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The Various Colors of Jade

Jade beads (*magnified image*) from the Narisitai settlement site of the Hongshan culture (6600–4900 BP), Bairin Left Banner, Inner Mongolia, China. The surface of the beads clearly shows traces of machine drilling

Even early humans, on the eve of evolution, desired to decorate themselves with ornaments made of rare materials (be it boar fangs, shark teeth, or ostrich feathers). In the Stone Age, as befits the epoch, colorful minerals were especially well-liked. Suffice it to recall a find from Layer 11 in Denisova Cave—a bracelet of dark green chloritolite, dated to about 30 000 years before present (Derevyanko, Shunkov, and Volkov, 2008). It seems that people of those days must have already developed an aesthetic perception of such things ("It really looks good!"). What is beyond doubt is that the decorations meant prestige and high status, as evidenced by a large body of ethnographic data. Another practical—from the perspective of traditional culture—purpose of colored stones is their magical effect as amulets, including for the treatment and prevention of diseases as well as hex and evil eye. Publications on these topics swarm all over the Internet, but in this case home-grown astrologers and healers illicitly exploit truly ancient beliefs

Key words: nephrite, jade implements, Hongshan Culture, Hamin dwelling-site, Hac Sa (Heisha) work-shop, ancient technologies, stone bearings

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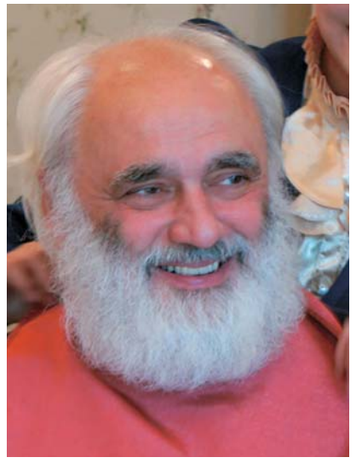

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Jade items from dwelling F46 at the Hamin Neolithic settlement site. The dwellers wore such ornaments in everyday life

Due to its high technological characteristics, jade always stood out among prestigious healing products made of rare materials. In the times of antiquity, jade was called *iaspis* (possibly derived from the ancient Greek verb 'heal'). It was only in modern times that the stone acquired its current name—in two versions: the Latin phrase *lapis nephriticus* ('stone for healing kidneys') first appeared in 1611, and the French word *jade* (from the Spanish term *piedra de ijada*, 'stone against colic in the side') in 1647 (Fersman, 1974).

Jade: a medicine or a symbol?

In China, the word used to call jade (*yu*) did not have any pronounced therapeutic connotations although many medical treatises mentioned, for instance, the use of jade plates for medical skin applications. The sacred, symbolic role of jade received much greater recognition. It was on the territory of Northeast Asia that the use of jade reached its peak throughout the human history. It became a highly respected and viable cultural symbol in many countries of the region (primarily in China itself). According to one of the authors of this article, jade was chosen as a symbol of supreme perfection by people of the Mongoloid race whereas the Caucasians chose gold (Tang Chung, 1998).

The comprehensive study of jade items, launched by Prof. Tang Chung as early as in the 1990s, inevitably brought him to the problems of transcontinental contacts and migrations, leading to the development of new ideas and approaches in both technological and aesthetic fields. These problems could only be addressed through the maximum use of the collected materials and with intellectual support from scholars who study jade cultures in the Asia–Pacific region.

Generally speaking, the Mongoloid peoples did not dislike gold and used it willingly both as ornaments and treasures but only alongside jade, which they held in higher regard as a more refined and valuable mineral. Some authors believe that such a tepid (uncommon in Europeans) attitude towards gold was due to its rarity. True, there are no large gold deposits on the territory of modern China. However, sources of high-quality nephrite were also few in number. The most valuable varieties—milky white and emerald green (jadeite)—were delivered from afar, from Khotan and Burma, respectively. Thus, the reasons for worshiping jade in East Asia were ideological rather than geological. Gold meant merely a thing of material value while jade also stood as a symbol of all virtues. However, the practical-minded Chinese managed to combine the material reasons with the spiritual ones. So, wishing someone good luck and prosperity, they said (and still say): "Jin yu man tang!" ("May gold and jade fill your house!")

