoenvironmental studies that his findings have been widely accepted within the Chinese academic community.

Overall, simple cupule petroglyphs are likely of considerable antiquity. However, their precise chronology requires a context-specific analysis.

2. TYPOLOGY OF CUPULE-BASED ANTHROPOMORPHIC FACE PETROGLYPHS

Given the substantial number of discovered cupule-based human-face images and their relatively limited morphological variation, this study selects a representative sample for analysis. These petroglyphs are classified into two primary types, A and B, based on the presence or absence of facial outlines. The chronology of each type will be discussed separately.[1]

Type A: The defining characteristic of this type is the absence of an outer outline. The eyes are exclusively represented by cupules (also referred to as *circular hollows*). The mouth is depicted either using cupules, short straight lines, or curved arcs. In a minority of cases, only the eyes are indicated by cupules, with the mouth omitted entirely.

Subtype Aa: The primary characteristic of this subtype is the use of cupules to represent both the eyes and mouth, or only the eyes without any other facial features. Petroglyphs of this subtype have been identified in both the West Liao River region and the Russian Far East (see Table 1 (1)–(5)).

Subtype Ab: This subtype is primarily defined by the use of cupules for the eyes, combined with a mouth rendered as a short, straight, or curved incised line. Examples of this subtype have been found in both the West Liao River region and the Russian Far East (see Table 1 (6)–(7)).

Type B: This type is primarily defined by the presence of an outline, typically depicted as a single or double circle. The eyes and mouth are represented by cupules, although some examples lack a mouth entirely.

Subtype Ba: This subtype features a single circular outline. The eyes are marked by relatively deep cupules. In one instance, the outline is incomplete due to flaking at the lower end. The mouth is depicted with a cupule in some cases, while one example uses a short incised line and also features a continuous arched motif resembling eyebrows on the forehead. Two other images lack a mouth altogether. Distinctively, one petroglyph employs circles to represent both the eyes and mouth. Furthermore, several images exhibit additional decorative elements: one has an extra cupule below the left eye and a short line on the forehead; another has a near-rectangular outline with two smaller cupules above the mouth representing a nose; additionally, two images feature radiating lines resembling sunrays outside the outline (see Table 1 (8)–(13)).

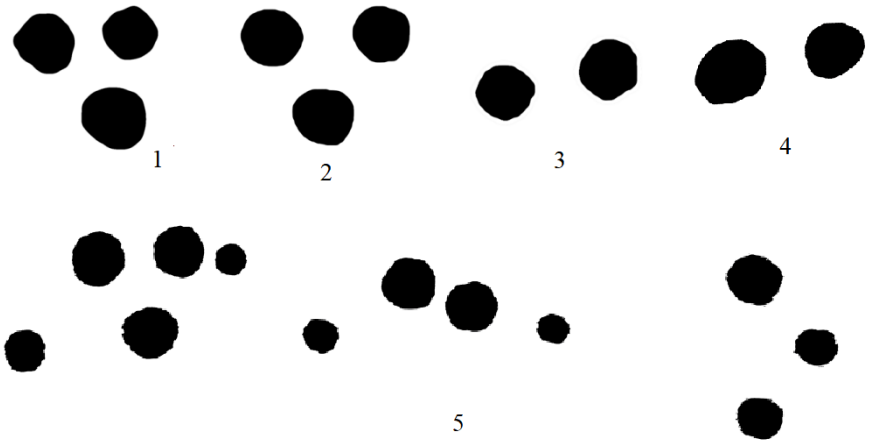
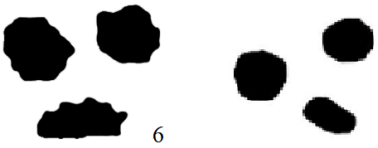
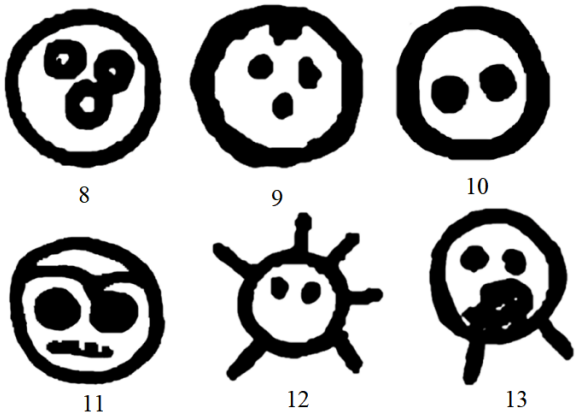
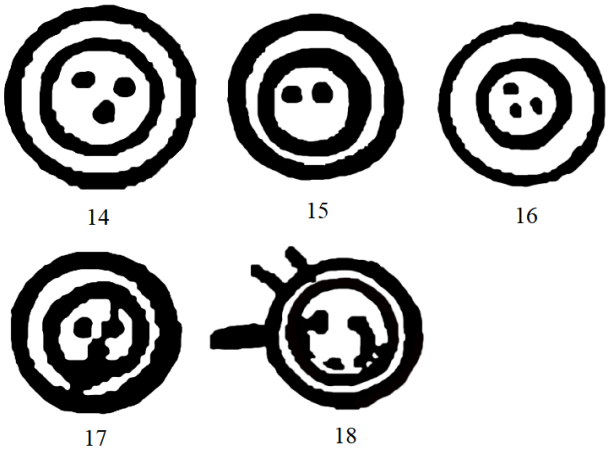
Subtype Bb: This subtype is similar to Subtype Ba, with the sole distinction being its outline, which consists of a double circle. The eyes are similarly represented by cupules, and the mouth is usually a cupule, although one example lacks a mouth, and another features external radiating lines as well as teardrop-shaped lines below the eyes. Petroglyphs of this subtype have been frequently discovered in both Northern China and Siberian Russia. Notably, similar imagery is also commonly found in the painted pottery cultures of Neolithic China. The sinologist Carl Hentze specifically analyzed the motifs and meanings in Majiayao culture painted pottery (including facial zigzags, lozenges, and straight lines), concluding that such patterns share identical ritual symbolism, representing a *weeping deity* whose tears (the lines on the face) irrigate the land (see Table 1 (14)–(18)) (Vasiliev, 1989).

