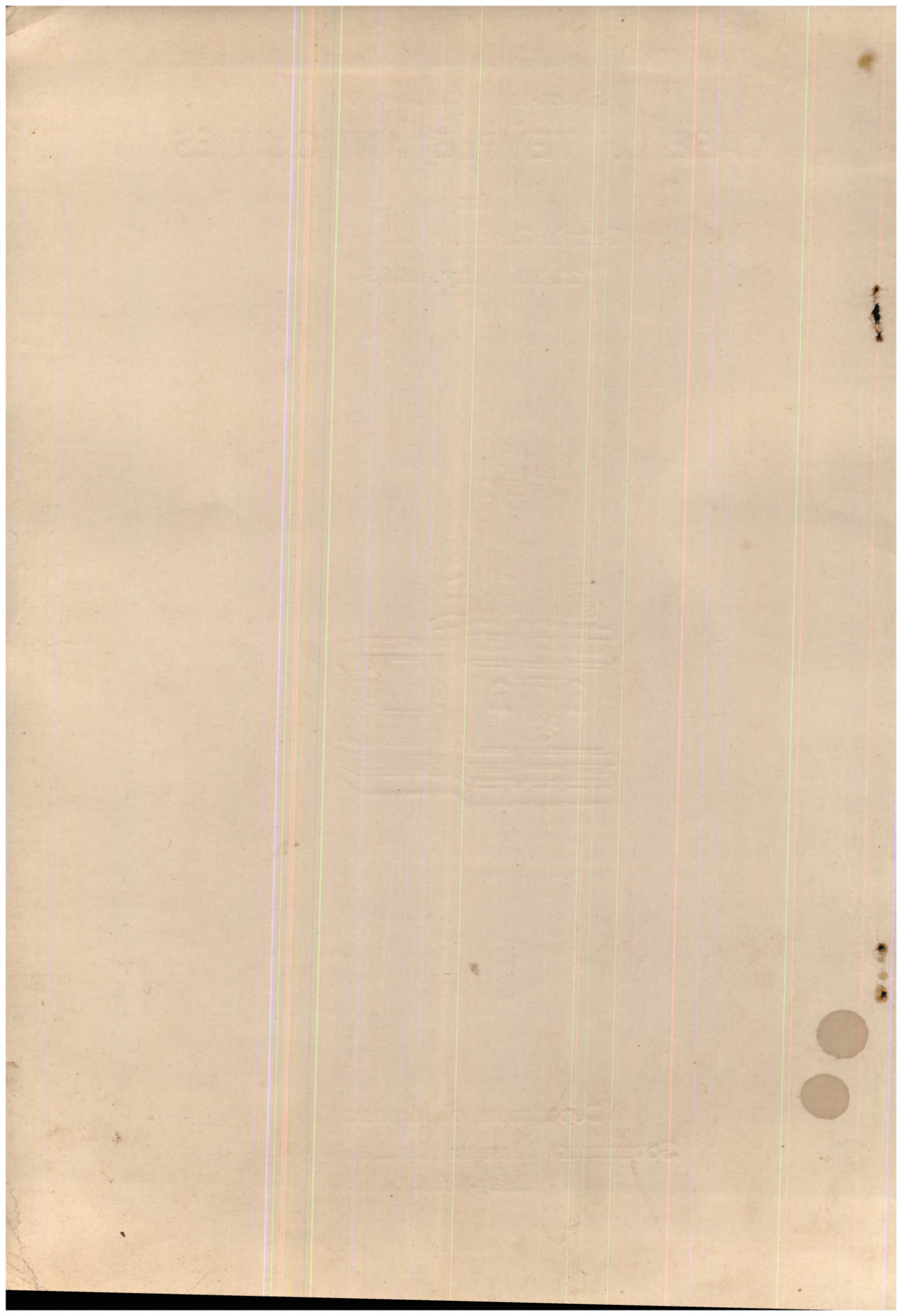


Short-term Course on
CARE OF TEMPLE ANTIQUITIES

for
Temple Executive Officers
(22-26 May, 1995)



Department of Museums
Government Museum, Madras-600 008.
May, 1995



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Inauguration of the Short-term Course on "Care of Temple Antiquities"

Programme

Venue:

Childrens' Museum Basement

Time :

930 a.m. 22.5.1995 Monday

Invocation

- Welcome Address : **Mr. M. Ramu, I.A.S.**
Commissioner of Museums
- Presidential Address : **Mr. S. Savarkar, I.A.S.**
Commissioner, HR&CE
- Inaugural Address : **Mr. R. Santhanam, I.A.S.**
Secretary to Govt., C.T.&R.E. Department
- Vote of Thanks : **Dr. V. Jeyaraj,**
Curator

Contents

Care of temple antiquities – Preface	M. Ramu
Factors affecting temple antiquities and their control measures	S. Thangavelu
Treasure-trove temple jewelleryes	N. Devasahayam
Archaeological Collections	R. Balasubramanian
General methods of conservation	V. Jeyaraj
Care of metallic objects	V. Jeyaraj
Care of wooden objects	V. Jeyaraj
Care of palm-leaf manuscripts	V. Jeyaraj
Care of monuments and temples	V. Jeyaraj
Care of stone objects	V. Jeyaraj
Care of paintings	V. Jeyaraj
Mishandling, neglect and vandalism	V. Jeyaraj
Storage and maintenance guidelines	V. Jeyaraj

Chemical Conservation and Research Laboratory
Government Museum, Madras 600 008.

Head of Section: Curator
Dr. V. Jeyaraj

Laboratory Assistant: Mr. J.D. Jagannathan
Technical Assistant : Mr. B. Saravanan

Care of Temple Antiquities

Preface

In Tamilnadu the contribution to art has come more from temple and religious institutions. Art objects were used in pooja, festive occasions and they were of organic, in-organic and composite origin. *The icons of deities, vahanas etc.* are taken out during the festivals and during non-festivals days they do not generally receive the attention they deserve, as a result they deteriorate.

There are various factors which cause deterioration. Moisture, atmospheric agents such as oxides of nitrogen and sulphur, particulate matter, hydrogen sulphide etc., are the primary agents inducing deterioration. Biodeteriation is another important factor and vandalism, neglect and mishandling pose a serious problem to the protection of these unique historic pieces which have been passed on to us by generation of our ancestors.

In order to safeguard these antiquities there are generally two types of conservation methods. They are preventive conservation and interventive conservation. Most of the objects need preventive conservation measures. The proper control of measures such as climate control, proper upkeep, handling, care etc. will help in preventing the damages in the antiquities. If those who are incharge of the care of the antiquities become aware of the factors/ causes leading to the deterioration of these art objects, they will serve this cause much more efficiently

If the objects are already damaged they should be preserved after cleaning them. Unless proper method of removal is known the removal of the accretions itself may result in further physical damage to the art pieces. Museums department has restored 5 temple cars at Therazhundur, Srimushnam and Tiruchendur in the past.

With the idea of imparting training, the short-term course on "Care of Temple Antiquities" is designed for the first time in the Museum. In the past, there were

requests from various museums for training their personnel for taking care of the objects in the museums. The result is the Refresher Course on "Care of Museum Objects". In the recent past there was a request from the Commissioner, Hindu Religious and Charitable Endowments Department, Tamil Nadu for training their Executive Officers who are looking after the administration of the temples in Madras. It is a good step in the direction of conservation of our art treasures in the temples. So the whole effort of the Conservation Wing of the Museum Department was focused on this and the present short-term course has been designed to the needs of those who take care of icons and other art works.

The course covers the classification of objects, deteriorating factors and their control measures besides treatment of affected objects. It comprises of both lectures and practicals in the Chemical Conservation Laboratory. The participants would, in fact, be handling the objects and would be exposed to the various problems which may confront them. They will be provided with both theoretical and practical facts up to suit their job needs

We also plan to make a survey of the condition of all the bronzes which are preserved in the icon preservation centres in our state for suggesting ways and means to preserve them for posterity.

The present course is the first step in this direction. The Secretary to Government, Commercial Taxes and Religious Endowments Department and the Commissioner of Hindu Religious and Charitable Endowments have evinced very keen interest in this project which in itself, would enable us to make a beginning to preserve and protect our cultural treasures in the care of our temples for the lasting benefit of the posterity.