Jade figurines. *The Hongshan culture, about 5500 BP*. Chinese researchers believe that the shaman's posture (*top*) shows that he is working with inner energy (*Qi*)

Crazy for the red blue white and yellow...

The earliest evidence of jade crafting comes from Siberia, from sites dating to the Upper Paleolithic (near the village of Malta along the Angara River). The tradition evolved further in the neighborhoods of Lake Baikal, an area that concentrates huge reserves of nephrite. Here, the Neolithic sites of the Serovo culture (5500—4300 BP) show a prevalence of tools made of green jade, and the Glazkovo sites of the Bronze Age (4000—3600 BP) contain mostly rings and discs made of white stone. However, the Glazkovo-type white jade ornaments spread in the Bronze Age over a much wider territory, from the banks of the Oka River in the Volga region to the basin of the Amur River, but it remains debatable whether they had come from a single center or had arisen convergent in different cultures.

Speaking about China, the earliest finds are attributed to the Neolithic cultures of Xinglongwa (8200—7200 BP) and Hongshan (c. 6600—4900 BP), which were discovered in Dongbei (more ancient jade ornaments, dating to 10,000 years BP, were recently found in this region, but they are few in number and not systematic). The most valuable items were made of yellowish-green jade, most likely from Xiuyan, the only field we know of in this region.

Meanwhile, the white jade items that were found in Heilongjiang are likely to originate from the cis-Baikal region, a possibility suggested as far back as in 1998 by Prof. Shinpei Kato. Contacts could have occurred along the banks of the Amur River. Ornaments made of white translucent jade are also found in Inner Mongolia, Jilin, and Liaoning, especially at early Bronze Age sites. It should be noted that the raw materials for jade manufacture were hardly of a local origin since no stones of this color have been found in Xiuyan.

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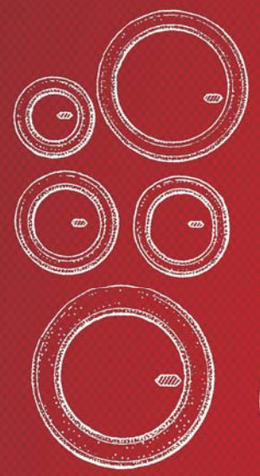
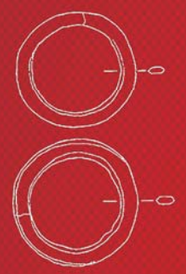
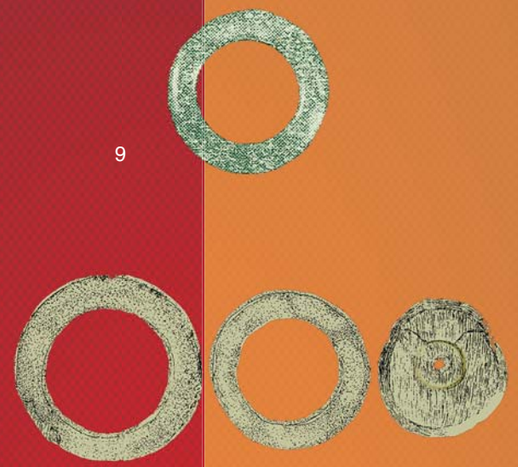
The cult of jade in China was given an ideological underpinning reinforced by the authority of Confucius. The treatise *Xunzi* (compiled in the 30s of the 3rd century BCE) ascribes to him the following words: "As for jade, the gentleman compares it with virtue." After saying this, Confucius gives an accurate and recognizable description of the mineral's most essential properties: "The way it is warm, smooth, and lustrous resembles benevolence (*ren*). The way it has structure and contains patterns resembles wisdom (*zhi*). The way it is firm and unyielding resembles responsibility (*yi*). The way it is sharp but does not cut resembles proper conduct (*xing*). The way it can be broken but does not bend resembles courage (*young*). The way that even its flaws are visible resembles genuineness (*qing*). In the way that when struck, its sound is pure, rises high, and can be heard far away, but when it stops, it finishes completely, it resembles proper speech (*ci*)." Jade pendants, shining like virtuous humanity, are mentioned in the commentary by Wang Yi (89—156) to the classic poetry anthology *Chu Ci* (*Verses of Chu*) and in some other literary works of the Ancient World and the Middle Ages (Yang Boda, 1997; Wang Yanchun, 1998)

