

# Unraveling the Enigma of the Bi: The Spindle Whorl as the Model of the Ritual Disk



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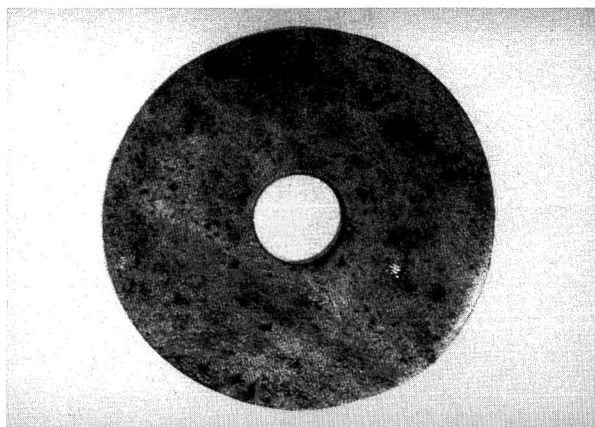
ARCHAEOLOGICAL REPORTS from the People's Republic of China, particularly since the end of the Cultural Revolution in the early 1970s, reveal jade *bi* disks in the classic form in late Neolithic tombs and provide the basis for a new exploration of the origins of the *bi*.<sup>1</sup> The *bi* is a ritual or decorative jade<sup>2</sup> disk with a wide flat body and a relatively small hole in the middle (Pls. I, II). This size aperture suggests that the form originally had a use (that is, the shape conforms to part of an ancient tool) because other Chinese ritual jades, which are obvious reproductions of implements, such as axes, hoes, and adzes, contain holes for wooden handles. Another common Neolithic artifact is a flat disk with a hole in the middle, the discoidal spindle whorl. The whorl is a flywheel on the shaft of a hand-held spindle designed to maintain a twisting momentum to the yarn drawn out from a cluster of fibers. The hand-spindle, thus, is a simple device consisting of a stick and a weight, the whorl (Pl. III). The hypothesis developed here is that the class of objects known as a discoidal spindle whorl and the *bi* are linked formally, historically, and contextually.

This hypothesis is not entirely new (Robert Poor, personal communication, 1991). As early as 1948, Kuo Pao-chun suggested that the *bi* was derived from the spindle whorl (*fanglun*) or the round axe (1948:4–5). Chou Nan-chuan echoed the opinion of Kuo and mentioned the similarity to jade spindle whorls (1985:82). Jade spindle whorls excavated under controlled conditions at the Liangzhu site of Fuquanshan (Pl. IV) stimulated Zhao Qingfang, a member of the Nanjing Museum Academic Committee, to suggest, “A clue to the derivation of the *bi* from the *fanglun* is likely to be unraveled by examining the similarity in shape more closely” (1989:82). This paper attempts to complete that task.

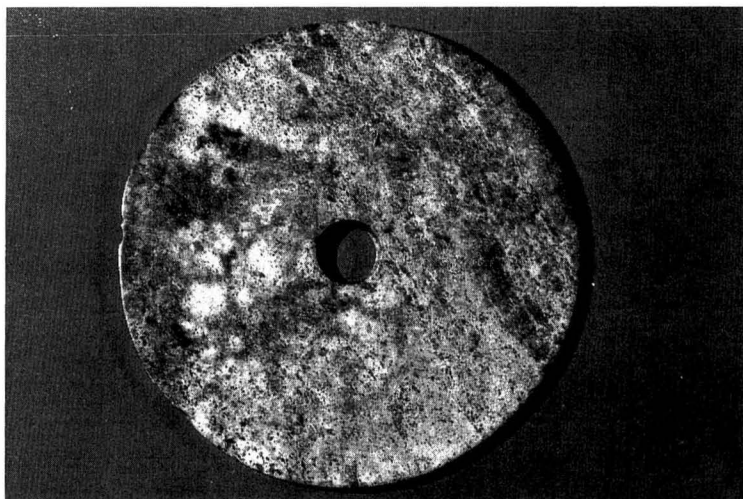
The hypothesis concerning the transformation of the spindle whorl into *bi* is not universally accepted by scholars. Kuo's notion was not included in William Willetts's discussions of the matter (1958:94, 1965:46), while others reject the idea of a tool prototype for the *bi* completely. For instance, James Watt, senior curator of Asian art at the Metropolitan Museum of Art in New York, asserts that the *bi* and the *cong* “represent the earliest known Chinese artifacts that were given forms entirely divorced from any use, ornamental or utilitarian” (1990:11).

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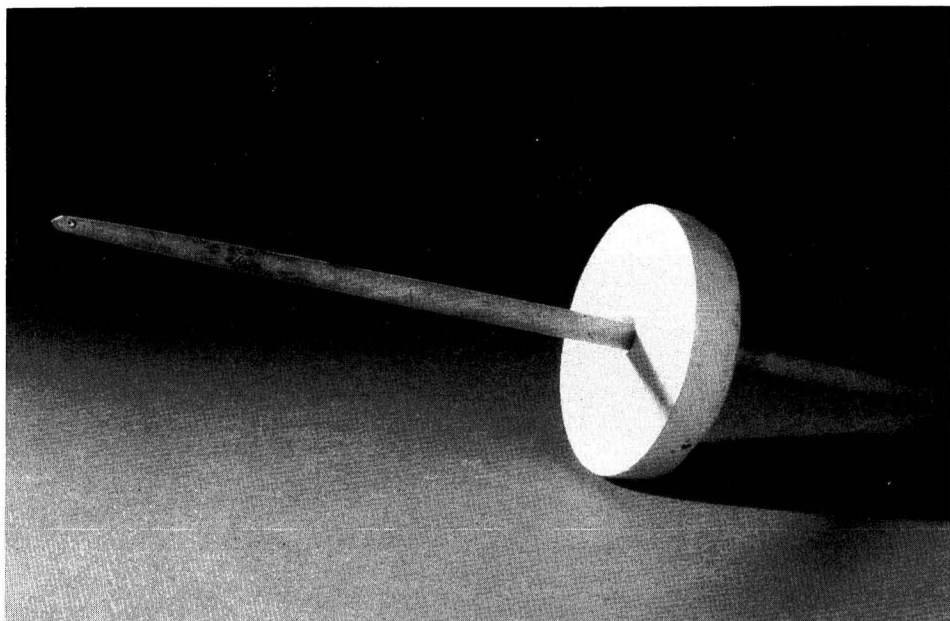


Pl. I. *Bi* from Liangzhu Culture, M198 (II):10, at Caoxieshan, Wu County, Jiangsu. Lavender with dark gray spots. Diam. 21.2 cm, thickness 0.8 cm. Tremolite. After Yang Jiangfang (1987: Pl. II:1).

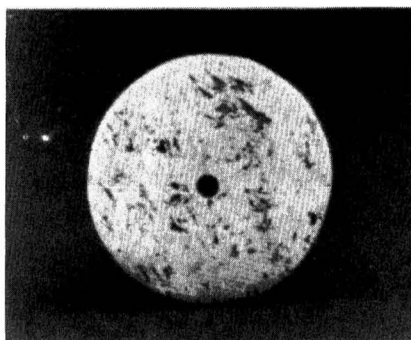


Pl. II. Largest *bi* from Burial M3 at Sidun, Wujin County, in Changzhou, Jiangsu, M3:65; c. 2320 B.C., late Liangzhu Culture. Diam. 26.7 cm, thickness 1 cm. Blue with gray and white spots. After Yang Boda (1986:19).