Simple cupule petroglyphs have been frequently discovered in the West Liao River Basin. These findings primarily fall into two categories. A typical example is the Xiaogulitu rock art site in Sijiazi Town, Aohan Banner, Chifeng City. This site is located on a hilltop northwest of Xiaogulitu Village, where over ten rock art panels comprising nearly one hundred individual cupule motifs have been identified (Figure 1 (1)). All the petroglyphs are situated within the confines of the Xiaogulitu archaeological site. The Xiaogulitu site itself is located on a gentle piedmont slope on the western bank of the Laohushan River. Its geographical coordinates are 41°53' North latitude, 120°07' East longitude, at an elevation of 678 meters. The site comprises eight Hongshan Culture localities. Seven of these are ceremonial sites, featuring altars, burial mounds, or combinations thereof, surrounded by low stone walls constructed from reddish-brown detritus. These structures are oriented almost due east, measuring 36 meters in width (east-west) and 222 meters in length (north-south), covering an area of approximately 1,200 m^2. Pottery sherds from the Hongshan Culture are scattered across the surface (Inner Mongolia Regional Conditions Website, 2016). Consequently, the age of these cupule petroglyphs is highly likely to be contemporaneous with the period of the stone-enclosed burial mounds. As only a portion of the Xiaogulitu petroglyphs are currently exposed, it is reasonable to hypothesize that fully excavating the rock mass would likely reveal additional cupule petroglyphs.

In fact, similar compositional patterns have also been identified in the Yinshan rock art complex, located near the West Liao River Basin (Figure 1 (2)–(4)). Compared to the two regions mentioned above, the human-face imagery coexisting with cupules in the Yinshan rock art can largely be regarded as variants of cupule petroglyphs. In one particular image, although the outline of the face and a small number of decorative lines are depicted, the eyes are represented by exaggeratedly large cupules, with the mouth indicated by a smaller cupule. Beyond the eyes and mouth, the facial outlines of some images contain additional small cupules, while other cupules are arranged encircling the outlined human faces (Figure 2 (3)). Another panel is even more characteristic. Here, the fundamental constituent element of all the petroglyphs is the cupule. Among them, four human faces are formed by adding circular outlines around cupules. The number of cupules contained within these outlines varies (Figure 2 (4)).

Broadening our perspective reveals that similar petroglyphs are even more widely distributed in the Anshan region of Liaoning Province (Li, 2023). As Li Gang points out in his article *An Analysis of Cupule Petroglyphs on Turtle-Shaped Stones in the Anshan Area*, the rock art in Anshan is predominantly found on turtle-shaped stones. He posits that these cupule petroglyphs belong to a megalithic culture and are associated with turtle worship. Subsequently, in their article *A Brief Discussion on Two Similarities between Anshan Cupule Petroglyphs and Artifacts Unearthed at Niuheliang* (Li, 2014), Yang Xudong, Cao Guoqun, and Li Gang further compared the Anshan cupules with the Niuheliang site's unearthed artifacts. They drew parallels between the cupules and a *tower*-shaped vessel bearing pit-pattern motifs, as well as jade turtles (or jade soft-shelled turtles) excavated at Niuheliang, indicating certain similarities (Yang et al., 2017). Similar tortoise-shaped stones have also been identified as rock art supports in the West Liao River region, further suggesting a potential cultural connection between the petroglyph traditions of these areas.

Table 1 Cupule-based Human-face Petroglyphs from the West Liao River Basin

Type	Subtype	Typical Petroglyph
A	Aa	
	Ab	
B	Ba	
	Bb	

Notes: (1), (6) Suobeishan; (2), (3) Jushushi; (4) Hongshanhou; (5) Chuangjingou; (7) Sanzuodian; (8), (9), (12)–(18) Gelaoyingzi; (10), (11) Kangjiashanwan. (Sources: (1), (6) Wu Jiacai: *Investigation Report of the Ancient Rock Paintings at the Suobei Mountains in the Wuerjilun River Basin, the Upper Stream of the West Liaohe River*, Northern Cultural Relics, No. 6, 2021; (2), (3) Zhu Lifeng: *Human-face Petroglyphs in Northern China from a Circum-Pacific Perspective*, Beijing: China Social Sciences Press, 2017, p. 224; (4), (7) Zhou Yushu & Wu Jiacai (eds.): *Rock Art of Chifeng* (Volumes I-III), Volume III, Beijing: Science Press, 2022, pp. 757–775; (5) Zhou Yushu & Wu Jiacai (eds.): *Rock Art of Chifeng* (Volumes I-III), Volume I, Beijing: Science Press, 2022, p. 8; (8), (9), (12)–(18) Zhang Songbai & Liu Zhiyi: *Investigation Report on the Petroglyphs in the Baicha River Valley, Inner Mongolia*, Cultural Relics, No. 2, 1984; (10), (11) Tian Guanglin: *Survey of Ancient Petroglyphs in the Middle and Lower Yinhe River Valley in Chifeng City, Inner Mongolia*, Archaeology, No. 12, 2004.)

