CHAPTER - II

REVIEW OF LITERATURE

Review of literature is a prerequisite to gain an insight into the pertinent area of research. The chapter comprises of theoretical literature and related researches gathered from various secondary sources such as books, magazines, journals, thesis, museums and websites. The libraries visited were The Hansa Mehta, Faculty of Fine Arts, Baroda Museum & Picture Gallery Library, Vadodara; Calico Museum Library, Ahmedabad and National Museum Library, Delhi.

The review of literature related to the present study has been categorized and discussed under the following heads:

2.1 Theoretical Review

2.1.1 Factors assisting the degradation of textiles

2.1.2 Documentation and digitization of textiles

2.1.3 Development of Database for traditional textiles

2.1.4 Preservation and Conservation methods of textiles

2.2 Research Review

2.1.1 Factors Assisting Degradation of Textiles

Textiles are literally a part of the fabric of our everyday lives. From wedding dresses to upholstery, ancient shrouds to a tapestry, church vestment to trade union banners, textiles combine the traditions of art, culture and technology. They form a multidisciplinary subject integrating scientific knowledge with aesthetic sensitivity and practical skills. Many own some form of antique textiles in their home being intentional collectors or not. An upholstered chair, an embroidered sampler, a woven carpet or a clothing item which may have been passed through generations that becomes instilled with an emotional and historical significance. The organic content of textiles and the unavoidable wear and tear upon them determine that the process of disintegration is more or less inevitable. (37)

2.1.1.a Climate (Temperature and Relative Humidity)

Scientific studies revealed that climatic conditions of the place where the textile objects are displayed or stored have a profound effect on them and their method of preservation. All works of art are affected by humidity and temperature, the two most important components of climate.

The climate of a place is resultant of many factors such as sunshine, precipitation, humidity and temperature governed by the altitude, latitude, surroundings, proximity to the sea and to the mountains.

Climate is a general term used to describe conditions in a wider area or region. However, variations of climate occur in a region and therefore a term "microclimate" is used for climatic conditions of a limited area i.e. a city, building or showcase. (4)

Temperature and humidity are interrelated. Air is never free from water vapour and seldom come across absolutely dry air i.e. air with no vapour in it. Air can retain more moisture at high temperature than at low temperature whereas, damp or dry atmospheric condition varies considerably according to the changes in temperature or presence of moisture in the air. In case of museums, it is not the presence of moisture in the air that matters as much as the atmospheric conditions but, the extent to which moisture is absorbed or released by the exhibits in such conditions.

It is the relative humidity which affects art objects rather than absolute humidity. A 1°F rise in temperature corresponds to neatly two per cent decrease in RH which shows that RH has a direct relationship with temperature and owing to this relationship we find that a sudden change in temperature brings about a change in RH simultaneously. Observations also revealed that RH factor had greater influence on the process of decay than temperature and sudden changes in RH were followed by marked deterioration. Humidity has been found responsible not only for chemical deterioration but, also for mechanical and biological reactions. (27)

Think of a textile artifact like a "skin", says Beth (2008), senior textile conservator at the Midwest Art Conservation Center. Textiles are sensitive to ***ambient conditions*** either heat, cold, humidity and fluctuations. Most textile items are "mixed media" there are different fibers and components all affected in various ways by temperature and humidity. (29)

Textile fibers are susceptible to changes in the temperature and humidity around. They have a capacity for retaining a certain level of moisture. A high relative humidity causes textile fibres to swell into absorbed water; a low relative humidity will cause the fibres to give off moisture and shrink. Fast changes in the relative humidity cause rapid shrinking and swelling in the materials, resulting in damage to the fibres. (28)

Frequent changes in the temperature and humidity can also be detrimental to a textile because as fibres contract and respond in response to altering conditions, abrasion will occur. This is particularly damaging if sharp dust and dirt particles are present causing over a period of time cuts through moving fibres. In addition, high temperatures and high relative humidity levels may initiate dye bleeding, yellowing, browning or biological deterioration (mould and mildew growth). Similarly, low humidity can cause embrittlement and desiccation. (70)

2.1.1.b Light

Light, natural and artificial pose a threat to certain categories of art works. All objects of organic material such as textiles, paper, natural historical specimens, paintings etc. are liable to be affected by it. In tropical countries where the sun is bright almost throughout the year, the damage from light can be serious. Both natural and artificial light can fade colour and contribute to the degradation and permanent damage of many textile fibres. The rate at which damage occurs is determined by the level of illumination and duration of exposure. (4,33)

There are mainly three sources of light i.e. sunlight, fluorescent tubes and incandescent bulbs. Irrespective of the source of light either natural or artificial, the rays it emits generally contain visible radiations to which the human eye is insensitive. (4)

According to laws of electro-magnetism proportional to the wavelength higher energy is produced at shorter wavelengths. It has been observed that at wavelengths shorter than 500 nanometers, energy is sufficient to damage many of the organic compounds found in textiles, papers, leathers and similar materials. Ultra-violet radiations of less than 300 nm are seldom found in normal light because such radiations are readily absorbed by the earth's atmosphere in case of sunlight and by the glass envelopes of lamps in case of artificial light. It is therefore, apparent that light in the wavelength range of 300-500 nm is mainly responsible for photo chemical degradation. This photo chemically active region of light covers the near ultraviolet (300-400 nm) and the violet and blue (400-500 nm) portions of the spectrum. It is found that sunlight, direct or indirect, from a clear or cloudy sky, is energy. Incandescent lamps also known as tungsten lamps do not contain much ultraviolet and blue light and it was found that they are the safest source of light. Yet they generate heat that sometimes causes problems in museum. (3,4)

All conservators will mention light as a major threat to textile objects. As stated by Vuori (2008), "In comparison to other materials present in museum collections such as metals, glass and ceramics, textiles and specifically colored textiles are amongst the most sensitive to light."

Light damage depends on the intensity of the light, the amount of ultraviolet radiation and the length of light exposure. "There is no level of light at which fading ceases to occurs," says Patricia (2008) of University of Nebraska. Ordonez (2008) of the University of Rhode Island also points out that "When fading is observed, what we see is the damage to the dyes. What is not seen but occurs is the oxidation process damaging the textile fibers." (29)

Unfortunately nothing can be done about the colour that fades away once, it is lost forever, says Vuori (2004). Initial fading occurs most rapidly. An aged textile that has already faded is not going to continue fading at the same rate. (28)

However, a balance must be maintained between the public's desire to see and enjoy the textile and meet the demands of preservation. Museums and historic dwellings require light for public accessibility. Light is one of the most degrading environmental influences hence an immediate conflict arises due to the opposing goals of maximizing public display while minimizing damage from lighting. (10)

2.1.1.c Insects

Textiles are generally made up of organic fibrous materials like cotton, linen, wool, silk etc. Though the fibre is the chief component of a textile, additive materials like dyes, starches, water repellents etc. also make up for the composition of fabrics. Several physical, chemical, biological agents that cause damage to textiles are mainly responsible for the deterioration of textiles. The biological agents causing damage to textiles are mainly insects and microorganisms. (5)

Of all the destructive agents, ravages caused by insects are amongst the greatest. The insect menace is greater in tropical climate than in temperate zone because high temperature and humidity favour insects' growth. Destruction of organic materials in museums by insects is not a problem of recent origin. The history of the ravages of cultural properties by biological agents is rooted in the remote past. Aristotle, Horace, Ovid and other classical writers make mention of the irreparable damage caused to books, documents and textiles. In fact, insects have surpassed fire and water in the destruction of cultural properties. This is one of the reasons why not many organic antiquities have survived. Insect ravages in warm and humid countries are much worse than in temperate zones. (3,27)

Fortunately, only certain species of insects constitute the worst enemies of museums. Major pests of textiles are the organisms that feed directly on the materials and secondary substances still, may damage because they thrive on secondary substances present. (5)