Jade items found on the territory of Northeast China (Dongbei), presented in the chronological order:

1 – Shuangta site, around 10,000 BP;
2 – Xiaonanshan site, 9000 BP;
3 – Xinglongwa culture, 8000–7500 BP;
4 – Houtaomuga site, period 3, around 6500 BP;
5 – *top*: Houtaomuga site, period 4;
bottom: Hamin site, 5500 BP;
6 – Hongshan culture, around 5500 BP;
7 – Ligaotu site, around 4000 BP







Distribution map of Baikal jades in the Bronze Age (*green*, site locations in Russia; *brown*, site locations in China):

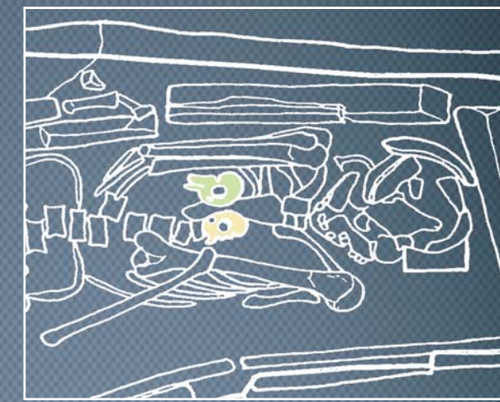
1 – Seima;
2 – Ust'-Vetluga burial site;
3 – Turbino;
4 – Okunevo-15;
5 – Shamansky Mys (Shaman Cape);
6 – Shumilikha;
7 – Hake, Inner Mongolia;
8 – Daqiao (Big Bridge) at the Wuyuer River, Heilongjiang province;
9 – Wanghaitun, Heilongjiang province;
10 – Xinxingxiang, Jilin province

Quarry in Xiuyan (Liaoning Province) for the extraction of marble and "soft" nephrite. *Bottom*: jade samples of different shades from the Xiuyan deposit

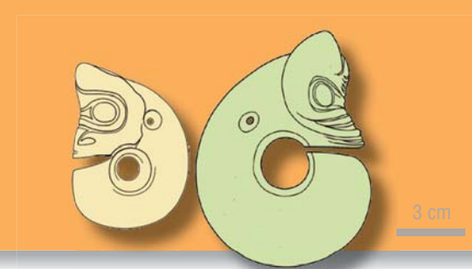
A while back, Chinese scholars discovered that most of geochemical techniques (such as X-ray diffraction, infrared and Raman spectroscopy, etc.) cannot reliably distinguish between nephrite sources inside China. Russian experts came to more or less similar conclusions. Therefore, much importance is attached to visual techniques for identifying the color and transparency of the mineral on the accepted scale (the various shades of green and white predominate in the color scheme, but there also are yellow, azure, reddish, and even black stones).