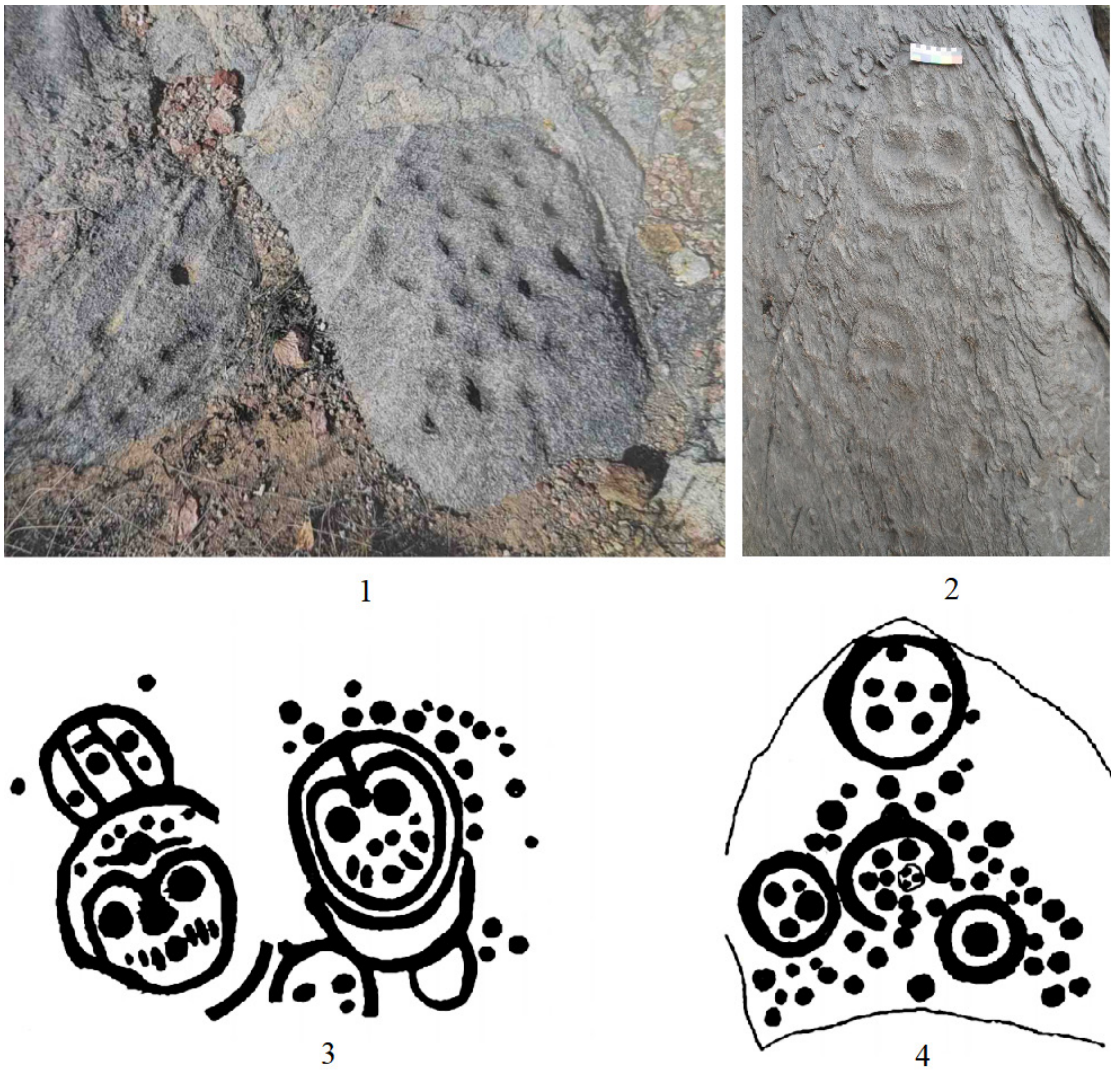


Figure 1 Cupules and Cupule-based Human-face Petroglyphs in Inner Mongolia: (1) Section of the Cupule Petroglyphs at Xiaogulitu; (2) Bayan'erge'er Aobao Gou; (3), (4) Han Wula Mountain Petroglyphs. (Sources: (1) Zhou Yushu & Wu Jiacai (eds.): *Rock Art of Chifeng* (Volumes I-III), Vol. III, Beijing: Social Sciences Press, 2002, p. 929; (2) Photo by Xiao Bo; (3), (4) Gai Shanlin: *Yinshan Rock Art*, Beijing: Cultural Relics Publishing House, 1986, p. 71.)

In recent years, a stone tool bearing cupules (excavators referred to it as a *drilled-pit stone tool*) was unearthed from burial 15M6 at the Xiaonanshan site in Raohe County, Heilongjiang Province. The tool is nearly oblate in shape, with pits of varying sizes drilled on both surfaces. It measures 2.82 cm in length, 6.2 cm in width, 2.73 cm in thickness, and weighs 146.9 grams (Figure 2 (1)). It dates to approximately 9,000 years BP, placing it chronologically between the Osiopovka Culture and the Xinkailiu-Rudnaya Culture(Li & Yang, 2019). The arrangement of cupules on the stone tool bears a resemblance to contourless human-face petroglyphs, although the facial features in the petroglyphs are typically more pronounced. However, no similar cupule petroglyphs have been discovered in the vicinity of this burial, and the relationship between this object and the human-face petroglyphs remains unclear.

Furthermore, a significant number of cupule-based human-face petroglyphs have been discovered at the Chahai site (Figure 2 (2)–(7)). The Chahai site is located in Fuxin Mongol Autonomous County, Fuxin City, in northwestern Liaoning Province, falling within the West Liao River Basin. In September 1985, after examining the artifacts unearthed at Chahai, Mr. Su Bingqi pointed out that the Chahai site type should be considered one of the primary sources of the Hongshan Culture. Based on this, he proposed the concept of a *Pre-Hongshan Culture* (Xin, 2012). Systematic excavations at the site subsequently commenced. Among the finds, one artifact is a pottery object (Figure 2 (3)), while the others are all stone tools (Figure 2 (2), (4)–(7)). It is noteworthy that a groove on one pitted stone tool, cataloged as F17:18, shows signs of use-wear (Figure 2 (4)). Additionally, we observe that one image strongly resembles a human face, featuring two cupules for eyes and a fainter cupule below them representing the mouth (Figure 2 (2)). Regarding the pitted stone tools, the excavators speculated that some, like specimen F32:85 (Figure 2 (5)), might have been anvils for cracking nut shells. In reality, the function of these stones is more likely to be discerned from the cupules themselves, which may be associated with rituals or divination practices. This point will be discussed further later. As for the chronology of the Chahai site, Zhao Binfu divided it into early, middle, and late periods. The early remains of the Chahai period can be represented by the Xiaohexi Culture, dating to approximately 7,000–6,200 BCE; the middle remains by the Nantaizi Culture, dating to approximately 6,200–5,500 BCE; and the late remains by the Xinglongwa Culture, dating to approximately 5,500–5,000 BCE (Zhao & Ding, 2023). However, the specific period to which these drilled and pitted stone tools and pottery from the Chahai site belong is not entirely clear, though they can generally be placed within the timeframe of 7,000–5,000 BCE.