The origin of the complex ritual tube, the *cong*, lies outside the scope of this paper, but both the *bi* and the *cong* may have evolved in the Liangzhu Culture (Fig. 1), which flourished in the lower reaches of the Changjiang (Yangtze) River, particularly in northern Zhejiang and southern Jiangsu provinces, from c. 3300 to 2200 B.C.<sup>3</sup> This presentation focuses on the Liangzhu Culture; although other Neolithic culture sites have yielded *bi*,<sup>4</sup> these disks do not have the consistency, repetition, and uniformity of form that characterize the Liangzhu version. Huang (1992:78) recently stated, "Of more than . . . 200 jade *bi* rings archaeologically unearthed, not more than . . . 20 jade *bi* came from other Neolithic cultures." The Liangzhu *bi* are much larger than those from other areas (Huang 1992:78), and Liangzhu craftsmen are associated with the wide thin *bi* that became the classic form.



Pl. III. Complete jade spindle whorl, diam. 4.3 cm, M11:16, Yaoshan, Yuhang County, Zhejiang. Early second period Liangzhu. After Zhejiangsheng et al. (1989: Pl. CCII).



Pl. IV. Jade spindle whorl from Fuquanshan, Qingpu County, Shanghai T27M2:30. Diam. 3.2 cm. Liangzhu Culture. After Shanghai City Cultural Relics Conservation Bureau (1986:21).

In recent years several major Liangzhu sites, including the remains of earlier cultures, have been excavated under controlled circumstances and documented (Fig. 2). The principal locations discussed here are: Caoxieshan (Nanjing Bowuyuan 1980) in Wu County, Jiangsu; Fuquanshan (Shanghaishi Wenwu Baoguan Weiyuanhui 1986; Shanghaishi Wenwu Guanli Weiyuanhui 1990) in Qingpu County, Shanghai; Sidun (Nanjing Bowuyuan 1981, 1984) in Wujin County, in the city of Changzhou, Jiangsu; Yaoshan and Fanshan in Yuhang County, Zhejiang, near Hangzhou (Zhejiangsheng Wenwu Kaogu Yanjiusuo 1988; Zhejiangsheng Wenwu Kaogu Yanjiusuo Fanshan Kaogudui 1988). The jade artifacts from the Yaoshan and Fanshan cemeteries are particularly significant and present a sequence of the development from whorl to *bi*.

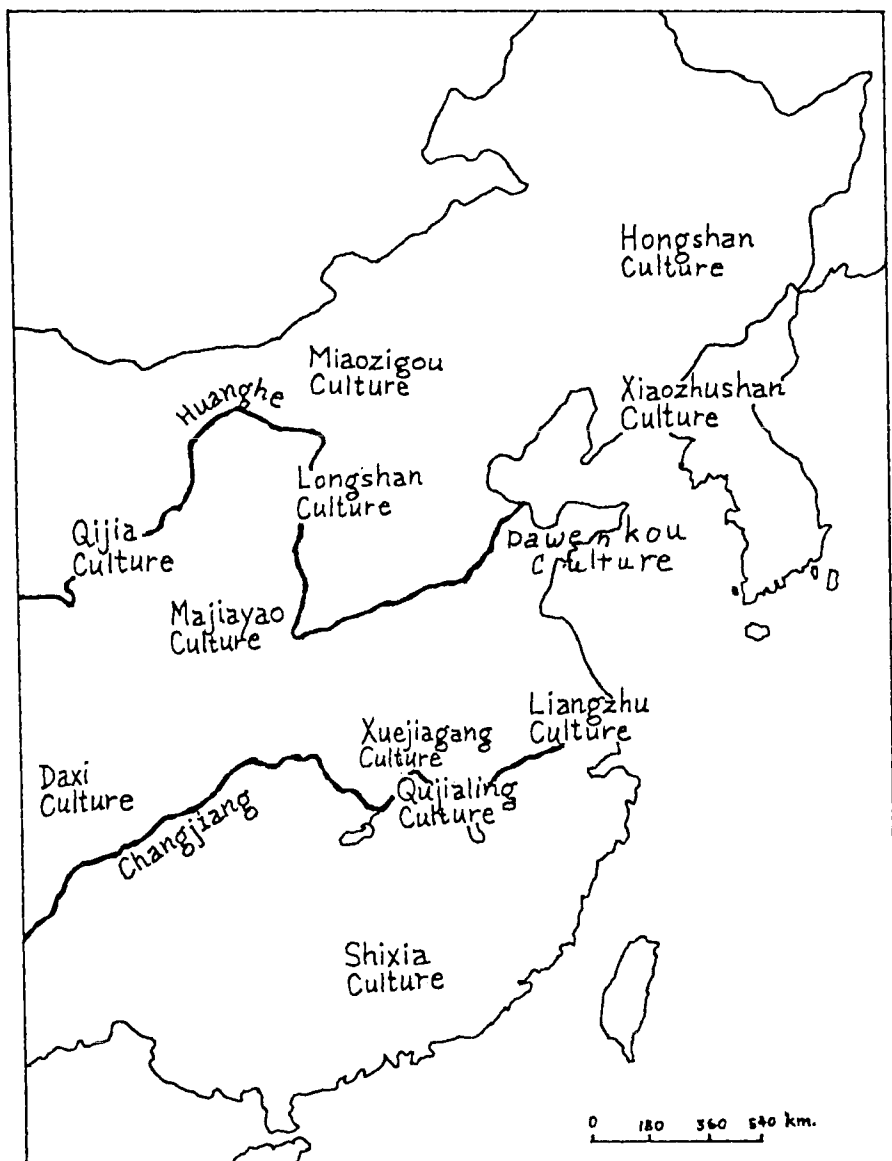


Fig. 1. Map showing the approximate area of Neolithic cultures mentioned in this paper. The cultures that preceded the Liangzhu but occupied the same general area (Hemudu, Majiabang, and Songze) are omitted. The Longshan Culture followed the Dawenkou Culture in the Shandong Peninsula.

