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CONTRIBUTIONS of the CENTER for BEAD RESEARCH 2;

REPORT ON THE BEADS FROM NISHAPUR, IRAN IN THE METROPOLITAN MUSEUM OF ART

Obtained from the Museum's Excavations under Charles K. Wilkinson

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T A B L E O F C O N T E N T S

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The beads from Nishapur present a unique opportunity to study this ancient and ubiquitous ornament in Western Asia during the early Islamic period. No other comparable assemblage of beads of this age from this region have been made available for detailed research. Thus the Nishapur collection fills a deep lacuna in our knowledge of styles, materials, and beadmaking processes. This work has forced a revision of many previously held assumptions about beads in this area of the world.

The 709 beads examined were made from a wide range of materials, including minerals (most notably the quartz group), artificial materials or those heavily altered by man (faience, glass, clay, and metals), and recent and fossil organic materials (jet, shell, amber, bone, and wood). Their origins both reflect the developments of contemporary Persian beadmaking industries and attest to a widespread trade in beads and bead materials with neighbors to the west and the east.

In general, the beads date from the eight to the twelfth century. When more precise dates are available, they are noted in the catalogue. The name "Persia" is used here when speaking of the ancient or medieval periods, while "Iran" is used for the modern country.

Beads are sensitive markers of human activity and thought. They are often made of new materials, by processes at the forefront of technological innovation, or by methods uniquely devised for them. Beads are indicative of aesthetic, social, religious, and other cultural attributes, and in some cases are virtually the only surviving artifacts representative of these forms of belief and thought.

Bead research is an interdisciplinary endeavor, relying as much on the data derived from materials studies, mineralogy, and biology, as from the disciplines of archaeology, history, art history, linguistics, and ethnography. It is a highly specialized subject which requires detailed knowledge germane to the study of other art objects but often not avialable to other specialists in full.

This report is divided into two major sections. The text will consider several aspects of the beads from Nishapur: their materials, the techniques used to make them, and their roles in early Medieval Persian society. Among the questions we shall consider when dealing with these aspects are their origins and the similarities between beads from Nishapur and elsewhere. Following the text is the catalogue of the beads.

SECTION ONE:

THE MATERIAL OF THE NISHAPUR BEADS

GENERAL CONSIDERATIONS

A total of 709 objects were examined for this study. Of them 23 (3.2 % of the total) have been identified as modern beads, made in the late nineteenth or twentieth century. These are what archaeologists call "intrusions," no doubt primarily gathered from the surface of the site. A number of these modern beads have been published by the Museum and several have been placed on public display. Attention is called to this problem not to embarrass anyone, but to indicate some of the complexities involved in bead research and the importance of understanding even modern beads when dealing with an ancient collection of them. They will be discussed in detail in the final section of the text. For the purposes of the statistics presented here, only those beads which have not definitely been identified as modern (686, 96.8 % of the total) are considered.

It should also be borne in mind that despite the seeming statistical accuracy of the following figures, there is often ambiguity involved in some of the data. A few objects examined are not or are likely not to be beads, a few are suspected of being modern, and a few have been placed into a materials category which may not be entirely accurate. Details on these questionable ascriptions are to be found in the catalogue.

If the beads are categorized into their major material groups (organic, synthetic or humanly altered, mineral) it is clear that each group has significantly contributed to the Nishapur bead collection:

TABLE 1:
Major Material Groups of the Beads from Nishapur

Organic	325	47.5%
Synthetic	202	29.4%
Mineral	159	23.2%

Organic materials, both fossil and recent, were most represented among the beads from Nishapur. The great majority of them and by far the largest single materials group in the collection are those of jet (280 specimens, 40.8% of the total collection). These are complemented largely with beads of shell (and coral) totaling 40 (5.8%), and to a much lesser extent by beads of amber, bone, and wood.

The second major group, that of synthetic and humanly altered materials, is also dominated by a single type, faience (139, 20.3%), complemented by glass (53, 7.7%), and by fewer examples of clay, bronze, and gold.

Amongst the minerals, the quartz group is by far the most important (112, 16.3%). Within this group the chalcedonies of all types form the great majority, and a majority of all mineral beads (91, 13.3%). The chalcedony group is in turn dominated by carnelian (57, 8.3%). Aside from the quartz family beads, the only other major mineral is lapis lazuli (13, 1.9%), and there is a fairly large group of mineral beads whose precise identifications have not been made (28, 4.1%).

The census of each group is to be found on Table 2 at the beginning of the catalogue.

JET

The most abundant Nishapur bead material, nearly 41 % of all beads, is jet. Jet is a hard form of coal, also known as bright coal or vitrain. Its precise origin is not understood, but it is probably composed of wood (antharxylon) rather than other soft plant parts (Pettijohn 1957:490-5).

Several Museum accession cards have an undated handwritten note that says a certain Dr. Forbes examined and analyzed these "jet" beads and determined that they were steatite. The material listed as jet is certainly not steatite (soapstone; a massive form of talc), but a more jet-like material. Whether it is all actually jet remains to be learned. A number of similar coal products, including lignite, cannel coal, and durain are often confused with jet, and have been in the past. This has been true even of regions of jet production, such as the Whitby area of England (Pollard et al. 1981). Precise testing of some of these beads is necessary before they can all be called jet with confidence instead of merely for convenience.

The source of this jet might also be traced if enough beads were analyzed. No jet deposits seem to be recorded for Iran, but Iran does have coal. The The largest and only currently commercially viable deposit is near Kirman (Ganji 1970:571), but others exist between Isfahan and Shiraz, and along the south Caspian coast, relatively close to Nishapur (Crabbe and McBride 1979: 207). The nearest known jet (as opposed to coal) sources are in Turkey, in the southeast in ancient Lucia, exploited since classical times (Eichholz 1962:113), and in the west around Erzurum, currently being exploited.

Jet does not seem to have been used for beads in Iran until relatively late. None, for example, are recorded from Tepe Giyan (Contenau and Ghirshman 1935) or Tepe Sialk (Ghirshman 1938). They have been recorded from the Parthian Period (Oda 1965:34), but the large amount of jet at Nishapur is quite striking.

FAIENCE

The next most abundant material for beads from Nishapur is faience. Faience is a ceramic product closely allied to glass. It is composed chiefly of small particles of silicate (usually quartz) which have not been heated sufficiently to melt and flow but are joined by sintering, that is, fused where they touch. A small amount of alkali is added to the faience to give it a glaze, but not enough to turn it into glass. Metals are added for coloring, the most common being copper to make it blue. The coefficient of expansion between the glaze and the body is sufficiently different that in a relatively short time (archaeologically speaking) the glaze cracks and flakes off the body, leaving only the core. Virtually all the faience from Nishapur is in this condition. The few pieces which retain significant glaze may well be modern products.

The name faience is something of a misnomer, being derived from the early non-acquaintance with the material and called faience after a blue ceramic produced in Faenza, Italy. Early reports often call faience "paste," "frit," or other terms which are now recognized as being inappropriate.

Faience preceded glass as the first synthetic material; the oldest known examples are from late fifth millennium B.C. sites in Mesopotamia, Tepe Gawra (Tobler 1950:192) and Tall Arpachiya (Mallowen and Rose 1935:91) and in the mid fourth millennium B.C. in Nubia (Williams 1980:19). Faience became a very popular material for small objects, particularly beads, and was produced in most ancient civilizations, especially Mesopotamia, Egypt, and the Indus Valley, but also in England and Scotland (Newton and Renfrew 1970), Anatolia (Mellaart 1968), Hungary (Harding and Warren 1973), and the Levant, Cyprus, Crete, and Greece (Foster 1979:48-55, 59-60, 120-1).

It has been asserted that faience production died out for some time and was rediscovered in Iran and improved only about the twelfth century (Lane 1947:9; Allan et al. 1973:171). It has been further suggested that the faience beadmakers of modern Qom had come from Egypt (Wulff et al. 1968). One of the problems cited had been the lack of faience objects, especially beads, from early Persian Islamic sites, such as Siraf (Allan et al. 1973:171). but see

A different view is taken here. Faience beads in pre-Achaemenid Persia are well known, but production did not cease as it did elsewhere when superseded by glass. Faience beads are known from Persepolis (Schmidt 1937: Table III), which visually resemble those found at Nishapur (Persepolis Museum, personal observation). Faience is known from the Parthian and Sasanian Periods (Allan et al. 1973:171), and the beads from Nishapur fill the gap in the occurrences of Persian faience. After Nishapur, faience making for tiles and other small objects is well attested, including even a recipe dated 1301 (Allan et al. 1973; Allan 1973). The modern faience beadmakers of Qom produce a product which has many affinities to those found at Nishapur (Wulff 1966:167; Wulff et al. 1968).

GLASS

Glass is an inorganic product of fusion which has been cooled below its point of crystallization without crystallizing. The earliest glass products are ascribed to the middle of the third millennium B.C. from Mesopotamia, Egypt, and the Cacausus. In time, glass came to be made in most ancient civilizations, being produced in China and India by the year 1000 B.C. (see Francis 1986a:3-4). The Persian glass industry is imperfectly known, despite the best efforts of many scholars. Lamm's dictum a half century ago that, "Peoples that excel in the ceramic art, are, it seems, seldom as skillful in glass making, and vice versa, and Persia, even allowing for our limited knowledge of her glass, apparently was no exception to the rule...." (1939:2593), has been somewhat modified: "It is becoming abundantly clear that Persia was a glass-producing area of the first order, and that its true importance has not been recognized." (Smith 1957:29). Yet our knowledge of Persian glass beadmaking has hardly advanced. Local glassmaking, including beads, was discovered at Siraf (Whitehouse 1968), and there are no doubt other Persian glassmaking centers yet to be identified. Lamm N 75

The glass beads found at Nishapur are of great technical interest, an aspect which will be discussed at length when we consider beadmaking processes. There is to date no evidence for glass beadmaking at Nishapur. Chunks or parts of glass "cakes" have been found there, but at least some of these were used only for glazing ceramics (Wilkinson 1986:262). The relative scarcity of glass beads and a considerable variety amongst them tends to argue against any of them having actually been made at the city.

MINERALS

A variety of stone beads were found at Nishapur, most of them belonging to the quartz mineral series. Quartz, the most abundant mineral on Earth, is a major rock-building component, and the basis of the sands of shores and deserts. It is also a raw material in both glass and most faience.

The quartz series is extremely large and nomenclature for all quartz varieties is not entirely fixed. The series is initially divided according to the crystal form of the varieties. Crystalline quartz comes in large, macroscopic crystals in several colors, the three represented at Nishapur being clear rock crystal, white milky quartz, and purple amethyst. There are two series of microcrystalline quartz, which form very tiny crystals, visible only with a powerful microscope. In one the crystals are arranged in a haphazard or granular pattern, and this group is known as jasper. In the other, the crystals are laid in a fibrous pattern, and known as chalcedony, an especially important stone bead group generally and at Nishapur in particular. When chalcedony is banded it is called agate (onyx is an altered form of agate), and when of a consistent color is usually called chalcedony, or carnelian if red and sard if brown. There is also a sub-microscopic crystalline form of quartz known as opal (see Frondel 1962).

The sources for the quartz minerals may have included some local ones. Whitehouse has noted the debris of carnelian beadworking at Siraf and other Islamic Persian sites (1975), but no debitage was found (or at least reported) at Nishapur. Western India, the master stone beadmakers of the world for millennia, likely supplied the bulk or even all of these beads. While Nishapur flourished, Indian beadcutting was centered at Ujjain and secondarily at Valabhi, moving to Limodra early in the twelfth century. The source for the stones was always along the banks of the Narmada, centered at or near Ratanpur (Francis 1982a:15-18).

An alternate source might have been Yemen. Al-Hamdani (died 334 A.H.= A.D. 945) listed several onyx and related stone sources in Al-Iklil (Faris 1938:26-7), although 'Abdu'llah Mohammad ibn Ahmed al-Muqaddasi said that onyx was being imported to Oman by Persians (from India) in A.D. 985 (Hasan 1928:127). The twelfth century Book of the Balance of Wisdom by Al-Khazini, apparently written in Egypt, discusses the devaluation of semiprecious stone because of oversupply, including turquoise with any matrix, lapis lazuli, crystal, and amethyst. Only onyx was prized. About carnelian he said, "Men have long tired of the cornelian, so that it has ceased to be used for seal-rings, even for the hands of common people, to say nothing of the great." (Khanikoff 1860:64).

Among the other minerals used for beads in the Nishapur collection are lapis lazuli, long of economic and ornamental importance in Western Asia and the Middle East. The only locale known in antiquity for lapis lazuli is commonly said to be in Badakshan. However, Hamd-Alla Mustawfi of Qazvin, the State Accountant of Sultan Abu Said (A.D. 1316-1335) wrote, "The best mines of this stone are in Badakhstan, but there are mines also in Manzandaran and others at Dismar in Azerbaijan and there is also one in Kerman." Herrmann does not consider Manzandaran a likely lapis source because of the lack of metamorphic limestone (marble), and believes the others are possible but perhaps only worked in the thirteenth and fourteenth centuries (1968:27).

Turquoise, which is available locally, was rarely made into beads because of its fragility, and only one turquoise bead and two cabochons are represented in the Nishapur collection. An interesting older account of the workings of the mines is to be found in Schnidler (1884).

Three beads have been identified as garnet, however, they do not seem to have been tested and might possibly be spinel. If garnet, the most available sources would be India, where they have been worked in Rajasthan for a long time (Bauer 1904:354-5). If they are spinels, however, they most likely came from Badakshan, source of the so-called Balas Rubies. These stones were highly prized at one time, and famous large specimens such as the Timur Ruby and the Black Prince Ruby were once part of the crown jewels of European monarchs. Marco Polo described the importance of spinel to the region, noting that the king controlled their distribution, otherwise the relatively common stones would become valueless (Komroff 1953:59-60).

There are also some minerals which have not been satisfactorily identified. Among these are several believed to belong to the quartz series (jasper and Lydian stone, a black form of chalcedony). There is a green stone with a hardness on the Mohs scale of a bit more than 3, which takes a high polish. The excavators called it by its local name, Abbasabad stone. There is also a red stone with a hardness of about 5.5, about that of glass, and several others likely to be steatite, gypsum, and calcite, all rather soft stones.

SHELL

Shell has been used for human adornment since the very beginning of the modern human race and constituted the bulk of early prehistoric adornment materials. It has never gone out of fashion, and the presence of a number of beads cut from shell (and the related coral) and whole shells perforated to be strung as beads is significant. There is even one clay bead made in imitation of a Conus shell, the most commonly found identifiable genus at Nishapur. All of the shell beads at Nishapur are of marine species.

OTHER MATERIALS

Few other materials were found used for beads in the Nishapur collection, and those are only in limited numbers. There were eight of clay, although some may have been spindle whorls rather than beads.

There were two beads of amber, most likely from the Baltic Sea area. The earliest amber in Iran may be from Tepe Hisar IIIC, ca. 2000 B.C. (Schmidt 1937:223). The Sasanians, who carried on a lively silver trade for fur with northeastern Russia, outflanking the Byzantines, imported considerable amber into Persia (Frye 1972:266-7). The evidence of the amber and, as we shall see, of etched carnelians, suggest the continuation of this trade in the early Islamic period.

The two coral beads appear to belong to the species of precious coral, Corallium rubrum, and were likely imports from the Mediterranean, probably from Egypt, which conducted a major coral export in the early Islamic period (Goitein 1961:170; 1963:198). One interesting speculation is that the Farsi word for coral (and pearl), marjan, was derived from the words mard (man; owner or possessor of) and jan or gan (soul or life), and means literally "owner of life." It has been further suggested that the word was borrowed by the Greeks through the Arameans to form the Greek-Latin word for pearl (and bead), margarita (Mingana 1925). Goitein 73

There was considerable metal jewelry, but the only objects studied here are a series of six welded balls of gold, now curved into a bead shape, though whether that was their original intent is unclear, and a bronze flat charm case pendant. The single bead of wood is of a species currently used for beads in Iran (this example may be recent) and is locally called "Yesham" wood (personal observation). There were also two beads of bone.

SECTION TWO:

THE MANUFACTURE OF NISHAPUR BEADS

The method by which beads are made furnishes important data about them. It can offer clues as to the technological state of development at the time, and in some cases to the origin or date of the beads. Bead manufacturing methods have in the past been often imperfectly understood, and it is not always possible to reconstruct the methods used. The material from which a bead is made naturally imposes limits as to the way in which it was made.

JET AND OTHER SOFT MATERIALS

We shall consider jet together here with other soft stones, in particular turquoise, both of which were probably made at Nishapur, and lapis lazuli, which may have been worked there. Perhaps the only description of an older jet industry is rather far removed from the Nishapur period, that of the industry at Whitby, England, during the reign of Victoria (Muller 1980: 15-18). Nonetheless, we can extrapolate some information from that source, tempering it with a description of the turquoise industry at Nishapur by General A.H. Schnidler, put in charge of the operation by the Minister of Mines (1884).

The first step in preparing jet was to remove the spar, or rind of the raw pieces, which was done by hand with an iron chisel weighted with lead. Pieces suitable for working were cut out of the raw block either with a chisel or a disc saw, and then ground against a sandstone grit wheel and polished against a leaden wheel. Beads were drilled on a lathe with an old umbrella spoke (better than a commercial drill bit, perhaps because it was hollow), and finally polished against a series of rotating wheels coated with pig's bristle, wool, and finally walrus, porpoise or cow's leather.

How much of this process went on at Nishapur is our concern. The chipping away of the rind with a chisel presents no problem. Cutting up raw pieces may also have been done with a chisel. Cutting harder stone (lapis lazuli) at an earlier time in Persia was done by making an incision on the block with a stone blade and striking the block at the proper angle (Tosi and Piperno 1973:20).

The next step is the fashioning of blocks into bead shapes. In 1884 Schnidler reported that turquoise was "cut out" (by which he clearly meant ground to shape) with a wooden wheel coated with emery from Badakshan adhesed with gum from India. However, thirty years before, grinding was entirely done by hand against slabs of sandstone (1884:139). This method would account for the shaping of beads in various square or flat shapes. However, in the case of the circular sectioned jet beads from Nishapur, most examined were apparently shaped on a lathe, probably bow driven. They are quite circular in shape, have the characteristic striae of lathe-work, and have marks at their bases where they were attached to the lathe.

Drilling was no doubt done with a bow drill. Jet is soft enough that a metal drill will pierce it easily.

As to the final polishing, the range of materials available to the Whitby jet workers was probably not employed at Nishapur. Schnidler (1884:139) reported only sandstone and leather being used to polish turquoise.

SHELL

The shell beads from Nishapur are of two types. Some have been cut from shells, in some cases the columella of large gastropods, and in other cases the outer shell of bivalves or univalves. Such beads would have been worked by a process similar to that already postulated for jet and soft stones: chipped out (probably hammered), ground against sandstone, bored with a bow drill, and given some polish against a fine grained stone or leather.