Several pitted stone tools, totaling six artifacts, were discovered at the Beifudi site. These are similar to the drilled-pit stone tool unearthed from burial 15M6 at the Xiaonanshan site mentioned earlier (Figure 2 (8)–(13)). These tools were primarily made from flat natural stones or river pebbles. Dense clusters of pits were ground onto one relatively flat surface, or onto a surface that had been slightly modified; some examples have pits on both sides. The pit diameters mostly range between 1–1.5 cm, with a depth of about 1 cm. The number of pits on each tool varies depending on the size of the raw material, ranging from more than twenty to as few as three or four. Regarding their function,

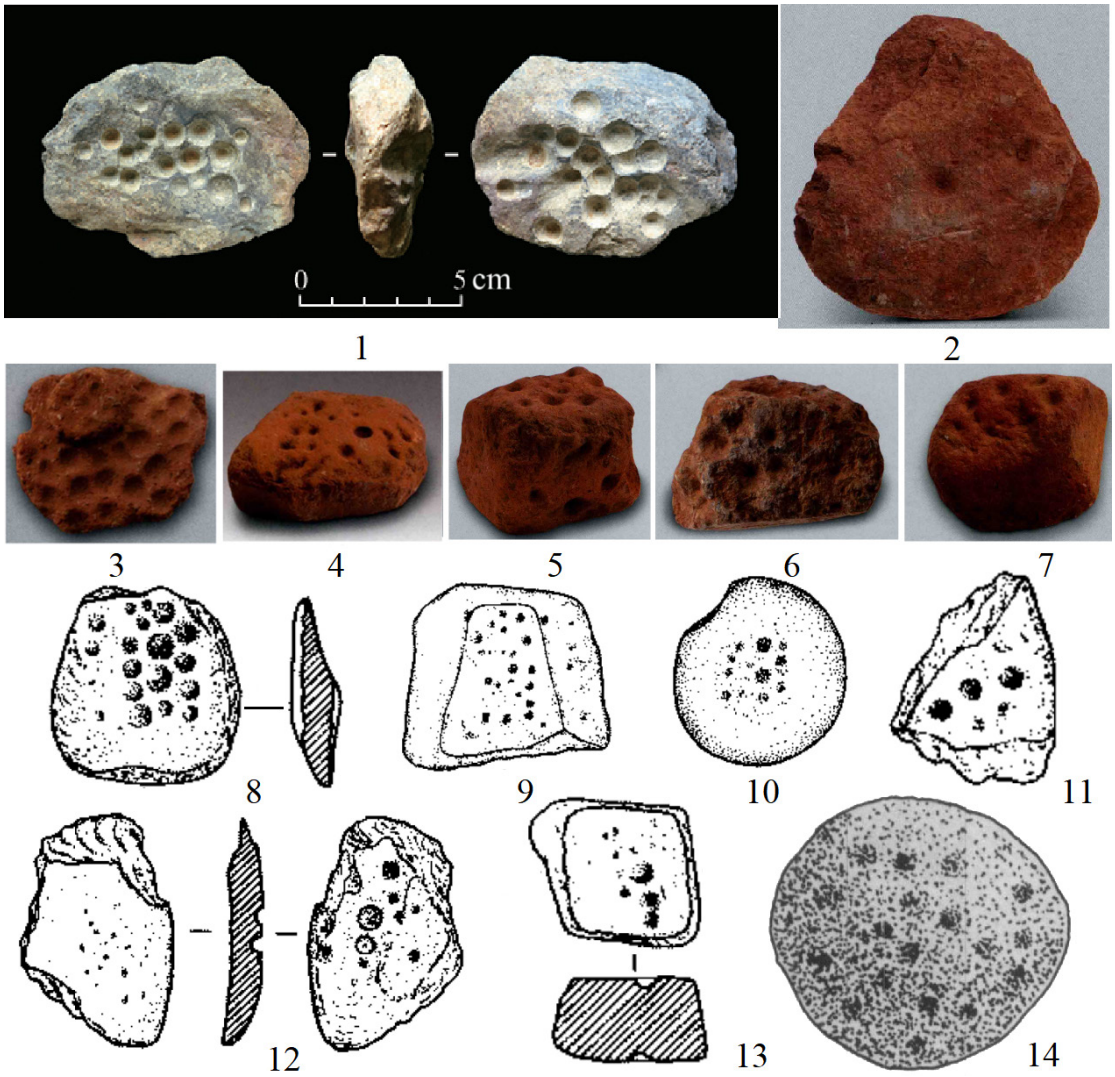


Figure 2 Drilled Stone Tools and Pottery Unearthed in Northern China: (1) Xiaonanshan Site; (2)–(7) Chahai Site ((3) Pottery, all others are stone tools); (8)–(13) Beifudi Site; (14) Houtaizi Site. (Sources: (1) Li Youqian, Yang Yongcai: *The Excavation of Zone III of the Xiao Nanshan Site in Raohe County, Heilongjiang in 2015*, Archaeology, No. 8, 2019; (2)–(7) Xin Yan: *Chahai: Excavation Report on a Neolithic Settlement Site* (Volume I), Beijing: Cultural Relics Publishing House, 2012, Plates 161–236; (8)–(13) Duan Hongzhen: *Beifudi: Prehistoric Sites in the Yishui River Valley*, Beijing: Cultural Relics Publishing House, 2007, p. 309; (14) Chengde Regional Cultural Relics Preservation Office and Luanping County Museum: *Brief Report on the Excavation of the Houtaizi Site in Luanping County, Hebei*, Cultural Relics, No. 3, 1994.)

the excavators suggest they were a type of whetstone or grinding tool for special purposes (Duan, 2007). The Beifudi site is closely related to the Xinglongwa Culture. Consequently, the pitted stone tools found there may have a direct connection with the cupule-based human-face petroglyphs uncovered in the West Liao River region. Additionally, one chipped stone tool was unearthed from the lower layer of the Houtaizi site in Luanping County, Hebei. Specimen Cai: 25, made of diabase, is a battering tool with a spherical shape. Its surface features pits, showing considerable similarity to the pitted stone tools from the Beifudi site (Figure 2 (14)). Concerning its chronology, Mr. Liu Guoxiang initially proposed that the remains from the lower layer of Houtaizi were later than those of the Zhaobaogou Culture (Liu, 2004). He later revised this view, stating that the Zhaobaogou Culture period includes the Zhaobaogou and Xiaoshan sites, as well as the contemporaneous Houtaizi site in the Luanhe River basin (Liu, 2015). This study adopts the latter perspective, positing that the site dates to the same period as the Zhaobaogou Culture.