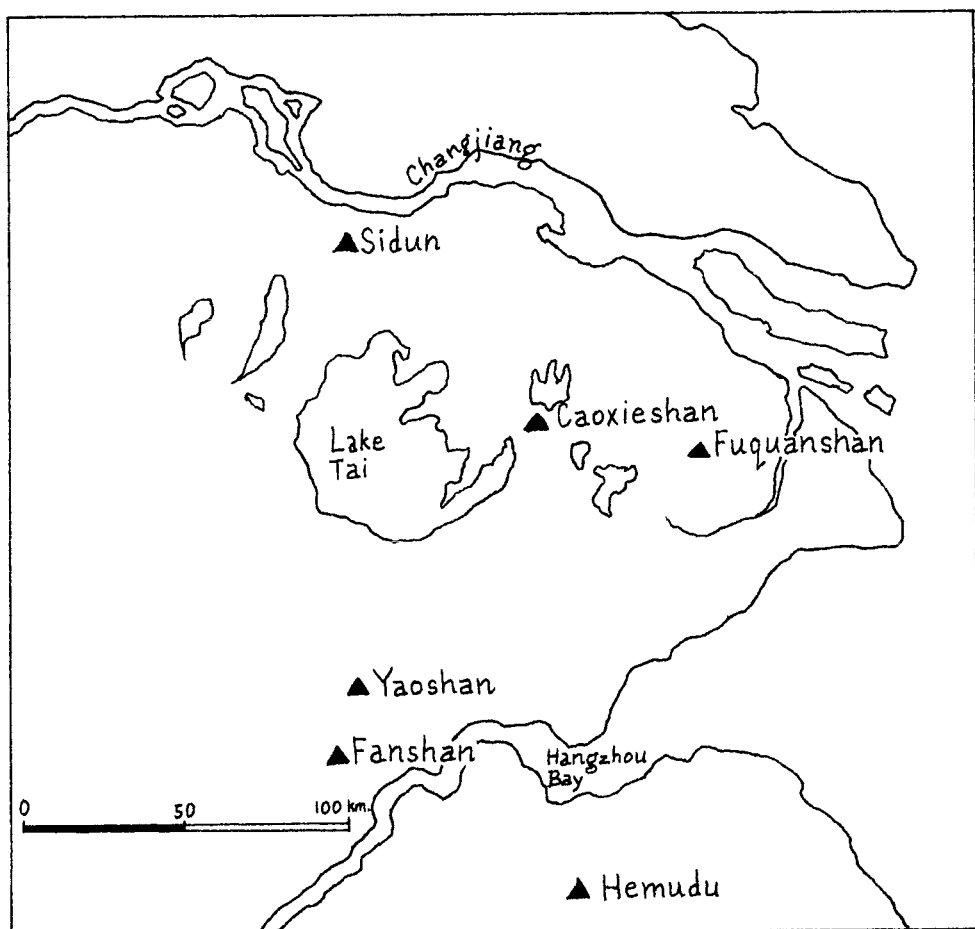


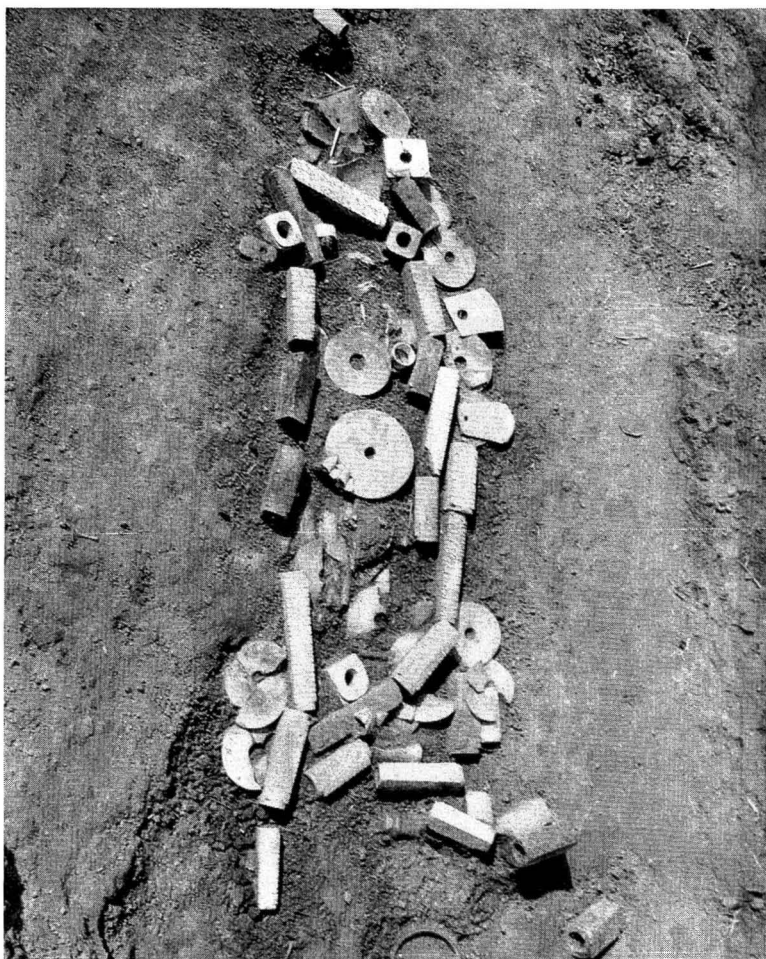
Fig. 2. Map of Liangzhu sites discussed in this paper.

#### THE FORMAL RELATIONSHIP OF THE *BI* AND THE DISCOIDAL SPINDLE WHORL

##### *The Shape of the Bi*

About two millennia after the end of the Liangzhu Culture, the writers of the *Er ya*, a glossary, contrived to differentiate the *bi* from other jade disks. According to the *Er ya*, a *bi* had a hole one-half the width of the body (*rou*), while a *huan* had a hole and body of equal width, and a *yuan* was a shape in which the hole was twice the width of the body (Anon. 1929–1936:4).

Na Chih-liang clarifies the *Er Ya* by precisely defining *body*, or *rou*, in his description of the *bi*. He writes, “When the object has the smallest hole or when the diameter of the hole is smaller than the distance from the edge of the hole to the edge of the object (*rou*), call it *bi*” (Na 1980:74–75). Xia Nai notes that “among excavation artifacts the . . . ratios are not uniform” (1986:212) and calls the rigidity of the *Er ya* “hocus pocus and hair splitting” (1986:212). Nevertheless, Xia Nai sug-

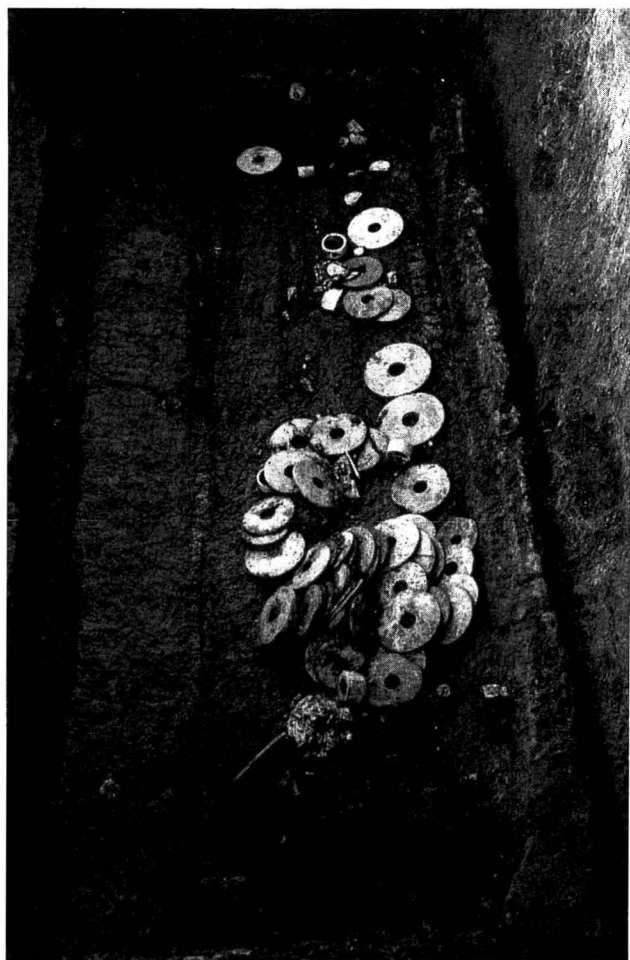


Pl. V. Burial M3 at Sidun, Wujin County, in Changzhou, Jiangsu, c. 2320 B.C., late Liangzhu Culture. After Nanjing Bowuyuan (1984).

gests, "Those pieces with slender ring-bodies and perforations greater in diameter than one-half that of the whole piece may be especially termed *huan*" (1986:213).

Elsewhere, Xia Nai defines *bi* as "those with both hole and body roughly the same size or with holes smaller than the bodies. . . . Those with small delicate bodies but larger holes, I call jade-rings" (1983:25). This is what I will use as a working definition. The Liangzhu *bi* meet these criteria.

The standardization of *bi* shape seen at the tombs of Fanshan and Sidun (Pls. V, VI) demonstrates that the small-holed disk is an identifiable object. These massed *bi* have a quite consistent configuration: a wide flywheel form. The laws of mechanics dictate that this shape can do spinning work more easily than large-holed so-called *yuan* disks of the same outer body diameter, thickness, and material. The recurrent shape of the Fanshan and Sidun *bi* suggests that these *bi* are formally related to a working tool, the discoidal spindle whorl.



