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Scientific Research in Early Chinese Glass.

Robert H. Brill and John H. Martin, editors.
The Corning Museum of Glass, One Museum

Way, Corning, New York 14830-2253; 1991. ix + 212 pp., 187 figs., 32 tables. \$55.00 (cloth).

This attractive and well-constructed book fills a niche in glass studies that has been empty since before Liberation. Brill and Martin and The Corning Museum are to be congratulated for obtaining funds from the Woodcock Foundation and the National Science Foundation for the publication of this "Symposium sponsored by TC17: The Archaeometry of Glass, a Technical Committee of the International Commission on Glass." Officially this work represents and is subtitled the "Proceedings of The Archaeometry of Glass Sessions of the 1984 International Symposium on Glass, September 7, 1984 with Supplementary Papers." It is also A Publication of The Corning Museum of Glass.

The original symposium had seven papers listed, two of which were not delivered, yet eleven papers were presented. The two papers not read are included in Part I. Part II contains seven Supplementary Papers.

In their Introduction, the editors present an impressive list of sixteen research questions, a list worthy of further discussion and research. As they point out, the symposium has resulted in the emergence of some answers but also new questions. When this research is applied to modern bead research, even more questions come to mind. They also explain that the delay in publication is the result of the success of the meeting. Too many papers resulted in the need for a new source of publication funds.

In the Introduction to the Symposium Papers, Gan Fuxi sets the tone of the symposium in his major interest, the chemistry of Chinese glass. He also presents a brief but well-done summary of the major arguments on the origins of Chinese glass.

Gan sets up four major dated periods for the production of Chinese glass:

1. From the Western Zhou Dynasty (ca. 1100-771 B.C.) to the Spring and Autumn Period (770-476 B.C.).
2. From the Warring States Period (475-227 B.C.) to the Sui Dynasty (A.D. 581-618).
3. From the Tang Dynasty (A.D. 618-907) to the Yuan Dynasty (A.D. 1271-1368).
4. From the Ming Dynasty (A.D. 1368-1644) to the Qing Dynasty (A.D. 1644-1911) [p. 2].

These dates are followed by a description of the typical glass products and the major chemical formulas used in glass manufacture. For the readership of *Beads*, it should be noted that both during the earliest period of glass or faience production in the Western Zhou and the earliest true-glass production in the Warring States Period, beads were a major part of that production.

An Jiayao, the author of Chapter 1, is a second-generation archaeologist with the Institute of Archaeology of the Chinese Academy of Social Sciences. She is one of the first, if not the first, Chinese glass researchers to appreciate the value of observing modern glass production for an understanding of ancient glass. Since the symposium, she has done research at The Corning Museum of Glass and other museums in North America. Her excellent article is a summary of the early periods of Chinese-produced and imported wares. The value of the chapter is enhanced by numerous illustrations, a listing of glass vessels excavated since Liberation, and a listing of chemical analyses of selected specimens.

The brief chapter by Cheng Zhuhai and Zhou Changyuan on a garment made of glass pieces is of interest to bead researchers because of the early date (late Western Han: 206 B.C.-A.D.24) for what are essentially "mold-pressed" (p. 21) beads, some of which contained gold foil. Included are a table of shapes, sizes, and number of perforations (3 or 4); chemical analysis; and illustrations of the pieces.

"Investigations of Some Ancient Chinese Lead Glasses" is the brief Chapter 3. It mentions beads, lists two cases of bright green beads in the inventory, and shows a cross-section of a badly weathered bead but says nothing more about the manufacturing technique of specific beads.

Chapter 4, "Chemical Analyses of Some Early Chinese Glasses," by Robert H. Brill, Stephen S.C. Tong and Doris Dohrenwend, is the longest and a major contribution to this volume. Some of the questions listed in the Introduction are again posed. One of the more interesting interpretations is the suggestion that barium is high in Chinese glass in contrast to Western glass because it gives the glass a turbidity that is jade-like in appearance. Most of the conclusions are based on chemical analysis and a real effort to begin a chronology of Chinese glass based on

chemical content. The illustrations, which include several beads, are excellent and are keyed to the Catalogue of Glass Samples.