A variety of pests (insects) can cause structural damage to textiles. In general, insects are placed in the class Insecta or Hexapoda under the phylum Arthropoda. Their sizes vary from macro to microscopic and some of the most important types in the tropics are sliver fish, cloth moths, carpet beetles, termites and cockroaches. (3)

Silver Fish are normally white or grey in colour with flat scales over the body giving them a greasy feel and shiny appearance. They generally live in dark places where the humidity is greater than 55 per cent and temperature varies between 60°F to 80°F. Silver fish generally feeds on starchy materials such as glue and fabric sizing, starchy and sugary matter. Silver fish leave irregular holes by eating the surface material of the objects with a shaving off of the surface fibres. (27,75)

Cloth moths are well known as pests of stored woolens but they also attack wide range of other fibres including hair, fur, silk and feathers. Serious infestations of cloth moths can develop undetected in home causing significant damage to clothing, bedding, floor covering and other articles. (43)

They prefer dark, undisturbed areas such as closets, basements and attics and tend to live in corners or in folds of the fabric. The actual damage is done by the larvae which after coming out of the eggs, eat voraciously substances of many types especially protienacious materials, for instance woolen textiles, feathers and fur. Damage to the articles consists of irregular surface feeding or holes eaten completely through the fabric. (3,43)

Carpet Beetles can do extensive damage as it feeds without preference on wool, fur and silk. It leaves clean neat holes in the textiles with a fine powder of the same colour of the object. (75)

Cockroaches are very common in all tropical countries. They live in darks warm, humid places and cause damage to paper, book binding and textiles. They spoil materials by excrements which actually leave stains in presence of moisture. (27)

Termites feed fabrics of plant origin. They devour rapidly and silently everything composed of cellulose, digging out intricate communication trench and in some cases causing almost total destruction of the material attached, leaving intact an external thin cover which hides the devastation underneath. Another essential requisite for termite invasion is the presence of moisture, which assists in their proliferation. (4,27)

2.1.1.d Microorganism

In tropical countries with humid climate, damage to cultural property especially textiles caused by various types of microorganisms is a great danger. The inherent properties of the textile fibres provide room for the growth of microorganisms. Besides, the structure of the substrates, the chemical processes also induces the growth of microbes. Infestation by microbes cause cross infection by pathogens and development of odour on the textiles. In addition, the staining and loss of the performance properties of textile substrate are the results of microbial attack. (4,24)

Textiles made from natural fibres are generally more susceptible to bio deterioration than the synthetic man-made fibres. Products such as starch, protein derivatives, fats and oils used in the finishing of textiles promote microbial growth.

The microorganism may attack the entire substrate i.e. the textile fibres or they may attack only one component of the substrate such as plasticizers contained therein or grow on dirt that has accumulated on the surface of a product. Nevertheless even mild surface growth can make a fabric look unattractive by the appearance of unwanted pigmentation. Heavy infestation that results in rotting and breakdown of the fibres with subsequent physical changes such as loss of strength or flexibility that may cause the fabric to fail in service. The material is attacked chemically by the action of extra cellular enzymes produced by the microorganism for the purpose of food. (11)

Microbes are the tiniest creatures not seen by the naked eye. They include a variety of microorganisms such as bacteria, fungi, algae, moulds and mildews. (20)

Moulds and mildews spore growths that break down the cellulose found in cotton, linen and rayon for nutrition. They cause a stain, if left on a textile for long cannot be easily removed. They appear as irregular shapes of gray, black or green spots on fabric and even discolor a fabric and emit musty odour. Animal fibres are more resistant to mildew growth than plant fibres. Pure silk is less susceptible if completely degummed. Wool decays slowly but the chemical and mechanical damage during processing can increase its susceptibility to deterioration. (75,11)

Fungi bear microscopic spores that are produced in enormous quantities always present in air. They are unable to photosynthesize their own food and hence damage the material on which they grow. Usually, they are aerobic but some species are anaerobic, requiring no air for the growth. They degrade and cause stains on the textiles. (39)

Bacteria are unicellular organisms which grow very rapidly under warmth and moisture.

Algae are also typical microorganisms which are either fungal or bacterial. They require continuous sources of water and sunlight to grow and develop darker stains on the fabrics. Algae greening also occur on fabrics which remain wet for long periods. (11)

2.1.1.e Dust, Soil and other contaminants

Textiles are at risk from dust, dirt and airborne pollutants, such as sulphur di oxide in the air emitted from automobiles and industry.

Dust is more than simply cosmetic problem for clothing. It is easily absorbed by textiles because dirt is acidic and attracts moisture; hence there is an increased chemical activity. Some dust particles are large enough to cut the fibres. Dust particles act like small knives, cutting into the fibres as the textiles expand and contract in response to changes in relative humidity. (60)

According to Ewer (2004), a textile or costume object that is soiled or stained has a greater attraction as a food source for insects, rodents and mould. (28)

2.1.1.f Display, Storage and Handling

Most textiles at some time in their history have served as functional objects. This history of use along with environmental and handling factors can affect a textile's condition resulting in the need for special care to ensure its' long term preservation. Making careful and informed decisions regarding the handling, display and storage of a textile can make the difference between a short life span and a textile's preservation for future generations.

Textiles are best preserved when displayed and stored in clean, well ventilated areas that are routinely and adequately maintained controlling dust, clutter and other accumulations of extraneous material that will greatly reduce the possibility of damage caused by insects, rodents and microorganisms such as moulds and fungi. (33)

2.1.2 Documentation and digitization of textiles

2.1.2.1 Documentation of textiles

Art & Architecture Thesaurus Online defines documentation as a process of gathering and recording information, especially to establish or provide evidence of facts or testimony. (53)

An AIC definition of conservation terminology defines documentation as the recording in a permanent format of information derived from conservation activities. (46)

Documentation - "The conservation profession has an obligation to produce and maintain accurate, complete and permanent records of examination, sampling, scientific investigation and treatment. The records should be both written and pictorial. The kind and extent of documentation may vary according to the circumstances, the nature of the object, or whether an individual object or a collection that is to be documented." (35)

According to Workgroup at Getty Conservation Institute (2003), a collection of data and the assembly, analysis and interpretation of recorded data is referred to as documentation. (55)

According to Getty Conservation Institute, 2008, "Documentation refers to the already existing stock of information. As an activity, it stands for the systematic collection and archiving of records in order to preserve them for future reference. It can be said: today's recording is tomorrow's documentation." (55)

Documentation of historic textiles and costume can reduce the amount of handling and exhibition necessary for communicating the historical, cultural and technical aspects to scholars and the public. Photography, pattern-making, drawings and written descriptions are all good methods of documentation. Photography is often done by professionals with varying degrees of experience in museum work; it is imperative that costume curators and conservators be able to communicate the proper procedures and the desired end result. Historic costume should rather be well photographed once than be subjected to repeated sessions of handling and lighting. (47)

The type and extent of documentation depends on several factors.

- Purpose or reason for examination
- Overall condition of the piece
- Resources designated to the project
- Extent of previous documentation

There are several formats followed for documentation of textiles depending on the type and extent of information sought. They are as follows:

1. Checklist

Form with blanks for information and descriptors with boxes to check for condition and treatment. They are good for large surveys or mass treatment as well as useful to the custodian to evaluate needs or proposal for future conservator depending on how the checklist is developed.

2. Outline

Sentences or phrase description for each heading; allows for more detailed description than the checklist format.

3. Narrative

Paragraph or essay format for the entire report with headings necessary to locate specific information.

4. Combination

It integrates checklist and phrase descriptions.