Pl. VI. Pile of plain *bi*, diam. 15–18 cm, in Tomb M23 at Fanshan, Yuhang County, Zhejiang, c. 3000–2800 B.C., Liangzhu Culture. After Zhejiangsheng et al. (1989: Pl. III).

### *The Spindle Whorl Shape, Its Inferred Use and Importance*

Spindle weights in Neolithic China took various forms, such as truncated cones, mounds, or globular shapes. Dieter Kuhn in his volume on Chinese textile technology writes, however, that the most common form for a spindle weight was a flat disk with a hole in the center for the spindle rod (1988:152). The weight of the whorl varies directly with the heaviness of the thread, so that the size of whorls ranges from 2.6 to 11.2 cm in outer diameter (Kuhn 1988:151). As shown in Figure 3, spindle whorls overlap in the size of the diameter with smaller *bi*.

Archaeological and textual data support the premise that the artifact that Chinese archaeologists call the spindle whorl was actually used for the spinning activity to which its design was so well suited.<sup>5</sup> Chinese textile fragments dating from the Neolithic period contain spun threads. This implies the use of a hand-held spindle, since the spinning wheel was not introduced in China until the Zhou dynasty (c. 1100–256 B.C.) (Kuhn 1988:142). Oracle-bone graphs, which depict the twisting or doubling of two or three silk filaments into a thread with a hand-

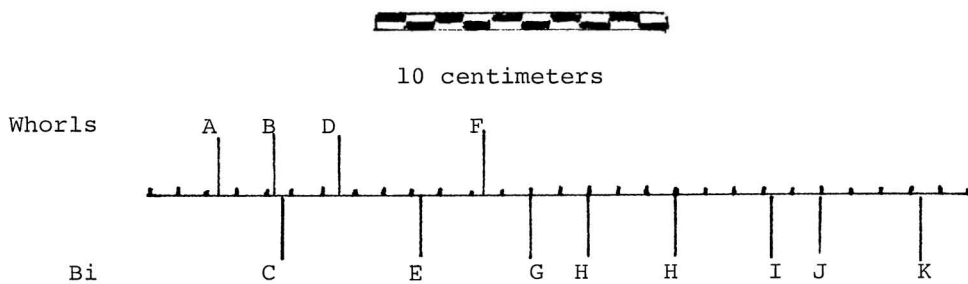


Fig. 3. The continuum of whorl and *bi* as seen in outer diameters: A, smallest spindle whorl, 2.6 cm (Kuhn 1988:151); B, whorl of jade spindle from Yaoshan, 4.3 cm (Pl. III); C, *bi* T-8 M4:5 from Fuquanshan, Songze Culture, 4.5 cm (Shanghai 1990:320); D, decorated whorl from Hemudu, 6.4 cm (Fig. 4a); E, Inner Mongolian *bi*, Miaozigou Culture, 9.2 cm (Nei Menggu 1989:29-30); F, largest spindle whorl, 11.2 cm (Kuhn 1988:151); G, late Liangzhu *bi* from Fuquanshan, T-21 M4:46, 13 cm (Shanghaishi 1986:16); H, early rough plain Liangzhu *bi* from Fanshan, 15-18 cm (Pl. VI); I, Liangzhu *bi* from Caoxieshan, 21.2 cm (Pl. I); J, largest *bi* from Fuquanshan, T-15 M3:111, late Liangzhu, 23 cm (Shanghaishi 1986:16); K, largest *bi* from Sidun, late Liangzhu, 26.2 cm (Pl. II). *Note:* In designations for *bi*, T indicates an excavation area; M, a tomb. The number after the colon is the object number.

spindle, provide textual evidence of the spinning function (Kuhn 1988:89-90). The earliest pieces of silk cloth (2850-2650 B.C.) so far discovered contain spun threads and come from the Liangzhu Culture.<sup>6</sup> One fragment "has a thread count of 72:64 warp-threads to weft-threads per cm" (Kuhn 1988:273), demonstrating the advanced nature of this craft by the third millennium B.C.

The hand-spindle made possible the fast, efficient production of yarns of an even width with fibers so tightly intertwined that they did not spring loose. The spinner could intentionally vary the quality, elasticity, or strength of the thread (Kuhn 1988:70). Kuhn states, "Without question the hand-spindle should be considered as the most important invention ever made in the field of spinning technology. It constitutes an outstanding technological and cultural achievement of Neolithic times, a 'revolution' in textile manufacturing, a complete change in yarn production" (1988:70).

#### *A Comparison of the Bi Shape with That of Other Neolithic Artifacts*

Scholars have introduced various hypotheses for the tool prototype of the *bi*. Willetts credits H. Hentze with the suggestion that the Neolithic model of the *bi* may have been a mace (1965:56-57). Although the *bi* progenitor may have been used occasionally as a cudgel, the *bi* shape is not best suited to this purpose. If the instrument were made originally for bludgeoning, it would be desirable to design it with more heft. A stone shape with jagged teeth on the rim and a very large central hole to accommodate a heavy club would have inflicted considerable damage on the skull of an animal or enemy but is not as close to the *bi* shape as is the discoidal spindle whorl.

Xia Nai favored the round stone axe or the stone bracelet (1986:223) for the precursor to the *bi*. The aperture in a bracelet is too large for a *bi*. Further, the disk shape of a *bi* is not the optimal design for chopping with an axe. Heavy work may have been better served by fat, doughnut-shaped tools, but these do not resemble the *bi* as closely as does the discoidal spindle whorl.



Xia Nai also asserted that the *bi* with a slit (*jue*) was originally an earring or other hanging ornament (1986:216). Although this form preceded the *bi* (Yang Jianfang 1987:185) and could be the *bi* model, many of the early earrings are plump, not flat, and with the slit are not really *bi*-shaped.

In an earlier book, Willetts leaned toward the idea that the *bi* model was the flywheel of a drill (1958:94). This idea is very close to the solution proposed here. Chinese archaeological reports are full of references to spindle whorls from almost all provinces, but none apparently contains illustrations of drill flywheels from Neolithic sites. The heavier whorls, however, could have functioned as drill flywheels, and many jade artifacts possess drilled holes. If some of the spindle whorls doubled as flywheels of drills, then these dual-function objects would join the regular textile implements as ancestors of the *bi*. The accepted designation of the ancient discoidal plaque, however, is "spindle whorl," and this is the name employed here.

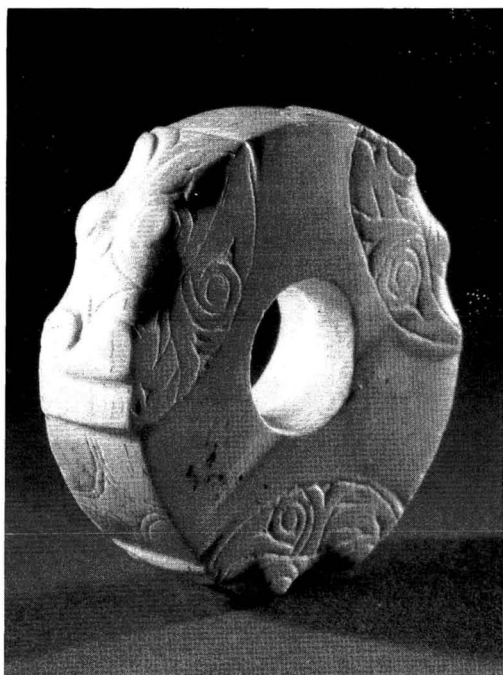
Although the *bi* matches the discoidal spindle whorl more closely than any other tool, ornament, or weapon model, the discoidal spinning whorl and the *bi* differ in material and function. *Bi* are always made of jade or some other decorative stone. Some small *bi* shapes are termed "jade spindle whorls," but Chinese Neolithic utilitarian whorls are made of pottery, nonprecious stone, bone, or wood. Large Liangzhu *bi* fulfilled mortuary or ceremonial functions, while spindle whorls were components of tools. These differences may also apply to the jade ritual axe or hoe and their implement counterparts; therefore, they do not negate the strong formal resemblance of the discoidal spindle whorl and the *bi*.