Madras
19.5.1995

M. Ramu, I.A.S.,
Commissioner of Museums

Introduction

Tamil Nadu from time immemorial excelled in the skill of creating art in various mediums. The contribution to art is through religious means. The art, cultural and religious antiquities used by our forefathers are still in use in temples of Tamil Nadu eventhough a great number of these are received as treasure-trove finds in the museums. The remains of our art and cultural heritage should be preserved for posterity. Museums have personnel and facilities to preserve their collections to posterity. Similarly the antiquities which are with the temples also should be preserved for posterity. If the officials who are incharge of the antiquities know about the materials, their-types, their behaviour to the environment and the need for their preservation, the objects will be best maintained.

Classification of objects:

Depending upon the type of treatment to be given to the objects they can be classified as follows:

1. Metals
2. Organic objects
3. In-organic objects
4. Paintings.

Metals:

Temple antiquities are mainly metallic objects. Bronze icons, bells, vessels, weapons, jewelleries etc. They are affected by corrosion. The corrosion products should be removed and stabilised avoiding further corrosion.

Organic objects:

Materials derived from living organisms are organic objects. Wooden objects like temple cars, doors, vahanas, clothes, palmleaves, leather objects etc., are prone to climatic changes. The environment should be stable and the objects should be attended to carefully as they are easily affected by insects also at large.

In-organic objects:

Temples are mostly constructed with the materials of inorganic nature. Stone pillars, sculptures, inscriptions, terracotta objects etc., are some of the inorganic materials. They are mostly exposed to the atmosphere and are affected both by rain and weathering takes place. They should be treated and preserved.

Paintings:

Shrines are mostly decorated with paintings of different types. Wall paintings, Tanjore panel and glass paintings are the paintings seen. Some are even white washed and lost. They should be preserved.

This booklet gives an idea of preservation and care of temple antiquities. Anyhow, whenever there are serious problems the conservation experts should be consulted. Especially whenever temple renovation takes place the conservation experts should be consulted and work carried out. This will help to preserve our cultural heritage to posterity.

-V. Jeyaraj, Curator (Cons)

Factors affecting temple antiquities and their control measures

Art and antiquities are affected by climate, light, biological agents, air pollution, soluble salts and neglect.

i) Climate

Change of temperature and humidity causes deterioration in objects. When high temperature prevails, paper, leather, palm leaf, paintings are affected. During dry conditions palm leaf, leather because very dry. They lose the flexibility and become brittle.

Paper, parchment, wood, ivory, bone are all hygroscopic in nature. When humidity increases, they swell when humidity decreases, they shrink.

Very low or very high conditions of humidity causes strain in wood and causes damage.

ii) Light

Direct light on organic objects causes damage. The UV radiation from the light source causes discolouration and fading. Therefore we should not allow direct light on organic objects. We can arrange in such a way that the light is reflected on the object. Otherwise we can use filters to prevent UV radiation so that it may not cause any damage on the object.

iii) Biological Agents

1) Insects:

Silver fish, cockroach, termites, book lice, wood borer, cloth moth.

2) Micro-organism

- a) Bacteria
- b) Fungi and foxing
- c) Algae and moss

Among the insects termites are more dangerous in humid conditions, than another biological agents.

iv) Air Pollution

The gases from chimnies (from homes as well as from industries), exhausts from cars, locomotives, acroplanes.

Oxides of Sulphur

Oxides of Carbon

Oxides of Nitrogen and the other gases cause damage to all kind of objects.

v) Soluble Salts

In coastal area, the air contains especially sodium salts and the sodium salts settles on objects and causes damage.

vi) Neglect

- a) Mishandling
- b) Bad storage
- c) Accidents

-S. Thangavelu, Asst. Director of Museums.

The Treasure-trove Temple Jewelleries in the Collection of Madras Museum

The Archaeological sources reveal the prevalence of jewellery in Indian sub-continent even from 3rd millennium B.C. onwards. The Indus Valley sites yielded numerous ornaments made of gold, silver, bronze, shell and faience. But for historic periods, in the absence of jewellery as an item, we have to depend mainly on artistic expressions given in shape in forms like terracottas, stone sculptures, bronzes, paintings and coins to visualise the richness and variety of Indian ornaments. Surprisingly, the historic bronzes or sculptures or coins which adorn the galleries of museums in India to portray this fact to some extent and not completely, since no museum in India (even including the National Museum, New Delhi) except the Madras museum has have the privilege of holding jewellery of our pre, proto and historic and even Sangam periods, acquired from earth thro' the Treasure Trove Act of 1878 through out the Madras Presidency since 1931. Thus, Dr. Gravely, the Director and Head of the Madras Museum became the State Treasure Trove Officer for the acquisition of bronzes, coins and jewelleries.

At present, there are 335 gold and 90 silver hoards of ornaments in reserve, for study and examination for researchers and scholars. Some of the jewelleries are taken out for organising special exhibitions on special occasions. For example, the Roman gold jewellery numbering nine pieces acquired in a hoard in 1939 from Veiallore village in Coimbatore District along with gold coins of Tiberius of 1st century A.D. have been taken out and exhibited at Inter State exhibition at Indian museum, Calcutta in 1992 and at Inter District exhibition at District museum at Coimbatore in 1993 and at Roman Antiquities special exhibition in 1992 in Madras Museum itself. The Veiallore jewellery in the form of neck and finger ornaments portray the influence of Rome on Indian artisans resulting in the production of these ornaments with symbols and signs of dragon, Greek warrior and Greek lady on them and thus fixing the age to Sangam period.

At a glance of these treasure trove jewellery items in this museum, it could be inferred that they represent the domestic wears such as talis, tali kodi, ear-rings, neck bands, bangles, pendants, nose rings etc., of varied types worn at different occasions.

However a careful examination reveals, that some of the jewelleries are exclusively used in worship – both at domestic level and for the adoration of temple deities. Equally are, a few items considered to be as votive offerings, presented to deities in token of a vow and in reverence by the devotees at times of crisis and difficulties.

The common deity that figure prominently in the collection is *Amman*. The hoard received from Yesalam village, Villupuram taluk in South Arcot District in 1990, holds an Amman figure in the form of Lakshmi. It is of size 6.5 cm and 5 cm made of thin plate of gold, crushed up, in seated form and with no decoration including stones on it. In contrast to this, the *Vinayagar* deity in another hoard which was received from Pasalikutti village, Tirupattur taluk in North Arcot District in 1987, is a solid but tiny figure of size 2.4 cm and 2 cm. Here the parts like crown, trunk, belly and hands are delicately brought out and are visible. This *Vinayagar* may be used in domestic worship by the family members. The other important deity is *Venugopala* as noticed in another hoard acquired from Tandalam village, Kumbakonam taluk in Thanjavur District in 1988. It is a solid and stumpy in statue of 4.3 cm and 4 cm. It is represented with five naga hoods with centrally placed *Venugopala*, leaning on the cow and playing a flute. And two gopis are seen on either side. The other noteworthy deity is *Kali* as per the hoard got from Kadathur village, Udumalpet taluk in Coimbatore District in 1971. Here the *Kali* jewellery is represented with bulging eyes with two hands holding flowers while the other two hands are merged with feet. However, the crown is prominent and three white stones are embedded at lower portion adding more colour and beauty to this votive offering. It is in the triangular shape in outline of 2.8 cm in length on all three sides.

Apart from these deities, other accessories used in worship are also noticed in the jewellery collection. For example, the treasure received from Urkad village, Ambasamudram taluk in Tirunelveli district in 1973 includes wheel, trident, axe, conch and bull. The gold *trident* is sharp at distal ends and the total length is 3 cm while at trident portion the width is of 1.5 cm. Similar in size and pattern is that of an *axe* with thin round stem of length 3.7 cm and blade is of 1.5 cm in width. Both the trident and axe may be of votive in nature. The *wheel* in this collection, is quite different, in irregular circular pattern with eleven beads fixed on the rim of circle. It may be taken more as a bangle or as a neck band used for deity. The hoard includes a silver *bull* of size 2.2 cm and 1.5 cm, with humped back and it may also be a votive offering to deity. A typical *Chakra* or *wheel* of diameter 1.6 cm with a central knob and with radiating spikes, intricately made is from another hoard received from Pidathapolur village, Nellore taluk in Andhra Pradesh in 1940. It may be used for the deity as a head ornament or may be kept in home for domestic worship. But a modified *wheel* or *chakra* is seen in another treasure got from Kurivimalai village, Polur taluk in North Arcot District in 1940.