The types of documentation include the following:

1. Examination/condition report
2. Treatment plan or proposal
3. Post-treatment Report
4. Photographic documentation
5. Storage and Exhibition Records

1. Examination/condition report

According to American Institute for Conservation of Historic and Artistic works, condition report is made to assess the condition of a textile at a given moment. The report should include a description of the textile, construction details and descriptions of the types and causes of damage (from age and original use), areas of loss and discoloration, changes or repairs it has sustained. It may be done as part of the acquisition process, as a precursor to a treatment proposal or prior to and following the exhibition. Standard sections for this report include:

A. Title or identifying description of an object, accession or job number, date (if known) and storage location.

B. Owner of object (or contact person) including address and phone number.

C. Description of the textile. The amount of detail may vary as per the artifact and requirement of the concerned person.

D. Name of examiner and date.

E. Historical documentation as it relates to conservation treatment.

F. History of piece, how it has been used and how it will be used. If privately owned, future use may affect the treatment.

G. Dimensions - Overall measurements given in inches and centimeters

H. Testing methods and material identification of components - Visual examination under various light sources.

I. Description of condition including extent and cause of damage.

- Losses, abrasions, tears, holes
- Usage, prior handling, storage or display conditions that may have affected the current state of the object, current mounting technique
- Previous repairs, alterations and conservation.

J. Visual aids to describe the condition and damage.

- Sketches and diagrams.
- Photographs.
- Color coded photocopies of photographs locating damage.
- Radiographs.
- Tracings of photo or overlay of textile.
- Digitalized annotated computer images. (48)

The condition of an object is an assessment or evaluation of whether or not the object has suffered damage. A condition report is a record of that state in which the object was found. Traditionally, information was recorded by filling in a condition card accompanied by photographs, but it can also be gathered by a variety of means including a tape recorder, video recorder or digital camera linked to a computer. Information gathered should be documented methodically; physical, chemical and biological damage should be noted and where possible the source of the problem identified. The nature and extent of the damage can determine the future role of that object.

The example of a condition report provided here is general to most objects and is fairly self-explanatory. Although quite detailed, it shows the approach most likely to taken up. Finally, apart from recording the current condition, an object may be given an overall condition rating in terms of priority of attention.

CONDITION REPORT

- Object
- Cat. No.
- Date of Object
- Location
- Artist/Manufacturer
- Dimension
- Labels, Identifying Marks
- Materials/Media
- Present storage system
- Damage description that includes:

Physical damage

Physical damage is caused by mechanical stress incurred by mishandling, inadequate storage support and unsuitable environmental conditions.

Major structural damage: (*e.g.,* parts detached, broken. Tears, fractures, pieces missing, holes)

Suggest cause \ source:

Minor structural damage: (*e.g.,* small tears, holes, creases, folds, loose parts, *etc.*)

Suggest cause \ source:

Surface damage: (cupping, flaking, abraded \ scratched surfaces, veneer lifting, delamination, cracked glazes)

Suggest cause/source:

Chemical damage

Chemical damage may arise as a result of intrinsic qualities within the objects, which are unstable and inherently harmful. (corrosion of metals, acidity in paper/ textiles, corrosion of inks, encrustation, tarnishing of metals and crizzling of glass)

Suggest cause/source: (internal or contaminant)

Biological damage

Biological damage is caused by microbial activity. These micro-organisms include fungi, such as moulds and mildew and insect life.

Suggest cause/source:

- Previous Repairs: (If made)
- Condition rating: (good, fair, poor, or do not handle)
- Treatment priority: (urgent, high, medium, low)
- Further comment or recommendations. (8)

Standardization of Terminology

Words used to designate condition rating and treatment priority may have different meanings to different people within textile conservation, as well as conservators in other specialties.

The use of subjective terms such as excellent, good, fair and poor and abbreviations are helpful in comparing condition among a group of objects, but they are open to interpretation. Providing a list with guidelines for what constitutes "good", "fair" or "poor" condition would be useful to the reader for truly understanding the condition of the object. (48)

National Park Service Museum Handbook Part I (1999) has stated the following condition rating codes.

Excellent: EX

No damage or deterioration. No treatment needed; no change will occur with good preventive conservation practices in place.

Good: GD

Minor damage and no active deterioration. No change will occur with good preventive conservation practices. Minor cosmetic treatment may be needed before exhibit (for example, many historic objects that have been used).

Fair: FR

Some damage or slow but active deterioration. Treatment may be needed to stabilize or before object is displayed (for example, a decorative ceramic object with losses to the rim or slowly rusting iron objects).

Poor: PR

Significant damage or active deterioration. Treatment is needed to prevent additional damage or deterioration (for example, a table with one leg missing, making it structurally unstable or an archaeological copper alloy object with "bronze disease).

The following descriptions are for the object in hand regardless of whether it is complete, incomplete or fragmentary. Note that an object can be incomplete, yet still be in excellent or good condition. (67)

The condition rating and treatment priority codes as mentioned by Corr (1999) in the manual of preventive conservation entitled, "Caring for collections" are as follows:

Condition Rating Code:

Good: Object is stable, can be handled and exhibited with care.

Fair: Object may be damaged and is vulnerable to further damage, must be handled with caution and may need remedial attention.

Poor: Object is seriously compromised. Do not handle; object is extremely fragile and vulnerable.

Treatment Priority Code

Urgent: Requires immediate conservation treatment or removal from present conditions.

High: Object is actively deteriorating.

Medium: May be damaged but is not actively deteriorating. Will need remedial treatment.

Low: Proper storage and care will ensure preservation. (8)

Due to discrepancy in the meanings of certain terms, the conservator should also be specific and explanatory when using such terms as lining, backing, consolidating, etc. So, a glossary of accepted terminology of textile related terms is a must. (48)

2.1.2.2 Digitization of textiles

Digitization describes the process of transferring analogue data to digital data. It is the procedure of capturing a digital reproduction of an object so that it can be made available through a variety of media. (61)

Digitization is the process of converting information into a digital format. Digitizing information makes it easier to preserve, access and share. For eg. an original historical document may only be accessible to people who visit its physical location but if the document content is digitized, it can be made available to people worldwide. (76)

One of the main virtues of digital imaging is its ability to make collections more accessible. Nowadays this process is much simpler if the collection has been digitised and recorded onto a CD-ROM, placed on a web page or in a database. Collections that were once too remote to be viewed are now accessible; objects that were once too fragile to be handled or exhibited can now be seen by broad audiences. Digitisation enhances preservation and conservation strategies, since once digitisation has occurred, the handling of fragile originals can be minimised.

Digitisation projects yield substantial benefits in various fields.

Research

1. Research by curators, students, teachers, scholars and specialists will be made easier and more effective as disparate images can be studied in new contexts.

2. Widespread dissemination of images of local or unique collections will encourage scholarly use of resources.

3. Exploration of other collection materials related to those on exhibit will increase and information about the museum and its significant collections will be enhanced.

4. International museum professionals and researchers may find digital images useful in investigating links, similarities and contrasts with works at other institutions.