#### THE CONTEXTUAL RELATIONSHIP BETWEEN DISCOIDAL SPINDLE WHORLS AND *BI*

##### *The Physical Proximity of Bi, Textile Apparatus, and Early Cloth at Liangzhu Archaeological Excavations*

The artificial cemetery hill of Fuquanshan contained the charred remains of fiery funerals and numerous jade offerings, including *bi*.<sup>7</sup> Large, late Liangzhu *bi* occurred here in layers above strata containing pottery spindle whorls of the earlier cultures that directly preceded and occupied the same general area as the Liangzhu. The Majiabang layer (c. 4300–3400 B.C.) yielded a red pottery disk-type spindle whorl, while the Songze layer (c. 3400–3300 B.C.) produced two discoidal whorls. No differently shaped whorls were found in these layers (Kuhn 1988:97).

Late Liangzhu tombs at this site included two jade spinning whorls, one of which is 3.2 cm in diameter. This piece (Pl. IV) has a very small hole, and its proportions most likely led the authors of the report to comment that "it looks like a small *bi*" (Shanghaishi Wenwu Baoguan Weiyuanhui 1986:19). The burial grounds at the site also yielded two jade disks with central holes about as wide as the bodies (*rou*). The earlier of the two has a diameter of 4.5 cm and is associated with Songze grave goods; associated <sup>14</sup>C dates overlap the end of the Songze period and the beginning of the Liangzhu (Shanghaishi Wenwu Guanli Weiyuanhui 1990:320). The second specimen, 4.7 cm in diameter, is from late Liangzhu contexts (Shanghaishi Wenwu Baoguan Weiyuanhui 1986:16). The archaeologists designate these pieces *bi*, although in size they are equivalent to plaques labeled jade spinning whorls at Yaoshan.



Pl. VII. Jade *bi*, diam. 4.2 cm, with dragon heads, from Yaoshan, Yuhang County, Zhejiang. Early second period Liangzhu Culture. After Zhejiangsheng et al. (1989: Pl. CCVIII).

A decorated broken discoidal spindle whorl lay in a Songze cultural stratum at Sidun near the Liangzhu layer that contained the major *bi* and a ceremonial cremation (Nanjing Bowuyuan 1981:197–198). Also a Songze disk-type spindle whorl underlay the typical Liangzhu *bi* (Pl. I) at Caoxieshan (Nanjing Bowuyuan 1980:9). The earliest textile fragment of any kind (c. 4000 B.C.) thus far recovered from China comes from a layer of the Caoxieshan site that is assigned to the Majiabang Culture. This piece of cloth is made of bean-creeper (*Puraria thunbergiana*), or *ge* (Nanjing Bowuyuan 1980:4). Spindle weights occur in the remains of the Hemudu Culture (c. 5000–4000 B.C.) situated in the area south of Hangzhou Bay in northern Zhejiang Province. The earliest large *bi* discussed here (Pl. VI) and the most crucial transition pieces, the jade spindle (Pl. III) and dragon-headed *bi* (Pl. VII) of Fanshan and Yaoshan, originate in the Hangzhou Bay vicinity, not far from the significant early agricultural and textile site of Hemudu. The earliest known bone weaving shuttle comes from Hemudu (Chang 1986:212), and researchers have reconstructed a standing loom from artifacts found at this center (Wang Xu 1990:89–91). The remains associated with cloth manufacture at Hemudu, dated to 4460–4260 B.C., also yielded 70 whorls, 50 of them of the flat disk type. These whorls ranged in diameter from 5.8 to 6.5 cm and were 1 cm thick (Kuhn 1988:93–94). Later occupation layers at Hemudu included the specimens in Figure 4a,b. These examples and other decorated spindle whorls celebrate the remarkably advanced inventions of this textile technology.

#### *Significantly Decorated Spindle Whorls and Their Linkage with Bi*

Wang Xu argues convincingly that the four-way design on the spindle whorl from Hemudu in Figure 4a depicts a handle or crank on a beam of a loom. This handle

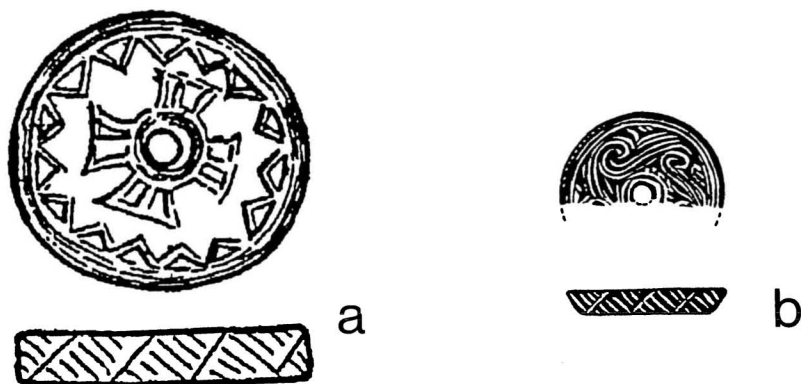


Fig. 4. Spindle whorls: *a*, Pottery spindle whorl with a loom crank or handle design; diam. 6.4 cm, thickness 1 cm; from Hemudu Village, Zhejiang; Hemudu Culture, c. 5000–4000 B.C. (after Hemudu 1980:10). *b*, Black clay broken spindle whorl with incised swirl decoration on one side and leaf or foliage design on the reverse; diam. 7.2 cm, thickness 0.9 cm; from Hemudu Village, Zhejiang; Hemudu Culture (after Hemudu 1980:10).

form became an attribute of female divinities, such as the Queen Mother of the West and the Spinning Damsel (1990:89–91). If one piece of textile apparatus became associated with a sacred symbol, then it may have been relatively simple to elaborate another cloth device, the spindle whorl, into a ritual object, the *bi*.

A companion whorl from Hemudu, the black clay disk in Figure 4*b*, bears designs that may be inspired by thread manufacture or sericulture. One side carries a pattern of incised swirls that may symbolize spinning. The obverse displays a leaf design that could be mulberry, the food plant of the silkworm. This carefully crafted disk, with its evenly slanted edge marked with hatching, could have been made especially as a funerary object rather than as a practical spindle whorl. If this were the case it would represent an instance in which a formerly utilitarian object, the spindle whorl, functioned as a *bi*.

The symbolic elaboration of whorls is suggested by the red-painted disk in Figure 5*a*, whose decoration represents “far more than just the working utensils of daily life” since it bears “a diagram which is traditionally understood as a representation of the *Yin* and *Yang* elements” (Kuhn 1988:113). This whorl is from a late Qujialing (c. 3000–2600 B.C.) site upriver from, and generally contemporary with, the Liangzhu. Other whorls with striking designs—some or all of which may refer to aspects of cloth making, sericulture, or other concepts—come from this site. The excavation team describes the high-fired disks as slightly shiny with red paint on yellow, black, or gray clay (Shilongguojiang shuiku zhi hui bu wenwu gongzuodui 1956:11–12). Such decorative treatments endow these whorls with potential symbolic qualities, relating them to the *bi*.

