

Conservation Of In-Door Archaeological Objects

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Definition:

Archaeological objects means any building, structure, monolith, monuments, any mound, tumulus, any tombs, place of interment, any cave, any sculptures, inscriptions or an immovable object which is of historical or artistic interest and which has been in existence for not less than hundred years. Again, in-door archaeological objects can be defined as any coin, sculpture, manuscript, epigraph or other work of art or craftsmanship or any article or object or thing detached from a building or cave and kept in the museums or by private owners.

Before discussing conservation of in-door Archaeological objects, it would be better to have an understanding of some of the terms frequently used in conservation procedures. These terms are:

(1) Preservation (2) Conservation (3) consolidation (4) Restoration (5) Reproduction

1. Preservation: The term preservation is frequently used in conservation of archaeological materials. It is a beforehand action. Preservation is done to the archaeological materials before it starts deteriorating. For example-when a wooden piece is

changed during restoration, a wood preservative is generally applied to protect it from insect attack.

2. Conservation: The dictionary meaning of the term conservation is prevention of loss, waste, damage, destruction, etc. Thus in archaeology the term is used to apply certain chemicals or products to prevent from further loss or damage.

3. Consolidation: The meaning of the term consolidation is making more solid, secure and strong. In archaeology the term is frequently used to give strength to the fragile materials often found during excavation or during restoration of monuments.

4. Restoration: The meaning of restoration is giving back to original shape and look. This is a term widely used in the conservation of historical buildings and monuments. During restoration, the missing portion is added so as to match the originality of the structures. Even those portions, which can not be consolidated by using chemicals, are also changed but the main criteria of restoration should be to giving back original look and shape by the use of original materials.

5. Reproduction: The dictionary meaning of reproduction is producing as the original one. This is a term frequently used in biology. In archaeological conservation it is used to denote the re-making of such historical buildings and monuments whose evidences and descriptions are present but whose remains are not available. For example-the making of Chyasin Mandap in front of Bhakatpur Darbar square may be termed as reproduction of that monument since nothing was left behind by the destruction of the great earthquake of 1990 BS. Only historical evidences were known.

On the basis of origin, archaeological objects can be classified as (1) Inorganic (2) Organic

1. Inorganic: It includes siliceous and non-siliceous materials. Archaeological materials produced from stones, terracotta, ceramics and glass can be included under siliceous materials whereas objects made of metals can be included under non-siliceous inorganic materials. Again metal objects can be classified as ferrous metals and non-ferrous metals. Objects made of iron is termed as ferrous metal objects whereas metal objects made from other than iron is termed as non-ferrous metal objects.

2) Organic: It includes archival and anthropological materials. Again archival materials include paper, bhojapatra, tadapatra, textiles, wooden objects, miniature paintings whereas anthropological objects include bone and ivory, leather, feather and fur etc.

Conservation Procedure:

The nature of deterioration of these objects varies from objects to objects. Some of the common types of methods employed for the conservation of archaeological objects are described below:

1. Conservation of inorganic objects: As we know those inorganic objects of archaeological importance includes siliceous and non-siliceous materials, the nature of deterioration of these objects

varies from materials to materials. So the nature of their treatment also varies from materials to materials. Hence to have a better understanding the method of their treatment will be discussed one by one.

a) Treatment of siliceous materials:

As we know that siliceous materials includes stone, terracotta, ceramics, glass etc. The natures of deterioration in these objects are somewhat similar in natures. So the method of their treatment is also very much similar. In these materials except glass problems of salt formation, growth of lower plants like fungi, lichens and algae, broken into pieces due to mishandling or some other factors have been noticed. So the treatment is done according to the problems noticed. In case the object is very fragile before doing any kind of treatment consolidation is a must. Consolidation is generally done with 2 to 5% solution of P.V.A. in Toluene. In case of salt formation, salt is extracted by paper pulp method. The presence of salt is tested by silver nitrate. By adding a few drops of silver nitrate solution to the extracted salt the formation of white precipitate indicates the presence of salt while the absence of white precipitate generally indicates the absence of salt. If lower plants like algae fungi and lichen are present first of all it should be tried to clean by mechanical method. If mechanical cleaning is not sufficient then a low percentage of ammonia along with non-ionic detergent may be tried. In case of joining broken pieces a special type of mortar can be prepared by mixing 1 part slacked lime, 2 to 3 parts stone powder if the object of stone or 2 to 3 parts brick powder if the object is of terracotta. This mixture is mixed with 100 grams of urad dal powder and 100 grams of PVA emulsion. Since Urad Dal has been used while preparing mortars, 1 to 2% biocides must be used to prevent fungal growth. Araldite or any other epoxy resin may join again small broken pieces but since araldite is harder than the materials itself its use should be restricted. In order to join big stone pieces, steel or copper rods of suitable size may be required. After cleaning, removal of salt and joining broken pieces, final step of

conservation of siliceous material is the application of a suitable type of preservative coating. For this again 2 to 5% solution of PVA in toluene or 2 to 5% solution of paraloid B-72 in toluene or acetone may be used. In case of siliceous materials made of glass, the nature of deterioration and their treatment is different. When acidic oxides like silica or boron oxide and alkaline oxides like sand, lime, soda, potash or lead oxide are fused together, glass is formed. Due to atmospheric pollution, carbon with water reacts and the alkalis are washed away and silica is deposited over the surface and pitted spots are formed. Such a glass object becomes porous and fragile. To overcome such problems in glass using solvents like Benzene, Alcohol or Acetone and finally washing with soft water can do cleaning.

b) Conservation of non-siliceous objects:

As we know that non-siliceous objects include archaeological materials made of metals. Again metal objects can be classified as ferrous and non-ferrous metal objects. Objects made of iron are termed as ferrous metal objects whereas objects made of other metals are termed as non-ferrous metal objects. The conservation of iron objects is a bit different from other metal objects because of its highly corrosive nature. The corrosion of iron objects can be removed by three ways:

- 1) Mechanical method
- 2) Chemical method
- 3) Electro-chemical and electrolytic reduction method

1) Mechanical method: In this method the corrosion products are carefully removed with the help of a sharp blade or scalpel. This is a very useful method since there is no danger of any chemical reaction but it requires a lot of patience and a lot of skill otherwise the objects may be spoiled.

2) Chemical method: In this method different chemicals are used to clean the corrosion products. In order to clean corrosion products from iron objects chemicals like thioglycolic acid, sodium

metahexaphosphate, sodium-potassium tartarate, sodium salt of EDTA are used in different proportions. Similarly, a solution of citric acid in different proportions may be used to clean copper objects, gold gilded objects, silver objects and other metal objects.

One of the important aspects in the conservation of metal objects is its consolidation because the excavated metal objects are sometimes in such a bad state that it may require consolidation prior to its cleaning. Using 2 to 5% solutions of PVA or paraloid B72 in toluene may do the consolidation of the metal objects. The same solution may be applied as a protective coating.

3) Electro-chemical and electrolytic reduction method: These methods are generally applied in such cases where the corrosion product is so hard that it can neither be removed mechanically or chemically. In electrolytic reduction method the object is made cathode and the electrolyte is a solution of sodium hydroxide. Similarly in Electro-chemical method a hot solution of sodium sulphite is used which is quick and similar to electrolytic reduction. An expert should only employ this method since in case of highly corroded objects nothing will be left after employing electrolytic reduction and Electro-chemical method of cleaning. Hence before applying this method, a thorough investigation of the condition of the metal objects received for treatment should be conducted so that its fusibility could be decided.

Again paraloid B-72 in toluene or acetone (2 to 5% solution) may be used as protective coating.

