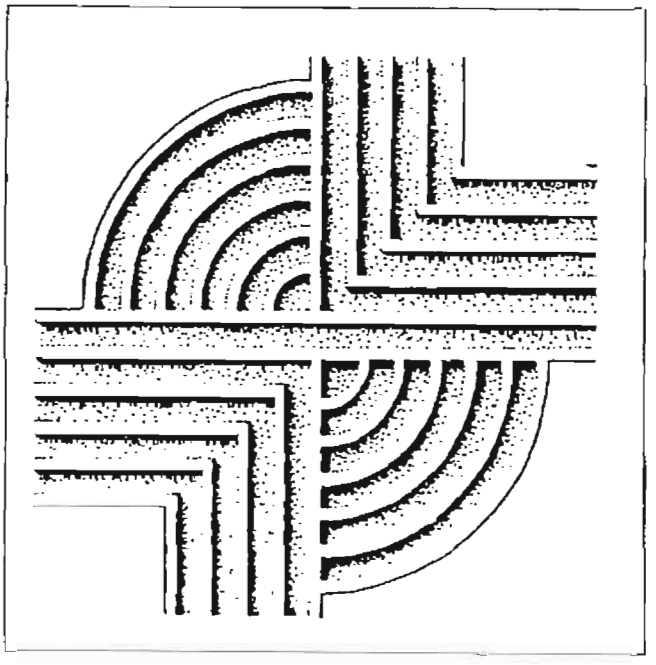
CONSERVATION TREATMENTS AND THEIR IMPACT ON THE NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT



CHICORA RESEARCH CONTRIBUTION 79

CONSERVATION TREATMENTS AND THEIR IMPACT ON THE NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT

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Chicora Research Contribution 79

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I have previously discussed the ethical implications of the Native American Grave Protection and Repatriation Act (Trinkley 1991) and Chicora Foundation has taken a clear position supporting the legislation (*Chicora Foundation Research*, March 1991). Consequently, with the enactment of the law, it seemed the appropriate time to turn to other, related, issues.

One issue that we at Chicora Foundation are interested in are the conservation treatments that bone materials have traditionally received and how these treatments may impact the spirit of the law, if not the letter.

A variety of materials have been used for the consolidation and repair of human skeletal material over the past 30 years. H.J. Plenderleith and A.E. Werner (1971:156) have suggested the use of soluble nylon and a polymethacrylate emulsion. D.R. Brothwell (1981:10) has suggested the use of Alvar 1570 or Paraloid B72, PVA, or PVA emulsions for consolidation. For repair, glues such as Balsa, UHU or Durofix were recommended. William Bass (1971), who perhaps has had the greatest impact on American scholars, suggested the use of such compounds as Duco, Alvar, Ambroid, and Gelva. To this list can be added Butvar and polyvinyledne chloride materials.

This is virtually a witches brew of chemicals. Unfortunately, most have serious long-term implications on the preservation of the materials they were meant to protect. While the principle of reversibility has been a cornerstone in conservation treatments for years, the long-term stability of many consolidants is only now becoming well understood. Further, many of these chemicals have been used by individuals who, understandably, had little or no concern for reversibility of the treatments.

Duco, one of the most widely known adhesives, has also been used as a consolidant by dilution with acetone. The problems with Duco have been amply dealt with by Moyer (1988), although I am surprised to still see its use, or the use of similar proprietary adhesives, such as **UHU**, **Balsa**, and **Durafix**. All are cellulose nitrate (CN) adhesives, mixed with variable amounts of plasticizers. These plasticizers are a problem themselves, migrating and potentially affecting other materials, but the real problem is the CN, which is very unstable. CN degrades at room temperature through oxidation and hydrolysis. Nitric and other acids are produced as by-products of the degradation. Yellowing is noticeable. CN bonds are brittle and incapable of supporting even moderate weight. The only redeeming characteristic is that it, under most circumstances, it can be removed by the use of solvents.

Alvar is an example of a poly(vinyl acetal) or PVacetal consolidant. These products can be cross-linked by traces of acids or heat. The polymers tend to yellow,

oxidize, and, with time, become insoluble (Horie 1987:100).

The use of both **polymethacrylate emulsion** and **soluble nylon** are not common, but are occasionally seen in the literature of bone consolidation and treatment. Polymethacrylates, such as PMMA and PEMA, can be highly variable in their suitability, but generally have problems with cross-linking, especially in light, and have been found to loss their solubility over time. Soluble nylon has problems with dirt pick-up, loss of strength, and, especially, insolubility.