Preservation

1. The handling of originals will be minimised.

2. For two-dimensional objects, the digital image will provide a backup copy of the original.

3. The capture of high-quality images will improve the legibility of faded or stained documents.

4. Conservation of material is emphasised and enhanced.(52)

2.1.3 Development of Database for traditional textiles

A database is a collection of information organized such that it can easily be accessed, managed and updated. The databases can be classified according to types of content such as bibliographic, full-text, numeric and images. (72)

According to Encyclopedia Britannica, "A database is also called electronic database that contains any collection of data or information which is specially organized for rapid search and retrieval by a computer. Databases are structured to facilitate the storage, retrieval, modification and deletion of data in conjunction with various data-processing operations." (42)

As defined in Wikipedia, "A database is an organized collection of data for one or more purposes usually in digital form. The data are typically organized to model relevant aspects of reality in a way that supports processes requiring the information. The term "database" refers both to the way its users view it and to the logical and physical materialization of its data, content in files, computer memory and computer data storage. This definition is very general and is independent of the technology used." (54)

A collection of various types of data including photographic images, sketches, measurements, condition assessments and other pieces of information stored in a systematic way for security and easy retrieval. Individual records or data are separated into sets, themes and fields with unique identifiers to allow data to be linked together and queried. Databases can connect separate "pieces" of information together allowing new information to be derived as stated by Ogleby (2009) in "Ancestral Art." (58)

Some databases of traditional textiles have been collected from various museum sites to form a base and have a deeper understanding for developing researcher's own database of the documented rare textile artifacts. They are as follows:

Objects: Kashmir Shawls

Shawl
19th century

298.5 x 134.5 cm (117 1/2 x 52 15/16 in.)
Border designs width - Sides 19 cm Ends 60cm

Manufactured in: silk, wool

This shawl has a twill woven cream ground with a large patterned border at each end consisting of large pine cone "buta" motifs. A narrow patterned border of smaller pine cone motifs runs along all four edges of the cream centre. A differently patterned narrow border runs down each outer side edge. The patterning is colored red, green, blue yellow and black. It is self fringed.

Inv. No. 254

Plate 2.1: Database of University of Leeds International Textiles Archive

Source: http://ulita.leeds.ac.uk/wiki/mediawiki-1.10.1/index.php/Education

Grandmother's flower garden quilt (1861-1899)

Item Name	quilt
Category	Bedding
Date Made	1861-1899
Culture	Canadian
Maker / Manufacturer	Robertson, Green Ross, Mary (artist/maker)
Place of Origin	North America: Canada
Material	cotton, silk
Technique	woven, plain, crepe, woven, satin
Description	Patchwork quilt; hexagonal "Grandmother's flower garden" pattern; consisting of 1305 small silk multi-coloured hexgonal patches forming 6-petaled flowers; black satin backing; border of black silk crepe; cotton batting.
Gender	not applicable
Accession #	1980.4.1

Plate 2.2: Database of University of Alberta Museums

Source: http://www.museums.ualberta.ca/dig/search/cltx/browse.php

Larger Image | Add to Lightbox

Core Record

Collection	Constance Howard Resource and Research Centre in Textiles: Material Collection
Object Name	hat
Date	mid 20th century
Brief Physical Description	Small pill-box style hat covered in silver couched thread embroidery. Select this link for more description information.
Id Number Current Accession	1293
Location Creation Site	Possibly Patahn
Subject	dress, dress accessories, embroidery, children's wear
Measurements	160mm (diameter)
Number Of Items	1
Materials Used (aat)	metal, cotton
Rights	Goldsmiths College, University of London. Constance Howard Resource and Research Centre in Textiles.

Object Description Information A small pillbox style hat covered entirely in padded couched silver thread. The couching stitches are pink and have been positioned to form padded diamond shaped patterns, a double row around the brim of the hat and four larger diamonds on the crown. The embroiderer has used the tension caused by the couched diamond shapes to indent the top of the hat giving a rich and varied surface and allowing maximum light play on the metallic thread. Spots of pink, blue, green and black link diamond shapes together and the change from metallic thread to soft cotton thread allows the stiff diamond patterns to undulate.

Plate 2.3: Database of Constance Howard Resource and Research Centre in Textiles

Source: http://vads.ahds.ac.uk/collections/CHM.html

Sari fragment

Object Name:	Sari fragment
Local Name:	*Sari*
Place Made:	Asia: South Asia, India, Western India, Gujarat
Period:	Early 20th century
Date:	1900 - 1930
Dimensions:	52 cm x 117 cm
Materials:	Silk
Techniques:	Ikat
ID Number:	T91.0481
Credit:	Gift of Dr. Marjory Wybourn

Plate 2.4: Database of Textile Museum of Canada

Source: http://www.textilemuseum.ca/collection/

Name:	brooch
Maker Role:	jeweller
Maker:	unknown
Made:	[New Zealand], Circa 1870-Circa 1890
Media:	huia beak, 15 carat gold
Object Category:	miscellaneous
Measurements:	length 90 mm
Credit:	gift of Edith Lawes, 1986, collection of Auckland Museum, Tamaki Paenga Hira, 1989.208, M2540
Information:	William Mason studied painting and textile design at London's Goldsmith College and the Central School of Arts and Crafts. In 1961 he won both first and second prizes at a Festival of Wellington wallpaper design competition. With the prize money, Mason and his wife Maureen set up Mason Handprints in their Plimmerton garage and began printing furnishing fabrics. They produced textiles from 1961 and wallpapers from 1965.
Gallery Section:	The Elegancies of Fashion

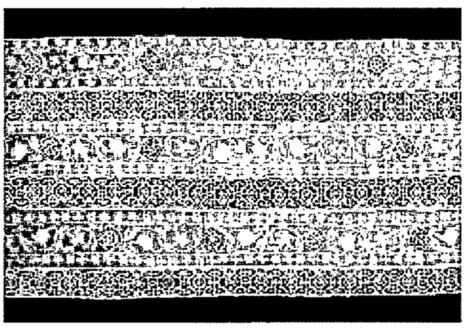
Plate 2.5: Database of Auckland Museum Collections

Source: http://muse.aucklandmuseum.com/databases/general/basicsearch.aspx

Long band, part of embroidered cover

Long band, part of embroidered cover. Bobbin lace and embroidered linen with needle lace insertions. Size: 183 x 44 cm.

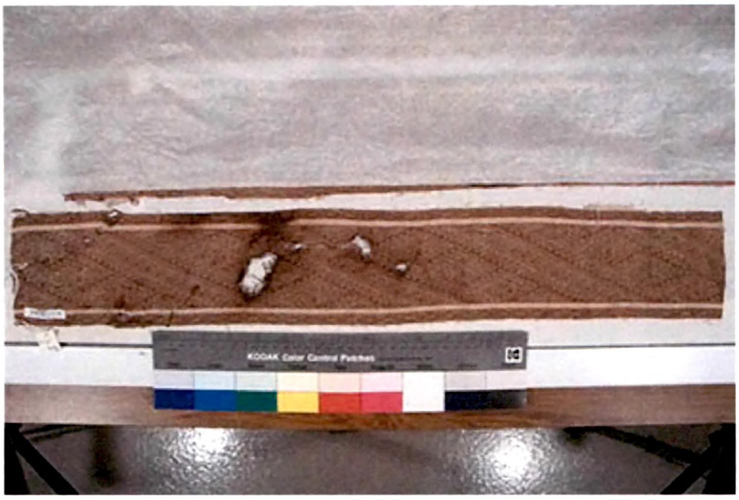
Origin:	Italy
Place:	Genoa
Object Type:	lace
Actual Date:	c.1620
Century:	17th century
Materials:	Lace, Linen
Museum Accession Number:	1986.24.13/Lace



click to enlarge

Plate 2.6: Database of The Bowes Museum

Source: http://www.bowesmuseum.org.uk/collections



TEXTILE FRAGMENT

SOUTH AMERICAN ARCHAEOLOGICAL COLLECTION

Catalog No: 41.2/ 7326 D

Culture: CHANCAY

Locale: COQUI, CHANCAY VALLEY

Country: PERU

Material: CLOTH (COTTON)

Dimensions: L: 67 W: 11 [in CM]

Technique: DOUBLE FACED COMPLEMENTARY WARP PATTERNING

Subject: SCROLLS; INTERLOCKED SNAKES; DIAMONDS

Period: LIP 1000-1476

Accession No: 1972-42

Donor:

Plate 2.7: Database of American Museum of Natural History

Source: http://anthro.amnh.org/anthropology/databases/jesup/textile_object.htm

+Enlarge Zoom

Robe, Emperor's 12-Symbol, 18th century; Qing dynasty (1644–1911) Chinese

Silk and metallic thread on silk; 56 5/8 x 63 1/2 in. (143.8 x 161.3 cm)

Gift of Lewis Einstein, 1954 (54.14.2)

Description

Description Official costume in imperial China was highly regulated, and the decorative motifs of court costumes were specific to rank. Among the emblems employed for the emperor's ceremonial robes were the twelve imperial symbols, as seen on this example: sun, moon, constellation, mountain, pair of dragons, bird, cups, water weed, millet, fire, ax, and the symmetrical "fu" symbol. A bright yellow was reserved for the emperor, but for occasions such as ceremonies performed at the Altar of Heaven, the requisite color was blue. The garment worn for the actual rituals was the more formal court robe ("chao pao"). The dragon robe ("qi fu") was used for the periods of fasting that preceded the ceremony.