An Appendix by Brandt A. Rising and Stephen S.C. Tong lists the analytical methods with a full table of sample results. An Addendum to Chapter 4 by Philip M. Fenn, Robert H. Brill and Shi Meiguang is of interest because one of the additional samples is illustrated and described thus: "3344 Medium-sized, flattened ellipsoid bead; date uncertain, poss. 'Peking glass.' Dk. blue transparent glass, unweathered, but with wear. Purchased by R.H.B. in Lhasa, 9/30/90" (p. 62).

Chapter 5, the second-longest chapter, like Chapter 3, is concerned with lead in early Chinese glass. Brill is again the lead author with J. Lyns Barnes and Emile C. Joel. The first sentence tells it all: "Isotope analyses of lead extracted from ancient objects can be used to determine from which mining regions the leads could or could not have come" (p. 65). The usefulness of such information is obvious to any archaeologist. Several of the samples, both in the main chapter and in the Addendum by Brill, Shi, Joel and Robert D. Vocke, were beads but little more is said about them specifically. The basic conclusions are that the leads found in China are very different from leads found in other parts of the world, and there are two very distinct districts represented in the Chinese material.

One bead illustrated in the Addendum is interesting because it comes from "Botago Tobago Island or nearby in the Philippines" and "is said to be similar to those worn by 'Formosan mountain aborigines'" (pp. 85, 89). This is the kind of cultural statement that bead researchers appreciate. The data on the history of studies of this kind of bead with silver foil are also interesting because familiar names like Beck and van der Sleen are mentioned. To fully grasp the meaning of Chapter 5, samples that are found in both must be compared to the results in Chapter 4.

Chapter 6 by Kazuo Yamasaki and Masayo Murozumi has a strong bead emphasis simply because beads are one of the more common artifacts recovered from tombs of the Tumulus Period (ca. A.D. 200-600). A map and a time chart comparing Chinese and Japanese cultural periods is a nice addition, although the chart will be difficult to use by those culture-

bound archaeologists who expect time charts to go from the bottom to the top in age. As with the preceding chapters, the bead-oriented cultural data quickly become overwhelmed by chemical data.

The chapter on "Chinese Glass Technology in Boshan around the 14th Century" by Yi Jialiang and Tu Shujin describes the results of excavations in 1982 at the site of a glass factory dating between the late Yuan and early Ming dynasties. Boshan, now incorporated into the modern city of Zibo, is even today known as a place of glass and ceramic manufacture. It was in Zibo, in 1987, that I was royally shown the sites of the city with a driver and interpreter, but was never able to obtain a straight answer concerning the modern manufacture of glass beads.

While no beads are mentioned, the technology suggested includes "tube-drawing, molding, and various types of off-hand processing" (p. 101). This chapter is also helped by the use of footnotes and references.

Chapter 8 is concerned with the chemical analysis of glass vessels from the Qing period. As is typical of this volume, the black and white photographs are all of excellent quality. In contrast to the preceding chapters, Chapter 9 is not concerned with the chemical composition but the Physical Properties of Early Chinese Glasses. Among the properties discussed are density, refractive index, viscosity-temperature curve and several lesser-known properties.

Chapter 10 is a discussion of glass sword decorations and *bi*, a flat ring placed with the dead. The objects date from the Warring State Period and were excavated in Hunan Province. While they are never described as beads in function, a *bi* could be classified as a large disk-shaped bead. Again the discussion leaves the area of cultural function and enters the chemical arena.

Chapter 11 is a three-paragraph summary that only whets the bead researcher's appetite by reciting historical sources concerning the fabrication of beads by the Marquis of Zeng. Chapter 12 is also just a summary concerning lead-barium glass from India. Again, the glass objects are beads which author H.C. Bhardwaj suggests are imported from China based on their chemical composition.

Part II, Supplementary Papers, contains seven papers not presented at the original symposium but

germane to the subject. Chapter 13, by Yang Boda, is a well-written and illustrated paper on Qing glassmaking. This chapter alone is well worth the price of the volume. While not mentioning beads, it presents a clear outline of the modern development of the Chinese glass industry. Four major centers of manufacture are described in detail: Boshan (Poshan), Guangzhou (Canton), Beijing (Peking) and Suzhou (Suchou). This is followed by a detailed chronological account, reign by reign, and finally "Some Closing Thoughts" (p. 149). This chapter, like several others, is well illustrated. However, the illustrations would have been much more useful if they had been coded to the very valuable and detailed explanation of the Chinese glass terms.