Poly(vinylidene chloride) or PVDC, such as the Saran brand, has also been used to consolidate bone. Unfortunately, PVDC degrades when exposed to heat or ultraviolet light in a fashion similar to PVC. It is generally considered unstable for long-term use (Horie 1987:114).

A variety of polyvinyl acetate (PVAC) compounds have been used, such as **Vinac** or Union Carbide's **AYAF**, **AYAC**, and **AYAA**, and emulsions (used on wet bone), such as **Vinamul** or **Rhodoplex**. Of all the polymers available in conservation PVAC is one of the most stable. While there is some oxidation with age, it does not appreciable cross-link or degrade in air, meaning, among other things, that it is reversible. Various PVAC emulsions have been used to consolidate wet bone in the field, often with very good success. Unfortunately, many of the positive features associated with PVAC compounds are lost when they are used as dispersions or emulsions. Recent work has found emulsions to have severe changes in flexibility, color, and dirt retention, often on a batch by batch basis. The best of the lot appears to be Primal AC-33, manufactured by Rohm and Haas (Horie 1987:96).

Another common material is **Butvar**, a polyvinyl butyral (PVB). While related to the inherently unstable poly(vinyl acetal) compounds, PVB is considered more stable and generally acceptable for use.

The single material which appears to uniformly receive high conservation marks for both stability and reversibility, is **Paraloid (or Acryloid) B-72**, an acrylic polymer. It does not become insoluble or degrade significantly in normal conditions of exposure. It has been ranked a Feller Class A material -- the highest ranking for stability and reversibility.

It is clear that many of the consolidants and adhesives used in the past on human skeletal material are inherently unstable. Through various forms of chemical deterioration these consolidants may no longer be removable and may have permanently altered the original nature of the bone.

I don't know if these changes will be seen as a problem by the Native American community. I suspect that if the bones of one's ancestors are important, it might also be important for them not be perceived as toxic waste dumps of unremovable chemicals.

It seems, therefore, appropriate for future treatment of human skeletal material to be limited to the minimum amount necessary for analysis. Further, the most stable of materials should be used, such as Paraloid B-72, so that the remains may be returned to something approaching their original condition if necessary.

Physical anthropologists and archaeologists will find additional benefits in using compounds such as B-72 -- they are widely available, relatively inexpensive, and easy to use. When mixed with high purity (at least 98%) solvents, they also provide relatively consistent results and the bias they introduce into various chemical studies can be better quantified (see Hedges 1987).

Bass, William M.
1971 *Human Osteology: A Laboratory and Field Manual of the Human Skeleton*. Missouri Archaeological Society, Columbia, Missouri.

Brothwell, D.R.
1981 *Digging Up Bones: The Excavation, Treatment and Study of Human Skeletal Remains*. Third Edition. Cornell University Press, Ithaca.

Hedges, R.E.M.
1987 Potential Information from Archaeological Bone, Its Recovery and Preservation. In *Archaeological Bone, Antler and Ivory*, edited by Katharine Starling and David Watkinson, pp. 22-23. Occasional Papers 5. United Kingdom Institute for Conservation, London.

Horie, C.V.
1987 *Materials for Conservation: Organic Consolidants, Adhesives and Coatings*. Butterworths, London.

Moyer, Curt
1988 Archaeological Conservation Forum - The Duco Dialogues. *The Society for Historical Archaeology Newsletter* 21(4):8-10.

Plenderleith, H.J. and A.E. Werner
1971 *The Conservation of Antiquities and Works of Art: Treatment, Repair, and Restoration*. Second Edition. Oxford University Press, New York.

CONSERVATION MATERIALS

Conservation Materials, Ltd.
240 Preeport Blvd.
PO Box 2884
Sparks, NV 89432
702-331-0582

Rohm and Haas Acryloid B-72, 1 qt., 50% solids in toluene, cat. # 3040-128
1 kg., 100% solids, cat. # 3052-100

Union Carbide AYAA, 1 kg., 100% solids, cat. # 2216-100
AYAC, 1 kg., 100% solids, cat. # 2215-100
AYAF, 1 kg., 100% solids, cat. # 2217-100
AYAT, 1 kg., 100% solids, cat. # 2218-100

Monsanto Butvar B-98, 1 kg., 100% solids, cat. #2209-100