Technology matters most

In recent years, a number of promising articles appeared on the study of rare-earth elements in nephrite by inductively coupled plasma mass spectrometry. Using this method, researchers were able to establish a difference in the concentration of rare-earth elements in nephrite from Xiuyan in comparison with other deposits in China. It seems that the same conclusion can be made about the Baikal nephrites. Data on stable strontium isotopes offer another

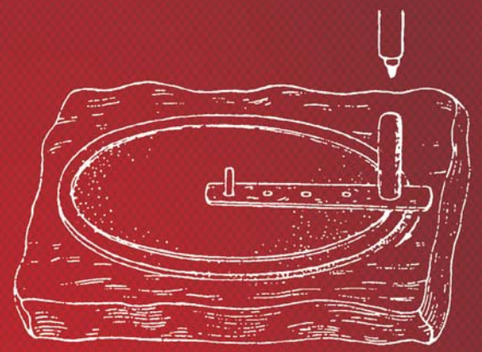


Jade dragons found in burial site N2Z1M4 at the Niuheliang cult monument in Liaoning Province



It was the Xinglongwa burial site that revealed the most ancient jade items in China: large ring-shaped pendant earrings (*jue*), which in later periods spread as far as Yakutia in the north and Vietnam in the south. In Manchuria, these ornaments appeared into the Hongshan culture, which highlighted the transition from the Late Neolithic to the early Metal Age (c. 6600—4900 BP). Particularly rich finds were unearthed at the Niuheliang cult site (Liaoning Province), in the vicinity of the so-called Goddess Temple. The ornaments were shaped like a coiled dragon with the face of a fantastic beast. According to the Novosibirsk archaeologist Sergei Alkin, the half-ring-shaped figurines depicted the larvae of some species of insects as an embodiment of the entomological layer of ancient mythology (Alkin, 1995; 2003). Indeed, insects, whose life cycle occurred in different environments and went through several radical metamorphoses, may well have served as a symbol of the most essential mythological function—that of transition (from one world to another). However, in our opinion, no less important is the fact that the jade figurines can be identified with the dragon, an originally multifaceted image extending the mythological image of a snake by combining it with features of other animals, including insects. Since one mythological symbol combined in itself different features, it could not be attributed to any specific real animal

Excavations at the Hac Sa (Heisha) site (meaning 'black sands') on the coast of Lingdingyang Channel (Macau Special Administrative Region, China) unearthed a stone-cutting workshop dating back to the Neolithic period (c. 4000 BP). The workshop produced small rings and discs, mainly from slate but also from jade, rock crystal, and other types of stone. Since the site was prolific with finds, Chinese archaeologists managed to reconstruct the production process: from raw materials through several stages of processing to finished items (Tang Chung, 2013). The stone bearings found at the site motivated a study of the rotation process throughout the evolution of ancient technologies. The evidence of mass-scale manufacturing and standardization gave rise to a hypothesis that the stone rings and discs served as a universal measure of value, in other words—money. Meanwhile, like all other ancient types of money, they also had consumer value, i. e., could be used as ornaments

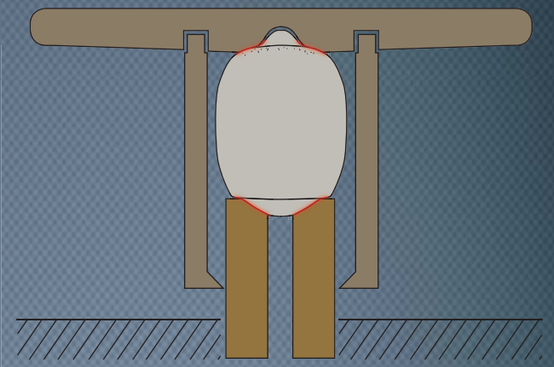


Top: "northern" technology for carving a jade disc (according to S. A. Semenov)

Bottom: a jade disc from Shumilikha, the Baikal region, crafted by the "northern" technology. This item is likely a semi-finished product for manufacturing a ring and a disc