The other type of shell beads are whole shells, mostly Conus. The Conus shell (as well as the Oliva and Olivella, the other perforated whole shells) is naturally hollow, as the living mollusc absorbs its columella as it grows. To perforate such shells it is only necessary to pierce it once, which along with the aperture, gives a path to string. It is most common to pierce such shells by grinding off the apex, and this is precisely what was done at Nishapur (Francis 1982b: n.d. a, n.d. b). The presence of a Conus shell which is not pierced is evidence that this operation took place at Nishapur itself.

STONES OF THE QUARTZ FAMILY

Previous reports which treated hard stone beads from Nishapur (Keene 1981: 30; Jenkins and Keene 1982:26-32) and the Museum's accession cards make frequent mention of stones "cut from block," and apparently are describing these stones as having been cut to shape using a rotary lapidary wheel. However, this is at variance with what is known about how such hard stone beads are manufactured. Although feasible, it is far more likely that these beads were made in a different manner.

The center of hard stone bead manufacturing has long been Western India, particularly around the Gulf of Cambay, along the Narmada River, and in Malwa (Francis 1982a). There has been no evidence that the hard stone beads from Nishapur were manufactured at Nishapur, and it is far more likely that they were imported from Western India. This is especially true in the case of carnelian, which requires a particular form of chalcedony to produce (see below), abundant only along the Narmada.

The process for making hard stone beads can be observed today in Cambay and can be postulated by the examination of bead wasters and unfinished beads. This process has been recorded from a number of sites, particularly in South Asia, and although there are some variations, the basic steps have been the same for millennia, as can be seen in the Indus Valley (most recently Vidale 1985), Ujjain (Bannerjee 1959), Limodra (Francis 1982a: 18-20), Kotalingala (Francis 1986b), Arikamedu (Francis 1987a), and Mantai, Sri Lanka, contemporary with Nishapur (Francis n.d. c). There is nothing to suggest that the beads at Nishapur were made by a different process.

The first step in making beads from raw stone is to heat them to make them easier to work. This is done by packing them in some combustible material such as rice husks either in inverted pots with holes broken at their bases or in a open trough. The stones are next chipped into crude shapes called roughouts. This is done today by bracing the stone against an iron spike driven into the ground and hitting it with a hammer made of water buffalo horn mounted on a thin bamboo. Evidence from Kotalingala and Arikamedu suggest that a thinned quartz/amethyst crystal was once used in this process (Francis 1986c:56).

The stones are given a final shape by being ground against sandstone or similar stone. The modern Cambay industry uses a lap wheel, but this was only introduced about 1950 (Trivedi 1964:65). This process leaves abrasive scars which are not removed successfully unless the beads are tumbled. These scars were apparently mistaken by Jenkins and Keene as the result of a rotary lap wheel.

Then the beads are drilled. This is done with a drill bit on which two small diamond splinters have been mounted. The use of a double diamond drill bit has been documented at Mantai during the seventh to tenth centuries (Gwinnett and Gorelick 1986) and most recently on material I have supplied Gorelick and Gwinnett from Arikamedu, no later than the third century A.D. (in press).

The final stage is that of polishing. The old method of polishing beads was to abrade them by hand against fine grained stones, plates of copper or teak, and at the end on leather, as we have noted with turquoise from Nishapur. By A.D. 950 to 960 the faceted carnelian beads imported from India into Scandinavia were being tumbled rather than polished by hand (Callmer 1977:91). This was probably done in much the same way as described in the last century: by putting beads, agate dust, and water in a goat skin bag and rolling it across the floor between two workers for two weeks (Cambell 1880:202). It is possible that round beads were tumbled earlier than this.

TREATING HARD STONES

Stones of the quartz family are often treated before or after being made into beads. In some cases this is virtually always the case, and in other cases it was used only for special effects.

Carnelian and Onyx

It is not widely appreciated that carnelian almost never occurs in nature in its usual deep red shade. In order to achieve that color, iron must be present and heated in a reducing (oxygen-starved) atmosphere. The beadmakers of Idar-Oberstein, Germany, who rely on chalcedonies from Minas Gerais, Brazil, must soak plain chalcedony in nitric acid in which iron has been dissolved and then heat them to produce carnelian (Hopkins 1925:571). This was not necessary in India, as the chalcedony nodules along the Narmada river are found in secondary deposits in a layer of red iron-bearing clay and contain enough iron to bring out the color when heated. This is part of the secret of the long success of the Western Indian bead industry.

Onyx, too, is almost never found in the desired black and white layers of that stone. Nearly all onyx is produced by taking grey or brown banded agate and soaking it in a sugar or honey solution with moderate heat. In a couple of weeks the more porous tinted layers of the stone absorb the sugar. When the stone is fired the sugar caramelizes, producing brown and white onyx. If the stone is put into sulphuric acid the sugar carbonizes to make black and white onyx (see Nassau 1984:69). The production of brown onyx was known in the Indus Valley Civilization (Beck 1940:400), and Pliny described it in Arabia in Roman times (1962:323). The use of sulphuric acid for black onyx has been suggested as early as the seventh century in Assyria (Thompson 1936:xliv). But in India it clearly came into use only when Arikamedu flourished, beginning in the third century B.C. (Francis 1986c:55-6). BC

Nearly all of the onyx at Nishapur is black onyx, made with the aid of sulphuric acid. The sugar does not always penetrate the whole stone (especially if it is large) and in some chipped examples it can be seen that the stone was artificially colored.

Glazed Quartz

The surface treatment of quartz by glazing it is an outstanding feature of the beads from Nishapur. No less than eleven of the sixteen quartz beads were glazed. The basic paper on the glazing of stone is that of the pioneer bead researcher, Horace Beck (1934, 1935). He traced the glazing of quartz to Predynastic Egypt, in use for a long period in Egypt, Mesopotamia, and Persia (1935:19-21). The beads which he had tested had all been glazed by adding soda to the surface (Ibid.: 23-5). For the Mesopotamian specimens he noted two varieties, the "frosted," which had many conchoidal fractures on the surface, apparently to help retain the glaze, and the "high polish," which were glazed without color, merely allowing the alkali to turn the surface into a glaze under heat (Ibid.: 25-8). To these two types we must add a third which was discussed but not named by Beck in which milky quartz was glazed with color, invariably blue, possibly derived from cobalt.

One group of glazed beads are known only from Persia, but unfortunately not from excavations. They are usually square uneven bicones, often with panels cut into their sides, some of which have small incised figures such as crosses, diamonds, or dashes (Francis 1979a:46). Their dating has caused considerable confusion. Beck suggested no date for them, except saying that one he examined suggested Medieval work (1935:28). Van der Sleen suggested they were B.C. in date (1967:68), while the catalogue of the Birch collection suggested they were Sasanian (Falk n.d.:67). The latter seems most likely, especially given the Sasanian penchant for panel decoration as seen on seal backs and in glassware.

No panel beads were found at Nishapur, but the bulk of the glazed beads were of milky quartz and colored, as are the panel beads. A few were fairly well made, but most were crude oblates and pendants of a type known in the Levant as "Tears of Christ" (Bowser 1975). Although that name for the pendant is not really appropriate for Islamic Nishapur, it is retained here as the only published name for them. There were also a few examples with the high polish.

The discovery of a variety of glazed beads at Nishapur is important for the light they shed on their doubtless Persian production at least into the early Medieval period. The absence of panel beads and presence of similar glazing strengthens the suggestion that the panel beads are Sasanian, but were no longer being produced after that period.

Etched carnelians

The process of adding smooth, indelible white (and occasionally black) lines to the surface of carnelians (or related stones) is known as "etching." The term is somewhat confusing because usually etching is done with acid, and these lines are put on with soda, an alkali. They are better called soda-etched.

The process was first noticed by Bellasis, who found such beads at Brahmanabad, Sind, and consequently visited what he called a "flourishing" industry in nearby Sehwan (1856a:418; 1856b:471). The outstanding paper on these beads is again by Beck (1933), but we owe most of our knowledge of the process to Mackay (1933), who met Shahebdino, the last living carnelian etcher in Sehwan and had him demonstrate the process. A paste of soda and the juice of the kirar bush (*Capparis aphylla*) was prepared and a design drawn onto a bead, which was put in a small tempered clay cup over embers. After about five minutes of heating and ten of cooling, the white design was fixed. Mackay experimentally determined that the kirar bush juice was used only for convenience to allow the worker to see the soda as it was being applied and had no chemical affect upon the bead. Beck showed that the soda penetrated just under the surface of the bead, boring tiny pores, and spreading out, forming what appears to the eye to be a continuous line.

The soda-etching process is quite ancient and well known especially from sites of the Indus Valley. Reade has demonstrated through comparisons of designs that contemporary Mesopotamia also used it (1979). The process was more or less continuous in India until the early twentieth century, although by the second century A.D. it waned considerably in popularity. Dikshit determined that in the Early Historic Period there were different designs found in the north and south of India, indicating at least two Indian centers of manufacturing (1949).

However, one of the more vexing problems in tracing soda-etched carnelians is that of a later group (Beck's Period III), which differs from the earlier ones in three ways. 1.) It is later in time, Beck placing it from ca. A.D. 600 to 1000 or possibly earlier (1933:391). 2.) The designs are different from those known in India (Dikshit 1949). 3.) Their distribution is to the ~~east~~ west of India: Syria, Turkey, the Caucasus, the Crimea, and Turkistan (Beck 1933:390-3), and as far away as Scandinavia (Callmer 1977:136).

The dominant design on these beads is called "plant-like" in the etched carnelian literature, but is the typical heraldic or royal Sasanian device common on seals. It is known that the Persians learned the soda-etching technique because they inscribed pious sayings on carnelian plaques. This is now done entirely with acid; the earliest acid etched plaque known to me is one dated 1113 A.H. = A.D. 1701 (Budge 1961:67, pl. V). We must assume that at least by the Sasanian Period the Persians learned to soda-etch carnelians (Francis 1980). V. Deopik in a work in Russian that I have not seen appears to have reached the same conclusion (Callmer 1977:197, n. 362).

In addition to the Sasanian device, there are several other soda-etched designs which in India are found only at Brahmanabad, whose upper layers contain tenth century Persian pottery (Cousins 1903:pl. XLIX; Dikshit 1949: pl. X). One of the Nishapur beads, a diamond toggle with two triangles on each side is duplicated in the Brahmanabad collection (Dikshit 1949:X.8), and are to be (or were to be) found on the antiquities market in Afghanistan (personal observation). Another, a barrel with scroll decorations in the center is also found at Brahmanabad (Dikshit 1949:X.15, 16). The two Nishapur beads with "snowflake" patterns have parallels with beads in the Center for Bead Research Collection purchased in Iran (Francis 1980:27), and several are illustrated by Kunz (1913:opp. p. 370).

The Nishapur etched carnelians confirm an observation about them that I have noted for some time. That is, the Persian etched carnelians are generally less well made as beads and of lesser quality carnelian than undecorated or soda-etched carnelian beads from India. This suggests that the beads themselves might have been made in Persia as well as having been decorated there, and strengthens the opinion that well made carnelians of good color are Indian imports.

In sum, the presence of these soda-etched carnelians in Nishapur is of considerable interest. They reaffirm the Persian origins of the types of patterns found on these particular beads. They also indicate that the soda-etching technique was still being practiced for beads (instead of exclusively for plaques) in the post-Sasanian, early Islamic period.

FAIENCE

The manufacture of faience has occasioned considerable debate and even experimentation in recent years. Lucas produced a faience by glazing quartz with natron and malachite, chipping off the glaze, powdering it, and applying it to the surface of a ground quartz body (Lucas and Harris 1962: 173-5). Noble (1969), and following him Kiefer and Allibert (1971), formed faience by a self-glazing process in which natron and copper were mixed with the body and allowed to sit for a few days during which the alkali and coloring matter migrated to the surface ("wicked out"), and then was fired.

Wulff managed to penetrate the rather secretive Qom bead industry and described the process used there. Ground quartzite bound together with a water solution of gum tragacanth were formed into balls by hand or molded and allowed to dry in the sun, after which they were perforated with a bow drill. They were then packed in layers between a mixture of lime, powdered quartz, ash, charcoal, and copper oxide and fired at about 1000° C for twelve hours and allowed to cool another twelve. Then the pots were emptied and the material kicked, which loosened the bright blue beads from the glazing mixture (Wulff et al. 1968).

Given the various ways faience is reported to have been made and has been made experimentally, the work of Tite et al. (1983) is important in showing that all three of the methods described (coating the faience body, self-glazing, and the Qom method) was known in Egyptian antiquity.

The faience beads from Nishapur are very similar to beads from modern Qom. Microscopic examination is necessary to confirm that they were made in the same way, but certainly all appearances suggest they were. The presence of a few which had not been completely bored through suggests local manufacture for the them, which after the jet beads are the most numerous types in the Nishapur collection.

GLASS

Glass is the most studied and documented of all of the raw materials used for the beads from Nishapur. Yet, until very recently, the ways in which glass beads were made were very imperfectly understood. There are a great many ways to form a bit of glass into a bead (Francis 1983), and the recognition of these methods are important to appreciate them.

Several glass beadmaking methods were used for the beads from Nishapur. Some are relatively recent, developed only in the last two centuries. Their recognition is a clue to separating modern glass beads from those of the early Islamic period. Because these modern beads constitute a problem of their own, they are discussed in a separate section.

The oldest and most universal way to make glass beads is to wrap molten glass around a metal (or occasionally wood) rod, called a mandrel. This technique produces wound beads. The traditional way to make wound beads is to dip the mandrel into a crucible in the furnace pick up a bit of glass on it, and twirl it until the bead is built up. While still hot, the bead may be further formed by being paddled or molded into shape or be decorated by adding other colors of glass to it. Beads made in this way must be annealed, or slowly cooled, usually by putting them into a pot or a special section of the furnace and allowing them to cool slowly overnight as the furnace itself cools. When beads are made with an iron mandrel it is a simple matter (providing the timing is correct) to knock them off while both are still hot, as iron cools and contracts faster than glass. The use of an iron mandrel often leaves a black deposit of iron oxide inside the bead.

The great majority of early Islamic glass beads from Nishapur were made by the winding method. Of the 49 beads (not counting two glass splatters and two cabochons), 33 or 67.3 were made in this way. Fully 34.7 % of the beads could be identified as furnace-wound either because of black perforation deposits or the tapered shape of their perforations. It is likely that the other wound beads were furnace-wound as well. A number are decorated with other colors of glass. In some cases these were merely blobed or trailed on. In a few cases they have mosaic glass canes slices, which shall be discussed below.

Three wound beads were pressed with a small paddle into a flattened oval tabular shape; these had previously been reported as molded (Jenkins and Keene 1982: 32; Jenkins 1986:55). These particular beads are in such good condition (most of the glass beads from Nishapur show at least some corrosion) and are so relatively common in Iranian bazaars (personal observation) that they may be recent.

A few other wound beads have been pressed into shape. Two are melons (gadrooned oblates), made by pressing the edge of a tool into the side of the bead, and one is cubical.

Several wound beads were decorated by adding other colors of glass. Five are stratified eye beads, made by placing two or more layers of contrasting glass atop each other in small spots (or eyes). Three of these have blue pupils surrounded by white and were made with short straight dashes of glass, while the other two have more circular eyes.

A few beads were decorated with trailed waves, sometimes with added spots. One probably with a wound core had black and white lines added to the surface which were then combed (dragged by a thin tool) into an up-and-down ogee pattern. Yet another was decorated with many variously colored spots of glass which were then rolled into the surface of the bead (marvered), a type known as a "crumb" bead. One other bead was covered all over its surface with small pieces of multicolored striped plaques of glass, a rather unusual specimen. There were also several beads with mosaic decorations, which we shall discuss below.

Technologically, the other most important method for making beads is the drawing method. A glass tube is drawn out from a hollowed gather of glass by one of several means. The tube is then cut into bead sized pieces which can be individually shaped or decorated or agitated over heat together to round the sharp edges. Only three drawn beads are included in the Nishapur collection.

Another means of making glass beads in the Middle Ages involved a glass tube with thin walls. This was constricted along its length to make a series of bead-sized segments, which were cut apart either as individual beads or left in series of two or more. Three such segmented beads were found at Nishapur.

A variation of segmented beads was to cover a tube with gold foil (or tin foil for a silvery effect) and place it inside a second thin-walled tube, which was constricted along its length. The outer glass tube protected the gold foil resting upon the inner one, producing a bead that shone like the precious metal. These are known as "gold-glass" beads, and one and quite likely two were found at Nishapur.

A single bead was made by the <u>folding</u> technique in which a plaque or ribbon of glass is formed, often decorated in contrasting colors. This is then reheated and rolled up a wire until the two opposite edges meet to form a complete bead. Such beads have seams running their length, and a silicone impression made of the perforation of the Nishapur bead revealed the presence of a seam inside as well as outside.

A much more unusual way of treating glass beads in the Medieval period was to <u>mold</u> them. Such beads were usually first wound on a mandrel and then placed in a two part mold which was closed around them. Only one such bead is in the Nishapur collection, molded in the shape of a fish, but too corroded to say precisely how it was formed.

Three translucent dark green beads were <u>ground</u> into octagonal bicone shapes and perforated in the same manner as stone beads. It is tempting to suggest that this unusual technique as meant to simulate precious stones, although no precious green stones of that shape are known.

Finally, it remains to discuss the technique of <u>mosaic</u> glass. Mosaic glass, usually in the form of a rod (called a cane), has a pattern which runs throughout its length. The pattern is made as a cylinder which is drawn into a long cane. This is cut into short segments, which duplicate the pattern on their faces, and are placed onto beads for decoration.

The patterns can be made by bundling discrete monochrome canes of glass together, forming a pointillist effect. They may also be made by repeatedly dipping a gather of glass into other colors and pressing it into molds to give a floral or star pattern. The first method is known on some ancient glasses, but was not used on any of the Nishapur beads. The second method was development of fifteenth century Venice.

A third method of making mosaic canes is to lay semimolten strips of glass atop each other to build up a pattern. This is done today in India (Francis 1982c:15), and now appears to be much more widespread than had been thought (Francis 1987b). It is probably the way the mosaic canes were made for the Nishapur beads, except that one bead appears to have folded canes.

The Origin of the Glass Beads at Nishapur

Understanding the variety of glassmaking techniques used for beads can help us determine where certain beads were made. As we have noted, there is no direct evidence for glass beadmaking at Nishapur itself, and most of the glass beads must have been imported, either from other Persian cities or further afield.

A few parallels can be cited. The drawn bead of green glass over a yellow core is Indian. It is found on the Deccan Plateau: from early Historic Nevasa (Deo 1960:355) and Navadatoli (Deo 1971:361), and Medieval Nevasa (Deo 1960:361) and Brahmapuri (Sankalia and Dikshit 1951:104). A rounded bead of this type was uncovered from Mantai (Francis n.d. c).

The combed black and white bead bears a visual resemblance to a bead from early Medieval Hama (Riis et al. 1967:68; 212A). Wound beads with waves and blobs recall Syrian glass vessels, and a wave bead was found at Hama (Ibid.:216). Mosaic canes are generally thought to be Egyptian in origin; certainly they must have been produced by a sophisticated industry.