Except for a few details in black, white, and pale blue silk, this robe is embroidered in very fine gold and silver threads, which are laid in pairs and couched. Besides the imperial symbols, the dragon robe required additional motifs: nine large dragons rendered full face or in profile; and clouds, waves, and mountains symmetrically arranged to represent an orderly universe. This example is further embellished with auspicious "wan" and "shou" medallions, Buddhist and Daoist symbols, and bats.

Plate 2.8: Database of The Metropolitan Museum of Art

Source: http://www.metmuseum.org/works_of_art/collection_database/antonio_ratti

2.1.4 Preservation and conservation methods of textiles

Conservation is defined as the profession devoted to the preservation of cultural property for the future. The activities include examination, documentation, treatment and preventive care, supported by research and education. (8)

Canadian Association for Conservation of Cultural Property refers that the purpose of conservation is to study, record, retain and restore the culturally significant qualities of the cultural property as embodied in its physical and chemical nature, with the least possible intervention. Conservation includes the following: examination, documentation, preventive conservation, treatment, restoration and reconstruction. (69)

International Council of Museums - Committee for Conservation (2008) defines conservation as all measures and actions aimed at safeguarding tangible cultural heritage while ensuring its accessibility to present and future generations. Conservation embraces preventive conservation, remedial conservation and restoration. All measures and actions should respect the significance and the physical properties of the cultural heritage item. (58)

Preventive conservation is an applied form of conservation that seeks to delay the natural or accidental degradation of cultural objects through proactive measures that address safe conditions for management, storage, use, transportation or exhibition of collections. (65)

Preventive conservation (Preservation) - All measures and actions aimed at avoiding and minimizing future deterioration or loss. They are carried out within the context or on the surroundings of an item. These measures and actions are indirect as they do not interfere with the materials and structures of the items. They do not modify their appearance.

All actions directly applied to an item or a group of items aimed at arresting current damaging processes or reinforcing their structure. These actions are only carried out when the items are in such a fragile condition or deteriorating at such a rate, that they could be lost in a relatively short time. These actions sometimes modify the appearance of the items referred as Curative conservation. (58)

The importance of preventive conservation is growing in virtually every region of the globe. Defined as the management of the environmental conditions under which collections are housed and used, preventive conservation has advanced in both research and application. The last few years have been a period of progress. Managing the environment now applies to all potential risks to collections, be they ubiquitous environmental parameters like relative humidity or temperature; phenomena that are periodic and rare (such as natural disasters); or simply access, handling and use by collection staff. (12)

2.1.4.a Climate

In India, climatic conditions vary so much that unless sufficient precautionary measures are taken in time against sudden changes of temperature and RH, there is every possibility of damage being caused to the museum materials. An ideal climate is one in which sudden fluctuations of RH and temperature do not occur and where the two factors are present within reasonable limits affording protection to exhibits and comfort to visitors. Considerable study has been done on the subject and as a result it is recommended that the relative humidity in museum, libraries or in private collections should range between 45 to 60 per cent and the temperature between 68°F to 78°F (20°C to 24°C). (27)

Climate can be best controlled through air conditioning. Norms for air conditioning should be chosen keeping in view the conditions outside the museum or the library. In humid climate a higher figure of relative humidity can be chosen for control at 55 per cent or more but always below 65 per cent. For dry climate a lower limit about 45 per cent can be tolerated. Similarly, for hot countries the temperatures should be maintained at the higher limit of 24°C and in cool climate the temperature can be kept at 20°C. (4)

The whole problem of temperature and humidity can be solved satisfactorily by air conditioning but, this is rather a costly proposition because the place will also require dust extractors. Hence, local control can be thought of for individual showcases or cupboards to produce a favorable microclimate. Small humidifiers enclosed in the bottom part of the showcase not visible from outside can be used successfully. Silica Gel placed inside the sealed showcase or cupboard can normalize the relative humidity. The chemical has the property of absorbing moisture from wet air and giving it off in dry air. For an enclosed space of one cubic metre about 500 gms of silica gel are desired. (4,27)

Quick lime lumps can also be used for dehumidification. A simple means of regulating humidity is also the use of sufficient quantity of cotton hidden from view inside sealed cases. As cotton is hydroscopic in nature therefore it absorbs moisture when conditions are wet and gives off moisture in dry conditions. (27)

Variations in relative humidity can be controlled by suitable adjustments of the ventilation system during summer and monsoon seasons. The use of ceiling and exhaust fans will assist in removing excess moisture and also expel stagnant air from such places. Humidity in small rooms can be increased by the introduction of potted plants, water humidifies, khus curtains or screens made of wood clippings or vegetable fibers kept moist to prevent evaporation. (4)

Better results can be obtained if windows are kept closed during the hot and monsoon weather. The movement of hot and wet air that intensifies during the dry and rainy season can be prevented from entering the storage area by closing the windows.

2.1.3.b Light

All light, irrespective of the source, natural or artificial is radiant energy and causes permanent and irreversible damage. Control of light in museums or in areas where vulnerable objects are to be stored or exhibited must take three forms.

1. Minimize the intensity of light falling upon the object.
2. Expose objects to the light for a minimum period of time.
3. Eliminate the photo-chemically active radiations from the light. (4)

It has been scientifically established that the most often recommended light level for displaying textiles is 50 lux. Most people are more used to viewing objects under 300 lux light levels. But the minimum intensity of light needed for visibility and good colour retention is about 15 lux. Hence, a level of 50 lux is therefore not too, low. The levels of light, recommended above are rather low and may seem inadequate to visitors but too low a level of interior illumination is particularly noticeable in tropics .This is because the levels of outdoor light are high and therefore, the eye, once it is accustomed to a high level of illumination finds it difficult to adjust to lower levels. (3)

In order to minimize the other destructive effects of light, it is advisable to expose highly susceptible materials to view for as short a period of time as possible, especially sensitive objects should not be kept on exhibition for a long time. After a brief display open to the viewers, the fragile textiles may be returned to storage or else curtains be drawn on showcases. Such objects to be displayed only when a visitor wants to view them. Switches which turn off automatically after a brief period of time operated by visitors can also be used.

The third aspect of light control for better preservation of objects is the elimination of invisible but photo chemically active radiations using the ultra violet absorbing chemicals. These chemicals are added to acrylic sheets of films which are then put in front of or over light sources such as windows and tubes of lamps. Ultraviolet absorbing plastic sheets which can be slipped over fluorescent light tubes are also manufactured. Ultra violet observing varnishes can also be coated on glass panels to filter out ultraviolet rays. However, varnishes are less efficacious than sheets and are competively expensive than films with increased durability. (4)

Ensure that protective devices are kept continually in good order for efficient functioning, it is advisable to monitor at intervals the illumination and the ultraviolet radiations present in galleries and cases. Even the ultra-violet absorbing plastic filters deteriorate with time and lose their efficiency. (3)

Excessive light, often used for photographing art objects can be very dangerous and should never be allowed. It has been found that the electronic flash is safer than tungsten lamps for photographing art objects because the duration of exposure is very small.