Conservation of archival materials: Since all these materials contain cellulose in their structure, hence the nature of their deterioration and their treatment is very much similar. In case of archival materials, loss of moisture, biodegradation, fungal growth and physical damage have been noticed. Hence the nature of treatment depends on the basis of the above mentioned causes. If there is loss of moisture

then suitable amount of moisture should be provided otherwise the objects tend to brittle. In order to overcome biodegradation of these materials, suitable insecticides and fumigants can be applied. In case of wooden objects, insecticide like chlorpyrifos 20 EC in suitable solvents can be applied whereas in case of paper documents, tadapatras and bhojpatras fumigants like paradichlorobenzene or sodium pentachlorophenate can be used. In order to overcome the problem of fungal attack suitable fungicides can be applied. For this carbendizeme or kiroxy 1 or 5% solution of formaldehyde or 1-% solution of thymol can be used. Physical damage can be avoided by providing proper place for each object and with careful handling of the objects. Prior to the use of textiles, primitive people used skin of animals, barks of trees as clothes. It was only in 1890 AD that textiles on commercial scale came into use. Textiles are prepared from natural fibres of animals like wool and silk and vegetable fibers like cotton, flax, hamper or jute. Animal fibres do not burn steadily but if they are held under the flame, they are burnt leaving carbon as residue and giving burnt hair smell. A vegetable fibre is full of cellulose and hence catches fire easily leaving Grey ash. Protein constituents are present in animal fibres whereas cellulose contents are present in vegetable fibres. Physical factors like light, temperature, humidity and diurnal changes are one of the factors responsible for textiles decay. Insect attack, moth attack, fungal and lichen growth are biological causes of deterioration of textiles. Loss of moisture is another cause of degradation of textiles. Using non-ionic detergents can do cleaning of textile. A 2% solution of paraloid B-72 in toluene can be applied as protective coating for textile. Miniature paintings are done on papers. Loss of paint layers, insect attack, loss of moisture, deposition of dust and dirt, fungal growth, oil stains etc. have been noticed in miniature paintings. Dry cleaning can be used to

remove dust and dirt. Suitable solvents can be chosen to remove different types of stains. 2 to 3% solution of paraloid B-72 in sulfur free toluene can be used to consolidate flaking paint layers. In order to control insect and fungal attack suitable fumigants like paradichlorobenzene or pentachlorophenol can be used. 2 to 3% solution of paraloid B-72 in sulfur free toluene can be applied as protective coating.

Conservation of anthropological objects: As we know that anthropological objects include objects made up of bones and ivory, leathers, feather and fur etc. Both bone and ivory are used as tools, decorative materials, statues etc. They are anisotropic and protein ossein is decomposed by prolonged exposure to humid condition. Acid radicals like fluorides, calcium phosphate and calcium carbonate can attack both bones and ivory objects. Cleaning can be done with distilled water. Insoluble salts like calcium sulphate, calcium carbonate or magnesium sulphate can be removed with very dilute solution of hydrochloric acid. Pale Grey color of bones and ivory objects can be removed with a bleaching agent like hydrogen peroxide. Again shellac solution in spirit or 2% solution of polyvinyl acetate in toluene can be used as preservative and consolidants. Skin of different animals has been extensively used by pre-historic people as clothes, for writing, bookbinding etc. The main problems of leather objects are to loose moisture, insect and fungal attack. In order to retain moisture castor oil and rectified spirit in the ration of 1:4 can be applied or the leather objects can be impregnated in Turkey oil. To control insect and fungal attack, fumigants like pyrethrum, DDT or 5% solution of sodium pentachlorophenate in kerosene oil can be used. Feathers of peacock are used as head decorator. Fur and hair of animals are used for making warm clothes. The main problems of these objects are brittleness, falling of hair, moth attack, insect and fungal attack etc. In order to retain flexibility a



Before Conservation



After Conservation



Before Conservation



After Conservation

mixture of castor oil and rectified spirit in the ratio of 1:4 can be used. In order to overcome the problem of insect and fungal attack, fumigation with carbon dioxide, carbon tetrachloride or carbon disulfide can be done. Storage of these objects along with camphor dissolved in Lysol can prevent hair falling.

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