Gold-glass beads are found in many places. East Mediterranean and European examples are thought to be Egyptian, particularly Coptic (Boon 1966). They are common in small numbers on Indian sites, and some scholars believe they were made there during the Early Historic Period (Dikshit 1969: 56-8; Singh 1983). They were found at Mantai, mostly in the early Medieval period (Francis n.d. c). Further east, they are known from Vietnam, south China, Thailand, Malaysia, the Philippines, Java, and Korea in contexts spanning the entire first millennium A.D. (Francis n.d. d). Their wide distribution in time and place suggest that there were several centers of manufacture.

Segmented beads of many different types also have a wide distribution. They are found throughout Europe, and it has been suggested that they were made in ex-Byzantine Muslim areas (Callmer 1977:98). Novogorod, Russia, made some types in the tenth century (Dekówna 1970:344). Several different types appear before the seventh century at Oc-eo, Vietnam (Malleret 1962: 249-69), and there was a considerable variety at Mantai (Francis n.d. c.).

Unfortunately, the lack of many well dated Medieval glass bead collections prevents us from drawing more conclusions about the source of the beads from Nishapur. The Nishapur collection is important in securely dating these beads, and perhaps furnish more information about them than can be told about them. Except for the green on yellow drawn bead and perhaps the gold-glass beads, however, it is doubtful that any of the Nishapur beads came from India, and we should look more westward for their origins.

OTHER BEAD MATERIALS

The other materials from which beads in the Nishapur collection were made were formed mostly by techniques which we have discussed in conjunction with the major material groups. Their production depended largely upon the nature of the substances themselves.

Amber, which was probably made into beads before being imported to Nishapur, is soft and can be easily worked. Current amber bead production at Simojovel, Mexico, reflects ancient Mesoamerican techniques, which are not likely to have been much different from Old World practices. Raw amber is shaped into a roughout with a knife, ground against a file or sandpaper (substituting for a stone), bored with a drill twirled between the fingers of one hand, and polished off with cloth and a drop of gasoline (probably oil was used anciently) (Francis:1987c).

The coral beads appear to belong to the species of precious coral, *Corralium rubrum*, from the Mediterranean. They were not worked beyond cleaning off the "bark," or coenosarc and being drilled. They are probably products of Egyptian or other North African shops.

The bone beads and the wooden bead appear to have been worked on a lathe, and could have been pierced with a hot poker or drilled.

The bronze charm case pendant was molded, while the group of six gold balls now bent into a bead-like ring were molded as strings of half beads and then welded together. The technologies of early Islamic metalworking has been covered in other publications, and need not detain us here.

The hardest stone to work among those in the Nishapur collection was garnet (or spinel, which is slightly harder). Only one of these was shaped, a small oblate on a gold ring. The other two are crude pendants, one of which clearly exhibits signs of having been ground against a flat surface. Perforating such hard stones was possible with a diamond drill, but the thinning of the aforementioned pendant at the perforation indicates that even with a diamond drill boring was considered a task to minimize.

The clay beads were made by several methods. One was hand shaped, and the other oblates and the Conus shell shaped bead were likely rolled in the hand or against a flat surface. The multifaceted bead might have been molded, although there is no visible seam. Three thick round discs may have been spindle whorls or something other than beads, although the thinness of the center of the bore on one of them suggests not. This and another specimen appear to have been made by rolling a cylinder of clay, baking it, then sawing discs from it and finally drilling perforations from both sides.

SECTION THREE:

THE MEANING OF THE BEADS FROM NISHAPUR

The most common use of beads is for personal adornment, but they often function in many other ways as well. Beads can decorate far more than the human body, virtually anything from architecture to zebus. They are commonly considered magical, functioning as amulets or talismans. They are used to indicate status, either wealth, social standing, or belonging to a particular group. They may serve practical ends: as mnemonic devices, as counters on prayer strands or an abacus, as seals, or as currency.

It is not always possible to discern the role beads played in their original context when collected together from an excavation. To do so, it is necessary to rely on an understanding of the shapes of the beads and how particular ones may have functioned. Knowledge of historical and ethnographic parallels also furnish some idea of the uses of particular beads. Some of the early Islamic Persian beliefs about the amuletic value of beads or bead materials can be ascribed to pan-Islamic influences, while others have more remote origins. The following notes suggest the functions of some of the beads in the Nishapur collection.

AMULETS AND TALISMANS: MATERIALS

Beads are often made from materials which are themselves considered effective in warding off evil influences (amulets) or calling upon beneficent influences (talismans). Many of the beads from Nishapur were most likely made of particular materials for those specific reasons.

The most important amuletic use for beads in early Islamic Nishapur was no doubt the desire to stop the influences of the Evil Eye. This widespread superstition was and is important to Muslims and many other peoples (See Maloney 1976). It is believed that that the Qoran itself warned against the Evil Eye. "The Pen," (Surah 68, lines 51 ff.) has been interpreted as saying,

> The unbelievers wellnigh strike thee down
> with their glances, when they hear the
> Reminder, and they say, "Surely he is
> a man possessed!"

(Arberry 1964:601-2).

A number of materials are prescribed for combatting the effects of the Evil Eye. Among those represented in the Nishapur collection are the cowrie shell, known in Iran as <u>Bibin Tarak</u>, the "eye-cracker" (Allgrove 1976:45; Spooner 1976). Several of the chalcedony family of stones, including agate, especially brown agate, carnelian, and onyx are also supposed to be effective against the Eye (Budge 1961:306, 310, 320; Spooner 1976:80). Blue eyes were especially feared by West Asians, and the use of blue has been used against the Eye in many countries, including Iran (Allgrove 1976:45). This may help explain the large number of blue beads in the Nishapur collection: those of lapis lazuli, turquoise, blue chalcedony, glazed quartz, the large number of faience beads, and many blue glass beads (15; 28.3% of the glass beads).

In addition to the considerations of material and color, designs which resemble eyes are also believed helpful to ward off the Evil Eye. Thirteen of the glass beads have eye patterns of some type, while the circle/dot motif (made with a metal caliper which produces the dot in the center with one leg while inscribing a perfect circle around it with the other) is quite common, found on 17 jet beads and six beads of unidentified stone.

Indeed, when all of the materials, colors, and motifs believed to help save an individual from the Evil Eye found on beads from the Nishapur collection are tallied the total is quite astonishing. No less than 303 of the beads fall into one or the other of these categories, that is, 44.2 % of the total!

Aside from the superstition of the Evil Eye, several of the chalcedony stones have other associations with magico-religious beliefs. It is said that the Prophet Mohammed himself wore a carnelian seal (Kunz 1913:64), which would certainly sanction the use of that stone. The onyx is also associated with Solomon. Sale's translation of the Qoran contains a footnote to Surah 27, "The Ant," which reads:

> Some add that Balkis [the ambassador from the Queen of Sheba] to try whether Solomon was a prophet or no, dressed the boys like girls, and the girls like boys, and sent him, in a casket, a pearl not drilled, and an onyx drilled with a crooked hole; and that Solomon distinguished the boys from the girls by the different manner of their taking water, and ordered one worm to bore the pearl, and another to pass a thread through the onyx.
>
> (Sale n.d.:372, n. 1)

The story not only relates the great king to an onyx bead but also reminds us of the constant problem with the drilling of stones from both ends. This is done to prevent the distal end from cracking, and was done with nearly all the stone beads from Nishapur.

Grey banded agate, which is represented by only a few beads in the Nishapur collection, but including the important flat pendant which will be discussed below, is one of the two major products of the Western Indian agate bead industry. As with carnelians, it is mined along the banks of the Narmada River, and shares the ability to turn red upon heating, making them into sardonyx, and causing Ptolemy to place the Sardonyx Mountain at this locale (Francis 1982a:11). This stone is known as "babaghoria," after the patron saint of the region. As best as can be learned, Ghor was a scion of the Malwa Ghors, who died in battle early in the fifteenth century, and whose grave came to be used by the Muslims as an alternate focus of worship on what was long regarded as a holy hill (Francis 1986d).

Babaghoria agate was a popular Muslim amulet at least by the early sixteenth century. The Portuguese Duarte Barbosa described it when visiting Limodra, then the center of beadmaking, very close to the Ratanpur mines:

> And here they find in great abundance babagoure which we call calsadonia [chalcedony] which are stones with grey and white veins in them, which they fashion perfectly round, and after they are bored the Moors wear them...
>
> (Dames 1918:145)
>
> They also find in this town much chalcedony which they call babagore. They make beads with it, and other things which they wear about them, so that they touch the skin, as they say it is good for chastity. These stones are of little value there, for there are so many of them.
>
> (Stanley 1866:66-7)

The grey agate would not have been known as babaghoria before the death of Baba Ghor, but it was utilized long before it received its present name (Beck 1930). It was so popular in Persia in the mid nineteenth century that Tagore assumed that the name "babaghori" [sic] was given to it by the Persians themselves (1879:867, 885). Its use in the early Islamic period is also now confirmed.

Among other bead materials used at Nishapur, amber has long been scarce and valuable and used not only for decoration but for medicine (Budge 1961:309), a condition which still exists in Iran (personal observation). Turquoise, of which Nishapur was an exporter, has long been a favorite stone in Persian folklore. It has been said that to escape evil and attain good fortune one must look at the reflection of a new moon either on a copy of the Qoran, the face of a friend, or a turquoise, thus linking the stone with two of the most valuable possessions anyone can have (Kunz 1913:111).

Given the wide beneficent powers ascribed to stones, an old Persian legend might strike one as unharmonious. The tale is that when God created the world he made no useless things, but that the Devil, while thinking of ways to mislead humanity, noticed how Eve loved the colors of flowers. He therefore created precious stones in the colors of the fields, and has succeeded in engendering much crime and evil through the coveting of them (Kunz 1913:24-5). We are not told whether this is a pre- or post-Islamic legend, but it is a necessary caution about the wealth of the world.

THE SHAPES OF BEADS

The most easily recognizable shape among the beads from Nishapur are those that resemble charm cases. Charm cases are made of leather or metal and designed as containers to hold charms, usually written ones. Vertical ones were in use in Egypt as early as the XII Dynasty, while horizontal ones appear to be of Roman origin, and square packets did not appear until the Muslim Period (Petrie 1914:29). Most recently Schienerl has traced the development of the tubular types around the eastern Mediterranean (1980). If these ascriptions are correct, the shape passed over to India at an early date. Bodhisattva figures of at least the fourth or fifth century are wearing such cases or solid beads (personal observation). The stone bead made in imitation of this shape is known at Dwarka, an early Muslim Indian center, from the seventh or eighth century (Deccan College Museum, Poona; personal observation).

Four charm case beads are included in the Nishapur collection. One is a bronze example of the square type, imitating a leather case. The other three imitate vertical charm cases. One is a large example in jet with an inscription and the figure of an animal, the second is a decorated example in quartz crystal, and the third is made of Abbasabad stone.

It has been suggested that the horizontal charm case beads derive their form from doubly terminated quartz crystals (Keene 1981:30; Jenkins and Keene 1982:26). While this is an interesting idea, it has not been demonstrated to complete satisfaction. It was pointed out that quartz crystals are always hexagonal in shape, which is an important consideration. All three of the horizontal charm case beads from Nishapur are octagonal in shape. It was asserted that hexagonal varieties of these beads were more common than octagonal ones, but no evidence for this statement was given. It is not the case among the Nishapur beads. Nor among such pendants from Iran in the collection of the Center for Bead Research; of the eight in carnelian, babaghoria agate, and rock crystal, four have rounded bodies, and the faceted ones have seven, eight, or nine facets, never six.

A form that is likely related to the horizontal charm case consists of two tubes, one smaller than the other, joined together along their lengths. These are best known in glass, and all seem to come from Iran. There has been some question as to whether the beads were to be strung through the large tube or the smaller one, but the evidence of a red stone bead in this form from Nishapur proves that the smaller tube is the loop, as the larger one is solid. Smith, discussing glass examples in the Corning Museum of Glass, said that it has been suggested in Iran that the larger tube held written charms (1957:225), in which case they would have been functionally the same as horizontal charm cases.

Another pendant form from Nishapur is of considerable interest. It has no name, although it has been called a "Moghul (Mogul) shield pendant" because of its seeming origin in Moghul India (Francis 1979b:73). Its occurrence at Nishapur strongly suggests that it was an earlier development. The pendant is usually made of agate (often babaghoria), is fairly large and flat and perforated through a loop at the top. The body of the pendant is typically an ellipsoid with square "shoulders" or platforms at the top and the bottom. There are several variations known.

Jenkins and Keene point out a pendant on a stucco figure which might be a variation of the standard form of this pendant (1982:29) and can be dated from the mid eighth to mid ninth centuries (Wilkinson 1986:262, fig.4.3). The evidence of the figure, an agate form of this pendant, and what appears to be an unfinished steatite pendant similar to that on the stucco figure, place the form or at least variants of it into an early Islamic period.

The shape subsequently became very popular in the Muslim world. Budge suggested that it was peculiar to Shiite Muslims (1961:68, pl. VI), but it is further spread than that. Akbar issued a gold coin in the general shape in 981 A.H. = A.D. 1573 (Gupta 1979:Pl. XXVI.274), and it was popular for Moghul jade pendants (Brunel 1972:pl. 67). It was chosen for a glass bead shape by the highly imitative early Czech bead industry (Francis 1979c:11; pl. 1, 8.3-4), and sold in Iran with Muslim slogans on them and in Egypt with hieroglyphics (Petrie Collection, City College, London; personal observation). In short, it enjoys widespread popularity throughout the Muslim world, but especially in Iran. The early dating from Nishapur is significant, though what the complex shape means is still not solved.

Several other shapes among the beads call for some consideration. The molded fish glass bead might tempt one to consider it a Christian amulet, but fish are popular in Iranian folk jewelry (Allgrove 1976:47; personal observation). The term we have applied here to the rough glazed quartz pendants of "Tears of Christ" is not used in Iran but in the Levant. It is indicative of a certain respect given to this form, and its crude nature suggests something more than mere decoration. Many of the glazed quartz oblates are also very crude and rough in form.

The molded faience pendants seem to have little other than decorative effect, but their symbolism may be lost. We have referred to most as sun burst designs, but they might just as well be floral or rosettes. A rosette faience plaque with a central depression and five (instead of the usual six) surrounding depressions may well be a modern intrusion as it is still very brightly glazed. The type of amulet is well known in the Islamic world and likely derived from Roman prototypes (Schienerl 1982).

The cornerless cube (a cube or a rectangular solid with the eight corners beveled off) is common among the Nishapur beads, found in jet, lapis lazuli, carnelian, and a banded back and white stone. Although the shape is known from the Indus Valley, it only became widespread in the last few centuries B.C., and is known from Iran in many media (Francis 1986e). It has been suggested that green jasper ones have amuletic value among Bedouins for the Evil Eye (Schienerl 1985). More needs to be learned about the beliefs concerning this shape, but its presence at Nishapur in different materials is not surprising.

A common shape at Nishapur is the melon, a gadrooned oblate or sphere, found in faience, glass, jet, quartz, and amethyst. It is a very ancient bead shape (Eisen 1930), and quite widespread, even used by the Olmecs (National Museum of Anthropology and History, Mexico City; personal observation). It may well have had some special significance, but was porobaly only decorative when it was employed at Nishapur.

A bead shape that has long enjoyed popularity in Iran is the round tabular, a flat (table-like) bead with a round profile. Tabulars of shell, shell, lapis lazuli (a seal), and glass (usually oval and perhaps modern) were found at Nishapur. At least some of the carnelian ones were by-products of the Western Indian agate industry, made from the centers of finger rings cut out with hollow drills (Francis 1982a:pl. 1.6).

Some other beads are evocative but their significance is not immediately discernable. The onyx "claw" pendant may be a representation of the fierceness of wild animals; the wearing of real or artificial claws is still widespread today. The designs on the soda-etched carnelians may well have some meaning, but aside from suggesting that the "snowflake" design could help ward off the Evil Eye, more work on this important class of beads is needed before anything can be said. The unusually cut jet beads, made into star-like forms by cutting out pieces from a cube no doubt had meanings, at least in the delight of a tour de force of the lapidary's skill. The vase or pear shape, so common among the jet beads (73 of them) may well have had some meaning which is not yet understood. Finally, the black (steatite?) flat square plaque with holes for suspension at two ends and engraved on one side with a horse and other the other with a camel, would seem to answer the description of an amulet more than a seal or a mere decoration.

A few of the beads from Nishapur can be considered at least as functional as useful. This applies to the seals, some of which are cabochons rather than beads. The suggestion that a long faceted carnelian bead may have been the end bead (the "column") of a Muslim tasbih or prayer strand and that a number of other beads may have also been on prayer strands (Jenkins and Keene 1982:30) is well taken.

The crude thick clay discs are quite unusual. They may have been some sort of tool, such as spindle whorls, although they are very different from the numerous spindle whorls found at Nishapur. They might have been made from sacred clay, perhaps from Kerbala, which is used in modern Iran to make small plaques upon which the forehead rests during payer.

There are also a few "beads" which may not have been beads at all. A flat oval pendant of black Lydian stone appears to have been a touchstone (see Ahlberg et al. 1976). Several of the Abbasabad stone objects do not seem to have been pendants, as they are perforated in peculiar ways. One has an iron rod which has rusted inside it; it might have been a handle, as might some of the other strangely shaped "pendants" in this stone.

To summarize, a great many of the beads from the Nishapur collection may be said to have more than a simple decorative function. Nearly half of them may well have been regarded as amulets, most of which were probably for the perceived constant threat of the Evil Eye. We do not yet know what roles all or even most of the Nishapur beads played, but they were clearly of importance in early Islamic Persia.

SECTION FOUR:

MODERN BEADS FROM NISHAPUR

THE PROBLEM OF MODERN INTRUSIONS

The presence of modern or recent beads in a collection of much greater age is neither unusual nor surprising. As with most ancient sites, the ruins of Nishapur are near a living town, and the possibility of recent material being deposited on the surface of an older site is constantly present. It is unknown how these particular beads were acquired as part of the Museum's Nishapur collection. It is possible that they were surface finds or that by any one of several mechanisms they were buried to some depth. At least 23 modern beads (3.2% of the total) intruded into the collection.

Modern beads in collections of older beads are a world-wide phenomenon, and I have treated the problem elsewhere, likening it to that of "noise" in cybernetics (n.d. e). Some of the beads discussed here have been included in Museum publications, and they and others have been displayed in the Nishapur gallery. Because it is important to distinguish between modern intrusions and beads which can be reasonably be considered of early Islamic date, some detailed discussion seems in order.

There are basically three characteristics by which the modern beads could be distinguished from early Islamic ones. One is when they were made by a technique used only in recent times. Another is when they are made of a material not available in older times, or as in this case with newer glass colorants. Finally, if a given bead is known to have modern parallels but not ancient ones it can be assumed it is of recent date. When two or more of these characteristics can be applied to a particular bead our confidence in labeling them as recent increases.