In addition to the aforementioned drilled-pit stone tools and pottery, a significant number of cupule-based human-face petroglyphs with more pronounced facial features have been discovered among the unearthed artifacts. Eight of these artifacts originate from the West Liao River Basin (Figure 3). One item, excavated from the Chahai site and cataloged as F6:41, is a thin, flat, circular stone flake with two perforations. Some scholars interpret this object as a prototype of a stone hoe (Figure 3 (1)) (Zhao, 2003). However, it is important to note that the overall object bears a strong resemblance to a human face. In fact, numerous similar perforated stone spade-shaped objects have been found at the Chahai site. These objects typically feature two holes. Their function may have been utilitarian, perhaps for hafting the stone spade to a wooden handle. Alternatively, they could have served decorative or even ceremonial purposes. Consequently, the possibility cannot be ruled out that the two holes here were intentionally meant to represent human eyes. These double-holed stone shovels might have been objects of ancestral worship or served as emblems of shamans. Furthermore, the Chahai site is closely associated with the Xinglongwa Culture.

An additional four artifacts, originating from the Xinglongwa Culture, feature perforations on their surfaces to represent eyes and a mouth (Figure 3 (2)–(5)). One is a stone human face unearthed from F22 at Locality 1 of the Xinglonggou site. The face is roughly an inverted triangle with slightly curved edges. The upper part has two drilled holes representing the eyes; these eye holes are not perforated through. Above the left eye is a fully perforated hole, similar in size to the eye holes, likely used for suspension (Figure 3 (2)). The second artifact, also from F22 at Locality 1 of the Xinglonggou site, is crafted from a shell. This shell artifact is peach-shaped, rounded at the top, and pointed at the bottom, with partial damage. Four nearly perfectly circular holes represent the eyes, mouth, and nose. Shallow circular incisions around the eye holes possibly depict sockets, with the holes themselves representing pupils. A

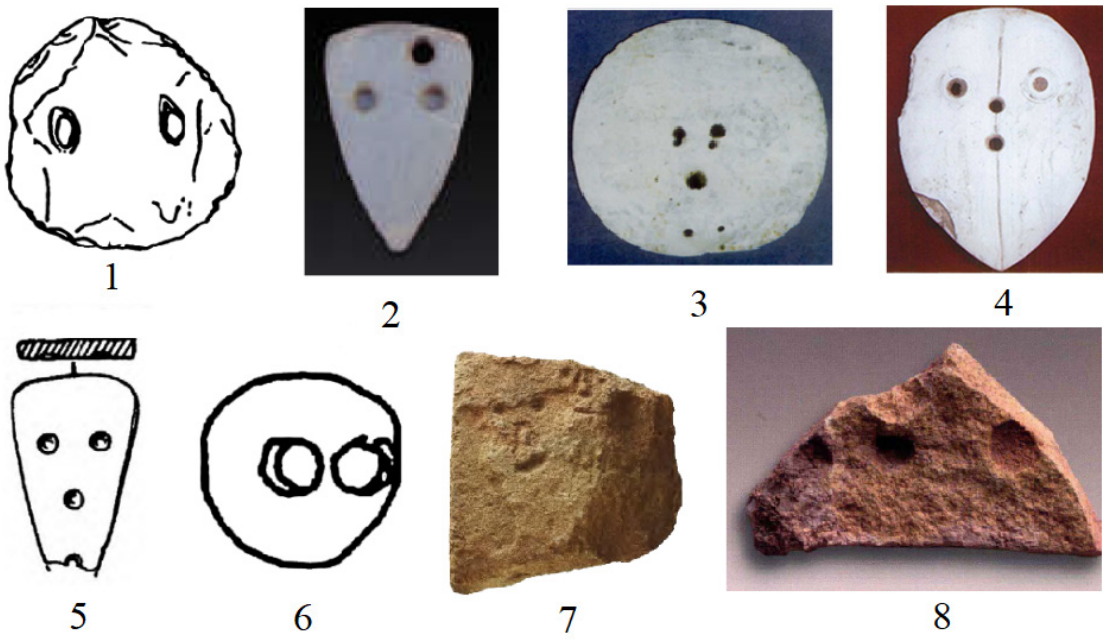


Figure 3 Cupule-based Human-face Images Unearthed from the West Liao River Basin: (1) Chahai Site; (2)–(5) Xinglongwa Culture; (6) Qijia Site; (7) Banlashan Cemetery; (8) Niuheliang Site. (Sources: (1) Zhao Binfu: *The Paleolithic and Neolithic Archaeology of Northeast China*, Changchun: Jilin University Press, 2003, p. 172; (2) Wang Ping: *Analysis of the Characteristics and Functions of Prehistoric Human-face Figurines in the Liaoxi Region*, Cultural Relics in Southern China, No. 6, 2021; (3), (5) Yang Hu: *Brief Report on the 1992 Excavation of the Xinglongwa Settlement Site in Aohan Banner, Inner Mongolia*, Archaeology, No. 1, 1997; (4) Liu Guoxiang, Jia Xiaobing, Zhao Minghui, et al.: *2002-2003 Excavation on the Settlement-site at Xinglonggou in Chifeng City, Inner Mongolia*, Archaeology, No. 7, 2004; (6) Ma Fenglei, Zhao Shuxia, Yu Wenli, et al.: *Hongshan Cultural Site at Qijia, AoHan Banner, ChiFeng City*, Steppe Cultural Relics, No. 1, 2015; (7) Xiong Zenglong, Fan Shengying, Li Daoxin, et al.: *The Banlashan Cemetery of the Hongshan Culture in Chaoyang, Liaoning*, Archaeology, No. 7, 2017; (8) Liaoning Provincial Institute of Archaeology and Cultural Relics: *Niuheliang: Excavation Report of the Hongshan Culture Site (1983–2003)*, Volume II, Beijing: Cultural Relics Press, 2012, Plate 204.)

vertical line divides the face symmetrically (Figure 3 (4)). The third piece is a circular shell ornament from the Xinglongwa site, specimen M118:5, crafted from polished shell. Two fully perforated circular holes at the center represent the eyes. Below each eye is a connection to a miniature hole, beneath which lies a larger, roughly circular hole denoting the mouth. Near the lower edge are two rows totaling four holes: the upper two are larger and well-preserved, while the lower two are smaller, situated close to the edge, with the right one damaged. The periphery of the shell ornament is bordered by a band of small, densely distributed circular pits (Figure 3 (3)). This object bears a notable resemblance to the Type B human-face petroglyphs. The fourth artifact is a human-faced shell ornament from the Xinglongwa site, specimen M117:2, shaped like an inverted triangle. Three cupules represent the eyes and mouth. The lower part is damaged, revealing a partially preserved additional cupule within the damaged area (Figure 3 (5)). Based on a comprehensive review of ^{14}C dating data from sites including Xinglongwa, Shangzhai, and Baiyinchanghan, the Xinglongwa Culture dates to approximately 6,200–5,200 BCE.