2.1.4.c Insects

The treatment of museum objects against bio-deterioration follows two general causes of action: preventive measures aimed at averting the possibilities of destruction and control measures required to be undertaken if the infestation has already set in. (5)

The design of the building where the art objects are kept and the material used for construction of the building play an important role in prevention of insect attack. As far as possible insect proof materials like steel should be used for structures. All timber should be properly treated to make it insect proof, especially against termite attack. As high humidity promotes reproductive activity of insects, air conditioning and climate control is advisable but in poor developing countries air conditioning being very costly, other means of protection against insects will have to be employed. (4)

Prevention of insect attack by chemicals is one such method. Many chemicals, referred to as "insecticides", kill insects, while others which don't kill but repel them are known as repellants. A large number of insecticides can be used for general purposes, but preservation of colour, durability of object, non-toxicity to human being and ease of application are important considerations limiting the choice. (4,27)

Man's battle against insect pests is not a battle of today. He has been fighting on this front since the dawn of history. In India aromatic plants and their leaves were used as insect repellants since ancient times. Those known to them were *Gorbach or Shadgranth* (Acorus Calamus Linn; Family: Araceae) *Ashvogandha or Asana* (Withania Somnifer a Dun; Family: Solanacea), tobacco leaves etc.

"*Gorbach*" is well known as an effective insect repellent and in the Konkan district of Maharashtra it is known as "*Pandru*". It contains an aromatic volatile oil and a bitter substance known as "acorin", together they constitute a powerful pesticide. An attack by the white ants was often checked by use of powered "*Gorbach*". It was a common practice to keep *Gorbach* and *Ashvagandha* in our ancient repositions and libraries to protect books and manuscripts from damage by insect pests. The exudation of the Indian Franchincese tree known as "*Gugal*" or "*Dhup*" is used in many parts of India and burnt as incense. It disinfects the house and serves as a fumigant to drive away insect pests. (27)

After the second World War, chemical control of pests has greatly advanced and now a wide variety of chemicals are available to exterminate the grave menace caused by insect pests and these are known as insecticides. The two main methods of treatment of museum objects with insecticides are fumigation and application in the form of a solution. (3)

Fumigation is a very effective, quick and safe method for control of insects. Certain chemicals evaporate at ordinary temperature and form gases which are lethal to insects, for e.g. par dichlorobenzene, carbon disulphide, carbon tetrachloride, methyl bromide etc. The infested objects if kept for a sufficient period of time in an atmosphere charged with these chemicals vapours, the insects are killed. (3,4)

Before the use of any fumigant, it is necessary to ascertain the nature of the materials of which the objects is composed, the type of insects and effect of the fumigant on the material. Another consideration in the use of fumigants should be their toxicity to human being. Concern has been expressed quite often and rightly so, that even very small dosages of certain fumigants are toxic. Further, it has one drawback that it doesn't have a lasting effect and has to be repeated periodically.

Application of an insecticide to an object in solution form is a more permanent protection. Here the application is done with the spray or brush. Insecticidal solutions containing a chemical like gamexane, mercuric chloride, pentachlorophenol and its sodium salts are suitable. Hence, all storage cupboard, drawers, screens, shelves, walls should always be treated with liquid insecticides. In addition, insecticides in powder form, like pyrethrum can be sprinkled on the shelves, so that insects coming in contact with them are destroyed.

Another approach advocated these days for proper pest control is known as Integrated Pest Control. This approach takes into account the factors that encourage the development of biological agents on museum objects such as dust, lack of ventilation, low lighting conditions, high temperature and relative humidity, inferior material used for conservation and improper surroundings. The strategy is to control these factors in order to minimize the use of chemical insecticides thus emphasizing prevention rather than remedial action. (4)

2.1.4.d Microorganisms

The best means to prevent or control the spread of microorganism growth is to deny the spores and moisture necessary for germination. Therefore, regulating the environment especially the RH is essential to prevent the deterioration of a collection from microorganisms' growth.

Conditions recommended for textile storage include a temperature of 18°C to 20°C (64°F to 68°F). Temperature may be lower than these levels but the upper limit should be 24°C (75°F). The relative humidity should be kept below 65 per cent and a level of 50 per cent to 55 per cent is recommended. These conditions should be maintained consistently as functions may allow dormant spores to begin growth. Numerous methods such as dehumidifiers, desiccant bags, silica gel and other buggers help adjust RH conditions within a sealed space such as a storage cabinet or exhibit case. It is also important to keep any area that houses textile collections clean and free of dust, dirt and organic debris that can nourish spores. (39,68)

The growth of microorganisms should be controlled by preventive conservation rather curative or remedial conservation. When growths are encountered on a textile, a combination of mechanical treatment methods should be attempted to eradicate the problem and prevent its' spread.

- Vacuuming the textile will remove most of the active growth. The procedure for vacuuming must be well thought and appropriate equipment must be used.
- Dry cleaning is another treatment option that will kill microorganism growth. However the use of dry cleaning solvents requires special procedures and temperature levels that must be adhered to when cleaning historic textiles. (68)

2.1.4.e Storage, Display and Handling

The materials used in exhibition cases, frames or storage units must be carefully selected to ensure environmental stability. Wood, cardboard and many plastic and metals are considered unsatisfactory because they emit volatile acids or chemicals. If these materials are the only ones available place a barrier of stable material such as heavy-duty aluminum foil between the object and support. Cotton sheets also provide protection for pieces in storage, but they need to be washed periodically as they absorb volatile emissions. (34)

Polyethylene plastic and acid free cardboard boxes are suitable for storage. So, is acid free tissue paper or pre washed unbleached cotton muslin when used as a box liner packaging material or dust cover. At any costs avoid regular paper, cardboard, wood and wood products and adhesives such as urea formaldehyde which emit damaging acids. Also, do not use plastics garment bags because there is no air circulation (which can encourage moisture to build up); they offer no protection from light and they are typical made of a non recommended plastic. (70)

There are two methods to store a garment: hanged or boxed. Each garment is unique and should be considered individually.

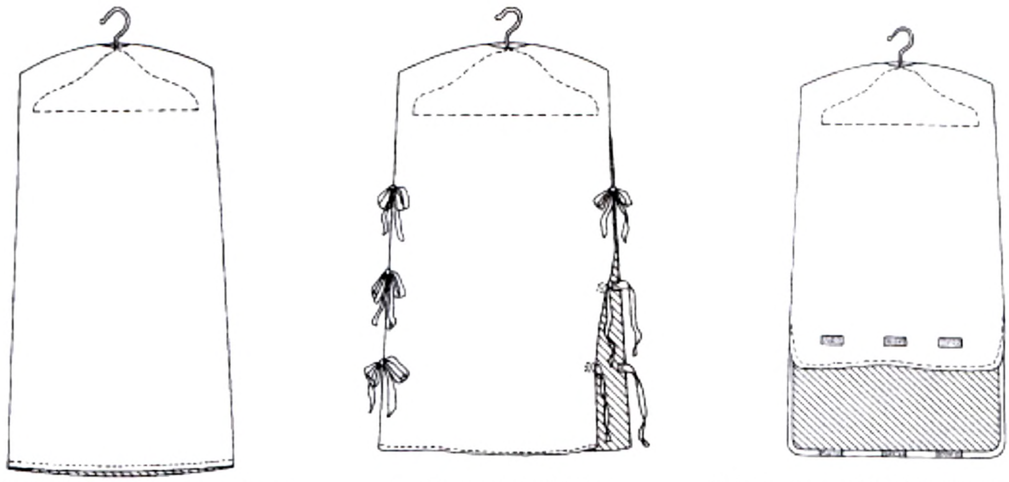
Vertical storage (hanged)