GLASS COLORANTS

Six of the beads are of glass colored with ingredients or in hues not available in the early Islamic period. Three are a light translucent yellow color with a green tinge, characteristic of one type of glass colored with uranium. Uranium was only isolated in 1789 from pitchblende by Kalproth and soon was used to color glass (Weyl 1959:205; Trifanov and Trifanov 1982:71).

Two other beads are of a translucent red color, often referred to as ruby red. Although ruby red had been produced with copper from about the thirteenth century (Turner 1956:Table VII), the use of gold with a richer color and greater ease requires the suspension of gold in stannic (tin) acid. This tincture was known to medieval pharmacists, although probably not to the ancients as has been claimed (Thompson 1936:xxxi-xxxvi). The preparation of the tincture and its use in glass were not described until 1685 in De Auro by Andreas Cassius, and has since been called "Purple of Cassius." The commercial development of ruby glass was begun by Johann Kunckel (ca. 1630-1705), but had limited applications (Weyl 1959:380-1). The final improvements seem to have been made in Venice by Giuseppe Zecchin before 1859 (Morazzoni 1953:57). The Cornaline d'Allepo bead from Nishapur is colored with gold-red glass.

The other translucent red bead is colored with selenium, as is an opaque red unperforated faceted stud. Selenium is an element not identified until 1817 by J. Berzelius (Trifanov and Trifanov 1982:104). It was first used in glass in 1865 by J.T. Pelouze, but was not very successful. In 1891 F. Welz of Bohemia was granted a patent for making brilliant red glass colored with it (Weyl 1959:282-3).

MANUFACTURING METHODS

Two of the beads colored with uranium discussed above were also made by a recent technique. The two faceted biconical beads were first made by being molded into a ball shape with a deep conical perforation which did not entirely pierce the ball. Then they were placed on a tapered mandrel or dop and held against a wheel to facet them. When they were faceted all over the mandrel was struck from behind and the beads were completely pierced. This method is called "mandrel-pressing" and was first described by Ross (1974). Beads made in this way have characteristic conical holes, ground facets and areas of broken or chipped glass around the small aperture. They were made in the Bohemian beadworks (now in Czechoslovakia) centered around Jalonec nad Nisou from about 1860 until 1900 (Francis 1979c:5-6).

Another most unusual method of making beads was done in several European countries, but chiefly in Bohemia. The method is known as the "Prosser" technique after its inventor Richard (or his brother Thomas) Prosser, the first patent of which was secured in 1840 (Sprague 1983). Prosser beads are made by molding powdered glass under pressure until it melts and fuses. They are related to tile beads and buttons. Prosser beads are distinguished by having a thick equatorial band and a distinctive glossy surface, which, however, is pockmarked, rather like the rind of an orange, around one aperture. Two Nishapur beads are Prosser beads.

The Bohemians were the true masters at molding beads and in addition to making beads by some of the more traditional and some more radically new methods, much of their production was done in two part molds. The beads have characteristically clear glass, the mold seams are usually visible but not intrusive, and the perforations are generally quite small. Five Nishapur beads are so clearly new and molded (two of which are selenium red in color and another in uranium yellow-green) that they must be Czech or Czech-derived in origin (after World War II some beadmakers fled to Germany and Austria, and the Czech have exported their techniques to Japan, India, and most recently China).

BEAD STYLES

The masters of the modern bead trade have long been the Venetians (Francis 1979d). There are nine wound beads that can be identified as their work. One is the gold-red Cornaline d'Allepo, a name long established in the trade (Haldeman 1879:269), but apparently not really related to Allepo itself. Five are eye beads with white or white and blue and pink eyes on black, and three are polychrome beads with a combed floral spray running around them. These beads are typically Venetian in style, with smooth sides and obvious coils of glass at the ends, due to rolling a hot bead along a small trough to smooth it, which does not usually smooth out the ends.

Besides this technical consideration, it should be suffice to say that all of these beads are to be found on Venetian bead sample cards dating from the mid to the late nineteenth century. Four major card collections are available for comparison: the Levin and Slade collections in the British Museum published by Karklins (1982), the Giacomuzzi Brothers sample book (personal observation), and the cards in the Museo Vetrario di Murano. All have examples which match these Venetian beads in the Nishapur collection.

One glass "bead" is clearly a modern chandelier piece. Two others are judged to be modern, although there are neither technical reasons nor known provenance for them. They are of a swirled light blue and white glass and are simple wound suboblates. Similar beads in a fairly limited range of colors and always as oblates or suboblates are relatively common in Iranian bazaars, and although they are considered a good bead by the dealers, all are of well preserved glass, and there is nothing to indicate that they are of any considerable age.

Finally, one clay bead has been judged as modern. It is a small green colored ellipsoid. Precisely the same sort of beads are strung in a modern tasbih (prayer strand) in the Center for Bead Research Collection.

CATALOGUE OF THE BEADS FROM NISHAPUR

Notes:

The beads are divided according to their material, except that the modern beads of glass and clay are listed at the end of the catalogue. Each bead is described as to its form and its color or species when appropriate. Specific observations about the technique by which the bead was made or its condition, the most precise assumed dating available and the Museum's accession numbers are included in each entry. Nearly all of the beads were measured, the exceptions being a large number of similar beads in a group (under one accession number), of which those that appeared to be the largest and smallest of each type were measured. All measurements are given in centimeters, to a tenth of a millimeter. In most cases both bore apertures were measured, but when they appeared to be the same they were not. Modern beads and objects which do not appear to be beads were not measured in as many ways as the ancient beads.

The following abbreviations were used in the catalogue entries:

D. = Diameter

L. = Length (along the perforation)

W. = Width

T. = Thickness

b. = Width of the aperture(s) of the perforation

Max. = Maximum

Min. = Minimum

Lp. = Length of the perforation

Wp. = Width at the perforation

Dp. = Diameter at the perforation

(B) = broken along this axis, e.g. L.(B) = Length in the broken state

ca. = circa, about.

H (without a period) = Hardness in the Mohs scale

The following terms call for some explanation:

Oblate = a round bead, called by various others round, spherical, or globular. A suboblate is more flattened at the poles.

<0.06 (used on measurements of bore apertures) = A bore too small to measure with my hand calipers, the minimum measurement attainable being about 0.06 cm.

The colors of mosaic canes are noted by naming parts of the canes found in the Nishapur collection. The center is the spot of color at the center of the cane. The collar is the line surrounding the center. The field is a patch of color encircling the collar. The frame is the line which encloses the interior colors. Stripes are longitudinal lines along the mosaic cane which are visible when flattened out against the bead.

Table 2:
Census of the Beads from Nishapur by Material

Material	Number	% of Ancient Beads	% of Stone Beads	% of Quartz Beads
Amber	2	0.3		
Bone	2	0.3		
Bronze	1	0.15		
Clay	8	1.2		
Coral	2	0.3		
Faience	139	20.3		
Glass	53	7.7		
Gold	1	0.15		
Jet	280	40.8		
Garnet	3	0.4	1.9	
Lapis Lazuli	13	1.9	8.3	
All Quartz	112	16.3	70.4	100.0
All Chalcedony	91	13.3	27.2	81.25
Rock Crystal	16	2.3	10.1	14.3
Agate	8	1.2	5.0	7.1
Amethyst	1	0.15	0.6	0.9
Carnelian	57	8.3	35.8	50.9
Chalcedony	13	1.9	8.3	11.6
Onyx	13	1.9	8.3	11.6
Opal	1	0.15	0.6	0.9
Jasper	3	0.4	1.9	2.7
Turquoise	3	0.4	1.9	
Unidentified Stones	28	4.1	17.6	
Shell	38	5.5		
Wood	1	0.15		

19 broken
2.4%

		% of All Beads
Modern glass	23	3.2
Modern Clay	1	0.1

all uses for Evil Eye =
538/685 ancient =
78.5%
(etc not counted)

AMBER

Slightly wedge disc. D. 1.03, L. 0.55, b. 0.31, 0.35. [48.101.78A].

Squarish disc, crackled. Max. D. 1.03, Min. D. 0.90, L. 0.73, b. ca. 0.22. [48.101.78B].

BONE

Oblate with one beveled end. D. 0.81, L. 0.65, b. 0.19, 0.21. [48.101.74].

Double chamfered cylinder, slightly polished with some abrasion marks still visible, bored from one side. D. 0.89, L. 0.57, b. 0.19, 0.23. [48.101. 191f]

BRONZE ?

Flat charm case pendant with two loops, slightly tapered toward the bottom. From Tepe Madraseh, late eighth to tenth century. H. (without loop) 1.91, H (loop) 0.55, W. 2.05, T. 0.35. [40.170.274].

CLAY

Black oblate. D. 1.35, L. 1.21, b. 0.19, 0.19. [no number].

Multifaceted, with a base of dark brown and black glaze or paint on the faces of the facets. D. 1.45, L. 1.28, b. 0.18, 0.20. [no number].

Grey clay shaped like a Conus shell with six vertical rows of four punctates. D. 0.60, L. 0.82, b. <0.06. [48.101.72X].

Oblate, probably hand formed clay and painted red on the surface. The accession card says "soft gritty tan stone (earthenware?)." D. 0.59, L. 0.49, b. 0.15, 0.19. [48.101.75c].

Light brown thick disc. A spindle whorl? D. 1.90, L. 1.09, b. 0.46, 0.49. [48.101.185a].

Thick disc, possibly a spindle whorl, but the thinness of the center bore argues against that? Appears to have been sawed from a cylinder. The edge is a darker brown than the sides. Drilled from both sides. D. 2.53, L. 0.72, b. 0.52, 0.66, bore at center 0.20. [48.101.185b].

Thick disc, a spindle whorl? Similar in material to 48.101.185b, except that that the edge and one end are darker (the end of the cylinder?) and there are no visible sawing marks. D. 1.95, L. 0.63, b. 0.48, 0.54. [48.101.185c].

Oblate, brown surface, probably clay. D. 1.00, L. 0.90, b. 0.25, 0.27. [48.101.197C].

CORAL

Uneven tube of red coral, likely to be Corallium rubrum. D. 0.71, L. 1.68. [48.101.77A].

Uneven tube of red coral, likely to be Corallium rubrum. D. 0.55, L. 1.26. [48.101.70B].

FAIENCE

Blue oblate, not completely perforated through, though pierced at both ends. D. 0.62, L. 0.45, b. 0.14, 0.21. [40.170.79b].

Strand of 125 beads. [48.101.222; individually labeled 1 through 125].
Molded pendant of sunburst design, the loop is broken. L. 263, W. 2.45, T. 0.91. [#122].
Molded pendant of sunburst design. L.2.37, W. 1.65, T. 0.67, L.(loop) 0.79. [#123].
Molded pendant of sunburst design, the loop is virtually closed. L. 2.22, W. 1.50, T. 0.72, L. (loop) 0.89.
Two thin pointed pendants. L. 1.64, W. 0.67, Wp. 0.51; L. 1.68, W. 0.79, Wp. 0.60.
Two half ball pendants. L. 1.28, Wp. 0.45; L. 1.20, Wp. 0.50.
One triangular sectioned ovate profile pendant. L. 1.34, Wp. 0.57.
69 crude oblates and suboblates. Largest: D. 2.25, L. 1.73, Smallest: D. 0.85, L. 0.69.
46 crude melons. Largest: D. 2.43, L. 2.10, b. 0.69, 0.74; Smallest: D. 0.40, L. 0.60, b. 0.14, 0.21.
The color of most of these is a light blue, although there is some variation. Numbers 48 and 74 retain their glaze and look new.

Light green molded pendant with of shape with thick molded design on one face. H. 4.50, W. 3.55, T. 1.27, T.(loop) 1.39. [38.40.238].

Light blue molded pendant of circular shape with molded design on one face. H. 4.19, W. 3.58, T. 0.78, T.(loop) 0.95. [38.40.256].

Light green rounded, molded pendant of crescentric outline, with a molded design on one side. From Tepe Madraseh, late eighth to tenth century. H. 4.16, W. 3.85, T. 0.78. [38.40.257].

Light green molded pendant of irregular outline. H. 4.69, W. 4.46, T. 1.37, T.(loop) 1.15. [48.101.45].

Light green broken oblate. D. 1.40, L. 1.44. [48.101.89].

Dark blue disc with rosette of five depressions surrounding one; two are holes. Modern? D. 1.74, L. 1.56, T. 0.41. [48.101.119].

Melon shaped with nine lobes. Traces of glaze; glaze only penetrates the tops of the perforations. D. 2.25, L. 1.60, b. 0.55, 0.55. [48.101.220A].

Rough oblate with traces of blue glaze. D. 1.89, L. 1.62, b. 0.51, 0.55. [48.101.220B].

Light blue irregular melon of seven lobes, one of which is quite large, with a peak on one end. No coloration in the perforation. D. 1.42, L. 1.20, b. 0.45, 0.49. [48.101.220C].

Light blue green irregular melon of seven lobes, one of which is quite large, with a peak on one end. D. 1.45, L. 1.09, b. 0.62, 0.55. [48.101.200D].

Multicolored surface of a crude four lobed melon with a peak on one end. D. 1.36, L. 1.20, b. 0.49, 0.43. [48.101.200E].

Note: 48.101 200 C, D, and E all have quite similar sections and all have a similar peak at one end.

Light blue, rather cone shaped oblate. D. 1.25, L. 1.35, b. 0.11. [48.101.200F].

Light blue fragment. L. 0.98. [48.101.222B].

GLASS

Black wound oblate with crossing yellow waves and mosaic slices with black, white or yellow centers, white collars, and black and red stripes. D. 1.65, L. 1.50, b. 0.30, 0.37. [no number].

Small, black wound oblate, perhaps with white combed lines. D. 0.61, L. 0.60, b. <0.06. [no number].

Drawn deep translucent blue heptagonal chamfered cylinder, somewhat corroded on surface. D. 1.10, L. 0.89, b. 0.13, 0.14. [no number].

Black wound suboblate. D. 0.90, L. 0.58, b. 0.20, 0.31. [no number].

Spherical splatter. L. 0.75. [no number].

Melon shaped bead with lobes of increasing size. The glass is heavily corroded, perhaps originally green. Inside the perforation is a black layer, indicating furnace winding. D. 0.92, L. 0.85, b. 0.25, 0.34. [no number]. 7 lobes

Dark translucent blue wound suboblate. D. 0.93, L. 0.82, b. 0.28. [no number].

Melon shape with 7? lobes, possibly two-layered segmented type. Very corroded. D. 0.91, L. 0.83, b. 0.19. [no number].

Furnace-wound black short barrel with three rows of multi-stratified eyes of white, blue, white, blue, white. Heavily corroded or worn, so that all the eyes cannot be seen, and the blue color is not too distinct. D. 0.83, L. 0.94, b. 0.15, 0.45. [40.170.700A].

Furnace-wound short cylinder of translucent medium blue glass with yellow waves and large raised spots, mostly at the curves of the waves. D. 2.20, L. 2.30, b. 0.40, 0.46. [40.170.701a].

Furnace-wound short cylinder with intersecting white waves and folded (?) eye elements of red, white, red, and white. D. 2.12, L. 2.10, b. 0.40, 0.50. [40.170.701b].

Furnace-wound crumb bead of black with yellow, blue, and red impressed crumbs. D. 1.66, L. 1.46, b. 0.67, 0.73. [40.170.701c].

Furnace-wound short barrel completely covered with irregular striped ribbon sections in yellow, red, black, white, and green. D. 1.94, L. 1.34, b. 0.52, 0.55. [40.170.701d].

Dark translucent blue wound and pressed oval tabular. Modern? D. 0.98, T. 0.65, L. 1.00, b. 0.29. [48.101.?].

Light translucent blue cabochon with polished flat top and roughened rounded bottom (for a foil?). The accession card says this is a stone, but it appears to be glass; a small broken area is somewhat corroded. W. 0.90, L. 0.36. [48.101.63].

Wound light opaque blue oblate, corroded to yellow. D. 0.82, L. 0.70, b. 0.14. [48.101.79].

Yellow lopsided wound short barrel with striped mosaic eyes. Max. D. 1.86, Min. D. 1.62, L. 1.14, b. 0.31, 0.39. [48.101.84A].

A yellow furnace-wound bead (with black deposit in the perforation) decorated with slices of mosaic cane. All the cane slices have red, black, and yellow outer stripes and red collars. The centers are yellow and green, yellow and red (or black), and white, red, and white. D. 1.14, L. 0.87, b. 0.30, 0.47. [48.101.84b].

Furnace-wound black barrel with stratified eyes of white and blue pupils in circular eyes. D. 1.14, L. 1.21, b. 0.22, 0.41. [48.101.84C].

Furnace-wound black oblate with stratified eyes of white with blue (now grey) pupils. Pupils and whites are single strokes. D. 0.73, L. 0.69, b. 0.20, 0.16. [48.101.84D].

Folded barrel of deep blue with combed lines. D. 1.02, L. 3.28, b. ca. 0.30, 0.40 [48.101.84E].

Translucent deep green octagonal bicones, ground and bored as if it were stone. D. 0.58, L. 1.03, b. 0.12. [48.101.86A].

Translucent deep green octagonal bicones, ground and bored as if it were stone. D. 0.60, L. 1.15, b. 0.09, 0.11. [48.101.86B].

Translucent deep green octagonal bicone, ground and bored as if it were stone. D. 0.50, L. 1.25, b. 0.10, 0.11. [48.101.86C].

Translucent dark green furnace-wound bicone. Accession card says it is faceted, but it is merely slumped to one side. D. 0.92, L. 0.61, b. 0.16, 0.20. [48.101.86D].

Cobalt blue piece, perhaps a very thin cabochon. L. 1.21, W. 0.96, T. 0.11. [48.101.87b].

Three segmented gold-glass bead, highly iridescent corrosion. D. 0.47, L. 1.03. [48.101.90a].

One segmented hollow bead with one end broken, likely to have been a gold-glass bead. D. 0.86, L. 0.86, b. ca. 0.15. [48.101.90b].

Square cube, originally green, now highly corroded, probably wound. D. 0.83, L. 0.87, b. 0.21, 0.20. [48.101.90d].

Clear, wound round disc, now corroded. D. 1.14, L. 0.62, b. 0.27, 0.28. [48.101.90f].

Furnace-wound light opaque blue suboblate, corroded. D. 0.80, L. 0.65, b. 0.32, 0.28. [48.101.90I].

Light translucent blue hexagonal tube, corroded, but probably drawn. Max. D. 0.67, Min. D. 0.65, L. 1.45., b. 0.16. [48.101.90I].

Light opaque blue wound oblate. D. 0.53, L. 0.50, b. 0.11, 0.15. [48.101.90k].

Wound translucent green suboblate, perhaps modern. D. 0.80, L. 0.59, b. 0.23, 0.28. [48.101.90P].

Drawn tube of dark translucent green over opaque yellow. Reheated on ends. D. 0.50, L. 0.68. [48.101.90q].

One segmented black suboblate. D. 0.70, L. 0.58, b. 0.13, 0.18. [48.101.90r].

Deep opaque blue furnace-wound oblate, heavily corroded. D. 1.02, L. 0.98. [48.101.90S].