Furthermore, several similar artifacts have been discovered within the Hongshan Culture. One specimen, labeled F3:4, was unearthed at the Qijia site in Aohan Banner, Chifeng City. It is a white stone bead, smoothly ground and flat, with two non-penetrative concave pits on its bottom surface resembling human eyes (Figure 3 (6)). It dates to the middle and late periods of the Hongshan Culture (Suo & Li, 2011). This object also resembles Type B petroglyphs, potentially providing a reference for its dating. The second artifact was excavated from the Banlashan cemetery in Chaoyang City, Liaoning Province. Specimen T0306②B:1 comprises two ground human-face images found on a stone in the western wall of an altar. One face has only eyes and a mouth: the eyes are represented by small circular pits, and the mouth by a short incised line. The other face appears to include not only eyes and a mouth but also a nose (Figure 3 (7)). These images can essentially be considered petroglyphs, albeit on a different medium. It is even plausible to suggest that they were initially created on surface rocks and later repurposed as construction material, a practice also documented in Xinjiang and Southern Siberia. These two images resemble Subtype Ab petroglyphs, offering some chronological reference. However, it is crucial to note that cupule-based human-face petroglyphs are generally ground deeper and appear to be older. Furthermore, their location in the altar's western wall strongly suggests an association with ritual activities, indicating that these petroglyphs were likely created for social functions beyond mere artistry. As previously noted, their calibrated radiocarbon date is 5,465–5,345 BP (Xiong et al., 2017). Additionally, a stone tool with cupules was unearthed at the Niuheliang site. Specimen N5H16:7 is made of red chert, elongated and roughly triangular. The two cupules on the left likely represent eyes, with a short incised line below possibly denoting a mouth, together forming a Subtype Ab human-face image (Figure 3 (8)). It belongs to the Hongshan Culture period, dating to approximately 6,000–5,000 BP.

Furthermore, similar imagery has been discovered in other parts of China beyond the West Liao River Basin (Figure 4). One such artifact is a pottery human face unearthed from the Beiwutun site on the Liaodong Peninsula. Cataloged as Specimen T3③:107, this object is made of sandy red-brown pottery and is fragmentary, surviving in a semicircular shape. The upper part features an incised slanted line on each side, with multiple vertical lines incised on it. While the excavators interpreted these as representing a hairline, they bear a stronger resemblance to the radiating lines depicting the sun found on other unearthed artifacts and in petroglyphs. The eyes are represented by two cupules. Below them, near the center of the bottom, is a fully perforated circular hole, flanked by symmetrical curved lines on both sides (Figure 4 (1)). This pottery face belongs to the Lower Xiaozhushan Culture, dating to approximately 6,500–6,000 BP (Xu et al., 1994).

Moreover, two human-face petroglyphs characterized by cupules were discovered at the Aobaoshan site in Tongyu County, Jilin Province. One is a fragmented anthropomorphic figure, retaining only a cylindrical head with a relatively square facial plane and slightly recessed temples. The eyes are formed by deep conical pits, each 0.5 cm in diameter. The mouth and nose are delineated, with a high nasal bridge and no other facial features (Figure 4 (2)). The other is also a fragmented anthropomorphic figure, preserving only the head. Both the front and back sides utilize

cupules to represent the eyes and mouth. The sides of the headdress curve upwards and outwards, resembling horn-like projections (Figure 4 (3)). Researchers suggest that this site exhibits certain distinctions from Neolithic cultural remains found in northern regions, particularly differing significantly from the Ang'angxi Culture of the Nenjiang River Basin, while showing closer affinities to Neolithic assemblages in the south. The impressed *Zigzag* pattern found at the site is quite similar to that of the Hongshan Culture in the Liao River Basin, indicating that they were likely roughly contemporaneous (Wang, 1984).

Three ceramic artifacts were recovered from the Phase I remains at the Beifudi site (Figure 4 (4)–(6)). One is a Type A pottery zhijiao, Specimen H36:2, made of mica-tempered gray-brown pottery, with only the top front section remaining. The top surface is acutely peach-shaped, featuring three pits on the front-facing surface representing human eyes and a mouth (Figure 4 (4)). The second is an incised pottery mask, Specimen F12:9, a rim sherd made of mica-tempered brown pottery. Below the rim is an incised human face depiction without a defined outline, of which only the eyes remain (Figure 4 (5)). Additionally, another pottery mask with similar characteristics was discovered among the Phase I remains at Beifudi. Specimen F11:2, a basal sherd made of mica-tempered red-brown pottery, has two drilled holes representing the eyes, while the nose and mouth are indistinct, with a faint, small pit seemingly indicating the mouth (Figure 4 (6)). In fact, a total of 145 incised pottery masks were found in the Phase I remains at Beifudi, 12 of which are complete or restorable. The larger ones are life-sized, while the smaller ones measure around 10 cm. Notably, many of these masks exhibit features characteristic of cupule-based petroglyphs. The cultural profile of the Beifudi site shows numerous similarities with the early Cishan remains and also shares some affinities with the Xinglongwa Culture. Regarding its chronology, the excavators state that "the absolute date of the Phase I remains falls approximately between 6,000–5,000 BCE, i.e., around 8,000–7,000 BP." (Duan, 2007), placing it in the early stage of Neolithic culture.

An unidentified pottery artifact was unearthed from the Dadiwan site. Cataloged as Specimen T400③:12, the object is fragmented and made of fine orange-buff clay. The surviving portion is rectangular, broken at its lower end. Near the top, both the front and back surfaces feature three small, shallow circular pits, identified as attachment scars for missing appendages. Near the break on both faces, there are long, groove-like depressions; the area on one side of these grooves is slightly raised, while the other side is more prominently raised (Figure 4 (7)). This pottery artifact belongs to Phase IV of the Dadiwan Culture, a late type of the Yangshao Culture. Contemporary assemblages with similar cultural features include the second and third phases at Baoji Fulinbao and the second phase at Fufeng Anban.