A whorl (Fig. 5*b*) from the Majiabang Culture and from the same county as the fire burial at Sidun carries an eight-pointed star, or sun sign, which Wang Xu identifies as a sprocket or handle from a loom (1990:84–86). This insignia occurs on pottery bowls and on several other Neolithic spinning whorls (The Organization Committee of the Exhibition of Archaeological Finds of the People’s Republic of China 1975:51; Wang Xu 1990). The motif also appears in jade, the stone of the *bi*,

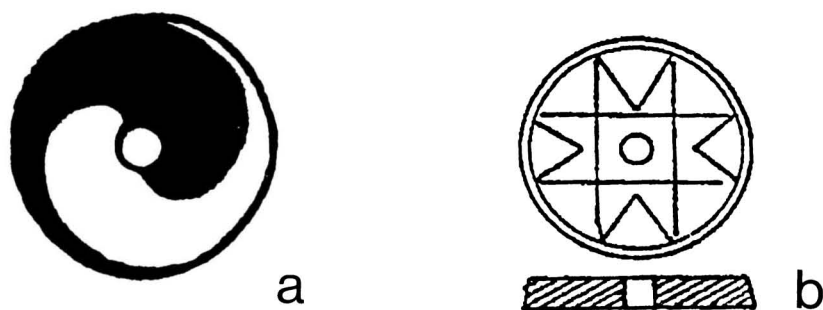


Fig. 5. Spindle whorls: *a*, Red-painted pottery spindle whorl; Qujialing Culture, c. 3000–2600 B.C.; from near Tianmen, Jingshan, Hubei (after Shilongguojiang 1956:14). *b*, Spindle whorl with eight-pointed star or sun sign; Majiabang Culture, c. 4300–3400 B.C.; from Panjiatang, Wujin County, Jiangsu (after Wang Xu 1990:84).

engraved on a rectangular plaque, and augmented with radiating lines like the sun sign. (Wang Yucheng 1992:59). The sun, in turn, may be connected with the *bi*.

Elizabeth Childs-Johnson juxtaposes an oracle-bone pictograph for the “sun’s brightness” with the incised drawing in Plate VIII from a *bi* in the Freer Gallery of Art. Although this *bi* was exhumed without documentation sometime before 1917, the symbols on it and its companion pieces relate to objects unearthed in recent years under controlled circumstances (Zhang and Wang Huiju 1990:905). Childs-Johnson concludes that the *bi* was a “ritual utensil connected with sun worship” (1988:37). If Childs-Johnson is correct, the sun theme joins the *bi* with spindle whorls bearing the star and solar patterns.<sup>8</sup>

### *The Spinning of Whorl and Bi*

I suggest that the whorl and the Liangzhu *bi* had not only a similarity of static shape but also a dynamic correspondence. It is reasonable to assume that the painted and incised spindle whorls, jade whorls, and *bi* were turned on sticks in a manner similar to utilitarian spindle weights. The *bi* could well have had a wooden shaft like the spindle, for without such a staff the *bi* lacks a handle and is incomplete.<sup>9</sup> I suspect, moreover, that the Liangzhu people performed ritual spinning of yarn with jade spindle whorls and *bi*.<sup>10</sup>

### *Ritually Smashed Bi and Broken Spindle Whorls*

In 1982 a team from the Nanjing Museum excavated a rich late Liangzhu grave and documented details that reveal a ritual funeral. This splendid burial, M3, at Sidun Wujin in Changzhou, Jiangsu, contained a lavish offering of jades, many of them burned and some apparently intentionally broken (Pl. V). This feature is dated by <sup>14</sup>C to 2320 ± 20 B.C. The tomb of this man estimated to have been about 20 years old at the time of his death is graced with 24 jade *bi* disks, 33 *cong*, 14 jade tools, and 9 jade ornaments. Five *cong* were broken in half. Many jade *bi* and axes were burned in the grave. Of 21 fragments of *bi*, 13 show evidence of burning. Moreover, eight pieces of *cong* were burned. The man’s body was placed in the grave



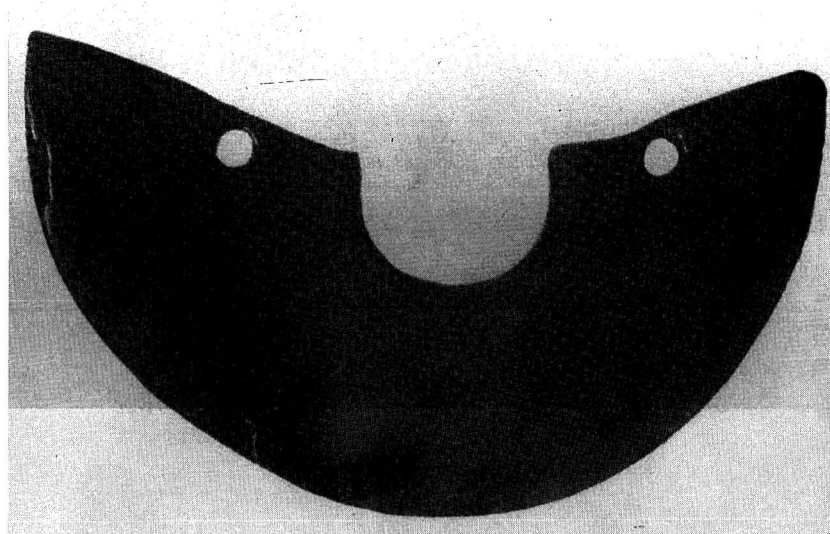
Pl. VIII. Incised figure on a *bi*. Courtesy of The Freer Gallery of Art, Smithsonian Institution, Washington, D.C. 17.348: "Chinese disc; Neolithic, ca. 2000 B.C.; Trad. Chekiang Province; carved jade: 9 5/16 in. (23.6 cm)."

when the fire was almost out. Then jades were placed around the body. The two largest and best *bi* were the last interred, and the biggest (Pl. II) was placed on the abdomen, the other on the chest (Nanjing Bowuyuan 1984:113–114).

I have speculated that the ceremonial breaking and incineration of jades relates to reverence for ancestors. Because burning can turn certain stones "chicken-bone white," a color acquired by jades left long in the ground, the ritual may have been designed to produce archaistic imitations of the grave goods of previous generations. I think that the discoidal *huang*, a partial *bi* (Pl. IX), is an archaistic representation of a fractured spindle whorl. Reverence for predecessors has a long tradition in Chinese culture and was strong centuries after the Sidun funeral in the Shang dynasty (c. 1750–1100 B.C.). David Keightley states that the "great bulk of Shang sacrificial wealth and divinatory attention was devoted to the ancestors" (1978:217). I suggest that the discoidal *huang* and the *bi* reproduce in precious stone the partial and whole spindle whorls found in the graves of the ancestors.

#### THE HISTORICAL RELATIONSHIP OF THE *BI* AND THE DISCOIDAL SPINDLE WHORL

Spindle whorls and *bi* overlap in time and place in the Liangzhu Culture. The burial grounds at Yaoshan and Fanshan provide an especially vivid example. In 1987 at the early Liangzhu cemetery of Yaoshan, atop an artificial ceremonial platform or "altar," archaeologists uncovered a transition piece between the whorl and the *bi*: a jade spindle shaft lying inserted into a jade whorl (Pl. III). In this accurate re-



Pl. IX. Example of a discoidal *huang*, a partial *bi*, Majiabang Culture, W. 3.2 cm. "Translucent yellow and pink jade plaque. . . . At each end is a small bore-hole with signs of wear. . . . Unearthed in 1974 from a grave at Songze, Qingpu County, Shanghai, and found near the cervical part of a female skeleton. . . . The  $^{14}\text{C}$  date of human bone from the same stratum as the above-mentioned female skeleton is  $5860 \pm 245$  B.P." (Yang Jianfang 1987:211 and Pl. I:3.).

production of the complete Neolithic tool, the whorl measures 4.3 cm in diameter. This jade whorl joined 25 pieces of similar plain white jade disks approximately 4.5 cm in diameter at this cemetery. The authors of the report term these disks "*bi*-style" because they are identical to *bi* in form and material (Zhejiangsheng Wenwu Kaogu Yanjiusuo 1988:48).

