55. HYDROFLUORIC ACID IN BEADWORK RESTORATION: A DEFINITE NO-NO, by Judith A. Logan and Tom Stone (1994, 24:10-12)

In her article "Restoring a Nineteenth-Century Yoruba Headdress: The Case of the Missing Trade Beads" which appeared in the January/February 1994 issue of *Piecework* magazine (pp. 75-77), Mary Jo Meade describes and advocates the use of hydrofluoric acid to alter the color and size of small glass beads for use in restoring ethnographic beadwork. This is a process that may be hazardous to both the user and the object being restored.

Although the article does warn the reader to not try and duplicate the process at home, it cannot be overstated that hydrofluoric acid is extremely dangerous. It must be used in a fumehood, in a laboratory that is fully equipped with showers, the proper acid spill kits, and emergency burn treatment kits. The vapors will penetrate skin and dissolve bone; this can be fatal, or at least lead to a very painful treatment that may involve amputation. Brief exposures to high levels of vapors may cause severe respiratory damage and contact with the eyes may cause blindness. Burns from contact with the vapors may not be felt immediately, and vapors can be absorbed by clothing and held against the skin for several hours before any burns are noticed. Leather that has absorbed the vapors cannot be decontaminated and must be destroyed. Readers should refer to the CRC Press *Handbook of Laboratory Safety*, 3rd edition, A. Keith Furr, editor, 1989, pp. 295-299, for a description of the effect of hydrofluoric acid on human tissue, handling precautions, and treatment of exposure to the acid.

The author does not describe the type of washing neutralization that was used to stop the action of the acid on the beads. Since the beads were subsequently coated with a "commercial glass paint," it is possible that residues of the acid have been sealed in under the paint. What will be the long-term effect on the beads treated this way, and is it possible that they could affect the rest of the headdress, or people who subsequently handle it? I am thinking of the huge surface area that had to be thoroughly cleaned of acid, including the increase in area due to etching of the glass and the difficulty of washing acid residues from the bead perforations.

The use of hydrofluoric acid and the potential long-term residual effect it may have on the beads is one problem. Another is the ethical approach in the manner of the replacement of the beads. There is no evidence of any attempt to differentiate the areas of replacement from the original material. The author states that the work on the headdress was a "restoration" and chose to match the beads as closely as possible with the original and, from an aesthetic point of view, this is understandable. However, it would have been relatively easy to use a very different material to restring the beads so as to provide some sort of evidence that a large part of the headdress had been rebuilt. On the contrary, the author went to the trouble and expense of having "30,000 yards of the thread on which the beads were restrung... custom-milled in North Carolina to match a fragment of the original." Even in the case of a "restoration" there is no need for this sort of exact replication of material which has the potential to mislead anyone studying the headdress in future.

56. THE DETERIORATION OF GLASS BEADS ON ETHNOGRAPHIC OBJECTS, by Sandra Lougheed and Jane Shaw (1985, 7:10-12)

Introduction

Conservators and scientists at the Canadian Conservation Institute, Ottawa, Ontario, have been investigating the deterioration of glass trade beads on Canadian ethnographic objects. These beads are on non-archaeological objects which have been stored in museums for varying amounts of time. Most of the beads examined are suffering from some form of glass disease.

Symptoms of Glass Disease

"Glass disease," a term loosely used to describe deteriorating glass, has a variety of causes and many different symptoms. Often when examining an object only one of the many colors of beads on it will be deteriorating while others remain unaffected. This phenomenon has been observed on a variety of objects and with many different colors of beads. To date, no chemical correlation has been observed between a specific color of glass and its stability. The deterioration relates to the poor quality of a particular batch of glass, not the colorant.

The most obvious symptoms of glass deterioration are cracked and broken beads. The more subtle symptoms include:

1) A crusty deposit on the glass bead or threading material (usually an alkaline carbonate).

2) A fine network of cracks , known as "crizzling," over the entire surface of the bead and only detected under a microscope. (Cracking of this sort occurs on the surface of the glass due to a structurally weak alkali-leached layer.)

3) A sticky or sweaty surface on the glass (usually a highly alkaline solution).

4) Internal cracking.

Symptoms which appear on the substrate (less common):

1) A "bleached image" of the beads on a wool or silk substrate directly below the deteriorating glass beads (a reaction between the highly alkaline glass surface and protein-based material).

2) A substantial darkening of the skin or leather directly in contact with the deteriorating glass beads (a reaction between the highly alkaline glass surface and proteinaceous substrate).

Deterioration of Glass

Several beads were analyzed by atomic absorption spectrophotometry and scanning electron microscopy, and various signs of deterioration were observed. In general the quality of glass was poor–the composition was found to be characteristic of unstable glass. (Glasses which contain an excess of alkali or a deficiency of stabilizer are prone to attack by atmospheric moisture. A glass containing more then 20% alkali and less than 4% lime or other stabilizer, is considered unstable and is prone to attack by water [Brill 1975:121].) Bubbles, inclusions, and glass decomposition of one form or another were detected. Scratches and cracks were also observed which can act to accelerate glass decomposition. Hydration occurs along the cracks which cause the walls to swell and propagate the crack.

In any area accessible to moisture there are two major processes which take place simultaneously at the glass-solution boundary. The first process involves the extraction of ions from the glass and this dominates at a pH of less than 9. The second process involves the dissolution of the siloxane bonds at the glass-solution interface and this process dominates at a pH of greater than 9. In general the removal of silica lags behind the extraction of the alkali ions from the surface, resulting in the formation of a leached layer (Clark 1979:1). This alkali-depleted layer was observed on both the inside and the outside surfaces of several beads and some beads had suffered pitting and glass decomposition where an alkaline solution had accumulated.

The variation in the quality of the glass used to make trade beads was illustrated by one bead which had a composition which changed from region to region. This glass was not mixed and melted properly, and in this case a glassy state may not have been achieved uniformly throughout the bead. Most of the unstable beads analyzed had either high alkali, low lime, or some other imbalance in composition. Some of the glasses were part lead glasses, some were soda-lime glasses, and some were hybrids which contained part potash, part soda, and part lead.

Preventive Conservation

Once beads have deteriorated to the stage that they are cracking and breaking apart, there is little that can be done. However, if the early stages or subtle symptoms of glass disease are detected, a number of preventive conservation methods should be followed:

1) Avoid cleaning unstable glass beads with water. Water accelerates glass deterioration.

2) Provide a rigid support such as a piece of Corex (fluted polypropylene) or acid-free matboard if the object is not self-supporting. This reduces the amount of lateral stress, thus minimizing scratching and breakage.

3) Control the relative humidity by providing RH between 30-40%. This will slow down the deterioration process considerably.

References Cited

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Clark, David E., C.G. Pantano and L.L. Hench

1979 *Corrosion of Glass*. Books for Industry and the Glass Industry, New York.

57. A HISTORIC NOTE ON BEAD USE AMONG THE SEMINOLE INDIANS, by Clay MacCauley (1997, 31:14-15)

The following item is extracted from Clay MacCauley's report on "The Seminole Indians of Florida" which appeared on pp. 469-531 of the *Fifth Annual Report of the Bureau of Ethnology 1883-1884* which was published in Washington, D.C., in 1887:

> My attention was called to the remarkable use of beads among these Indian women, young and old. It seems to be the ambition of the Seminole squaws to gather about their necks as many strings of beads