If the garment is very sturdy at the shoulder area, one can consider storing it on a hanger with a fabric cover. Avoid hanging fragile costumes, knits or decorated items or costumes that have weak shoulder seams. Remember that all the materials used to manufacture hangers can equally damage the textiles; wood is acidic, metal oxidizes and many plastics cause staining and accelerate chemical deterioration of the fibres. So, chose the hanger that will support the clothing and the padding will isolate the textiles from harmful materials. (50,14)

Avoid scented, padded hangers because the dried flowers as they contain attract pests.Wood or metal hangers can be padded with polyester batting and then covered with washed, unbleached muslin (Plate 2.1). Support the interior of the sleeves with crumpled acid free tissue and make sure that the garment sets on the hanger without putting strain on the shoulders, collars or sleeves. Then, place a loose muslin bag or dust cover (Plate 2.2) over the garment and hang in a well-ventilated place with ample room for hanging. (70)

Plate 2.9: Padded hangers with polyester batting

Source: http://www.heritagegown.com/products/Cotton-Padded-Hanger.html



A: Basic dust cover for costume B: Dust cover with ties C: Dust cover with fold up bottom flap

Figure 2.1: Types of dust covers for vertical storage

Source: http://www.nps.gov/museum/publications/conserveogram/dustcovers4-15.pdf

Horizontal storage (boxed)

Flat storage is recommended for most textiles because it provides support for the entire textiles. An acid free or polyethylene box with a lid, a sealed shelf or drawer can be used for flat storage. Line the box or shelf with unbleached muslin. Ideally, the textile should not be folded. But in unavoidable situations, pad the creases with acid free tissue paper or muslin. It is best not to stack several textiles on top of each other. If textiles have to be layered use acid free paper in between with the heaviest item at the bottom. Store in a dark place where there is stable heat, humidity and good air circulation. (70)

All objects when stored on shelves or kept on tables should have soft padding under them. Padding protects the object from abrasion against the hard surface and possible damage. All objects kept in trays must be surrounded by resilient material (Plate2.3). Since storage of material plays an important part in its maintenance, due care must be given to proper storage facilities. In absence of these facilities objects are frequently damaged. Do not use mothballs when storing textiles, while they do discourage larvae but they are not a repellant and are a suspected carcinogen. (3)

Plate2.10: Textiles stored flat in a metal planchest padded and protected with acid-free tissue

Source: http://www.artlabaustralia.com.au/

Rolling textiles for storage is another option. It works well for larger pieces (shawls, quilts and rugs) and for small textiles such as lengths of narrow lace. Acid-free cardboard tubes are available and regular cardboard tube can be used if covered by a barrier like polyethylene plastic sheeting. Be sure that the tube is larger than the item itself so that there is no contact with the ends when hanging the tube.

To roll a textile, place it face up on a flat clean surface. Smooth out bulges or creases and straighten the top and bottom as well as the edges. Place the tube parallel to either the warp or weft threads. Interleave rolled textiles with acid free tissue paper or pre washed cotton sheeting. Roll the flat textile onto the tube with the right side inwards (Plate2.11). Roll pieces with a raised texture such as pile carpets, velvets or embroideries with the right side outwards. For velvets and other fabrics with a pile, roll in the direction of the pile. If there are fringes, cut acid free tissue the width of the fringe and fold in half over the fringe. Once rolled, cover with muslin, cotton sheeting or acid free tissue and loosely secure with twill tapes. (Plate2.12). The roll should not support its' own weight; rather, provide support for the ends of the roll by using a hanging system or polyethylene foam blocks with corresponding carved recesses.

Plate 2.11: Rolling a textile onto a roller

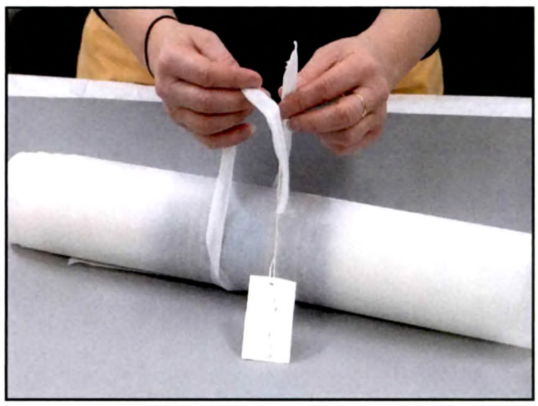


Plate 2.12: Rolled & secured loosely with twill tapes

Source: http://www.powerhousemuseum.com/pdf/preservation/rolled_storage_for_textiles.pdf

Clean hands are important when handling textiles as human shins contains perspiration. Refrain from using creams as they may be readily absorbed by the textile fibres and later contribute to staining. Wash your hands frequently or wear inexpensive white cotton gloves that are available through photographic and conservation suppliers. Remove jewelry or anything that may snag and do not to drag or rub your hands against the textile. Be aware that yarns and fibres can be easily pulled, frayed and weakened depending upon the condition of textile, its component material and method of construction.

Careless handling is one of the greatest causes of unnecessary damage to textiles. However, it is perhaps the easiest to prevent. The best advice is to handle textiles with care and avoid over manipulation. (70)

2.1.4.f Treatment (cleaning and stabilization)

With time or improper care and storage, textiles can become soiled. Cleaning can be a delicate operation depending on the condition of the artifact. Textiles that are in good condition can be surface cleaned by careful vacuuming but textiles that are powdering, splitting, fragmenting that have areas of loss, loose threads or broken seams should not be surface cleaned. (37)

Vacuuming is the primary means of cleaning textiles. It is effective in removing dust, other physical contaminants and discourages insects and moulds as well. Vacuuming is object specific. For many fragile or three-dimensional textiles, dusting the piece with a soft brush directly into the nozzle of a vacuum may be recommended. For large or sturdy textiles, vacuuming with an up and down motion (lifting, not dragging the nozzle) through a sheet of flexible plastic screen (Plate2.13) or net may be suggested (Plate2.14). Not all pieces can be readily vacuumed and not all vacuums are appropriate conservation tools. (34)

Plate 2.13: Barrier screen placed on the textile

Plate 2.14: Net or cheesecloth placed over the hose

Source: http://www.tepapa.govt.nz/SiteCollectionDocuments/NationalServices/Resources/CaringForTextilesAndClothing.pdf

Non coloured textiles that are in good condition can be wet cleaned (washed) by hands. Wet cleaning softens creases, realigns textiles and removes dirt and musty smells. In order to properly clean textiles in this way, it should be strong and be able to withstand the process. Proper cleaning techniques for antique textiles require a great deal of skill and experience; sometimes cleaning would be more harmful than allowing the textile to remain soiled. Dry cleaning is also dangerous for it applies considerable strain to the fabric and can dissolve some fabrics and trims such as early cellulose based sequins. Keep steaming and ironing to a minimum or refrain from doing it altogether. Heat accelerates the deterioration of textiles. Ironing also applies physical pressure to the structure and thus is harmful to the item. (37,50)

Stabilization of a textile artifact includes treatments that attempt to arrest or reduce the rate of deterioration. It may include reuniting parts, reinforcing and supporting a textile in order to achieve structural soundness or visual completeness. Pressure mounting, stitching, attaching full or localized support, consolidation and using adhesives are all methods of stabilization that are acceptable treatments under certain circumstances.

Stabilization or conservation can be carried out mainly by two methods. One is the conventional method with the use of needle and thread i.e. sewing or mending, a non adhesive method and the second one where consolidation is carried out by use of adhesives. (49)

Conservation of textiles by mending or repairing with needle and thread method involves the use of appropriate thread, support fabric and the correct sewing technique.

As a general rule, always use like with like. For example, a silk textile should be mounted on a silk fabric and stitched with silk thread. If the same fibre cannot be used, always use an inert synthetic fibre such as polyester. Using incompatible materials such as using silk with cotton accelerates the degradation of the textile. Silk and wool both are protein fibres and cotton, linen and other plant fibres are cellulose fibres, hence are compatible with each other. (45)

Support fabrics used for stabilization

The support fabrics to be applied should be chosen to correspond with the object to be stabilized. The properties like fiber, quality, yarn construction, fabric structure, texture, dimensional stability, weight, color and colorfastness, hand, sheen, finish must be considered when selecting a fabric to use in a stabilization treatment.