It is actually a thick five star figure like in shape with beads attached at intervening free edges making it shape as a wheel. It has got a central knob and it looks like a discus. The other quite interesting object is the *conch*, 2 cm in length with modification from its original shape with decorations. Both the *chakra* and *conch* are taken to be as votive offering of *Vaishnavite* temples.

The hill shrine station of Palani in Dindigul district has yielded three treasure trove jewellery hoards connected and dedicated to the temple. It includes a *kasu malai* containing 123 brass coins and 26 gold beads and small plates and 40 gold round plates.

A complete set of head and neck jewellery of a *stone deity* was received from Manakkal village, Nannilam taluk in Thanjavur district in 1934 is

quite interesting. It includes *sudar*, head, ear-rings, flower and crown of Tiruvasai with *odiyanam*. They are all made up of thin plates with intricate workmanship with designs and styles.

The religious sanctity and reverence of the people is seen in the ornaments of talis, necklets, pendants etc., bearing the signs of *Ohm*, *lingam*, *sacred ash*, *nammam* etc., in our jewellery collection.

Among the faunal collections, peacocks (male and female) are exquisitely and intricately worked out and used as ornaments. Snake figure in the form of *nagapadam* is quite common in the collection.

The author is thankful to Tmt. R. Santhi, Curator for Numismatics Section of the Museum for the help given in preparation of this article.

-N. Devasahayam, Asst. Director of Museums

Archaeological Collections

The science of archaeology deals with the study of materials relating to the historical times such as inscriptions, (stones, copper plates), architecture, sculptures, bronzes, terracottas etc. A careful analysis of the various details of these materials is very much essential for a proper understanding of the growth and development of Indian culture.

Inscriptions:

Inscriptions are important because they form the ancient source material for the history of India. Inscriptions are in different scripts and may be in stone and copper plates, the study of which is called palaeography.

In India the earliest examples of writing are those found on the seals from Mohanjo-Daro and Harappa. The writing is in the form of pictures.

The inscriptions are generally the records of achievements of a King or of donations, informations about various eras, astronomical details, social practices, festivals, administrations etc. Besides these some of the inscriptions are written in beautiful language and are the only surviving examples of literary skill of the authors.

The inscribed stone must be preserved by removing the dust by cleaning with water. The copper plates should be physically cleaned and later with soap solutions if necessary. If the encrustation is very thick it should be removed with suitable chemicals. But every care must be taken to see that the pressure applied is gentle and it does not mar the form or shape of the letters of the inscriptions.

Sculptures:

The sculptures of the Tamil country dating from 7th C A.D. are simpler in treatment than those from

other places. The five periods of Tamil sculptures – Pallava, early Chola, later Chola, Vijayanagar and modern – have their own characteristic features.

Pallava Period:

The figures are natural in pose and their modelling is fine. The draperies are heavy and ornaments are few and delicately carved. Feminine figures are delicately carved and extremely graceful. In general the sculptures are distinguished by the simplicity of treatment and high restraint of decorative designs.

Early Chola Period:

The sculptures of this period are noted for their grace. In poses and moulding they tend to be formal.

Later Chola Period:

The sculptures show a marked tendency to conventionalize the poses, draperies and ornaments. The classic tradition of earlier period is almost preserved.

Vijayanagar:

Elaboration of details such as draperies and ornamentation are seen which are unknown in the earlier periods. The face is somewhat expressionless with sharply pointed nose and vertically grooved chin, pronounced belly and naval are the characteristic features of this period.

Modern:

The sculptures are usually stiff and lifeless with unduly prominent noses and conventionalised draperies and emblems.

Metal Sculptures:

The Madras Government Museum has a rich collection of South Indian bronzes and some of the finest

masterpieces are on display in the gallery. The history of metal art in South India is of great antiquity and this is a living art today. The earliest specimen in Metal in Tamilnadu is the prehistoric figure of a mother goddess from Adichanallur, Tirunelveli district and may date back to 7th C B.C. The metal icons of historical period have survived from the Pallavas, which were on a restricted scale as greater attention was paid to the art of stone sculpturing. The survived metal icons of this period show the same characteristics of stone sculptures of this period. Kuram Natesa, Vishapaharana from Kilapuram, Somaskanda from Thiruvallangadu are examples of the art of this period. Particularly Vishapaharana is a rare representation in metal, has the sacred thread going over the right forearm, a characteristic of early images. Kuram Natesa is the only example of *Urdhvajani* pose in metal. Mention may be made of the snake in the left hand instead of agni commonly met with in Nataraja images. The small image of Somaskanda with a trident and a skull cup in the lower hands is the most remarkable bronze of this aspect.

The Rama group from Vadakkupaniyur and Srinivasa group from Sirupaniyur are the fine specimens of the 10th C A.D., so far known in metal. Natesa from Thiruvallangadu, much admired by the world famous sculptor Rodin is dated to the 11th C.A.D. Ardhanarisvara from Tiruvengadu dated to the 11th C.A.D. with the help of the inscription in the Svetharangesvarar temple, is the best specimen of the aspect yet known in metal. The images of Vishnu with consorts from Komal assigned to the 13th C A.D. represents him with only one pair of hands having the emblems embedded on the palms. This image wears a lengthy ornament called *Vanamala*, a rare feature in South Indian bronzes. Nagapattinam was an important port in ancient times. Some of the best Buddhist bronzes, ranging from 9th C. A.D. to 17th C A.D. have come down to us. Mention may be made that quite a number of those bronzes bear dedicatory inscription on the pedestal.

The dating of the metal icons which is very essential for appreciating better the history of this art is a question on which no consensus of opinion has emerged notwithstanding a fairly exhaustive and analytical study of a sufficiently good number of bronzes unearthed in different regions indicative of more than stylistic mooring. Dating is done on the basis of stylistic features of the icons.

Wood Carvings:

In the Rig Veda there were mentions about wood carvers as ' *वृक्षकर्तृ*'. We have ample references in early texts about wood. Uses of wood and selection of wood for temple car are mentioned. The time and the day in which wood have to be cut for these works are also mentioned. Wood carvings of earliest centuries have not survived for us for wood being a perishable material. Wood was largely used for the construction of shrines and other structures. This is proved from an inscription of Mahendravarman at Mandagapattu in South Arcot district. This inscription says, "Vichitracitta constructed the temple for the first time for Brahma, Siva and Vishnu without the use of brick, timber, metal or mortar". In the words of Sir George, Birdwood, South India serves as the best place for the study of wood carvings. Because of the bold relief the South Indian wood carvings occupied an unique place in the sphere of decorative art. Since the temple car is the most important Vahana the wood carvers bestowed their full attention in embellishing it with finely carved scenes from Hindu mythology". With the advent of stone both for architecture and sculpture, the wood carver transferred his skill outside for aesthetic pleasure and devotional gratification of the worshippers. The God of the temple moved out like a monarch in processions with all the temple paraphernalia transferred to a wooden counterpart i.e. Ratha, which in shape simulated the stone *Vimana* over the *garbagriha*.

Terracottas:

Terracottas form an important item in the folk rituals and cults. Handmade terracotta or clay figures have been occupying a special position for a long time in Indian Art. A large number of examples have been unearthed in Mohanjo-Daro and Harappa among which the figures of Mother goddess type abound. The grey coloured figures of Mauriyan period are noteworthy. During the Sunga period figurines are worked by a double process, namely the hand made body affixed to the head made from a mould. This technique came into being for the first time. After the introduction of this method the art made rapid progress. The well known examples of this period are the ones discovered at Mathura, Kosambi, Ahichatra, Patna etc.

-R. Balasubramanian, Curator (Arch).

General Methods of Conservation

The greatest challenge facing temples is the caring for the collections and using them for worship. Conservation methods should be known to persons who handle the objects under their possession. There are two types of conservation. They are a) preventive conservation and b) interventive conservation.

Preventive conservation:

Prevention is better than cure. If the degradation caused by a poor temple environment can be avoided, reducing the need for remedial conservation the temple antiquities will be saved for posterity to study and enjoy.