Wound and pressed oval tabular of deep translucent blue. Modern? Max. D. 0.82, Min. D. 0.65, L. 1.06, b. 0.27. [48.101.90T].

Furnace-wound black suboblate, probably colored with iron, as glass is slightly amber colored in spots. D. 1.04, L. 0.84, b. <0.06, 0.16. [48.101.90Y].

Segmented flattened barrel bead, originally light translucent blue, now heavily corroded. Accession card says ceramic. Max. D. 0.66, Min. D. 0.50, L. 1.05, b. <0.06. [48.101.180a].

Although the accession card calls this a bead, it is only a splatter (evidence of glass working) with a piece of copper? stuck on. L. 0.83. [48.101.181].

Opaque light blue wound suboblate. Accession card says ceramic. D. 0.81, L. 0.57, b. 0.17, 0.16. [48.101.186b].

Opaque light blue wound and pressed oval tabular. Modern? D. 1.20, T. 0.48, L.(B) 1.23, b. 0.23. [48.101.192b].

Opaque light blue wound and pressed oval tabular. Modern? D. 0.90, T. 0.54, L. 1.00, b. 0.29. [48.101.192c].

Opaque light blue wound suboblate. D. 0.85, L. 0.64, b. 0.22. [48.101.192E].

Oblate, originally colorless or slightly amber, but now highly corroded and iridescent. The manufacturing method is difficult to discern, but it may be a segmented bead. D. 1.28, L. 0.89. [48.101.209a].

Furnace-wound black oblate with three rows of stratified eyes of white with blue pupils in circular eyes. D. 1.31, L. 1.07, b. 0.16, 0.22. [48.101.209E].

Furnace-wound black oblate with stratified eyes of white with blue (now grey) pupils. Pupils and whites are single strokes. D. 1.24, L. 1.36, b. 0.20, 0.38. [48.101.209F].

Furnace-wound black oblate with stratified eyes of white with blue (now grey) pupils. Pupils and whites are single strokes. D. 0.96, L. 0.85, b. 0.37, 0.40. [48.101.209G].

Mosaic cane or millefiori tube with four rows of three cane eyes along length. Eyes composed of red center surrounded by white and black collars, a green field, and a yellow frame. D. 0.84, L. 2.49. [48.101.209H].

Black furnace-wound two segmented (either wound together or fused after being made separately) with eyes of colors which are difficult to discern, perhaps black surrounding white. D. 0.57, L. 0.82, b. 0.21, 0.24. [48.101.209I].

Oblate apparently a core onto which black and white stripes were applied and then combed into an ogee. D. 1.75, L. 0.60, b. 0.64, 0.65. [48.101.218].

Fish shaped bead, originally light blue-green, now heavily corroded. D. 1.10, T. 0.55, L. 1.80, b. 0.15. [48.101.235].

GOLD

Six balls connected to each other, each with a diameter of 0.33, made by welding two strips of six halves together (the second one from one side has a flat platform at one pole). These are now curved into a a bead-like piece, but they are not joined and there is no particular indication that they were made as a bead. [40.170.15A].

JET

A group of 138 jet beads. [no numbers].
One flattened octagonal chamfered cylinder. Max. D. 0.93, Min.D. 0.64, L. 0.95, b. 0.12.
One octagonal chamfered cylinder. Max.D. 1.06, Min. D. 0.99, L. 0.89, b. 0.10, 0.17.
One squat vase shape. D. 1.72, L. 1.44, b. 0.64, 0.65.
One oblate with two incised zones. D. 1.11, L. 0.99, b. 0.19, 0.20.
One chamfered cylinder with three incised zones. D. 0.80, L.(B) 0.70, b. 0.10, 0.15.
Two square bicones. D. 0.60, L. 0.92, b. 0.10, 0.10; D. 0.54, L.(B) 0.81, b. <0.06.
Three long bicones. Largest: D. 0.58, L. 0.80, b. <0.06.
Four discs. Largest: D. 0.95, L. 0.47, b. 0.22; Smallest: D. 0.64, L. 0.42, b. 0.11.
Four chamfered cylinders. Largest: D. 1.02, L. 0.80, b. 0.12, 0.14; Smallest: D. 0.85, L. 0.71, b. 0.11, 0.15.
Fourteen barrels. Largest: D. 1.60, L. 2.24, b. 0.25, 0.29; Smallest: D. 0.77, L. 0.87, b. 0.10, 0.15.
32 Pear or vase shaped beads. Largest: D. 1.93, L. 1.85, b. 0.20, 0.28; Smallest: D. 0.81, L. 0.80, b. 0.18, 0.18.
74 oblates or suboblates. Largest: D. 1.92, L. 1.64, b. 0.32, 0.32; Smallest: D. 0.55, L. 0.49, b. <0.06.
Plus additional fragments.

Octagonal cylinder with pointed octagonal ends, broken into two pieces. D. 0.88, L. 0.98. [no number].

Seal, square faced and sectioned tapering toward perforation and coming to a point after it. Max. D. 1.19, Min. D. 1.03, L. 2.06. [39.40.141].

Octagonal charm case pendant. The second facets of both sides have an inscription. One one side there is an animal on the third facet and an inscription on the loop. L(B). 3.85, Max. D. 2.25, T. 1.88. [40.170.404].

Oblate with inscription reading backwards, which the accession card suggests was used as a seal. D. 1.95, L. 1.92, b. 0.30. [40.170.407].

Bead of square section and profile, "vase" shape with five circle/dot motifs on one face and six on the opposite face, with traces of red in the incised lines. From Tepe Madraseh, mid eighth to late tenth century. Max. D. 0.95, Min. D. 0.67, L. 2.40. [40.170.409].

Round shield pendant with five short vertical cuts at top, three zones underneath, and three circle/dot motifs on the face. One side is perhaps filled in with a white material. From Vineyard Tepe, mid eighth to early tenth century. L. 2.96, W. 2.86, T. 0.75, b. 0.30. [40.170.410].

A strand of 26 jet beads [40.170.694; individually unnumbered].
Thirteen oblates or suboblates, the largest with a raised equatorial zone is D. 2.37, L. 1.95, b. 0.39, the smallest is D. 1.19, L. 0.86, b. 0.21. Two have incised zones, one of which also has an inscription, nearly rubbed off.
There are also barrels (6), a disc (1), a disc with a collar (1), an oblate with a collar (1), a flattened ellipsoidal barrel (1), a double chamfered cylinder (1), and beads too broken to determine their shape (2).
Most appear to have been shaped on a lathe.

A strand of 31 beads [48.101.695; not individually lettered].
One vase shape, with two zones and circle/dot motif. D. 0.57, L. 1.10.
Two pear shaped, with two zones and circle/dot motif. D. 0.60, L. 0.88; D. 0.64, L. 0.93
One oblate, plain. D. 0.43, L. 0.43.
Eight double chamfered cylinders with two zones and circle/dot motif between them. Largest: D. 0.50, L. 0.44, Smallest: D. 0.50, L. 0.39.
Nineteen tubes with double line collar/zones. Largest: D. 0.41, L. 0.76, Smallest: D. 0.37, L. 0.33.

A strand of five beads [40.170.696; individually lettered].
a Pear shaped. D. 1.85, L. 2.03, b. 0.19.
b Barrel. D. 0.75, L. 0.83, b. 0.10.
c Oblate. D. 1.21, L. 1.12, b. 0.13.
d Oblate. D. 1.21, L. 1.25, b. 0.18.
e Oblate. D. 1.30, L. 1.33, b. 0.16.
All of these have two red painted zones upon them. A, b, and e have inscriptions between the zones which have been infilled with a white substance. C and d have three circle/dot motifs, each of which contain three smaller circle/dot motifs.

A strand of 26 beads (accession card says 27). [40.170.697; not individually numbered].
One fluted barrel. D. 1.16, L. 1.50.
One melon. D. 1.04, L. 1.00.
One double chamfered cylinder. D. 1.00, L. 1.00.
Seventeen octagonal chamfered cylinders. Largest: D. 1.41, L. 1.53. Smallest: D. 0.89, L. 0.90.
One cornerless cube. D. 1.05, T. 0.90, L. 1.10.
One hexagonal chamfered cylinder with six facets at each end. D. 1.16, L. 1.05.
One heptagonal long bicone. D. 1.15, L. 3.30.
One cube cut into a star pattern. D. 1.50, T. 150, L. 1.20.

A strand of thirty jet beads. [40.170.698, individually unnumbered]
One is a double chamfered cylinder D. 180, L. 180.
All others are pear or drop shaped, five with rims (vase shaped), the largest being D. 198, L.(B) 2.12, the smallest D. 0.87, L. 0.78. Four have incised lines, and one is broken in half. All appear to have been turned on a lathe, many of them have deep dimples at their bases.

Pear shaped bead, perhaps of bitumen. D. 0.93, L. 0.78, b. 0.12, 0.14. [48.101.92a].

Oblate, perhaps bitumen. D. 0.83, L. 0.55, b. 0.12. [48.101.92a].

Oblate, presumably of jet. D. 1.30, L. 1.30, b. 0.20, 0.23. [48.101.179A].

A short barrel, turned on a lathe. D. 1.74, L. 2.00., b. 0.19, 0.24. [48.101.210].

Hexagonal chamfered cylinder, faceted with six diamonds and twelve triangles in the center and six triangles on each end. D. 1.25, L. 1.35, b. 0.11. [48.101.219b].

Hexagonal pear or drop shaped bead. Max. D. 1.41, Min. D. 0.87, L. 2.34, b. 0.11, 0.14. [48.101.242].

Pear or drop shaped bead with six flutes. Max. D. 1.43, Min. D. 0.87, L. 2.90, b. 0.19, 0.19. [48.101.248].

A group of unusually shaped jet pieces numbered 48.101.249c and pieces numbered a, a, c, e, f, and one without a number. All are fragmentary.
Long pendant? Lp. 0.29, L. 153. [48.101.249c]
Long broken piece with a deep groove along one edge. L. 2.09, T. 0.52 [a].
Wedge shaped fragment. L. 0.99, Lp. 0.22 [a].
Fragment with a groove along one edge. L. 1.06, T. 0.69 [c].
A flat diamond shaped center with two of four "ears" projecting from the sides of the diamond. L. 1.59, T. 0.44. [e].
Fragment, very fragile. L. 0.80, W. 0.46, T. 0.40 [f].

Vase shaped bead with a groove around the lip of the vase. D. 1.28, L. 2.43, b. 0.16, 0.24. [48.101.251].

A rectangular cube with at least one pointed end and flattened corners. The faces have triple concentric circle/dots surrounded by double concentric circle/dots. Broken on one end. D. 2.14, L. 2.81. [48.101.252].

Short barrel, finely done, drilled from both sides. D. 0.92, L. 0.67, b. 0.12, 0.12. [48.101.254].

A cube cut into the shape of two interpenetrated tetrahedra. Two faces (the intersection of the edges of the planes) have the perforation, while the other four have small collars surrounding holes which do not penetrate the body. H. 0.96, L. 0.82, W. 0.92. [48.101.247].

An irregular cornerless hexagonal with six facets at each end. Each main irregular hexagonal face has double concentric circle/dots. Facets are hand ground; bored from both ends. From Sabz Pushan, probably ninth to tenth century. Max. D. 2.64, Min. D. 2.58, L. 2.51, b. 0.37. 0.40. [40.170.405].

STONE

GARNET (OR SPINEL?)

Oblate on gold ring. From Tepe Madraseh, mid eighth to tenth century. D. 0.61, L. 0.46. [40.170.153].

Reddish-brown irregular pendant, ground and flattened in some places, especially around one perforation. Dp. 0.48, T. 0.35, L. 1.28, b. <0.06. [48.101.64].

Irregular drop pendant. D. 1.67, Dp. 037, L. 1.25. [48.101.90X].

LAPIS LAZULI

Round tabular seal stone bead. The wording "Ahmad [i]bn Hamzah, Alp Arslan," was gouged into the stone. D. 1.00, T. 0.32, L. 1.04, b. 0.10. [38.40.98].

Cornerless cube, perhaps tumbled or well worn. Max. D. 0.80, Min. D. 0.79, L. 0.85, b. 0.20. [48.101.69A].

Cornerless cube, only ground to shape. Max. D. 0.65, Min. D. 0.62, L. 0.71, b. 0.14. [48.101.69B].

Cornerless Cube. D. 0.60, L. 0.63, b. 0.15, 0.15. [48.101.69C].

Aviform? pendant, with three drillings on one side and two on the back. Max. D. 0 72, Dp. 0.41, L. 1.24., b. <0.06. [48.101.69D].

Diamond tabular only ground to shape, with perforations through the two thinner points. D. 1.10, T. 0.30, L. 0.70, b. <0.06. [48.101.69E].

Flat drop or tear shaped bead. Max. D. 0.85, Min. D. 0.30, L. 1.14, b. <0.06. [48.101.69F].

Round tabular, only ground to shape. D. 0.90, T. 0.32, L. 0.90, b. 0.14. [48.101.69G].

Octagonal pear, tumbled or well worn, bored from both sides. Max. D. 0.70, Min. D. 0.50, L. 0.90, b. 0.16, 0.19. [48.101.69I].

Barrel, bored from both sides. D. 0.77, L. 0.90, b. 0.10, 0.18. [48.101.69J].

Crude barrel. D. 0.60, L. 0.70, b. 0.14, 0.15. [48.101.69K].

Flat drop bead, tumbled or well worn, bored from both sides. D. 0.89, T. 0.32, L. 1.09, b. 0.12, 0.13. [48.101.182].

Irregular disc, faces not parallel, outline not circular, perforation not centered. D. 1.90, L. 0.55., b. 0.19, 0.24. [48.101.219].

QUARTZ FAMILY

ROCK CRYSTAL

White oblate, possibly glazed, bored from both sides. D. 1.18, L. 1.09, b. 0.20, 0.26. [48.101.73B].

White oblate with blue or green glaze, mostly gone. Bored from both sides. D. 1.14, L. 0.94, b. 0.17, 0.19. [48.101.73B].

White irregular or faceted oblate glazed with green or blue, mostly gone. Bored from both sides. D. 1.11, L. 0.89, b. 0.15, 0.20. [48.101.73D].

Irregular white oblate with traced of dark blue glaze. Drilled from both sides. D. 1.12, L. 1.07, b. 0.15, 0.15. [48.101.73E].

White oblate glazed with green or blue, mostly off. Drilled from both sides. D. 0.80, L. 0.68, b. 0.15, 0.15. [48.101.73F].

Fragment of white glazed bead with perforation, drilled from both sides. L. 0.80, W. 0.60, T. 0.54. [48.101.73G].

"Necktie" shaped white pendant, perforated through the faces, with traces of blue and green glaze. L. 1.75, Max.W. 1.05, Tp. 0.50, b. 0.13, 0.14. [48.101.73I].

Long octagonal bicone, high-polish glazed with traces of (?) glaze on facets. Drill dimpled, drilled from both sides. D. 1.15, L. 2.49, b. 0.15. [48.101.88].

Irregular "Tears of Christ" Pendant, glazed with dark blue (light blue appears to be a thinner layer of glaze) on white quartz. The top has been chipped to take a perforation from both sides. D. 0.55, L. 1.90, b. 0.11, 0.11. [48.101.194A].

Irregular flat triangular shape of white quartz with traces of blue glaze, "Tears of Christ" type. W. 0.95, L. 1.75, T. 0.56. [48.101.194b].

Charm case shape. Octagonal section and ends. On the side the top two facets have one and one and a half longitudinal lines, the other side has one and three, and the third facet has two partial lines, evidently a mistake. The top two edges on both sides have three vertical cuts. These cuts and the lines are wheel cut. The perforation loop on top is broken off. Listed on the ascession card as ninth to tenth century. Max. D. 0.93, Min. D. 0.82, L. 1.59. [48.101.200].

Drop pendant of clear quartz, with high-polish glaze on a roughened surface, drilled from both sides. D. 0.83, Tp. 0.55, L. 1.09. [48.101.201].

Octagonal cylinder with pointed octagonal ends. Dimples are chipped, and the bead is drilled from both sides. D. 0.72, L. 0.55, b. 0.09, 0.13. [48.101.203].

Heptagonal bicone. Chip dimpled and drilled from both sides. D. 1.45, L. 1.00, b. 0.10, 0.11. [48.101.203?].

Six lobed melon, broken in places, drilled from both sides. D. 1.63, L. 1.40, b. 0.14, 0.14. [48.101.204].

Irregular cabochon, tumble polished. L. 1.02, W. 0.83, T. 0.63. [48.101.206].

AGATE [See also Chalcedony Strand 48.101.71]

A flat pendant of striped agate with an ellipsoidal center, triple peaked top, and squared-off bottom, perforated through the top. This piece was in the conservation department, as it had been accidentally broken; I was not able to examine it personally. W. 2.54, H. 1.75, T. 0.56. [48.101.80].

Triangular barrel. Max. D. 1.65, Min. D. 1.46, L. 2.40, b. 0.32, 0.36. [48.101.193a].

AMETHYST

Light amethyst oblate with gouged lines making two collars and 24 flutes. Chip dimpled and drilled from both sides. D. 1.45, L. 1.30, b. 0.20. [48.101.89].

CARNELIAN [see also Chalcedony Strand 48.101.71]

Heptagonal bicone, only ground, not tumbled. Dimpled with drill, drilled from both sides. D. 0.91, L. 0.82, b. 0.09, 0.13. [no number].

Oval cabochon, flat on the top. Hand ground and polished only on the top and sides. L. 1.90, W. 1.19, T. 0.51. [48.101.65A].

A strand of 43 beads [48.101.70; not individually marked, but assigned letters a-z and aa-rr].
One octagonal drop. D. 1.00, L. 1.55, b. 0.11, 0.16.
Two hexagonal bicones, lightly tumbled. D. 0.90, L. 1.55, b. 0.16, 0.17; D. 0.88, L. 1.47, b. 0.11, 0.13.
Two crude tubes. D. 0.70, L. 1.55, b. 0.15, 0.15.; D. 0.61, L. 0.99, b. 0.11, 0.14.
Three flat octagonal tubes. Largest: D. 1.03, L. 1.54, b. 0.20, 0.21. Smallest: D. 0.71, L. 0.92, b. 0.10.
Two round tabulars. D. 1.80, T. 0.58, L. 1.80, b. 0.14, 0.14; D. 1.30, T. 0.59, L. 1.34, b. 0.13, 0.15.
One diamond tabular. D. 0.88, T. 0.55, L. 1.44, b. 0.14, 0.16.
Six cornerless cubes. Largest: D. 1.03, T. 0.75, L. 1.03, b. 0.15, 0.17. Smallest: D. 0.64, T. 0.46, L. 0.74, b. 0.10, 0.10.
Two hexagonal bicones. D. 1.02, L. 0.70, b. 0.16, 0.17; D. 0.95, L. 0.63, b. 0.14, 0.15.
One hexagonal bicone with one flattened edge. D. 0.64, L. 0.70, b. 0.14, 0.14.
Twenty-two oblates and suboblates. Largest: D. 1.48, L. 1.36, b. 0.17, 0.17. Smallest: D. 0.59, L. 0.49, b. 0.10, 0.11.