The same row of Yaoshan tombs also contained two whorl-shaped jade plaques with overlapping monster or dragon heads on the rim. One of these disks (Pl. VII) carries three identical faces equidistant from each other. The heads are imaginative composites of features: high horns or brows, flowing hair or feathers, round eyes, a wide mouth, blunt tusks, and a diamond-shaped nose. Arched lines make a four-way design between the heads. The authors of the report comment that these two disks "look like small *bi*" (Zhejiangsheng Wenwu Kaogu Yanjiusuo 1988:48). With its irregular outer edge and significant decoration, the jade plaque in Plate VII was certainly not for ordinary spinning. Its function was decorative, mortuary and probably ceremonial, making it indeed a small *bi*. The fantastic heads join this *bi* to the supernatural.

The same dragon faces appear on an arched pendant, a bracelet, and six discoidal pendants in this row of tombs (Zhejiangsheng et al. 1989: fig. 102, pl. 219). A white jade perforated disk, 4.8 cm in diameter and embellished with dragon faces overlapping the circumference, was found at the nearby cemetery of Fanshan. The Fanshan excavation revealed the earliest large *bi* discussed here: piles of crudely made plain jade disks 15–18 cm in diameter (Pl. VI) (Zhejiangsheng Wenwu Kaogu Yanjiusuo Fanshan Kaogudui 1988:9).



Pl. X. Jade suit and jade *bi* from the tomb of Dou Wan, c. 113 B.C., Han Dynasty. Six whole *bi* from this burial range from 14.1 to 21.2 cm in diameter (The Organization Committee of the Exhibition of Archaeological Finds of the People's Republic of China 1975:152–157). After *Zhongguo* (1972: Pl. XI).

No  $^{14}\text{C}$  dates are reported for Fanshan or Yaoshan, but the associated pottery styles date Yaoshan to “early second period Liangzhu” and Fanshan to c. 3000–2800 B.C. (Zhejiangsheng Wenwu Kaogu Yanjiusuo Fanshan Kaogudui 1988:30). These two sites contain the seminal elements of the *bi*: a perfect jade model of a complete spindle, plain whorl-sized jade proto-*bi*, small *bi* with supernatural dragon heads, and finally the many examples of the larger plain Liangzhu *bi* form.

In the late Liangzhu period craftsmen exploited the properties of the minerals from the Lake Tai district to make much wider, very thin *bi*. The blue *bi* from Sidun in Plate II measures 26.7 cm in diameter and an almost incredible 1 cm thick. The lavender *bi* from Caoxieshan in Plate I is 21.2 cm wide and 0.8 cm thick. These *bi* are displays of the jade workers' virtuosity. I believe that the unusual strength of the materials at hand stimulated aesthetic considerations and governed the extension and flattening of the jade spindle whorls, the dragon disks, and the rough Fanshan *bi* to the dimensions of the great *bi* from Caoxieshan, Fuquanshan, and Sidun.

The Liangzhu *bi* became the archetypal form. The Shang interred the disks in tamped foundations of buildings, indicating that *bi* were considered auspicious at this time (Rawson 1975:29). Also, *bi* were important Shang grave offerings: the famous Shang tomb of Lady Fu Hao yielded 16 *bi* (Xia 1986:210). The mortuary function continued into the Zhou dynasty, and Zhou literature contains descriptions of other uses of *bi* as well (Rawson 1975:29).<sup>11</sup> After the middle of the first millennium B.C., the bodies of *bi* were sometimes pierced and embellished with openwork on the rim, but the classic Liangzhu form endured. The *bi* that lay beside, under, and upon the corpse in the M3 burial at Sidun are the same shape as those that lay beside, under, and upon Dou Wan in her jade burial suit in the Han dynasty two millennia later (Pl. X)—and this is also the shape of the discoidal spindle whorl.



## CONCLUSION

The search for the origin of the *bi* attempts to solve the puzzle of a jade form that has been continually reproduced from the Neolithic to the present. It also deepens knowledge of the beginnings of the traditions of a proud, populous, and powerful country. Recent Chinese archaeology has opened tombs of the late Neolithic Liangzhu Culture of the lower Changjiang region, where *bi* appear in profusion, providing opportunities for a reevaluation of the *bi*. Because other Chinese ritual jades, such as axes and hoes, are obvious reproductions of tools, it is reasonable to seek a Neolithic implement prototype for this ceremonial disk.

The *bi* matches the discoidal whorl of the hand-spindle more nearly than any other Neolithic tool, weapon, or ornament, and smaller *bi* coincide in size with larger whorls. The hand-spindle was an important invention and was a significant component of the highly developed textile technology of the Liangzhu region. Therefore the disk, the most common form of the spindle weight that was an essential element of the spindle, was reproduced in jade.

Spindle whorls, other pieces of textile apparatus, and early fragments of cloth lie near *bi* in excavations. Some spindle whorls bear designs that infuse the disks with significance beyond their utilitarian functions, perhaps celebrating cloth making or sericulture, and linking these plaques with the *bi*. Ritually smashed and burned *bi* and the discoidal *huang*, a partial *bi*, may reproduce broken whorls from the graves of the ancestors. Furthermore, the Liangzhu people perhaps employed *bi* and jade spindle whorls for ritual spinning of yarn.

Jade spinning whorls, a complete jade spindle, small dragon-headed *bi* from Yaoshan, and large, crude *bi* from the related cemetery at Fanshan illustrate a possible sequence for the transition from whorl to *bi*. Later Liangzhu craftsmen skillfully exploited the qualities of the mineral material at hand to extend and flatten the shape of the jade spindle whorls and rough *bi* into wider, very thin classic *bi* forms. These inferred steps on the developmental path from the utilitarian spindle whorl to the ritual *bi* illuminate what may be a unique view of the transition from a Neolithic tool or weapon to the ritual jade analogue. The evidence links the jade *bi* and the discoidal whorl of the hand-spindle formally, contextually, and historically.

## APPENDIX A

Because the lower Changjiang region is so important in the development of the *bi*, it is particularly disconcerting that authorities differ on the dates of the Neolithic cultures there. Kwang-chih Chang writes that at a 1977 meeting of Chinese archaeologists from several provinces, "no agreement was reached as to what these cultures should be called" (1986:196). In the 1986 edition of his *Archaeology of Ancient China*, Chang locates the Hemudu Culture south of Hangzhou Bay and writes that this culture existed for "most of the fifth and fourth millennia B.C." (1986:208). He situates the Majiabang Culture north of the bay and generally contemporary with the Hemudu (1986:208). Although Chang writes that the Songze Culture developed from the Majiabang (1986:203), he gives identical radiocarbon dates for the two: c. 5000–3000 B.C. (1986:197). He relates that the Liangzhu Culture was an outgrowth of the Majiabang (1986:253) and shows a <sup>14</sup>C profile extending from before 4000 to after 2000 B.C. for the Liangzhu (1986:255).