Preventive conservation involves three broad categories i) environmental standards, ii) fire, security and safety factors and iii) design specifications.

Environmental Standards:

There are four main factors after the conservation of antiquities for which conservation experts have established standards. The role of preventive conservation is to apply the following standards to specific collections and effectively implement them in order to prevent damages on the antiquities.

Relative humidity :	50±3% R.H.
Air Cleanliness :	90-95% efficiency in particulate filtration
Light levels :	50 lux for high - sensitivity artifacts. 150-200 lux for medium sensitivity artifacts. 300 lux for low-sensitivity artifacts
Temperature :	21°C±0.5°C.

Fire safety and security:

Fire is another devastating agency which completely destroys objects such as organic objects and in-organic objects. Even metallic objects like lead will also be damaged. Fire safety is an important aspect to be cared for.

Design Specification:

The display and storage areas should be designed in such a way that lighting, environmental controls, building construction are upto the standards. But temples have high ceiling which controls the environment.

Interventive Conservation:

Interventive conservation is the conservation intervening the natural and physical decays taking place in the objects. The three important facets of chemical conservation are a) removal of accretion b) stabilising and arresting damages and c) consolidation, protection.

a) Removal of accretion

Cultural objects are prone to various accretions like corrosion, surface adherents. Unless these accretions are removed the objects lose their aesthetic look and the details cannot be legible. These accretions may be removed by physical means, chemical means, electrochemical means and electrolytic reduction means in the case of metals.

Physical method:

When objects found unused for long time they may have accretions on the surface hiding all the details even giving an ugly look. Accretions like silicious materials from metallic objects may be removed by means of chisel, knife, vibrotool etc. Accretions found on ceramics, beads etc., may be removed by brushing and by the application of soap solution etc. In case of prints, paintings etc., superficial dirt may be removed by rubbing with an eraser. Soot and biological accretions on stone objects may be removed by air abrasives, steam cleaning and laser cleaning. Since we do not introduce any chemicals in this method no side effects are noticed.

Chemical method:

The unwanted surface accretions may be removed from the surface of the objects by chemicals by dissolution. When chemicals are used less strong chemicals with low concentrations should be used. In the case of metals the corrosion products may be removed by dissolution. Alkaline Rochelle salt solution removes chlorides and carbonates, citric acid solution removes the oxides from copper based objects. Formic acid, ammonia remove the black tarnish and white chlorides from silver objects. Lead carbonate from lead objects are removed by acetic acid. Oxalic acid, glycollic acid etc., remove rusts from iron objects.

Solvents like acetone, benzene, rectified spirit etc., remove the only accretions from stone objects. The brown varnish layer from paintings and other objects are removed by organic solvents very carefully by means of cotton swabs. The oily accretions from painted wooden panels, tribal bamboo objects are cleaned by means of rectified spirit, benzene etc.

Stabilising and arresting defects:

Various defects such as corrosion on metals, warping in wooden objects, flaking and cohesion in paintings, scale removal on stone objects, twisting in palm leaves, browning in case of papers and textiles, hardening in leather etc., take place. The defects should be arrested and the objects should be properly stabilised.



Care of Metallic Objects

Temples have metallic objects such as bronze icons, jewellery, vessels, pooja materials etc. Some are used daily. Some are used on festive occasions

The decay of metal objects:

Although metals appear strong they are less durable when compared to that of stone. The metallic objects decay through various means and become the minerals from which they were extracted.

Corrosion is the main enemy to the durability of metals. Most of the metal antiquities are received in the museums from excavation, exploration and treasure-trove finds. When these objects are buried in the soil they corrode because of the contact of the surrounding saline condition and an equilibrium is obtained. When they are brought to the atmosphere this equilibrium is disturbed and the objects disintegrate abruptly.

The agents of deterioration of metallic antiquities are high relative humidity, polluted air and the mismanagement of the objects.

Iron objects:

The two important facets of chemical conservation are a) removal of the corrosion products and b) stabilising and arresting the corrosion products.

a) Removal of Corrosion Products:

The removal of the corrosion products are effected by various means and measures.

- i) Physical method
- ii) Chemical method
- iii) Electrochemical method
- iv) Electrolytic reduction method.

i) Physical method:

When objects have adherent silicious and corrosion products they give an ugly look. This can be removed mechanically by means of chisel, knife, vibro tools, etc. By these means the aesthetic beauty of the object is not lost. Since we do not introduce any chemical in this method no side effects are noticed. Anyhow rectified spirit or other organic solvents such as acetone, toluene, benzene may be used to have a dust free surface on the objects.

ii) Chemical method:

By dissolving the corrosion products from the objects by using chemicals the deleterious materials are removed. When we take up dissolution method we should use weak solutions of chemicals.

Copper based antiquities:

When the objects are covered with a bluish

green particles uniform layer on the surface and also have an ugly look due to chloride. The copper chloride corrosion products are removed by immersing the object in a 10% solution of sodium sesque carbonate (a mixture of equal amounts of sodium carbonate and bicarbonate) the unwanted deleterious chlorides are converted into oxide and the aesthetic colour of the object is retained.

When the copper based objects are affected by bronze disease and the details should be brought out the objects are kept immersed in a solution of alkaline Rochelle salt (15 grams of rochelle salt, 5 grams of sodium hydroxide and 80 ml. of distilled water). This immersion dissolves all the corrosion products and the oxide layer is visible. Then the objects are kept in a solution of 10% citric acid which removes the oxide layer and the underlying original metal surface is visible.

Silver objects:

Silver objects like vessels, jewellery either appear black, white or green. The green corrosion products can be either due to the leaching out of copper from the silver object or the corrosion transferred from a copper based object which was close by. Such objects can be treated by alkaline Rochelle salt solution.

The black of silver objects, tarnish, is removed by treating by a 10% solution of formic acid. The underlying white layer is removed by immersing or treating the object with ammonia solution.

Electrochemical reduction method:

The corroded metal objects may be electrochemically reduced by placing zinc powder and wetting it with 10% sodium hydroxide or 2% dilute sulphuric acid. By this method nascent hydrogen produced reduces the corrosion products into the corresponding metal. It is a localised treatment.

Electrolytic reduction method:

Electrolytic reduction is carried out in an electrolytic cell keeping the metal antiquity as the cathode with two strips of iron gauze suspended on either side of the object or a cylinder of the same material enclosing the object all around, as the anode in a 5% aqueous sodium hydroxide/sodium carbonate/acetic acid or formic acid. Current is passed from a direct current supply from a 1-50 volts source and an optimum density (2 amps per square decimeter with respect to cathodic object) for a few to several hours, depending on the thickness of the crustation. The corrosion products on the antiquity are reduced and removed by alternate brushing and washing until the hidden details are exposed with all its intrinsic artistic details. But the copper based metallic objects get a black tint in the surface.

Intensive washing:

Intensive washing is the last step but definitely not the least in importance in conservation of artifacts, unless the treated objects are washed completely free from the residual chemicals left behind on the objects, they will once again react with metal and the corrosion cycle will be repeated again. Therefore, washing should be intensive and thorough in the final stages especially with methods involving chemical treatment. The last residual salts in the treated objects is best eliminated by prolonged soaking of the objects in distilled water or the process may be speeded up by using hot water. This process may be repeated to ensure complete removal of chemicals by heating and cooling.

Consolidation and protective coating:

The metallic antiquities which are very fragile and highly mineralised need to be packed up with resin or acrylics. This process is called 'consolidation'. Consolidation of fragile metallic objects can be done with a 10% wax dissolved in benzene or by vacuum impregnation. A 2-3% polyvinyl acetate in acetone, toluene or acetone-toluene mixture can either be coated on the object or vacuum impregnated. In the case of fragile bronzes, the missing corroded portions after treatment are modelled with M-seal a resin and matched in colour. Mending of objects is done by doweling technique.

Arresting Corrosion:

In most of the excavated and treasure-trove objects it is seen that the corrosion has proceeded to an extreme where very little metal is left intact. In such cases the objects can best be conserved by stabilising the corrosion products formed.