Octagonal bicone, soda altered on surface, probably not artificially. Drilled from both sides. D. 0.85, L. 0.58, b. 0.14. [48.101.83].

Rough oblate, bored from both sides D. 0.91, L. 0.83, b. 0.15, 0.15. [48.101.193D].

ETCHED CARNELIAN

Strand of six etched carnelians [40.170.693; not individually numbered].
Flat diamond toggle with two diamonds on each face. D. 1.08, T. 0.32, L. 0.57, b. 0.10.
Thick round tabular with overall net of hexagonal cells, each containing a "snowflake." D. 0.95, T. 1.19, L. 1.19, b. 0.19, 0.19.
Barrel with double zones at the end and scroll design between them. D. 1.20, L. 2.00, b. 0.20, 0.20.
Suboblate with single zones at the ends and diagonal lines connecting them. Drilled from one side only, the distal end having been cracked out. D. 1.32, L. 1.05, b. 0.20, 0.21.
Hexagonal barrel with double zones at the ends and a meandering line between. D. 0.78, L. 1.14, b. 0.10, 0.11.
Oblate with single zones and the end. From one zone a single semicircle protrudes into the center, and from the other two semicircles. D. 0.83, L. 0.82, b. 0.11, 0.13.
All of these are on crude, rough stone which has only been lightly tumbled. They are all drill dimpled and except for the suboblate drilled from both sides.

Round tabular with "snowflakes" on sides and chevrons on the edge. D. 1.29, 1.34, L. 0.82. [48.101.198].

CHALCEDONY

Strand of 20 beads, of chalcedony, agate, and carnelian 48.101.71; each lettered separately; letters given by arrangement on strand:

	Material	Color	Shape	Diameter	Length	Bores	Other
A	chalcedony	brown	drop pendant	0.97	1.66	0.16, 0.18	T. 0.74
B	chalcedony	brown	ellipsoid	1.07	1.75	0.14, 0.19	
H	chalcedony	mixed	ellipsoid	1.47	2.80	0.19, 0.19	
H	chalcedony	mixed	barrel	1.78	2.44	0.22, 0.23	
G	chalcedony	blue	flat barrel	1.02	1.28	0.15, 0.17	
F	chalcedony	blue	flat barrel	1.53	1.84	0.24, 0.25	
E	carnelian	whitened	oblate	0.85	0.80	0.10, 0.15}	soda
D	carnelian	whitened	suboblate	1.05	0.74	0.15, 0.16}	altered
G	carnelian	whitened	flat octagonal cylinder	1.06	1.83	0.12, 0.14}	
B	sard	brown	hexagonal bicone	1.57	1.35	0.19, 0,19	
T	agate	dark	suboblate	0.76	0.62	0.11, 0.11	
K	agate	grey	oblate	0.82	0.82	0.12	
?	agate	orange	suboblate	0.87	0.66	0.12, 0.13	
Q	agate	brown	oblate	0.96	0.82	0.13, 0.14.	
P	agate	grey	oblate	1.04	0.90	0.20, 0.20	
O	chalcedony	brown	suboblate	1.03	0.77	0.14, 0.14	
H	chalcedony	brown	suboblate	1.23	0.94	0.32, 0.32	
M	agate	brown	oblate	1.47	1.33	0.19, 0.20	
L	chalcedony	brown	suboblate	1.85	1.40	0.17, 0.19	
K	chalcedony	white	barrel	1.45	0.74	0.10, 0.15	

All but the carnelian flat octagonal tube (G) have been drill dimpled and tumbled. All have been drilled from both sides.

Tan suboblate with slight crystalline vein. Not well rounded, polished, dimpled, drilled from both sides. D. 2.96, L. 2.42, b. 0.23, 0.24. [48.101.193b].

Blue irregular barrel, drilled dimple, and drilled from both sides. D. 1.75, L. 2.09, b. 0.22, 0.22

ONYX

Black oblate. D. 0.78, L. 0.71, b. 0.13. [no number].

Brown oblate. D. 0.62, L. 0.50, b. 0.11. [no number].

Black suboblate, color penetrates whole stone. Perhaps dimpled with a drill; drilled from both sides. D. 0.46, L. 1.24, b. 0.14, 0.20. [48.101.91A].

Black suboblate. D. 1.42, L. 1.05, b. 0.19, 0.19. [48.101.91B].

Black oblate, color penetrates through the stone. D. 0.83, L. 0.64, b. 0.14, 0.15. [48.101.91c].

Black oblate, color penetrates through stone. D. 0.85, L. 0.72, b. 0.13, 0.14. [48.101.91d].

Black oblate. D. 0.72, L. 0.63, b. 0.12, 0.13. [48.101.91E].

Barrel, dimpled and drilled from both sides. D. 0.39, L. 0.93, b. 0.09. [48.101.91G].

Black flat drop pendant, color penetrates the stone. W. 1.19, L. 1.82, T. 0.39. [48.101.91H].

Black "claw" pendant, broken at the bottom. W. 0.65, L.(B) 1.83, Lp. 0.60, b. 0.11, 0.14. [48.101.91J].

Pendant with a slightly curved "kite" section, broken at tip. Blackened throughout whole stone. Wp. 0.60, L.(B) 1.19, Max. W. 0.95. [48.101.91K].

Barrel. Bored from both sides, ends are broken. D. 0.55, L. 1.00, b. <0.06. [48.101.91?].

Rough disk, black with fine white lines, drilled from both sides. D. 2.40, L. 1.26, b. 0.56, 0.57. [48.101.193E].

OPAL

An oblate of white stone, possibly common opal. D. 1.37, L. 1.20, b. 0.20, 0.23. [48.101.73A].

JASPER

Flattened octagonal tube of mottled red-brown jasper, either tumbled or well worn. Max. D. 0.75, Min. D. 0.61, L. 1.42. [48.101.81B].

Mottled amber and black, apparently jasper, flat pointed pendant. The perforation is keyhole shaped. W. 1.11, L. 2.38, T. 0.64. [48.101.91A].

Suboblate of probably green jasper (H> 5.5). Drilled from both sides. D. 2.86, L. 2.12, b. 0.15, 0.15. [48.101.193F].

TURQUOISE?

Cabochon, emerald cut. L. 1.16, W. 0.95. [48.101.67B].

A greenish pendant with a semi-circular section, perforated at the top. An initial large boring is visible on the side around the complete perforation aperture. Max. D. 0.44, Dp. 0.23 L. 1.52, b. 0.15. [48.101.76C].

Drop shaped cabochon with a rounded and polished top; the underside is not polished. L. 1.49, W. 1.08, H. 0.73. [48.101.183].

UNIDENTIFIED STONE

[Note: Abassabad Stone is the local name of a mineral not yet identified. It is light green in color, takes a high polish and has a hardness of 3 +.]

Black square plaque, possibly of steatite, with a gouged image of a camel in a dotted frame one one side and that of a horse in a dotted frame on the other turned 90 degrees from the camel. All hooves and the camel head are drilled. There are two perforations at the two top corners. H. 2.78, W. 2.75, T. 1.01, b. 0.20, 0.29, 0.33. 0.35. [40.170.263].

Elaborate square pendant? of Abassabad Stone with two round and one rectangular holes through its face and a peaked top. The sides have lines and circle/dot motifs. It is perforated to the rectangular hole at the "bottom," but a perforation on the peaked top does not penetrate through. From Sabz Pushan, mid eighth to tenth century. Not likely to be a personal ornament. [40.170.419].

Square section long square "vase" shape of Abassabad Stone. At the bottom is a cross and two circle/dot motifs. A perforation through the "stem" does not penetrate the stone. Not likely to be a personal ornament. [48.101.?].

A conglomerate of a hard bluish mineral in a weaker matrix perhaps in the process of being formed into a cabochon. W. 1.43, L. 1.43, T. 0.58. [48.101.67A].

Pear or Job's Tear shaped grey stone (H <3), turned. D. 0.93, L. 0.79, b. 0.40, 0.44. [48.101.72E].

Oblate of olive color. Stone? Clay? D. 1.25, L. 1.24, b. 0.28. [48.101.75b].

Flat octagonal cylinder of a green stone. Max. D. 0.90, Min. D. 0.66, L. 1.27. b. <0.06. [48.101.76b].

Oblate, possibly of yellow jasper. D. 1.43, L. 1.47, b. 0.23, 0.27. [48.101.75a].

Red stone (H ≥ 5.5) in a wedge shaped pendant with two lines engraved at the "neck." Was this possibly a seal? Max. D. 1.20, Dp. 0.61, L. 1.57, Lp. 0.85. [48.101.81A].

Bicone of variegated violet stone?. Drilled from both sides. D. 1.19, L. 1.35, b. 0.18, 0.20. [48.101.81C].

White disc, possibly calcite. D. 1.23, L. 1.69, b. 0.49, 0.59. [48.101.88].

Green speckled pear shaped bead. The accession card says it is glass, but it appears to have been drilled, and the fractures do not have typical conchoidal appearances. (H ≥ 5.5). D. 0.52, L. 0.73. [48.101.90V].

Cornerless cube of artificially colored black and white striped stone. The accession card says it is soft alabaster, but the hardness is ≥ 5.5. The surface is crackled (has it been lacquered?). Drill dimpled, drilled from both sides. D. 1.04, T. 0.98, L. 1.20, b. 0.13, 0.13. [48.101.178].

Irregular barrel of a rock, probably mostly of silicate (jasper?) particles (H > 5.5). Drilled from both sides. D. 1.73, L. 1.69, b. 0.50. [48.101.183G].

A muted banded grey stone (H > 3). The profile is square, while the cross section is four lobed. It has been ground lengthwise and the ends perhaps polished. Bored from both sides. Max. D. 2.40, Min. D. 2.18, L. 1.48, b. 0.55. [48.101.186A].

Disc shaped grey stone, perhaps a spindle whorl (H 3 to 5). D. 2.60, L. 1.30, b. 0.73, 0.76. [48.101.186b].

Disc shaped Abassabad stone with irregular facets on cross section; sawed from a block and drilled from both sides. D. 1.90, L. 0.95, b. 0.55, 0.55. [48.101.186b].

Green stone (H > 3), barrel disc with off-centered perforation. D. 2.14, L. 0.85, b. 0.65. [48.101.186C].

White down pointing pendant with a loop; of gypsum? steatite? (H 2-3) with five circle/dot motifs on face. W. 0.83, L. 3.00, Lp. 0.73, b. 0.20. [48.101.189A].

White flattened rectangular tube of gypsum?, steatite? (H 2-3) with four circle/dot motifs on one face. W. 1.16, L. 1.94, T. 0.60, b. 0.24, 0.28 [48.101.189B].

Red stone (H ≥ 5.5) in the form of a double tube amulet. The top tube (the smaller one) is for suspension, while the bottom tube is solid with a circle/dot motif at each end. Small tube: D. 0.67, b. 0.20, 0.23; Large Tube: D. 0.71, L. 2.15 [48.101.190A].

Red stone (H ≥ 5.5) barrel. D. 1.56, L. 3.12, b. 0.20, 0.23. [48.101.190B].

Violet and white mottled, possibly jasper, oblate. D. 1.73, L. 1.56, b. 0.55, 0.60. [48.101.190C].

Black flat oval perforated object, possibly of Lydian stone. traces of gold or a gold-colored metal in streaks on one side strongly suggest that this is a touchstone and not merely a pendant. Drilled from both sides. Max. D. 3.18, T. 0.50 L. 2.19, b. 0.25, 0.27. [48.101.195].

Flat hexagonal collar of Abassabad stone with double concentric circle and dot designs on the broad faces and herringbone designs on the thinner facets. An iron spike through it has expanded with rust and split the stone. Perhaps a handle of some sort. Max. D. 1.70, Min. D. 1.13, L. 2.60. [48.101.239].

Probably grey steatite, probably in the process of being made into a heart shaped pendant with a top loop, but not bored. The face has an off centered circle/dot motif and some scratches which may have served as a frame, as well as other meaningless scratches. H. 2.77, W. 3.03, T. 0.57. [48.101.241].

Octagonal charm case with triple pointed loop of Abassabad stone. From Sabz Pushan, mid eighth to tenth century. D. 1.00, T. 0.91, L. 2.15, Lp. 0.91, b. 0.10. [48.101.274].

Red stone (H $\geq$ 5.5) pendant, somewhat pear or drop shape in profile, flat on one side and concave on the other with two groups of four circle/dot motifs and engraved lines at the four corners and two incised lines down the length at the center. The perforation is broken off. W. 3.17, L. 4.46, T. 1.30. [48.101.242].

SHELL

White barrel, cut from columella. D. 0.93, L. 1.06, b. 0.20, 0.22. [48.101.191D].

Flat heart or drop tabular. W. 2.11, L. 2.39, T. 0.46. [48.101.233].

Group of shells. [48.101.208; individually lettered]
a Conus, ground at the apex. L. 1.70
b Conus, not perforated. L. 2.37
c Conus, ground at the apex. L. 222
(not marked, probably d) Cypraea moneta, probably from the Maldives. Not pierced, but a resin-like material caught in the aperture is probably for attachment. L. 1.73.
e Conus, ground at the apex. L. 1.14.
f Conus, ground at the apex, worn. L. 132.
g Conus, ground very flat at the apex, worn. L. 1.33
h Conus ground at the apex, worn. L 1.12.
i Oliva, ground at the apex. L 3.49.

Strand of 24 shell beads. [48.101.72].

	Shape	D.	L.	bores	Notes
A	short barrel	1.45	1.45	0.20, 0.25	Cut from columella
B	oblate	0.95	0.88	0.11	
C	round disc	0.95	0.79	0.19, 0.19	
D	round disc	0.79	0.55	0.12	
E	not shell, see Stones, unidentified				
F	round tabular	1.70	1.80	0.14, 0.15	T. 0.39
G	round tabular	1.46	1.46	0.14, 0.15	T. 0.46
H	round tabular	1.25	1.23	0.14, 0.15	T. 0.45
I	round tabular	0.91	0.90	0.10, 0.11	T. 0.41
J	round tabular	0.82	0.80	<0.06	T. 0.37
K	heart tabular	1.83	2.30	0.13, 0.15	T. 0.48
L	heart tabular	1.46	2.30	0.10, 0.12	T. 0.41
M	heart tabular	1.48	1.90	0.10, 0.11	T. 0.51
N	rectangular disc	0.86	0.46	0.20, 0.20	T. 0.89
O	square tabular, concave on one side				
		2.00	1.76	0.16, B.	T. 0.66
P	ellipsoidal cylinder				
		1.00	1.03	0.13, 0.14	T. 0.43
Q	pear cylinder	0.91	1.62	0.12, 0.14	
R	pear cylinder	0.82	1.68	0.14, 0.15	T. 0.55
S	Conus shell		1.20		Ground at apex
T	Conus shell		1.10		Ground at apex
U?	Olivella shell		1.00		Ground at apex, worn
V	Conus shell		0.91		Ground at apex
W	Conus shell		0.83		Ground at apex
X	Not shell — see Clay.				

Group of shells and shell beads. [48.101.191; individually lettered].
a Conus, ground at the apex. L. 1.65
b Conus, ground at the apex. L. 1.42.
c Flat pear-like tube cut from columella. D. 0.85, T. 0.69, L. 1.40, b. 0.13, 0.15.
f. Round tabular, perforation angles up toward one face. D. 1.15, T. 0.31, L. 1.00, b. <0.06.

WOOD

Oblate of "Yesham" wood, probably modern. D. 1.60, L. 1.47, b. 0.21, 0.31. [no number].

MODERN GLASS

Multifaceted bicone of uranium-yellow-green glass made by the mandrel-press method. Czech ca. 1860-1900. D. 1.46, L. 1.25. [48.101.85A].

Multifaceted bicone of uranium-yellow-green glass made by the mandrel -press method. Czech ca. 1860-1900. D. 0.98, L. 0.71. [48.101.84b].

Barrel, which was faceted, although the facets are now worn nearly smooth, of uranium-green glass. Czech ca. 1860-1900. D. 0.91, L. 1.37. [48.101.85C].

Opaque selenium-red stud, faceted on the top, no perforation. Probably twentieth century Czech. W. 0.5, L. 0.65 [48.101.87].

Molded translucent violet cube. Probably Czech, twentieth century. D. 0.95, T. 0.95 L. 0.95. [48.101.90c].

Light opaque blue Prosser molded glass bead with facets and row of diamonds for equatorial band. Probably Czech, post 1840. D. 0.60, L. 0.55. [48.101.90L].

Lamp-wound black oblate with many white eyes. Venetian, nineteenth to early twentieth century. D. 1.09, L. 1.05. [40.170.700B].

Lamp-wound black oblate with white eyes and pink pupils. Venetian, nineteenth to early twentieth century. D. 1.19, L. 1.14. [40.170.700C].

Lamp-wound black oblate with a few white eyes with pink pupils. Venetian, nineteenth to early twentieth century. D. 1.11, L. 1.04. [40.170.700D].

Lamp-wound black oblate with a few white eyes with pink pupils. Venetian, nineteenth to early twentieth century. D. 1.18, L. 1.05. [40.170.700E].

Lamp-wound black oblate with a few white eyes. Venetian, nineteenth to early twentieth century. D. 1.32, L. 1.20. [40.170.700F].

"Flesh" colored oblate made by the Prosser technique. Post 1840, probably Czech. D. 0.76, L. 0.68. [48.101.90E].

Molded light opaque blue round tabular double spacer (two parallel perforations) with deep conical hole in one face. Czech. D. 0.32, L. 0.54. [48.101.90M].

Opalescent molded oblate. Czech, probably early twentieth century. D. 0.70, L. 0.69. [48.101.90N].

Wound gold-red on opaque white barrel "Cornaline d'Allepo." Probably Venetian, nineteenth century. D. 0.70, L. 0.80. [48.101.90o].

Molded translucent selenium-red drop pendant. Probably Czech, twentieth century. D. 0.70, L. 0.90. [48.101.90w].

Wound suboblate of light opaque blue and white in swirls. Modern, origin not known. D. 0.88, L. 0.57. [48.101.192C].

Wound suboblate of light opaque blue and white in swirls. Modern, origin not known. D. 0.84, L. 0.58. [48.101.192D].

Molded octagonal clear two holed chandelier piece. T. 0.91, L. 1.86. [48.101.199].

Translucent dark green oblate with combed polychrome floral design at equator. Lamp-wound Venetian, second half of nineteenth century. D. 1.08, L. 1.00. [48.101.209C].

Opaque green barrel with combed polychrome floral design spiraling along its length. Lamp-wound Venetian, second half of nineteenth century. D. 1.00, L. 1.84. [48.101.209D].

Opaque medium blue oblate with combed floral design spiraling along its length. Lamp-wound Venetian, second half of nineteenth century. D. 1.33, L. 1.32 [48.101.209-- last letter is illegible.]

MODERN CLAY

Green colored barrel, currently used for prayer strands. D. 1.05, L. 1.25, b. 0.24, 0.26. [48.101.75D].