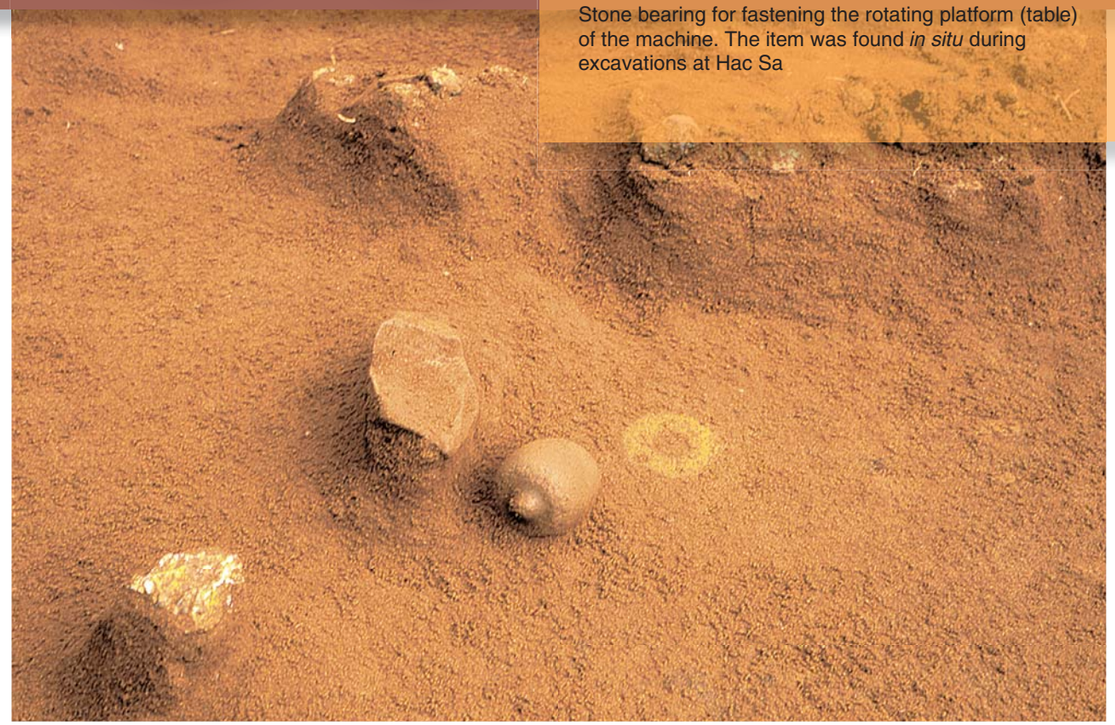
promising instrument for zoning the sources of nephrite. Systematic application of these methods will create a complete picture for all nephrite deposits in the region and trace the transportation routes for the delivery of this valuable and, undoubtedly, practical material.

The accumulated data on the composition of the mineral resources can be verified using the technological approach developed by Prof. Tang Chung. He studied finished jade items and unfinished blanks by trace evidence analysis to restore the manufacturing process and tested his theory using the methods of experimental archeology. It turned out that as early as in the Neolithic, people used two main procedures (and devised the corresponding mechanisms) for the manufacture of rings and discs. One of these procedures, reconstructed by the archaeologist Sergei Semenov back in the 1950s, involves the use of the simplest available tools for the sawing and drilling of blanks. This technology was popular in most of the Neolithic cultures of Siberia and the Far East and in the northern regions of Manchuria. Another technology emerged in East China (Liangzhu culture, etc.) and gradually spread to most of East and Southeast Asia. The craftsmen used a boring machine of some kind with a base on which they fixed a blank; the base was set in rotation by means of a stone bearing. Hollow bamboo trunks must have served as a drill cutter



Mounting diagram for a stone bearing at the base of the rotating table in the ancient drilling and milling machine ("eastern" technology). A similar machine was used in the workshop excavated at Hac Sa, Macau

Left: one of the most ancient stone bearings, which was found during excavations at the Chahai site in Liaoning Province (around 8000 BP)



Stone bearing for fastening the rotating platform (table) of the machine. The item was found *in situ* during excavations at Hac Sa