Bronze diseased spots formed over protective patina layer may be mechanically removed. The pits found are then filled with a fine paste of silver oxide (in alcohol/water) insoluble silver chloride formed seals off the underlying harmful effect of copper (II) chloride arresting further corrosion. Zinc dust in the place of silveroxide may be used effectively.

Benzo tri azole in water or alcohol forms a complex with cupric chloride and oxides. This inhibition procedure can also be adopted to arrest further corrosion. Benzo tri azole in water is preferred to benzo tri azole in alcohol in the cases of antiquities with thick layer of bronze disease as the former slowly but surely penetrates into the core of the metal - the evaporation of water mixture being slow compared to benzo tri azole - alcohol treatment. This is the most effective method for the conservation of copper and bronze archaeological antiquities affected with bronze disease.

One of the preventive methods of bronze disease in antiquities is to maintain the antiquity in a

dry atmosphere (45-60% R.H.). Under these conditions the spreading of further corrosion is arrested.

Metallic antiquities:

Gold:

Even if gold is non-corrosive it is a soft metal. Proper care should be taken in handling as well as in storage. In order to avoid abrasion the gold objects should be wrapped in tissue paper and kept in separate cells.

Silver:

Silver is easily tarnished. Silvo or specially made polish is used to do polishing the surface. Even wood emanates some acid fumes and therefore silver objects displayed inside the cases are also affected. Zinc oxide globules are to absorb the hydrogen sulphide, silver objects are coated with 2% solution of polyvinyl acetate in sulphur free toluene.

Copper:

Even though antiquities made of copper and copper based alloys appear to be stable, they are affected at high relative humidity. High humidity accelerates the development of bronze disease. Those objects which are affected by bronze disease may be cleaned and displayed in a show case which has provision to keep silica gel with self indicator which changes its colour by absorbing moisture.

Iron:

Since iron rusts fast, the corrosion should be stopped by applying a water repellent on the surface of the object. Besides wax, some consolidants and varnishes can be applied on the objects. Polyvinyl acetate, Paraloid B72 are some of the consolidants.

General Care:

Metal objects, gilded objects, painted objects and enamelled objects are very easily abraded or scratched. Therefore, they should not be stacked one over the other.

Bidriwares and inlay works should be handled very carefully. If any inlay is lost it should be filled with acrylic resin. Such delicate metallic objects should be stored under dry conditions by wrapping them in tissue paper and keeping in polythene bags.

Since dust and pollutants affect metal objects they should be kept arranged in racks wrapping with polythene bags.

Coins may be stored in small envelopes properly labelled. Shallow wooden drawers, with slots to keep the coins in position are best for their storage. Plastic shallow drawers will be best for lead and silver coins.

-V. Jeyaraj, Curator (Cons)

Care of wooden objects

Wood is a part of a tree. Wood can be obtained from monocot plant (Palm tree) and from dicot plants (branched trees). There are two parts in all these timbers. They are heart wood and sap wood. The heart wood (strong) contains some organic liquids like 'lignin' which makes the wood insect proof. The sap wood (soft) is easily prone to insects.

Temples:

Temples have temple cars, deities in the sanctum sanctorum, processional vahanas etc.

Deterioration in wooden objects:

Wood, even though hard and durable, being an organic material is very vulnerable to various causes of deterioration both of natural and manmade.

Wood is fibrous and cellular. A seasoned wood is said to have its water content in equilibrium with the atmosphere. When the wood is kept in a very dry atmosphere because of its quick drying cracks are developed. Because of the change in relative humidity wooden objects warp.

In most condition wooden objects are easily affected by insects such as beetles. The powder-post beetles make their entries into wood and give out fine powders. This damages the whole wood without anybody's knowledge. Among the insects the most damaging one is termites or white ants.

If wooden objects are kept in damp condition for a long time, they may develop fungal growth which weakens the surface. A really dangerous type of fungal attack on wood is called dry rot.

Wood carvings from temple car appear to have hardened oily accretions disfiguring the details of the sculptures. This is due to the application of protective coating of oil to preserve the sculptures at the time of festivals. Repeated coatings of oils and leaving the temple cars along the streets allowing dust to accumulate made the wood carvings appear disfigured with caked up oil. Similar case may also occur when repeatedly painting is done to protect the surface.

Mishandling and vandalism also affect wooden objects. Faulty handling and storage create a havoc in the protection of wooden objects.

Conservation measures:

Wooden objects should be segregated from the soil and walls in order to avoid the contact of termites. The showcases and the area of the display as well as storage should be treated for insects and pests with aldrin, chloropyrifos, etc.

Wide variations of climate cause disastrous effect on wooden objects. Therefore maintaining microclimate

of humidity range between 45 to 60% avoids damages on objects.

Insect attacked wooden objects may be fumigated with a mixture of carbon disulphide and carbon tetrachloride (1:4) in a closed chamber. This kills the powder-post beetles. Then the holes are filled with wooden putty mixed with an insecticide like D.D.T. The growth of fungus is eradicated by the application of 1% Orthophenyl phenol in rectified spirit.

Warping of wood may be set right by application of water and oil at the concave side and keeping light weight on the other side with proper padding. After required flat surface is regained the sides are coated with resins like Poly Vinyl Acetate to avoid water absorption.

The accretions on the wooden objects may be removed by use of solvents and softening agents. If accumulated dirt only is found on unpainted wooden objects they may be removed by using teepol in rectified spirit. The excess teepol used is removed by rectified spirit. If dirt is accumulated on painted wooden objects care should be taken to remove the dirt. Benzene, rectified spirit may be used by means of cotton swabs and dirt may be removed area by area.

In the case of oily caked up accretions, the conservation treatment is difficult. In such cases the accretions may be softened, by the use of organic solvents like acetone, rectified spirit, benzene etc. Care should be taken to avoid fire. In such cases a hot solution of 5% sodium carbonate is conveniently used to soften the hard material. Brushing with tooth brush and removing the material using blunt scalpels will clean the wooden objects. Through washing to remove the sodium carbonate used in necessary. The wooden object should be dried under shade. When dried the insect holes and cracks are filled with putty made of wood and insecticide like D.D.T. A 2% solution of As Cu in water may be applied as an insecticide as well as fungicide.

Since wooden objects are delicate in nature great care should be taken in handling and storing them. The wooden objects may be wrapped in polythene bags in the storage to avoid dust. They may be stacked in wooden racks. The storage area where the wooden objects are stored insecticides like B.H.C, D.D.T. may be sprinkled. Fogging with D.D.V.P. may be done to drive off insects.

Protective coating:

When the surface is cleaned for the accumulated dirt the surface is clean and it should be protected from further accretions. Varnish may be applied to give a glossy look when there is no painted surface. If painted surface is available a 2% solution of polyvinyl acetate in toluene may be applied as a protective coating.

-V. Jeyaraj, Curator (Cons)

Care of Palm-leaf Manuscripts

In the tropical countries palm trees are in vogue and the palm leaves were used as writing materials. Styluses were used to scribe on palm leaves. Temples are in possession of palmleaf manuscripts which consists of Sthalapuranas, accounts, Ramayana, Mahabharatha, local history etc., which should be preserved.

Preparation of palmleaf manuscripts:

The tender leaves of 4 to 5 weeks old are cut into size and dried under shade or buried under marshy water. In the contrary they are boiled in stream or in turmeric solution. Such seasoned palmleaves are scribed by stylus. Since the scribed letters are having the colour of the leaf the inscribed portions were either applied with the essence of "Kadukkai" or green leaves of "kovakkai plant". The letters after sometime appear black making it legible to read. The palmleaf manuscripts ranges from 4 cm to 85 cm in length and upto a bundle thickness of 50 cms.

Deterioration of palmleaf manuscripts:

Palmleaf manuscripts are organic in nature and therefore they are affected by high humidity, microorganisms, insects, dust, heat, mishandling, vandalism and illmaintenance. When certain insects attack them they bore from one edge to the other making a tunnel and hence the leaves are stuck together. The edges are accumulated with dust and they attract fungal attack. Normally the palmleaf manuscripts were preserved in the lofts of the kitchen. They are accumulated with soot and smoke. Silver fish etc., eat away the surface and letters are lost.

Traditional preservation:

The palmleaf manuscript bundles were dusted, cleaned with turmeric powder and bundled by cloth keeping margosa dry leaves or kaz-kaz (vettiver). Sometimes powdered pepper, lavankam, pattai, cloves etc., are mixed and kept in between the leaves as a cloth packet. These used to drive away the insects and microorganisms.