REFERENCES

Ahlberg, M, R. Akselsson, B. Forkman, and G. Rausing (1976) "Gold Traces on Wedge-Shaped Artefacts from the Late Neolithic of Southern Scandinavia Analysed by Proton Induced X-Ray Emission Spectrometry," Archaeometry 18:1.

Allan, J.W. (1973) "Abu'l Qasim's Treatise on Ceramics," Iran XI.

---, L.R. Llewellyn, and F. Schweizer (1973) "The History of So-Called Egyptian Faience in Islamic Persia: Investigations into Abu'l Qasim's Treatise," Archaeometry 15(2).

Allgrove, Joan (1976) "Jewellery," in World of Islam Festival 1976, The Qashqa'i of Iran, Whitworth Art Gallery, Manchester, pp. 44-51.

Arberry, Arthur J. (1964) The Koran Interpreted, The World's Classics 596, Oxford University Press, London.

Bannerjee, N.R. (1959) "The Technique and Manufacture of Stone Beads in Ancient Ujjain, Journal of the Asiatic Society 1(2):189-95.

Bauer, Max (1904) Precious Stones, Charles Griffen & Co., London (1986 reprint, Dover Publications, New York, in two volumes.)

Bellasis, A.F. (1856a) "An Account of the Ancient and Ruined City of Brahminabad in Sind," Journal of the Bombay Branch of the Royal Asiatic Society 5.

--- (1856b) "Further Observations on the Ruined City of Brahminabad in Sind, JBBRAS 5.

Beck, Horace C. (1928) "Classification and Nomenclature of Beads and Pendants," Archaeologia LXXVII:1-76 (reprinted 1975 as a monograph, Liberty Cap Books, York, PA).

--- (1930) "A Note on Certain Agate Beads," Antiquaries Journal X:149-51.

--- (1933) "Etched Carnelian Beads," Antiquaries Journal XIII:384-98.

--- (1934, 1935) "Notes on Glazed Stones, Part One, Glazed Steatite," "Notes on Glazed Stone, Part Two Glazed Quartz: Part Three Carnelian, Agate, and Feldspar," Ancient Egypt and the East 1934(II):14-34; 1935(I):34-7.

--- (1940) The Beads from Taxila, Memoirs of the Archeological Survey of India 65, A.S.I., Delhi.

Boon, G.C. (1966) "Gilt Glass Beads from Caerleon and Elsewhere," Bulletin of the Board of Celtic Studies, 22(1):104-9.

Bowser, Joanna (1975) "Tears of Christ," Bead Journal 2(1):3.

Brunel, Francis (1972) Jewellery of India: Five Thousand Years of Tradition, National Book Trust, New Delhi.

Budge E.A. Wallis (1961) Amulets and Superstitions (1968 reprint as Amulets and Talismans, University Books, New Hyde Park, NY).

Callmer, Johan (1977) Trade Beads and the Bead Trade in Scandinavia ca. 800-1000 A.D., Acta Archaeologica Lundensia Ser. 4, No. 11, Bonn/Lund, R. Habelt/C.W.K. Gleerup.

Cambell, James M. (1880) Gazetteer of the Bombay Presidency, Vol. VI, Bombay Government Central Press, Bombay.

Contenau, G. & R. Ghirshman (1935) Fouilles de Tépé-Giyan Près de Néhavend 1931 et 1932, Librarie Orientaliste Paul Geuthner, Paris.

Cousins, Henry (1903) Antiquities of Sind, Oxford University Press, Oxford.

Crabbe, David and Richard McBride, eds. (1978) The World Energy Book: An A-Z Atlas and Statistical Source Book, Nicholas Book Co., New York.

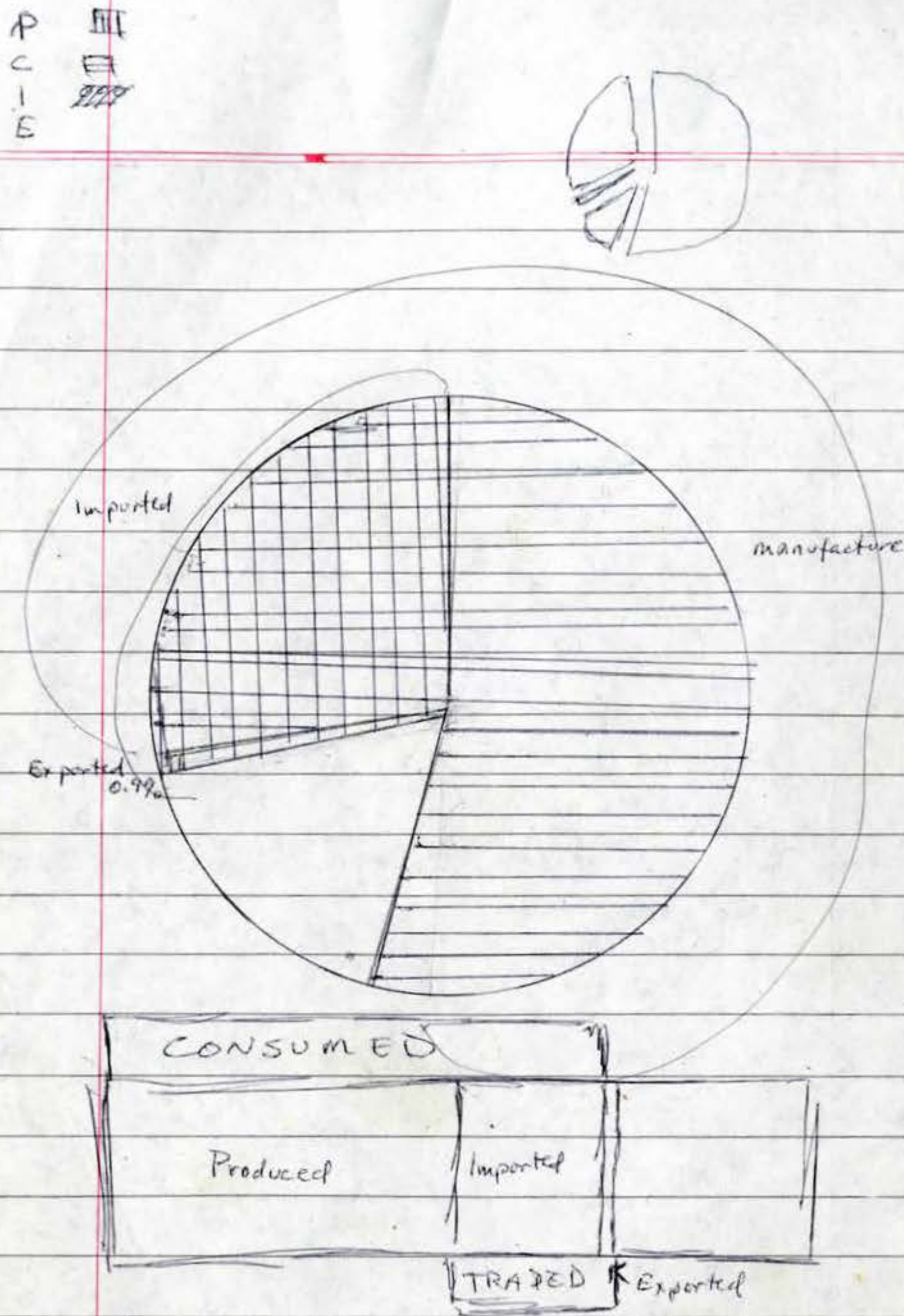
Dames, M.L. (1918) The Book of Duarte Barbosa, Haklyut Society, London.

Dekówna, M. (1970) "Recherches Sur les Techniques d'Exécution des Objects de Verre Anciens par les Méthods Pétrographiques," Annals du 5eme Congrès de l'Association International pour l'Historie du Verre:337-51.
Deo, S.B. (1960) "Beads, Pendants, and Amulets," in H.D. Sankalia, S.B. Deo, Z.N. Ansari, and S. Ehrhardt From History to Pre-History at Nevasa, Deccan College, Poona, India, pp. 346-75.
---- (1971) "Beads," in H.D. Sankalia, S.B. Deo, and Z.D. Ansari, Navadatoli, Deccan College/M.S. University, Poona/Baroda, India.
Dikshit, M.G. (1949) Etched Beads in India, Deccan College Monograph Series 4, Deccan College, Poona.
---- (1969) History of Indian Glass, Bombay University, Bombay.
Eichholz, D.E., ed. (1962) Natural History [of Pliny], Loeb Classical Library, Harvard University Press, Cambridge, MA.
Eisen, Gustavus A. (1930) "Lotus- and Melon-Beads," American Journal of Archaeology XXXIV(2):20-43.
Falk, Fritz (not dated) Jewelry from Persia: The Collection of Patti Birch, Schmuckmuseum Pforzheim, Pforzheim, Germany.
Faris, Nabih Amin, ed. (1938) The Antiquities of South Arabia: A Translation from the Arabic with Linguistic, Geographic, and Historic Notes of the Eighth Book of Al-Hamdani's Al-Iklal, Princeton University Press, Princeton.
Foster, Karen Polinger (1979) Aegean Faience of the Bronze Age, Yale University Press, New Haven and London.
Francis, Peter, Jr. (1979a) "Bead Report: Beads in Iran 1A," Ornament 4(1):44-6.
---- (1979b) A Short Dictionary of Bead Terms and Types, World of Beads Monograph Series (WBMS) 4, Lapis Route, Lake Placid, N.Y.
---- (1979c) The Czech Bead Story, WBMS 2, Lapis Route, Lake Placid.
---- (1979d) The Story of Venetian Beads, WBMS 1, Lapis Route, Lake Placid.
---- (1980) "Bead Report II: Etched Beads in Iran," Ornament 4(3):24-28.
---- (1982a) Indian Agate Beads, WBMS 6, Lapis Route, Lake Placid.
---- (1982b) "Experiments with Early Techniques for Making Whole Shells into Beads," Current Anthropology 23(6):713-14.
---- (1982c) The Glass Beads of India, WBMS 7, Lapis Route, Lake Placid.
---- (1983) "Some Thoughts on Glass Beadmaking," in Charles F. Hayes III, ed. Proceedings of the 1982 Glass Trade Bead Conference, Research Records 16, Rochester Museum and Science Center, Rochester, N.Y., pp. 193-202.
---- (1986a) Chinese Glass Beads: A Review of the Evidence, Occasional Papers of the Center for Bead Research 2, Lake Placid.
---- (1986b) "Indian Antiquity," Lapidary Journal, 39(12):45-55.
---- (1986c) "Bead Report XVII: The Asian Bead Study Tour III, A Tale of Two Beadmaking Cities," Ornament 9(3):53-8.
---- (1986d) "Baba Ghor and the Ratanpur Rakshisha," Journal of the Economic and Social History of the Orient XXIX:198-205.
---- (1986e) "A Bit More on the Cornerless Cube," Bead Forum 8:8-10.
---- (1987a) Bead Emporium: A Guide to the Beads from Arikamedu in the Pondicherry Museum, Museum Publications 2, Pondicherry Museum, Pondicherry, India.
---- (1987b) "Bead Report XX: Another Bead Potpourri," Ornament 10(3):62-3, 75-9.
---- (1987c) "Beadmaking Ad Hoc," The Margaretologist 1(4):10-11.
---- (not dated a) "The Manufacture of Beads from Shell," in Charles F. Hayes, ed., The Proceedings of the 1986 Shell Bead Conference, Rochester Museum and Science Center, Rochester, N.Y. (in press).

--- (not dated b) "Molluscan Shell Beads from Inamgaon" (with G.L. Badam) in M.K. Dhavalikar, ed., Inamgaon Excavation Report, Deccan College, Poona (in press).
--- (not dated c) "The Beads from Mantai," in John Carswell, ed., Mantai Excavation Report (in preparation).
--- (not dated d) "Glass Beads in Southeast Asia, An Introduction, Part II: Wound and Other Beads," (in preparation).
--- (not dated e) "Noise in Archaeology: A Specific Study in the Indian Context," (under consideration).
Frondel, C. (1962) The System of Mineralogy (of James Dwight Dana), Vol. III: The Silicates, John Wiley, New York.
Frye, Richard N. (1972) "Byzantine and Sasanian Trade Relations with Northeast Russia, Dumbarton Oak Papers 26, Washington.
Ganji, Mohammad Hasan (1970) "Iran — Economy," in Encyclopedia Britannia, Vol. 12, Encyclopedia Britannia Co., New York, pp. 520-25.
Ghirshman, Roman (1938) Fouilles de Sialk Près de Kashan 1933, 1934, 1937, Série Archéologique Tome IV, Librarie Orientaliste Paul Geuthner, Paris.
Giacomuzzi, Fratelli su Angelo (not dated, ca. 1852-1861) Bead sample card book, on display at the Bead Museum, Prescott, AZ.
Goitein, S.L. (1961) "The Main Industries of the Mediterranean Area as Reflected in the Records of the Cairo Geniza," Journal of the Economic and Social History of the Orient 4.
--- (1963) "Letters and Documents of the India Trade in Medieval Times," Islamic Culture 37(3).
Gupta, P. Lal (1979) Coins, India: The Land and the People, National Book Trust, New Delhi.
Gwinnett, John A. and Leonard Gorelick (1986) "Evidence for the Use of a Diamond Drill for Bead Making in Sri-Lanka c. 700-1000 AD" Scanning Electron Microsopy 1986(II):473-7.
Haldeman S.S. (1879) "Beads" in F.W. Putnam, ed. Report upon United States Geographical Surveys west of the one hundredth meridian, Vol VII, Archaeology, Government Printing Office, Washington, pp. 263-9.
Harding, Anthony and Stanley E. Warren (1973) "Early Bronze Age Faience Beads from Central Europe," Antiquity XLVII.
Hasan, Hadi (1928) A History of Persian Navigation, Methuen, London.
Herrmann, Georgina (1968) "Lapis Lazuli: The Early Phases of Its Trade," Iraq XXX.
Hopkins, Albert A. (1925) The Scientific American Cyclopedia of Formulas, Scientific American Publishing Co., New York.
Jenkins, Marilyn and Manuel Keene (1982) Islamic Jewelry in the Metropolitan Museum of Art, Metropolitan Museum of Art, New York.
Karklins, Karlis (1982) Glass Beads, History and Archaeology 59, Parks Canada, Hull, Quebec.
Keene, Manuel (1981) "The Lapidary Arts in Islam," Expedition 24(1):24-39.
Khanikoff, N. (1860) "Analyses and Extracts of the Book of the Balance of Wisdom," Journal of the American Oriental Society 6.
Kiefer, Charles and A. Allibert (1971) "Pharonic Blue Ceramic: The Process of Self-Glazing," Archaeology 24(2):107-17.
Komroff, Manuel, ed. (1953) The Travels of Marco Polo, Modern Library 196, Random House, New York.
Kunz, George F. (1913) The Curious Lore of Precious Stones, J.P. Lipponcott, New York (reprinted 1971, Dover Publications, New York).
Lamm, Carl Johan (1939) "Glass and Hard Stone Vessels" in Arthur Upham Pope, ed., A Survey of Persian Art, Oxford University Press, London.

Lane, A. (1947) Early Islamic Pottery: Mesopotamia, Egypt, Persia, London.
Lucas, A. and J.R. Harris (1962; 4th ed.) Ancient Egyptian Materials and Industries, Edward Arnold Ltd., London.
Mackay, E.J.H. (1933) "Decorated Cornelian Beads," Man 33, Art. 150.
Malleret, Louis (1962) L'Archaéologie du Delta du Mékong, Tome 3, La Culture du Fou-Nam, Texte, École Francais d'Extrême-orient, Paris.
Mallowen, M.E.L. and J.C. Rose (1935) Excavations at Tell Arpachiah 1933, Oxford University Press, London [reprinted from Iraq II(1)].
Maloney, Clarence, ed. (1976) The Evil Eye, Columbia University Press, New York.
Mellaart, J. (1968) "Anatolian Trade with Europe and Anatolian Geography and Cultural Provinces in the Late Stone Age," Anatolian Studies XVIII.
Mingana, A. (1925) "On the Meaning of the Persian Word for Pearl and Coral," Man 25, Art. 23.
Morazzoni, Giuseppe (1953) "La Conterie Veneziane dal Secolo XIII al Secolo XIX," in G. Morazzoni and M. Pasquato, Le Conterie Veneziane, Societa Veneziana Conterie e Cristallerie, Venice.
Muller, Helen (1980) Jet Jewellery and Ornaments, Shire Publications, Aylesbury, Bucks, U.K.
Museo Vetrario di Murano (not dated) Set of twenty slides depicting bead sample cards in the museum, Center for Bead Research library.
Nassau, Kurt (1984) Gemstone Enhancement, Butterworths, London.
Newton, R.G. and Colin Renfrew (1970) "British Faience Beads Reconsidered," Antiquity XLIV.
Noble, John V. (1969) "The Technique of Egyptian Faience, American Journal of Archaeology," 73(4):435-9.
Oda, Sachiko (1965) "Chemical Studies on the Materials of Beads from the Ghalekuti I Site," in Namio Egami, Shinji Fukai and Seiichi Masuda, Dailaman I, Institute for Oriental Culture, University of Tokyo, Tokyo, pp. 33-55.
Petrie, W.M.F. (1914) Amulets, Constable & Co., London.
Pettijohn, F.J. (1957) Sedimentary Rocks, (reprint) Oxford University Press, Calcutta.
Pollard, A.M., G.D. Bussell, and D.C. Baird (1981) "The Analytical Investigation of Early Bronze Age Jet and Jet-Like Material from the Devizes Museum, Archaeometry 23(2).
Riis, P.J., Vagn Poulson, and E. Hammershaimb (1967) Hama, IV, 2, Les Verreries et Poteries Medievals, Copehnhagen.
Ross, Lester (1974) "Hudson's Bay Company Glass Trade Beads: Manufacturing Types Imported to Fort Vancouver (1829-1860)," Bead Journal 1(2):15-22.
Sale, George, ed. (not dated) The Koran, Frederick Warne & Co., London/New York.
Sankalia, H.D. and M.G. Dikshit (1951) Excavations at Brahmapuri (Kolhapur) 1945-46, Deccan College Monograph Series 5, Deccan College, Poona, India.
Schienerl, Peter (1980) "Historical Survey of Tubular Charm-cases Up to the 7th C. AD," Ornament 4(4):10-14.
--- (1982) "Crescent to Cross: Roman and Byzantine Glass Pendants," Ornament 6(2):8-9, 54.
--- (1985) "Cornerless Cube Stone Beads in Egypt and Palestine," Bead Forum 7:8-9.
Schmidt, Erich F. (1937) Excavations at Tepe Hissar, Damghan, The University Museum, University of Pennsylvania, Philadelphia.