The *Chinese Encyclopedia of Archaeology*, also published in 1986, agrees on the dates for the Hemudu Culture but places the Majiabang at 5000–4000 B.C., the Songze at 3900–3300 B.C., and the Liangzhu at 3300–2200 B.C. (Xia 1986:188, 271–272, 300–301, 486).

In a 1987 volume, Yang Jianfang gives the following dates: Hemudu, c. 5000–4800 B.C.; Majiabang, c. 4750–3900 B.C.; Songze, c. 3900–2700 B.C.; and Liangzhu, c. 2700–2250 B.C. (1987:197).

An Zhemin, writing in December 1988, however, dates the Hemudu at c. 5000–4000 B.C. and the Majiabang at c. 4300–3400 B.C. He gives the Songze Culture the surprisingly short span of c. 3400–3300 B.C., and sets the Liangzhu Culture at c. 3300–2200 B.C. (1988:756).

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#### NOTES

1. Pinyin, the method of romanization of the People's Republic of China, is used except in quotations, where the authors' original spelling is retained. In the text and citations the family name precedes the given name for all Chinese names. In Appendix A and in the notes Chinese names are written in the manner used by the individual. In the references the family name of each author is followed by a comma and precedes the given name. The given name precedes the family name for all other names in the references.
2. The word *jade* is used broadly in this paper to include various minerals found near Lake Tai, such as serpentine, actinolite, tremolite, agate, and chrysotile. Nephrite, "a compact form of tremolite or, if iron is present in considerable quantity, of actinolite," was used occasionally (Yang Jianfang 1987:186).
3. For Chinese Neolithic cultures I have chosen to use the dates given by An Zhimin, vice director of the Institute of Archaeology, Chinese Academy of Social Sciences (1988:756). A discussion of dates used by other authorities is included in Appendix A.
4. Other Neolithic cultures from which *bi* have been reported are the Hongshan, Shixia, Dawenkou, Daxi, Longshan, Majiayao, Qijia, Xiaozhushan, and Xuejiagang (Huang 1992:80). A bluish green *bi* has also been reported for the Miaozigou Culture in Inner Mongolia (Nei Menggu Wenwu Kaogu yanjiusuo 1989:29–30), and I discuss a report of a Songze *bi*.
5. It would be a mistake to arbitrarily project modern tool differentiation upon Neolithic people. Some whorls show wear on their edges that may have been caused by some use other than or in addition to spinning. Such a tool could also have been used as an axe, weight for agricultural tools, hunting tool, symbol of authority, religious object, decorative object, or leather-working tool (Yun 1986:535–546). Some nondiscoidal artifacts, such as cones, mounds, and globular shapes, designated in reports as spindle whorls, may have been made originally for some other purpose, such as net, warp, or weft weights. Certain warp or weft weights are pebbles with indentations chipped into the surface making troughs to hold a fiber, like the indentation on the cylinder of a spool (Kent and Nelson 1976, 1977). The weights are, in fact, heavy spools or bobbins and are not disk-shaped. In sum, although the discoidal spindle whorls cited in this paper may have been used for other purposes, this design is particularly appropriate for a flywheel and is especially well suited to the spinning function.
6. The earliest silk fragments found in China used threads, some spun in an S direction and some spun in a Z direction. The filaments came from the domesticated silkworm, *Bombyx mori*. The pieces of silk were discovered in a bamboo basket "at the site of Chhien-shan-yang, [sic] Wu-hsing county in Chekiang province." The layer containing this artifact was <sup>14</sup>C dated between 2850 and 2650 B.C. The site most probably belonged to the Liang-chu culture" (Kuhn:1988:272–273). Bast fibers, such as hemp (*Cannabis sativa*, Chinese name *ma*), ramie (*Boehmeria nivea*, Chinese name *zhuma*), and bean-creeper (*Pueraria thunbergiana*, Chinese name *ge*, or *kuzu* as the plant is known in Japan) also were spun (Kuhn 1988:23–39, 274).

7. Liangzhu graves also held a variety of jade *cong*, *huang* (arched pendants or partial *bi*), rings, tridents, axes, D-shaped plaques, intricately carved trapezoidal crowns or hat ornaments, drum shapes, cylindrical rods, birds, fish, turtles, and jewelry, as well as elongated artifacts that archaeologists generally designate as hair-pins, awl-shaped objects, or handle-shaped pieces (Zhejiangsheng Wenwu Kaogu Yanjiusuo, Shanghai Shi Wenwu Baoguan Weiyuanhui, and Nanjing Bowuyuan 1989:8; Xia 1986:230, 233; Yang Jianfang 1987:227). The handle shapes have a tenon on one end to fit into something, and I have wondered if some of the jade handles reproduce the rods of spindles.
8. I am quite satisfied with the identification of the star with radiating lines as a sun symbol, but I am not convinced by Wang Yucheng's hypothesis that the eight-pointed star design began as crossed lacings for holes on turtle shells (1992:59). Zhang Minghua and Wang Huiju contend that the eight-pointed star depicts fish and may constitute a tribal emblem (1990:903–905). Wu Hung writes that the provocative and puzzling designs on the Freer *bi* are emblems for groups of people (1985:36).
9. A handle would not be necessary for the *bi* if it were a pendant, but I think that this was a use reserved for smaller, spindle-whorl-sized *bi*. Although the large Liangzhu *bi* would have been clumsy to wear as personal ornaments, small jade rings with wide holes could have been scarf clasps, a fashion illustrated in the first millennium B.C. Moreover six dragon-headed jade disks from Yaoshan and one identical piece from Fanshan bear small perforations, in addition to the central hole, indicating that they were sewn to garments or were pendants. The supernatural dragon or monster heads may have rendered these disks amulets.
10. The Liangzhu possessed a remarkable long filament for such ritual spinning: silk. Its special qualities—its softness, fineness, lightness, strength, and sheen—and presumed economic value perhaps inspired such use. Sericulture has a conceptual parallel with burial: the silkworm cocoon could symbolize a shroud or grave, and the metamorphosis and emergence of the moth could symbolize rebirth.
11. The use of the *bi* to worship Heaven, as recounted in the *Zhou li*, a Zhou dynasty book of rites, cannot be projected backward in time through the preceding Shang dynasty (Willets 1965:56). Xia Nai writes that he agrees “with most historians that the *Chou Li* is an archaizing work” and an artificial systemization (1986:209). In later centuries the *bi* found increasing favor in China as lapidary pieces for personal adornment and as honored features of the scholar's or official's paraphernalia, displayed in hangings or on stands. The antiquarian interests of the Chinese scholar class amplified the popularity of this auspicious jade form.

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## ABSTRACT

This paper examines the question of the origin of the *bi*, a Chinese ritual or decorative flat disk with a relatively small hole in the middle, in the light of recent archaeological reports relating to the late Neolithic Liangzhu culture of southern Jiangsu and northern Zhejiang provinces. Other Chinese ritual jades possess tool prototypes. The hypothesis is that the *bi* and the discoidal whorl of the hand spindle are linked formally, contextually, and historically. In addition to the formal resemblance, the relationship of *bi* to textile implements, the correspondence of ritually smashed *bi* with broken whorls, significantly decorated whorls, and the possible ritual spinning of yarn are treated. The Liangzhu cemeteries at Yaoshan and Fanshan present an example of a possible sequence from a complete jade spindle and other jade whorls to small dragon-headed *bi* and, finally, to the large Liangzhu *bi* form. KEYWORDS: *bi*, spindle whorl, jade spindle whorl, Liangzhu, Changjiang River, Lake Tai, Yaoshan, Fanshan, Sidun, Fuquanshan, Caoxieshan, Zhejiang, Jiangsu.