Conservation of palmleaves:

The stuck bundles of palmleaves are baked in a steam vessel. The steam percolates and moistens the

clayey materials and the leaves are easily separated. The leaves are cleaned with brush followed by rectified spirit. Then a 5% solution of citronella oil or lemon grass oil or olive oil in rectified spirit is applied and allowed to dry in shade. The oil used restores flexibility to the palmleaf. If the palm leaf is distorted 1:1 rectified spirit-water mixture is applied and pressed between blotting paper and kept under weight. When dried it is found flat. Then 5% oil in spirit is applied and dried. This act not only gives flexibility but also provides insecticide or fungicidal priority to the palm leaf manuscripts.

Restoration of palm leaves:

The broken palmleaf manuscripts should be restored. The restoration can be done in many ways. Because of the cleaning process or natural means the letters become illegible. Therefore the inscribed portions should be rubbed with "kadukkai" essence, Kovai plant leaves, or lamp black. Then the mending is done. The torn portions are cut to the required size keeping similar unscribed leaf with a knife. The affected portions are now pasted at the edges with the cut leaves. At times lamination by chiffon using maida flour paste is done. Lamination by cellulose acetate is also done but the edges are trimmed so that the leaves may breath.

General care:

Since the palmleaves are easily stained they may be displayed keeping them under polythene bag or cover. By this way dust also avoided. The displayed as well as storage areas should be kept clean as well as treated with insecticides and fungicides. Fogging with D.D.V.P. will be effective as it penetrates through the leaves and drive away the insects and fungi.

The palmleaves are tied keeping two planks of teak wood in both sides which is slightly wider than the leaves so as to give a protection from distortion and physical damage. The bundles are stacked in such a way that they stand on the planks support. This avoids dust to be accumulated at the edges of the leaves. Since high humidity bulges the bundle and attracts insects and micro-organism the storage may be airconditioned. Otherwise they may be kept under showcases and silica gel may be kept inside them to absorb excess of moisture.

-V. Jeyaraj, Curator (Cons)

Care of Monuments and Temples

Adequate legislation have been brought into existence for the protection of important monuments and sites in many countries. In India the Government have framed rules at the central and state levels to protect the cultural heritage of our country.

Ancient Monuments and Preservation Act (VII of 1904):

As per the Ancient Monuments and Preservation Act (VII of 1904) an "ancient monument" means any structure, erection or monument, or any tumulies or place of interest, or any cave, rock-sculpture, inscription or monolith, which is historical, archaeological or artistic interest, or any remains there of. This has three parts.

1. Protection of ancient monuments
2. Arresting the movement of movable objects of historical importance.
3. Protecting historically important sites and prohibiting excavations. Under this act historic, artistic monuments are declared as national or state protected monuments. It restricts removal of any artistic sculptures etc., without the written permission of the District Collector. There are number of amendments in this act.

The Indian Treasure-trove Act 1878:

According to the Indian Treasure-trove Act 1878, whenever a treasure (from underground) exceeding in amount or value ten rupees is found, the finder shall, as soon as practicable, give to the District Collector notice in writing.

a) of the nature and amount or approximate value of such treasure; b) of the place in which it was found; c) of the date of the finding; and either deposit the treasure in the nearest government treasury or give the District Collector such security as he thinks fit, to produce the treasure at such time and place as he may from time to time require. After due inquiries the finder and land owners are suitably compensated. The Director of Museums is the Treasure-trove Officer who assesses the treasure and acquires the treasure for the Government with the help of the Collector.

The Antiquities (Export Control) Act. 1947:

In order to prevent the antiquities from being exported the Antiquities (Export Control) Act, 1947 was enacted. As per this act coin, sculptures, manuscript, epigraph, or other works of art or craftsmanship; any article, object or thing illustrative of science, art, crafts, literature, religion, costumes, morals or politics in by-gone ages; any article, object or thing declared by the central government by notification in the official gazette to be an antiquity for the purpose of this act - which has been in existence for not less than one hundred years.

Besides this, in order to avoid the traffic of antiquities without the knowledge of the government the antiquities such as bronze icon etc., have to be registered with the government by the owner proving that they are his ancestral property.

Temple Architecture:

The preservation of an ancient temple/monument is an extremely delicate and intricate work. It is undertaken as per the nature of architecture, because the architecture is the mother of arts. The different types of monuments like, prehistoric caves, rock cut temples, cave temples, monolithic temples, structural temples should be given due attention for the preservation treatment.

The temple architecture may be classified as follows:

- i) Structural monuments
- ii) Rock-cut monuments
- iii) Monolithic caves/monuments .

In the Hindu architecture we may note vimanas, gopuras, pillars, gates, walls, sculptures in the temples. Mantapas are constructed by decorated pillars and pilasters.

The various stones utilised for construction of the temples may be classified according to the geological formation.

- 1) Igneous rocks - granites, basalts
- 2) sedimentary rocks - sandstone, limestone, marble
- 3) Metamorphic rocks - slate, laterite

Apart from the different varieties of rocks different stonemasonry were in use in the construction of temples.

- 1) Ashlar masonry
- 2) Chisel dressed masonry
- 3) Coursed rubble masonry and
- 4) Random rubble masonry.

The brick masonry are generally of two types. They are:

- 1) English bond type
- 2) Flemish bond type.

While preservation measures are taken the materials used for the construction should be understood properly so that proper materials for restoration may be chosen. Always it is better to consult conservation experts.

Treatment of buildings:

To begin with the photograph of the building before treatment should be taken. All destructive vegetation should be removed very carefully.

The unwanted vegetation all around the temple should be cleared. The roots of the larger trees will have damaging effect on the structures of the temples/monuments. The surface vegetation on the monument can be removed and roots may, however be taken away along with the debris and ensure that there would be no further growth of vegetation. First of all, the trees or

vegetation should be cut leaving the stem. Sodium or potassium arsenite or concentrated sulphuric acid may be pored carefully. This takes atleast six months to dry and then the stems are removed.

The biological growth such as moss, lichen, liverworts etc., will leave patches of green or black. This can be removed by brushing with 10% ammonia and applying 10% solution of zinc silico fluoride. After thorough washing a coating with 5% solution of polyvinyl acetate in toluene may be provided as a protective layer.

The temples which are situated near a river or lake are likely to be damaged in course of time. It is due to the percolation of water through the permeable foundation-soil. The seepage of water takes place along with grains of soil through the bottom contour and weakens the foundation especially during the rainy seasons when the water is stagnated closer to the monuments. If this is not checked at an initial stage the foundation may collapse and the structure may sink or fall down.

-V. Jeyaraj, Curator (Cons)

Care of Stone Objects

Stones such as granite, basalt, sandstone, limestone, marble etc., are very important in temple construction and carving of sculptures for worship besides inscribing details in temples. If they are not attended carefully, they deteriorate.

Deterioration of Stone:

Excavated stone objects are much affected by crystallisation of salts which were absorbed with in stone. Since salts deposited in cavities near the surface can impose strains great enough (upto more than 1000 atmospheres) to cause complete disintegration of surface features such as ornamentation.

Outdoor stone objects suffer the damages due to acid rain which is due to the dissolution of acids of sulphur, carbon and nitrogen in the atmosphere. Leaching of mobile material from inside and recrystallisation occurs on the surface as an efflorescent deposit. Further more, substances dissolving in the capillary passages of stone may produce high osmotic potential gradients which can lead to pressure damage. In urban areas black crusts of carbonaceous materials are often present.

Deterioration also occurs due to the growth of algae, fungi, moss, lichen and other microvegetation.

Insects and birds droppings also affect the stone objects and monuments.

Preservation of stone objects:

Most of the deteriorations on stone are due to water. Now, the job is to remove the unwanted dirt and salts from the objects, protecting the surface with a water repelling materials, and consolidating the crumbling surfaces.

Removal of dirt:

Stone sculptures often accumulate dust, dirt and stains. Loose dust can easily be brushed off. Pure water with detergent like teepol is used to remove the dirt accretions. Stains of grease, oil, wax or paint can be cleaned with suitable organic solvents like toluene, acetone, benzene, trichloroethylene, triethanolamine etc., or their mixtures. Whenever paints fall on the objects it should be cleaned before drying. Steam cleaning is also done.