Furthermore, a similar image was identified on a pottery vessel from the Dadiwan Phase II assemblage. This is a pottery yu, Specimen T212②:21, decorated on its belly with a three-dot pattern resembling an outline-less human face (Figure 4 (8)). Research indicates that Phase II of the Dadiwan Culture dates to approximately 6,500–5,900 BP, while the Phase IV culture dates to approximately 5,500–4,900 BP (Gansu

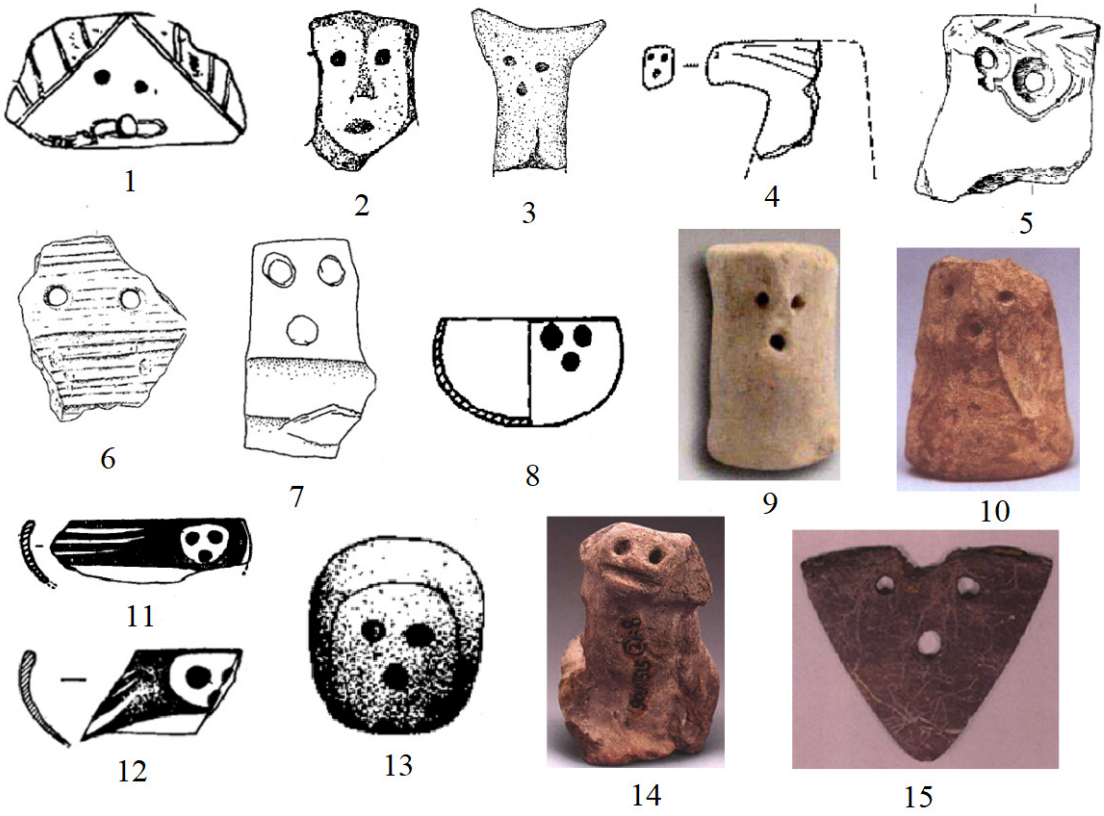


Figure 4 Artifacts with Cupule-based Human-face Images Unearthed from Other Regions of China: (1) Beiwutun Site; (2), (3) Aobaoshan Site; (4)-(6) Beifudi Site; (7), (8) Dadiwan Site; (9) Lantian Xinjie Site; (10) Anban Site; (11), (12) Fulinbao Site; (13)–(15) Miaoqian Site. (Sources: (1) Xu Yulin, Su Xiaoxing, Wang Sizhou, et al.: *The Neolithic Site at Beiwutun, Dalian City*, Acta Archaeologica Sinica, No. 3, 1994; (2), (3) Wang Guofan: *Survey of Neolithic Sites in Tongyu, Jilin*, Heilongjiang Cultural Relics Series, No. 4, 1984; (4)–(6) Duan Hongzhen: *Beifudi: Prehistoric Sites in the Yishui River Valley*, Beijing: Cultural Relics Publishing House, 2007, pp. 104, 128, 129; (7), (8) Gansu Provincial Institute of Cultural Relics and Archaeology: *Dadiwan in Qin'an: Report on Excavations at a Neolithic Site* (Volume I), Beijing: Cultural Relics Publishing House, 2006, pp. 135, 585; (9) National Cultural Heritage Administration: *2010 Significant Archaeological Discoveries in China*, Beijing: Cultural Relics Publishing House, 2011, p. 23; (10) Archaeology Program, School of Cultural Heritage and Museology, Northwest University: *The Excavation Report of the Anban Site in Fufeng*, Beijing: Science Press, 2000, Color Plate VII, 3; (11), (12) Baoji Archaeological Team, & Baoji Station of the Shaanxi Provincial Institute of Archaeology: *Baoji Fulinbao: Excavation Report of a Neolithic Site*, Beijing: Cultural Relics Publishing House, 1993, p. 19; (13)–(15) Zhejiang Provincial Institute of Cultural Relics and Archaeology: *Miaoqian*, Beijing: Cultural Relics Publishing House, 2005, p. 31, Plate XIII, 4, Plate XLIX, 4.)

Provincial Institute of Cultural Relics and Archaeology, 2006).

A single pottery anthropomorphic figurine was recovered from the Phase II remains at the Anban site in Fufeng, Shaanxi. Cataloged as Specimen H1:9, the eyes and mouth of the figurine are rendered as punched cupules (Figure 4 (10)). Regarding its chronology, the excavators state: "The Phase II remains at the Anban site share numerous similarities with the upper layer of the Banpo site in Xi'an, Shaanxi; Phase II of the Quanhucun site in Hua County; Phase IV of the Jiangzhai site in Lintong; and the middle period of the Xiwangcun site in Ruicheng, Shanxi. And all these assemblages belong to the late Yangshao culture." (Archaeology Program, 2000). While comprehensive ^{14}C dating results for the late Yangshao Culture are still lacking, based on chronological sequences, this period should postdate the Miaodigou Culture, dating to approximately 5,300 BP (Wang, 1993). It is noteworthy that a similar pottery anthropomorphic figurine has also been discovered at the Xinjie site in Lantian, Shaanxi (Figure 4 (9)). It dates to a similar period as the Anban specimen, likewise belonging to the late Yangshao Culture and being broadly contemporaneous with the aforementioned Dadiwan Phase IV culture.