Schnidler, A. Hontum (1884) "The Turquoise Mines of Nishapur, Khorassan," Records of the Geological Survey of India XVII.
Singh, Ravindra N. (1983) "The Antiquity of Gold-Glasses in Inida," Puratattava (dated 1981) 12:157-9.
Smith, Ray Winfield (1957) Glass from the Ancient World, Corning Museum of Glass, Corning, N.Y.
Spooner, Brian (1976) "Arabs and Iran: The Evil Eye in the Middle East," in Clarence Maloney, ed., op. cit., pp. 76-84.
Sprague, Roderick (1983) "Tile Bead Manufacturing," in Charles F. Hayes III, ed. Proceedings of the 1982 Glass Trade Bead Conference, Research Records 16, Rochester Museum and Science Center, Rochester, N.Y., pp. 167-72.
Stanley. Henry E., ed. (1866) A Description of the Coasts of East Africa and Malabar [by Duarte Barbosa], Haklyut Society, London.
Tagore, S.M. (1879) Mani-Mala or a Treatise on Gems, I.C. Bose, Calcutta.
Thompson, R. Campbell (1936) A Dictionary of Assyrian Chemistry and Geology, Clarendon Press, Oxford.
Tite, M.S., I.C. Freestone, and M. Bimson (1983) "Egyptian Faience: An Investigation of the Methods of Production," Archaeometry 25(1):17-27.
Tobler, Arthur J. (1950) Excavations at Tepe Gawra, Vol. II, University Museum, University of Pennsylvania, Philadelphia.
Tosi, Maurizio and Marcello Piperno (1973) "Lithic Technology Behind the Ancient Lapis Lazuli Trade," Expedition 16(1).
Trifanov, D.V. and V.D. Trifanov (1982) Chemical Elements: How They Were Discovered, Mir Publishers, Moscow.
Trivedi, R.K., ed. (1964) Agate Industry of Gujarat, The Census of India 1961, V, pt. VII A (2), Manager of Publications, Delhi..
Turner, W.E.S. (1956) "Studies in Ancient Glasses and Glass-Making Processes, Part IV, The Chemical Composition of Ancient Glass, Journal of the Society of Glass Technology XL:162T-186T.
Van der Sleen, W.G.N. (1967) A Handbook on Beads (1975 reprint Liberty Cap Books, York, PA).
Vidale, M. (1985) "Some Aspects of Lapidary Craft at Moenjodaro in the Light of the Surface Record of the Moneer South East Area," in Michael Jansen and G. Urban, eds. Interim Reports, Vol. 2, Aachen.
Weyl, Woldemar A. (1959) Coloured Glasses, (reprint Dawson's, London, originally 1951, Society of Glass Technology).
Whitehouse, David (1968) "Excavation at Siraf," Iran VI.
—— (1975) "Carnelian in the Persian Gulf," Antiquity XLIX:129-30.
Wilkinson, Charles K. (1986) Nishapur: Some Early Islamic Buildings and Their Decoration, Metropolitan Museum of Art, New York.
Williams, Bruce (1980) "The Lost Pharaohs of Nubia," Archaeology 33(5):12-21.
Wulff, Hans E. (1966; 1976 2nd printing) The Traditional Crafts of Persia, M.I.T. Press, Cambridge, MA.
——, Hildegard Wulff, and Leo Koch (1968) "Egyptian Faience: A Possible Survival in Iran," Archaeology 21(2):98-107.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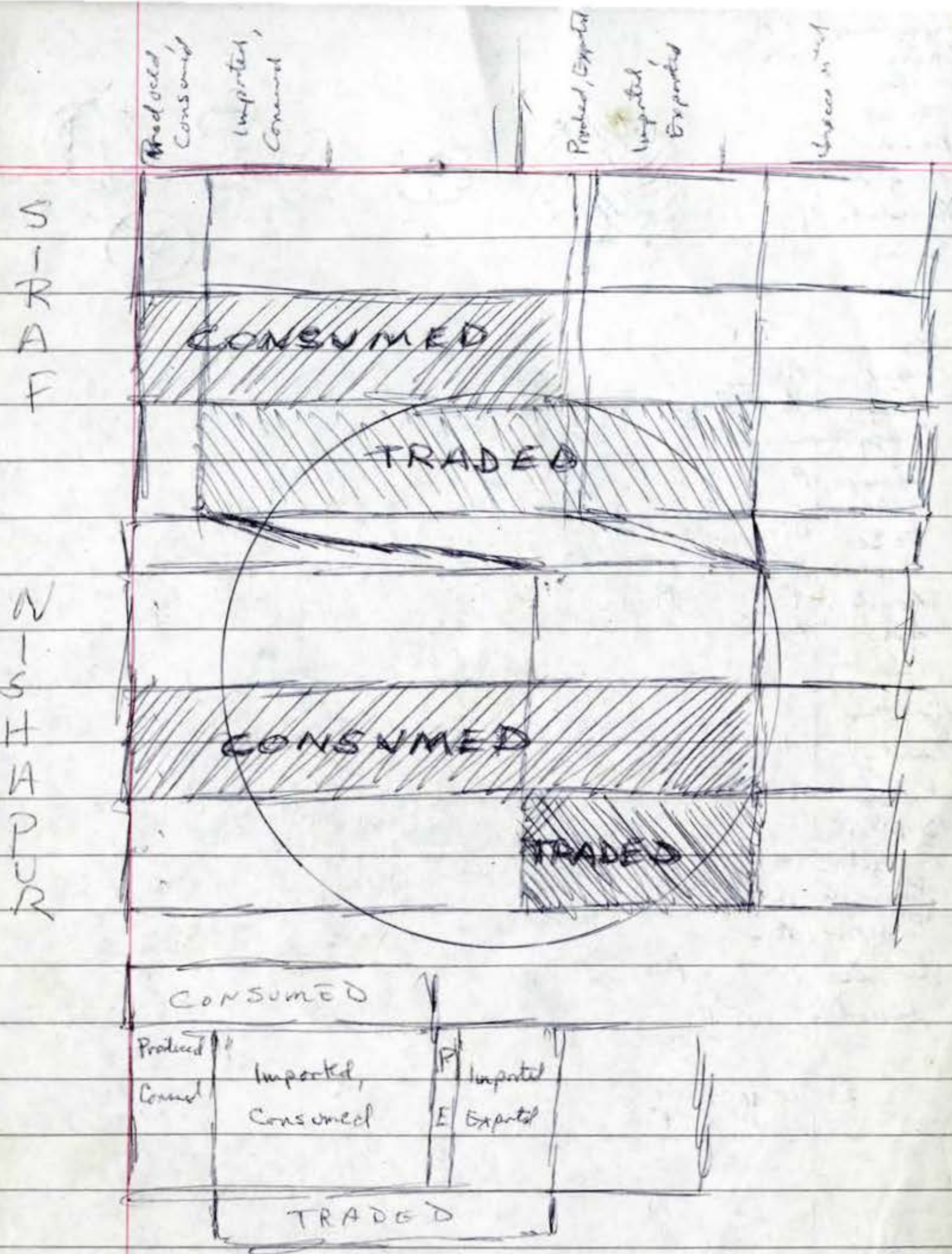
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SIRAF
CONSUMED
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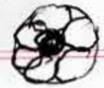


Alexandria	A			
Cairo	A	✓		
Mocha				
Aden				
Damascus				
Baghdad				
Bashah				
Siraf	A	✓		
Oman				
Quilon				
Mantai	A	✓		
Arikamedu	A	✓		
Nagapattam		✓	E	
Takuapa	A			P
Kedah				
Oc Eo	A			P
Kuala S	A	✓		P
Bengulu B	A			P
Johore	A	✓		
Palembang				
Bantam				
Canton	A	✓		
Kilwa	A	✓		
Sofala				
Zanzibar				
Kyongju	A	✓		
Puyo/Kongju	A	✓		
Ujjain	A			P
Limodra		✓	E	

29	15	10	2	4
		A	E	P

CONTRIBUTIONS of the CENTER for BEAD RESEARCH

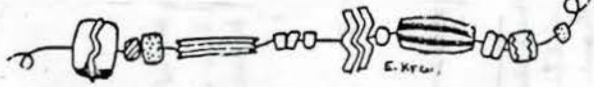
1 Report on the Beads from Reese Bay, Unalaska Island, Alaska, Excavated from a longhouse by Jean S. Aigner of the University of Alaska, Fairbanks
Prepared for: The Department of Anthropology, University of Alaska, Fairbanks,

2. Report on the Beads from Nishapur, Iran, in The Metropolitan Museum of Art. Obtained from the Museum's Excavations under Charles K. Wilkinson.
Prepared for: The Islamic Department of The Metropolitan Museum of Art, New York.
with assistance from: The Hagyop Kevorkian Fund and the Mantai Excavation Fund.

3. Report on the Beads from Siraf, Iran in The Department of Oriental Antiquities, British Museum. Excavated by David B. Whitehouse,

Prepared for: The Department of Oriental Antiquities, British Museum, London and
David B. Whitehouse, Curator of the Corning Museum of Glass, Corning N.Y.

WE'RE SO EXCITED!



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Lake Placid, N.Y. *12946*

Glass

SIRAF

IP: y: 3199/99; 3526a,b [2]/115-6; 3199/119; 2098/132

l senting 2855/134
btrg 2266/112; 3990/113; bopg 2281/132; 2099/132
mult op g: 3767/123; 5248?/124; 4909/125; 2047/131

K 3192a, 3192b/114; 3197a-e [5]/114; 2280/124; 3280/128
3321/114 (V color); 3526c-e [3]/115-6; 3174/125; 4164/128

trlb 1167/121; 2042/133

striped drawn corr 3292/130

k? corr: 3521a-m [13]/115; 3526 f-g [2]/115-6; ~~3288/128~~;

Lapworks - 441/133 (Stone? FL?)

φ twist? k 3272/130
Drawn cl. green 3198/117
green tube 769/118
hollow, long 3723/125
Seg 3519/99; 76/100; 3519/119; 3287/130
white 4066/117
3 long 4367/122; 4 long 3955/132
gold-glass 2237/126; 4181/129
galrosned 2872/114
mantai? 3747/124; 4170/128; 2280/128; 4174/129
Torus fold 2315/112
Type 3746: 3746/126; 2219/127; 3250/127; 3252/127; 2653/127;
~~stripe hollow 4170/128~~ fusiform 3247/129 | 328/129; 7217/131 | 2083/131; 2094/132
striped 3299/130;
Wound green 789/98; 3207/125;
black 259/99; 1386/122; 2264/125; 4045/125; 2229/133 | 2080/133;
blue 2170/99
sh hex tube b 5220/100
melon k, 2840/112
of eyes? 2874/113

Corr u/d 560/125; 2231/129
3285/130; 3288/128
Corr 6? 4656/126
hex tube folded 2093/131

sh bie yellow 2897/99
green 2276/123

frag 3115/113
corr 259/119; 563/125; 2245/127;
b bie 2170/119
Y "nail" 141a-c [3]/120
g bar 1904/120
sky blue 1174/120
cc y 403/120;
sq cyl 178/121
K disc 2268/124
K+w spiral 4831/125
~~Type 3746~~; 3746/126;
Strat. Eye 4182/126-7

swirled oblate 3275/129; -bar 2096/131
bar of lines 4168/128
barrel of zone 2689/128

Glass spatter/chunk 416/98); 519/123
red cake 512/98
"ball" frit/cullet 112/99
chunks 3335/116
main piece? 2239/116
splatter 961/116
? closed tubs 3807/117
chunk 4113/117
K chunk 416/118
red chips 512/118
b cake 1355a-b [2]/122

Glass cab
blue 2273/98
blue 2278/118
K△? 4692/123

Cab:
tqs 3459/116; 463/129
tqs 5704/117

ball, chunk, etc 112/119
melted 383/120; 195/121; 211/121; 1582/123
drawn objects 1164 [2]/120
drawn rod 1428/121; 425/122
curved 1448/121; 1296 [3]/123; 1363 [16]/124)
g chunks 425/122; 1296 [15]/123; 1363 [47]/124

hollow bombs 1363 [5]/124

cg oval longbent 153/98
pebble 962/98; 962/118
barrel 2657/98
chunk 16/98
disc 94/99; 94/119
(sand) ob. b. 1868/99
oblate 453/112; 566/121; 1434/122; 477/122
oblate 2451/112; 3181/121; 439/122; 2549/123
sq bie ~~[illegible]~~ 1484/115
flat oval longbent 153/117
926/126; 438/134
barr. 2154/118
Chip 166/118
CC —/132

ag ⊙ 860/113
bar 5815/116
hemisp 16/112 a
og/bar 417/121
bar 444/122
og ⊙ 4610/123

Lapis 2556/98
disc 2170/99; 2170/119
pendant 4657/100
sh cyl 3345/116; 2556/118
cc 1806/119
gadroon barr. 925/126; 2243/126 tqs
? 1841/100; 3338/115; 486/133
gc/6? 691/120
6?/5? 4870?/123
? 481/124; 924/126; 3515/129
amg spark? 416/121
S?/HC? ring hair? 2503/133
K+y rock blank? 320/133
green banded 3579/134
F
melon 1080/98; 630/99; 2809/99;

J8 green CC 2191/117
baroque cab 175/121
chg cyl 1594/124
strat cyl 961/128

sub oblate 1803/98; 2272/98; 201/99; 1169/99;
493/99; 482/99; 2345/100; 125/100; 4127/112;
3350/112; 1080/118; 1803/118; 2273/118; 630/119
201/119; 469/119; 493/119; 482/119; 2135/119;

disc amelt: 2 perfs 477/99; 477/118
7 holes: 5306/124
club P: 3108/114
bicone 1350/116
sh cyl 5308/122

? For 6? 954/116

	(17) A Homes	(132) B Dutch Mosque / Javanese tomb?	(16) C (VNG) Homes / Bazaar	(45+9) D Kilns	(27) E
GIP glass	1	(10) 10	1	3	1
G waste	10+3	33 (cones apd 5)	3	2	4
F.		2	2		3
cg	1	1	1	65 / 1	3
Bl/opw		5	3		8
vert	1	22	3		5 (r/p) c u
ag/og		5 (1 disc)			1
shell		2	1		
block		7		1 chg-unp.	1
seg G		20 [8 3746]	1 chunk	1	1
St?		7 (strut)	1		
lapis		3		1	1
tqs	1	1		1	
bone					2
jg					
coral		2			
qz.		2 (orng)			
pearl					
Abarms		1 Ag = 1		13	
conch bangle		5 Au = 1		Bz = 1	
seal		2			

	(16) F Homes 10-11th c	(4) G 14-15th Shrine	H	P mosque (1)	J Warehouse (military)	(11) K Palace	(26) M	(24) D
GIP glass	1	2				2 / 2	21	(24) 3
G waste	4							
F	2	2						1
cg					1	1		
Bl/sprh	2					5	2	1
vert.						1		
ag	1							1
shell	2						1	
block								1
seg G	1							10
St?								1
lapis							1	
tqs	1						1	
bone	1							
jg	1							

		G waste	Beads + Spwh
A	17	13	4
B	132	2	130
C	16	2	14
D	74	65	9
E	27	3	24
F	16	4	12
G	4		4
J	1		1
K	11		11
M	26		26
O	24		24
	348	89	259

= 259

50% in/around B - mosque

cg making @ E

73% G waste @ D

4P		G	F	B S	SpWH	
11	B	5	8	1	5	other
	W.	5				
		10	8	1	5	6

25 beads

Ag 1
Au 1
Ivory collar 1
Bit fogs 1
Coral 1
VNG 1

ochre B.F15.512.731
stripe dumon B.B6.401.3292 / D.269, 3747 / C.117.4367
mantri? B.D13.342.2280
goll-glass? B.H3.313, 3746; B.F8.367.4181
B.E11.342.4171
B.L7.312.2237
F.S.37.1350 F bee mea
cg ccfire B.F11-14 599 —
agbc: Conus worked B.1K6.628.742

Siraf

1P y: 5
g: 9
K: 15
K/cor: 15
b 2

		%G	% Beads	% obj.
1P:	46	39.7	18.3	11.5
		39.7% 0.9	0.4	0.3
strip dr	1	0.9	0.4	0.3
lapped	1			
drawn	3	2.6	1.2	0.8
Seg.	25	21.5	10.0	6.2
Seg-g: 2				
martin 4				
3746: 9				
Wound	33	28.4	13.1	8.2
ah bic 2				
nails 3				
stripey 1				
lines 4				
cc 1	folded 2	1.7	0.8	0.5
Corr	5	4.3	2.0	1.2

G Beads 116

Glass 98
splatter 8
cake 60
melt 5
pulled 20
rod 2
other 3

Glass Cals 3
"Abacus" 6
Recent 2
Misc G 11

Stone:		%S	%B	%O
cq =	23	37.1	9.2	5.7
pebble	2			
chips	2			
rough	2			
beads	17			
amq	1			
aq =	6	9.7	2.4	1.5
chq =	1 [3]	1.6 [4.8]	0.4 [1.2]	0.3 [0.8]
jq =	1	1.6	0.4	0.3
all qc =	32 [34]	51.6 [54.8]	12.8 [13.5]	8.0 [8.5]
Lapis	9	14.5	3.6	2.2
tqs	1 [4]	1.6 [6.5]	0.4 [1.6]	0.3 [1.0]
?	11	17.7	4.4	2.7
steat	1	1.6	0.4	0.3
		3.2	0.8	0.5
Am	2			
B3	1	1.6	0.4	0.3

minerals 57
tqs cals (3) 60 — 4.8 1.2 0.8
seals (2) 62 — 3.2 0.8 0.5

Faience = 29
sub-ob 19
melon 3
2 perf disc 2
7 perf disc 1
other IF/6 4

Shell: beads 4
Persant 1
Conus 6
dent. 1
All AS = 12

Bone 2
Soft K 13
pulled 1
AI collar 1
Coral 2
Pearl? 1
Plastic 1
Misc = 21

Spwh = 39
Ivory 21
birds 4
tress 1
other 1
Bone: 12
tress 1
pin 1
birds 1
AI/AB 6
trapbirds 1
AI/AB button 1

Fish Vert 8
Conch/bangles = 5

Glass Beads	114 + 2
Glass	98
Misc Glass	11
All Stones	62
All Faience	29
All Shell	12
Misc Mat.	19
Spwh/Button	36
	377
Conch/bangles	5
Misc = 21 +	2
Spwh = 39 +	3
Fish Vert	8

398 Objects

Beads (ex glass, Spwh, fish vert./ Conch-bangles) 245 Beads

		% Beads	% all Objects
Glass Beads	116	46.2	29.4
Glass	98		24.8
Misc Glass	11	4.4	2.8
Stones	62	24.7	15.7
Faience	29	11.6	7.3
Shell	12	4.8	3.0
Misc	21	8.4	5.3
Spwh AI/AB	39		9.9
Conch/bangles	5		1.3
Fish Vert.	8		2.0
1P Beads	46 (39.7% G beads)	18.3	11.5
Beads @ % of all objects (245) (251/401)			62.6

	%B
Mineral	24.7
Organic	12.7
Synthetic	62.5
Modern 3	1.2

against eye 77/251 = 30.7
+ 38 spwh / 289 = 34.4
corr G? spwh blank?

Add 5 corr glass beads
sub: 1 K/cor 1P G Beads

32
155
42
249