Chapter 14, on Zhou Dynasty tombs by Wang Shixiong, is the only one to be devoted largely to glass beads. The beads from the Western Zhou (ca. 1000 B.C.) are described as "tubular, spherical, rhombic, and ellipsoidal" (p. 151). It was a pleasure to see these accurate geometric terms being utilized instead of the more typical and inaccurate terms currently in use. But the pleasure was short lived as the term round, often used for spherical, is used in the next sentence to describe a tubular bead. Some of the spherical beads are decorated with spherical "drops" and some of the ellipsoidal beads (truncated biconical might be closer) are decorated with knobs. Excellent illustrations and cross-section drawings clarify these terms. Bead colors are light green and light blue with the diaphaneity being clear (transparent?) at one of the two sites and opaque at the other. The use of the beads is well stated: "All of the beads were found on the neck, breast, and arms of the deceased. They were located side-by-side with carnelians and gems, so their decorative nature is clear" (p. 151).

Following the usual chemical analysis, Wang concludes that these beads are very irregular because the workers did not have the skill to work with high-temperature molten glass. She suggests that the techniques used were closely related to the smelting of copper and that these beads were made in China and are "a precursor of Chinese glass" (p. 155).

In Chapter 15, Zhang Fukang summarizes much of the history of glass research in China. The emphasis on beads, especially eye-beads, and the use of good illustrations will make this chapter more useful to the readers of *Beads*. Also adding value to this chapter is

the use of notes, a defect in many of the previous chapters.

Chapter 16, a translation of a Chinese work, contains one page of text, two maps, and ten pages of tables on lead isotope ratios in mostly galena ores in China. As such it will be of great value to future researchers involved in the chemistry of glass but will not excite the average bead enthusiast.

Chapter 17, by Xiong Zhuanxin, concerns "A Han Dynasty Glass Spearhead from Changsha." Based on both the style of the spearhead and the composition of the glass, it is suggested that it represents a trade item from the West. The caption for Fig. 2 appears to be in error as no coin is shown.

"A Preliminary Study of Han Dynasty Glass in Guangxi" by Huang Qishan (Chapter 18) is presented in much the same way as several previous chapters. However, Huang has taken a very specific time and space limit and attempted to list the major finds with tables and good illustrations, as well as presenting much of the pertinent documentation. All of this is also footnoted. He has also drawn valid and well-described conclusions from his research. Because of the importance of this part of China to the later importation of glass beads into the New World, this early work is of special interest to North American researchers.

The final chapter is by Fan Shimin and Zhou Baozhong on "Some Glass in the Museum of Chinese History." Specific items in the museum in Beijing that date to several different periods have been analyzed. The conclusions are well summarized and tend to differ (especially in regard to item number 3 below) from many of the views expressed in this volume:

1. Typical Chinese lead-barium-silicate glass technology was already in use during the Warring States Period.
2. Glass objects made in western countries have been imported into China since the Western Han Dynasty. Chinese glass manufacture was influenced by advanced Western production technology.
3. The beginning of glass manufacture in China was later than its beginning in the West. However, the use of lead and barium as fluxes was a forerunner of the modern manufacture of lead glass [p. 199].

This difference of opinion among several glass researchers in China is one of the major points of interest in this volume. Only a few years ago, any scientific work coming out of China would have presented a monolithic point of view with no room for intellectual disagreement. Let us hope that the trend seen in this volume will continue.

At the end of the volume is a photo album of participants in the seminar, other authors, and historical figures in glass research. Perhaps this was done for purely historical reasons but it is also of immeasurable help to western researchers who are invariably mistaken about the gender (in the real meaning of that currently misused word) of Chinese names.

While there was a fair amount of history at the beginning of each section, as a behavioral scientist, I would like to see future work on Chinese glass tackle such subjects as the cultural meaning of the objects, the social system that resulted in one group of innovators and craftsmen making objects for another group, or the reasons for the trade systems that developed.

Typographical errors are rare and, in spite of a claim that the editors did not change the various authors rendition of Chinese, the use of Pinyin appears to be universal. The lack of footnotes and references for some of the chapters is understandable but nonetheless detracted from their usefulness. In this age of computers and public-domain software, an index would have added a lot for very little extra cost.

In summary, Brill and Martin are to be congratulated for bringing together an invaluable set of works in a pleasing format and with excellent editing under difficult conditions. Anyone with an interest in Far Eastern glass or beads must have and use this volume. It is not only a classic in a specialized field where more work is needed but will become a road map of where that work needs to be done.

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