Two ceramic artifacts were unearthed from the Phase I remains at the Fulinbao site in Baoji, Shaanxi. The first, Specimen T4④:3, is a pottery patra made of fine red clay with a rounded lip. A black band decorates the rim. The upper belly is ornamented with a black-pigment design combining dots, arc-sided triangles, and slanting lines. Three dots painted in black pigment form a human-face image (Figure 4 (11)). The composition of the second image is similar, likely also on a pottery patra. This sherd, from T3③, features a facial pattern composed of dotted and arc-sided triangular motifs. An outer frame of arc-sided triangles and curved lines encloses an oval shape containing three dots: the upper two resembling eyes and the lower one a mouth, creating a general likeness of a human or animal face (Figure 4 (12)). These two pottery vessels belong to the Miaodigou Type of the Yangshao Culture (Baoji Archaeological Team, & Baoji Station of the Shaanxi Provincial Institute of Archaeology, 1993). Regarding their chronology, Han Jianye's analysis suggests an overall date range between approximately 3,700 –3,100 BCE (Han, 2022).

The discovery of three artifacts bearing such imagery at the Miaoqian site in Hangzhou, Zhejiang, extends its distribution from the Central Plains and Northeast China further into Southern China (Figure 4 (13)–(15)). Specimen T512⑥:1, termed a *pig-shaped ornament* by the excavators, is made of sandy gray pottery. It is horizontally oblong with an elliptical cross-section and is hollow. One flat end features three circular holes, interpreted as representing a face, which connect to the hollow body; the other end retains traces of a tail (Figure 4 (13)). However, the possibility that the three holes depict a human face cannot be ruled out. Indeed, combinations of pig and human faces are also found in rock art. This pottery artifact belongs to the Majiabang Culture period. Research indicates the Majiabang Culture dates to approximately 7,000–5,800 BP, spanning about 1,200 years (Wang, 2019). However, the specific developmental phase of this particular artifact remains unclear. Specimen T515②:8, made of sandy red pottery, is referred to by excavators as a *pottery pig-shaped ornament*. In fact, the depressions at the front resemble eyes, and an impressed horizontal line represents a mouth, creating a composition similar to a human face (Figure 4 (14)). This image closely resembles Subtype Ab human-face petroglyphs (see Table 1 (9)). It dates to Phase I of the Liangzhu Culture.

Specimen T101②:2 is a stone ploughshare made of black tuff, finely polished. It is isosceles triangular in plan, with single-beveled edges along the two equal sides, a flat body, and three biconically drilled holes. Excavators suggest it may have been the leading section of a composite ploughshare consisting of three pieces (Figure 4 (15)) (Zhejiang Provincial Institute of Cultural Relics and Archaeology, 2005). Again, the possibility that the three holes represent a human face cannot be excluded. It belongs to the late stage of the Liangzhu Culture. Research suggests the Liangzhu Culture can be divided into five phases, with the first phase dating to approximately 5,300–5,000 BP. While the exact definition of the *late stage* is not specified, the latest Phase V dates to around 4,200–4,000 BP, providing a general chronological reference for this artifact (Li, 1999).

It is important to note that the vast majority of the human-face images on the artifacts mentioned above lack an outline. However, some can be considered variants of outlined images. Representative examples include the circular shell ornament from the Xinglongwa site (Figure 3 (3)), the stone bead from the Qijia site (Figure 3 (6)), and the pottery from the Phase I remains at the Fulinbao site (Figure 4 (11), (12)). The first two artifacts feature a circular outline, resembling Type B human-face petroglyphs. In contrast, the human-face images on the Fulinbao pottery are virtually identical to Type B petroglyphs. These can be interpreted as manifestations of the same cultural concept applied to different media.

3. CONCLUSIONS

Cupule-based human-face petroglyphs can be classified into two primary types, A and B, and are closely associated with local archaeological cultures. Overall, a considerable number of artifacts featuring cupules have been discovered within China. Among the early examples are those from the Xiaonanshan burial 15M6 and the Chahai site, which can be dated as early as 9,000 years BP. However, the motifs from the Xiaonanshan site consist of simple, isolated cupules, differing significantly from human-face petroglyphs, and thus a direct connection between the two is unlikely. In contrast, some artifacts with cupules from the Chahai site strongly resemble human faces and demonstrate close ties to the Xinglongwa Culture in the West Liao River Basin, suggesting that this area may represent a direct origin for this imagery. Furthermore, this type of imagery has also been identified within the Xinglongwa, Zhaobaogou, and Hongshan cultures. Beyond the regions mentioned above, it has also been found in the Central Plains' Yangshao Culture and the southern Majiabang Culture, indicating a wide geographical distribution and considerable temporal duration.

However, regarding the specific chronology of the West Liao River human-face petroglyphs, the most directly relevant local cultures are the Xinglongwa Culture (c. 6,200–5,400 BCE), the Zhaobaogou Culture (c. 5,200–4,200 BCE), and the Hongshan Culture (c. 4,700–3,000 BCE), although interactions with neighboring cultures cannot be ruled out. Among these, Type A human-face petroglyphs have been identified across all three archaeological cultures, while Type B petroglyphs primarily belong to the Xinglongwa Culture and the middle to late periods of the Hongshan Culture. It is important to note that although Type B human-face petroglyphs have not yet been definitively identified on artifacts from the Zhaobaogou Culture or the early Hongshan Culture, considering the continuity of ideological concepts, it is reasonable to hypothesize that similar rock art creation activities persisted in the West Liao River Basin during these periods as well. In summary, the chronology of cupule-based human-face petroglyphs in the West Liao River Basin broadly spans from approximately 6200 to 3,000 BCE, enduring from the Xinglongwa period through the late Hongshan Culture.

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ANNOTATION

Note 1: The actual number of simple cupule petroglyphs in the aforementioned regions far exceeds the count presented in this study. As this paper aims to explore connections between the rock art of the two regions through the analysis of specific cases, a comprehensive

statistical analysis of all available data was not undertaken.

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