Jade rings from the Ligaotu burial site, Inner Mongolia

The Hamin settlement (Horqin Left Middle Banner, the Tongliao city, Inner Mongolia, China) was excavated in 2010—2014 by Ji Ping and Tang Chung. The site is dated to the Neolithic; based on radiocarbon analysis, its age lies in the range of 5500—5100 BP. The dwellers' main activity was agriculture, as shown by such finds as seeds of Siberian and common millet; hemp; and also *Artemisia sieversiana;* the latter could be used to prepare concoct medicines. The excavation team unearthed an area of 8200 m^2 to discover 81 dwellings, 61 utility pits, and 14 burials; the settlement was surrounded by a double moat. Archaeologists found bone remains of 205 people, who were buried inside the dwellings rather than in graves. One small (18 m^2) dwelling F40 was found to contain remains of 97 people, who were brought there after death, then the dwelling was burned. Anthropologists found that all the bones belonged either to women or children. Other dwellings showed the same picture although they contained not so many bones (from 1 to 22 incomplete skeletons) (Tang Chung and Ji Ping, 2018). These details suggest that a tragedy must have happened five thousand years ago. The men probably went on a hunting or military expedition, after which the defenseless settlement was attacked by external forces (probably with epidemic included). In 2016, a museum park was created at the excavation site

(where there was no bamboo, one could have used large hollow bones, which were emptied of the core matter), which allowed for almost any diameter of the finished item. This "eastern" technology made it possible to mass-manufacture standard items, as demonstrated by excavations of stone-cutting workshops (e. g., at the Hac Sa (Heisha) site in Macau).

The two vast technological provinces interacted via an intermediate contact zone, which served as a venue for exchanging both raw materials and production skills. Thus, the stone ornaments from Chertovy Vorota Cave (7550—6880 BP) in Primorye, which is geographically close to the northern province, were manufactured using rotary mechanisms (machinery). The finds from the Ligaotu burial site (5000—4000 BP) in Inner Mongolia, despite its closeness to the Xinglongwa and Hongshan sites, include rings of white translucent jade made in the northern manner. The most original set of jade ornaments was found at Hamin (5500—5100 BP), also located in Inner Mongolia, relatively close to the former. Here, a single set of 30 items represents both traditions simultaneously.

The identification of this contact zone would allow a more detailed reconstruction of the contacts between the ancient cultures of Northeast Asia, and the new interdisciplinary methods would be helpful for further research of jade artifacts by Russian archaeologists (e.g., as applied to the problem of the origin of the Seima jades).

The year 2018 marked the completion of the research project called Jade Processing Technologies and the Exchange of Raw Materials in Prehistoric Northeast Asia: An Archaeological Study of Jade Products (CUHK No. 14602215), which was funded by the General Research Fund of the Government of the Hong Kong Special Autonomous Region (Hong Kong). This project was led by Prof. Tang Chung, Director of the Center for Chinese Archaeology and Art, Chinese University of Hong Kong, one of the leading universities in the region, which ranks highly in the TOP-100 lists (49th in the world ranking, according to QS, or 57th, according to THE). The Russian party to the project involved researchers from the Institute of Archeology and Ethnography SB RAS: Academician A. P. Derevyanko, S. A. Komissarov, and O. I. Goryunova. The research team also included scholars from mainland China and Japan

1 cm

1 cm

2 cm

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Excavations and finds at Hamin. The black layer of ashes, burnt bones, and sooty stone items indicate that the fire started after the dead bodies were placed, together with mundane inventory, in the dwellings. *Upper left corner*: dig pit of dwelling F13; *lower right corner*: dig pit of dwelling F21; *lower left corner*: a fragment of the dig pit of dwelling F37. *Center of the two-page opening*: jade items from the above dwellings (*left to right*): *bi* semidiscs (likely pendants) from F21; a poleax from F37; spades from F13

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Excavations of the "death house" F40 at Hamin

Most of the photographs and other illustrations were provided by Prof. Tang Chung; the photos of excavations at the Hamin settlement site were provided by Prof. Ji Ping