Removal of salts:

Salts that have migrated into the stone is to be removed along with efflorescent deposits on the surface without causing further damage. Smaller objects may be immersed in salt free water. A 'poultice' is applied to remove the salts. Porous materials such as cotton wool, paper pulp or sepiolite (hydrated magnesium silicate) are used as poultices.

Removal of biological accretions:

Deposits of moss or algae not only make them to appear patchy, green or black in colour but also produce pits in the surface of the stone, thereby weakening the structure. A 5-10% solution of ammonium hydroxide is used for removing algae. Cotton pads dipped in the solution and kept on the affected area for about 15 minutes, brushing and washing will remove the growth.

Restoration of stone objects:

Restoration is often necessary for reasons of safety of the object and is carried out using modern materials in a manner sympathetic to the existing structure, but not necessarily identical with it.

Doweling can be done in the case of broken objects by broken pieces are joined by means of stainless steel rods and adhesives.

One of the main causes of moisture formation in stone buildings and objects which are directly in touch with the ground is the rise of water from the ground to the body of the object through the capillary pores present in the stone. Hence stone objects should never to displayed by embedding parts of them in the ground or in brick or cement pedestals. Stone sculptures can be placed on brick or cement pedestals only when a moisture barrier, like a plastic sheet, is inserted in the pedestal, just above the ground.

General Care:

Stone materials should never be white-washed, painted. Salt should never be sprinkled. The soot deposits due to burning of lamps etc., should be cleaned by solvents like benzene, spirit, acetone. Oil accretions by touching should also be removed as above.

-V. Jeyaraj, Curator (Cons)

Care of Paintings

Temples are the treasure houses of paintings of all types. The paintings may be murals, miniatures and easel paintings. They are wall paintings, Tanjore panel, glass paintings, painted vahanas, painted carvings, etc. whatever may be the type of paintings they have the support, ground, pigments and protective layers.

The support may be wall stone, wood, glass, palm leaves, paper, cardboard etc.

The ground may be lime, gesso, cement etc. Which, is the smooth surface on which painting is done.

The pigment may be organic or inorganic in nature. Animal glue, vegetable gum in water ground well with pigments/dye was used for painting.

The protective layer may be varnishes of various kinds.

Wall paintings

Paintings are associated with religious activities mostly. Some of the temples in Tamil Nadu are blessed with paintings on walls. Both organic and inorganic pigments were used. A knowledge about their technique of execution, decay and maintenance will help those concerned to preserve them for posterity.

Painting Technique:

The paintings which are executed on wall (ie. muir) are called "Mural Paintings". The wall can be the surface of a cave or building by stone, mortar, mud, brick structure. Over the selected surface a thin layer of painting using vegetable dyes, lamp black or white kaolin might be created as in the early cave paintings. Such primitive paintings are executed by the application of an aqueous solution of the pigment/dye over the selected surface, preferably porous to permit the dye to percolate in. Later on, it was developed such that the solution was either added with animal glue or vegetable gum to give a solution of workable consistency. This glue or gum gave the dye a certain adhesive quality specially required when the wall or plaster was prepared in advance to accept the paint and a binding medium was required to bring about a true bonding. When the painter used the wet plaster to create a painting and used the nature of the lime wash to create a natural colour without an organic binder, the painter is said to have created a true fresco (buono), when he chooses to work on a dry plaster to express his creativity and requires a binding element in his paint to adhere to the plaster, he create a fresco (secco). Belonging to this last group of painting with a binder on a dry plaster are the South Indian paintings and these have been termed the tempera.

Deteriorations and their causes:

Flaking of paint layer, lifting up of the paint layer in the form of cups, blistering, cohesion, scroll formation, fading of paint layers, abrasion, physical damage by mishandling and vandalism are the various deteriorations on the wall paintings.

There are various causes for the deteriorations of wall paintings. There are variations in the humidity and temperature, particulate matter such as dust, soot, smoke, tarry and greasy matter due to burning of lamps, camphor etc., atmospheric pollutants such as oxides of carbon, sulphur and nitrogen, biological growth and droppings of birds and bats, insect nests, seepage of water, salt action, cracks in the building etc.

Disintegration of the binding medium, pigments chemical changes in them, expansion and contraction etc., are the causes within the painted layers.

Cleaning of wall paintings:

The accumulated dust should be brushed off using a soft squirrel hair brush. The accretions, if any, may be removed by gentle abrasion. The salts formed on the painting may be removed by scraping. The patches of white washings should be removed by mechanical means.

The biological growth should be removed mechanically and then gently brushed with brush.

Grease, smoke, soot etc., are removed by using a 10-20% aqueous ammonia or 10-20% butylamine in water. When blistering, cohesion, cupping, cracking are noticed experts should be consulted.

The ceiling should be properly repaired to avoid leakage and seepage.

Care of wall paintings:

Wall paintings should never be disturbed. Birds like pigeons, bats should be avoided. Squirrels, rats should be avoided by proper monitoring means. If possible the painted walls may be screened to avoid long exposure to light. During renovation the conservation experts may be consulted.

If the wall paintings are found detached from stone or brick walls they may be transferred by the experts and preserved for posterity.

Thanjavur paintings

Thanjavur paintings are in the gilded and gemset technique and are sacred icons of the Hindu deities. The 'iconic' style is therefore not an isolated phenomenon but is spread throughout the southern area and was practiced for about 200 years, approximately AD 1700-1900.

Painting technique:

A sheet of card board is pasted with a tamarind seed paste to a jack tree wooden base which is single or joined. One or two cloths are pasted to the card board. A lime paste is coated, which is called 'Sudha' and smoothened. Details are drawn and the position where gem stones are to be set are marked. Sukkan (unboiled limestone with glue) is applied and the surrounding is raised with sukkan. Over the relief areas gold paper is cut into strips and pasted with tamarind seed paste. The gold gilding on Thanjavur painting is of two distinct varieties. Gold gilding is either with pure gold leaf or with gold paper.

Damages in Thanjavur paintings:

Since the Thanjavur paintings are composite in nature the problems are also multiple. Since the wooden planks are joined they give way due to age and cracking is noticed on the paint as well as the textile and card board support. The gold paper is lost due to insect attack. The space between the textile and plank are affected by insects and the card board is badly damaged. Loss of gemstones and cut glasses which are used for ornamentation are noticed. At times it is noticed that the paint applied or white gems are also lost due to abrasion. Loss of pigment is noticed. Wrinkling of the surface due to cleavage of support layers. Water stain and fading of paints noticed.

Treatment of Thanjavur Paintings:

Main support:

The main support of the painting is fine cloth. When there is some loose adhesion tamarind seed paste (white of the seed with gum) is used to fix the *textile with* the accessory support.

Accessory support:

The fine cloth is normally pasted on a card-board which is in turn pasted to jack tree plank, which may be sheer single plank or two planks joined together reinforced by two or three reapers. The planks are set right and the cracks are avoided.

Loss of stones, pigments, gold gilding etc.:

The lost stones are replaced by new stones and fixed in place using tamarind paste. The gold paper strips are cut and pasted wherever there are losses. If there is any loss of pigment the places are infilled with lime paste and matched. The blue background are redone with blue ground with gum. If the gilded areas are found to be dark the areas are cleaned with cotton swabs dipped in rectified spirit.

Frame:

The Thanjavur paintings have a broad and light wooden frame. The bottom frame is some times is broader than the other three sides. The plaster ornaments are repaired if lost. The frames

are cleaned with fine emery and sprayed with a gild prepared out of gold gild powder and resin in thinner. It gives a good look.

Front:

Thanjavur paintings are generally provided with glass fronts or having been given provision for glass front. If there is no glass front a 3 mm glass front is provided leaving a gap between the painted surface and glass.

Backing:

Most of the paintings do not have any backing. The Wooden plank is exposed to humidity and dust. The planks are applied with insecticide, the holes, if any are filled with the insecticide, DDT and wax and coated with varnish to avoid water absorption at the back. The gap between the plank and frame is pasted with a cloth to avoid the entry of dust and insects. If necessary plywood backing may be given.

General care of Thanjavur paintings:

The Thanjavur paintings should be periodically examined for its condition. Application or spray of insecticides may be given at the back. It is better to fumigate the paintings in paradichlorobenzene to drive of any insect trapped inside the paintings.

Glass paintings

Most of the temples have glass paintings in their collections. The technique of glass painting was in vogue in Europe before the 18th century. The glass manufacturing Central European countries produced cheaper variety of glass which was used as the support of the folk art painting. The greater part of these paintings were religious. Glass painting technique seems to have apread all over Europe. Painting on glass, therefore, originated as a decorative art in a new medium. The Thanjavur glass painting is quite southern. The subject matter of Thanjavur glass paintings are both religious and secular.

Technique of painting on glass :

In this type of painting plain glass forms the support. The picture is drawn first with the brush outlines and details in tempera, which will, when finished, appear uppermost. Then the larger areas of opaque colour are brushed in. The paintings are generally flat except for the drapery and the face and body of the figures where a summary fullness is achieved by shading. When gold or silver effects are required gold and silver gilded papers are used. The shading is really a kind of modelling which tries to show the roundness of forms and is not related to cast shadow. Thus the usual painting method is reversed. The picture is then mounted with its unpainted side foremost so that it is seen through the glass.

Damages to glass paintings:

Glass is a fragile material which when falls down is broken into pieces and so the art work is lost. The paint pigments are lost both by insects and abrasion. Water stains are formed. Fading of colours occur. Gold paper, gild paper, pasted are detached due to humidity. Flaking of paint layer is also noticed. Due to alkaline nature glass disease is also noticed on the front side of the glass.

Treatment of paintings on glass:

Unlike other paintings, paintings on glass has the support which acts as the surface protection. When the glass is broken the painting loses its support as well as painting. The loss of pigment is restored by tempera colours. Wherever the gold gilded paper is detached it is pasted again with polyvinyl acetate in toluene. The broken pieces are aligned together on a thin glass plate of equal size in the reverse order and the joints are made with 5% polyvinyl acetate in toluene. The missing portions are replaced with acrylic sheets of same thickness. The details are drawn. When all the broken pieces are joined together and all restorations including retouching are over, another thin glass of same size is kept at the back of the painting. Actually the broken glass painting should be sandwiched by two plain glass sheets. The glass paint-

ing is fixed together at the edges with gummed tape avoiding entry of dust and moisture.

Frame:

Generally all glass paintings have wooden decorated frame. The frames are gilded with gold gild to have a better look when all the gold gilds are abraded are lost by wear and tear. Since the glass itself acts as the front no glass front is needed in the case of glass paintings.

Backing:

The back side of the painting should be protected well. Otherwise they will be eaten by insects. A proper backing either with plywood, wooden plank or aluminium sheet serves the purpose.

Care of Paintings on glass :

Utmost care should be exercised in preserving the paintings on glass. Nothing should hit the glass as the glass itself is the ground and support for the painting. If no backing is found, backing should be provided immediately. The paintings should be suspended or displayed using strong threads and also giving proper support at the bottom. The paintings may be sprayed with insecticides to eradicate the insects.

-V. Jeyaraj, Curator (Cons)

Mishandling, neglect and vandalism

Much wear and tear, as well as accidental damage to temple antiquities can be significantly reduced by the judicious management and basic conservation principles. Many damages to the temple objects are attributed to poor handling lack of training of staff, neglect and vandalism.

Mishandling:

Human factors such as poor handling and lack of training of staff to tackle objects result in serious damages to the objects either in the storage, transportation, or use in temples.

Careless handling of the objects results in soiling, dents, scrapes, abrasions etc.

Damage occurs when objects are dropped, objects tear or break when outside or heavy objects are hand-carried instead of being transported on trollies. Objects break when they are lifted from prints of weakness. Surfaces of objects get damaged when surfaces of objects are dusted or cleaned with coarse or soiled cloths, etc.

Neglect:

Neglect of temple objects results in various problems. Areas where any type of work on art objects is done must firstly be kept absolutely clean. Very often it is noticed that perspiration and grease of hands stain art objects. the natural oils of hands, deposited on objects,

attract dust which is chemically harmful. It is advisable to wear clean cotton gloves when handling objects of art, or to use a clean cloth between hands and the object. Hands should not touch painted surfaces, as in the case of miniatures or manuscripts, photographs or slides and negatives.

Vandalism:

Vandalism is a deliberate act by which damages are made on the temple objects. Acts of true vandalism are fortunately few. The visiting public are generally respectful of the deities etc. The motivation of the deranged individual to damage the objects take place in crowded temples. The defacement of paintings or sculptures with graffiti by pencils, felt pen, etc., particularly on nudes and female figures have moral and behavioral connotations which require study by psychoanalyses. Other instances of willful damage can be attributed to political, religious or racial fanaticism.

In the majority of situations the conservation and security precautions in temples are sufficient to prevent accidental damage, negligence, and to inhibit the less determined vandal. These measures include physical or psychological barriers, such as floor elevations ropes and stanchions. These barriers will deter many worshippers/visitors from approaching too close and touching, marking or accidentally scratching the icons/objects.

However, mischievous visitors will find ways to outwit the guard. Other means of security protection depend on the guard's perception of deviant behaviour in visitors. Close circuit TV scanning of queues of visitors can often pinpoint strange behavioural patterns and the guard on duty can be alerted to be more watchful of the individual spotted. Another method is to pass the visitors through airport style security electronic barriers

and remove potentially harmful devices.

Whether mishandling, neglect or vandalism they can be brought to minimum by the close monitoring of the duties of all the staff and by imparting training to the concerned staff who are preserving the temple cultural and religious objects for posterity.

-V. Jeyaraj, Curator (Cons)

Storage and Maintenance Guidelines

There is a natural tendency to relax conservation vigilance when the temple antiquities are out of sight in storage or in vaults. The basic principle of storage is to keep the object in a physically secure environment and yet to permit ready access for inspection before their removal to temple for worship or other locations.

Storage devices:

There are various storage devices and they are expected to meet the physical and environmental criteria intended for preserving the temple antiquities against damage.

Stacking:

Paintings and flat framed works, prints, photographs etc., may be placed on pads and stacked vertically using cardboards as separators. In group staking it is necessary to ensure that the pads are skid-proof, that the angle of stacking is secure, and that the largest objects are dealt with first. Three dimensional objects like sculptures, large objects should be placed on pallets to permit handling and lifting.

Shelving:

Shelving may be constructed either by wood or preferably by metal for storage of two-dimensional or three-dimensional objects. Vertical slots may be designed for flat items and bays set up for objects. Boxes of different sizes may be made and objects kept wrapped inside. This method will utilise all the spaces available in the shelves.

Drawers and cabinets:

Drawers are used for flat works of paper, cardboard, textiles, maps and similar items, and also, when appropriately designed, for small objects. Interleaves of acid free tissue papers are used.

Vaults:

Vaults and security storage area are used for extremely valuable objects, e.g. gold and silver coins pre-

cious stones or other treasures like silver, gold and diamond jewelleryes.

Conservation guidelines:

1. Storage area should be maintained clean and waste and condemned furnitures should not be stacked in the storage.

2. Regular vacuum cleaning should be done to get rid of dust.

3. If open storage is maintained the objects should be covered by polyethylene sheets or bags.

4. In order to avoid wastage of space in the storage as well as to avoid dust, slotted angle shelves should be arranged with different sized boxes containing objects.

5. The R.H. and temperature should be maintained at the optimum level and it should be monitored regularly.

6. Light sensitive objects should always be kept closed by screen.

7. When scholars are allowed to study the reserve collection pencil only should be allowed to write. Otherwise there is a likelihood of objects being stained by ink.

8. Biocides should be used regularly. Before the advent of monsoon organic objects should be fomicated (thymol) in order to avoid the growth of fungi and fogged with D.D.V.P. to avoid insect attack.

9. Smoking should never be allowed inside the storage as it involves fire risk.

10. Open fire should never be used to avoid fire.

11. When objects are removed from higher shelves ladders should be used.

12. Objects should never be kept near windows.

13. Proper pallets should be placed under heavy objects to order to facilitate lifting.

14. No object should be directly placed on the floor.

-V. Jeyaraj, Curator (Cons)

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