Some conservators prefer "like with like" and therefore match the fiber content of the stabilization fabric with that of the historic textile. Other conservators deliberately eschew protein-based fibers out of concern about the potential for insect damage. Many conservators follow no fixed rule but select fabrics to best suit the needs of the particular project, balancing the many fabric properties with the properties, condition and needs of the textile for which the fabric will be used. Some consider transparency as the first requirement so that the object can be studied from face and back in order to analyze the structure of the object. (49,45)

Commonly used fabrics are sheer fabrics like nylon net, silk crepe line or polyester for backing. Light to medium weight high thread count cotton fabrics such as shirting or sheeting are chosen when dimensional stability and flexibility are considerations. Tightly spun and densely woven balanced plain weave fabrics such as cotton duck are chosen when structural stability and weight bearing considerations are important. On woven materials such as spun-bonded synthetic fibers are occasionally chosen for their smooth texture, inelastic nature and hydrophobic qualities. (49)

Threads used for stabilization

Threads commonly used by conservators are smooth, tightly spun, plied and finished. The properties allow the thread to withstand the abrasion that results when threads are passed repeatedly between the layers being attached to each other. Generally, these yarns are chosen to be visually and structurally compatible with the object being stabilized. (49)

When selecting threads remember to always use like with like, for example, silk with silk or polyester or cotton with cotton. As a general rule, finer the thread, the better but the appearance of the fabric will be judged by the most appropriate denier of thread. For example, fine silk will require a fine silk or polyester thread. A woollen tapestry will require a coarser woollen thread. (45)

Stitches used for stabilization

Before stitching the historic textiles, the following points should be kept in mind:

- To make sure that the needle passes in between the threads in the weave, not through them. If the needle passes through weakened fibres it can cause considerable damage.
- To keep the tension of the stitches fairly loose, so as not to damage the fabric.
- Do not use knots. Start your thread by leaving a tail at the back of your textile and stitch three small stitches in one position to anchor your thread. (45)

The main stitches used for stabilization are described below:

Self-couching stitch is used to secure torn, frayed or weak areas to a new support fabric and is consequently the most frequently used stitch in textile conservation. The self-couching stitch is worked parallel either to the warp or to the weft. As illustrated in Figure 2.2 a, the long stitch is laid first and extends into the stronger area surrounding the damaged area under repair. The stitch is then held down by small stitches that crosses it at right angles (Figures 2.2b and 2.2c). The process is repeated at regular intervals until the weak area is completely secured.

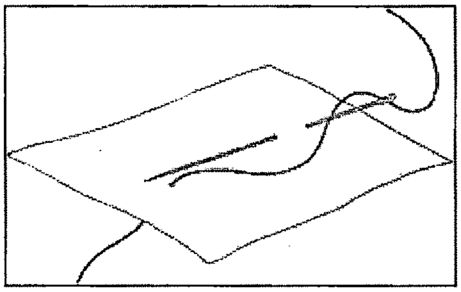


Figure 2.2a.: A long stitch is made first. It begins and ends in a sound area of the textile and spans the weak or damaged area. Support fabric and damaged area of textile not shown

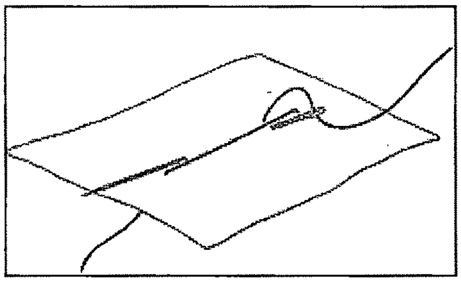


Figure 2.2 b: Small stitches hold down long stitch

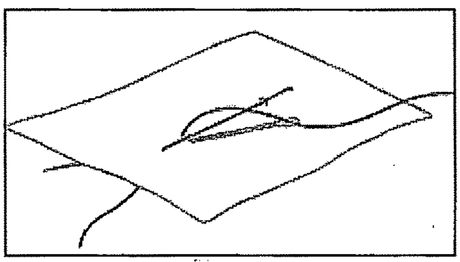


Figure 2.2c: Small stitches cross long stitch at right angles

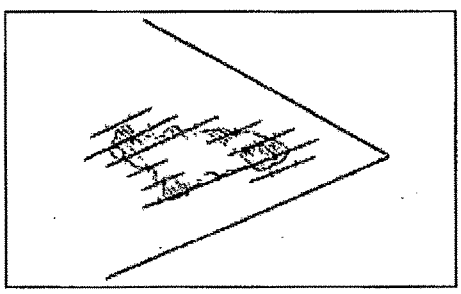


Figure2.2d: Damaged area of a textile that has been secured to its backing fabric by a series of self-couching stitches

Figure 2.2: Couching stitch

http://www.cci-icc.gc.ca/publications/notes/13-10-eng.aspx

Support stitch is used to hold large textiles to a new backing fabric while distributing the weight of the textile evenly (Figure2.3). A small, nearly invisible stitch is made on the top of the textile and a longer one is made on the back. Most frequently, the support stitch is applied in a staggered pattern parallel to the warp.

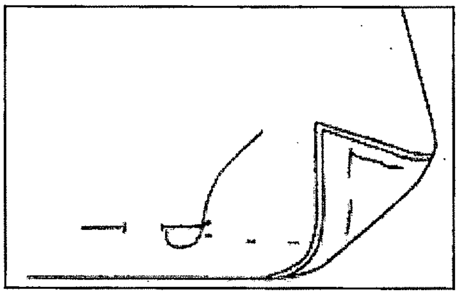


Figure 2.3: Support stitch

http://www.cci-icc.gc.ca/publications/notes/13-10-eng.aspx

Herring bone stitch is a simple interlacing stitch similar to a cross-stitch worked from left to right to secures raw edges (Figure2.4). It can be used to join two layers of fabric while maintaining flexibility. It is also frequently used to hold down single-fold hems or the edges of patches.

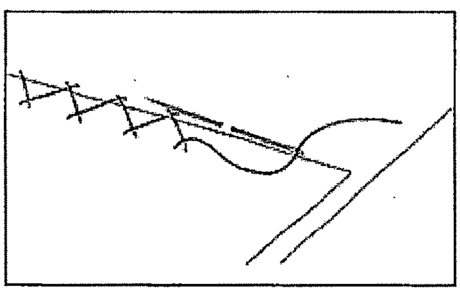


Figure 2.4: Herring bone stitch

http://www.cci-icc.gc.ca/publications/notes/13-10-eng.aspx

Slip stitch is almost invisible on the right side. It is used for blind hemming (Figure 2.5) and to attach linings to textiles. If worked loosely, it avoids undesirable tension between the backing fabric and the textile. (44)

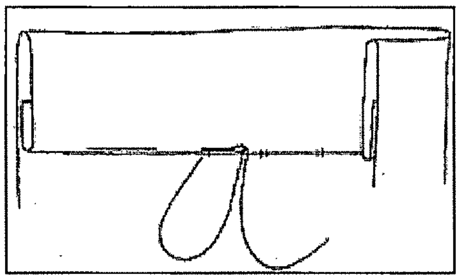


Figure 2.5: Slip stitch

http://www.cci-icc.gc.ca/publications/notes/13-10-eng.aspx

Adhesives used for stabilization

In general, we can say that we need to apply natural or synthetic adhesives only when the degradation of the old material has progressed too far to make a sewing technique successful. There are, however a lot of objects which are already in such a bad condition that the material has become too fragile and brittle to apply a sewing technique with good result. The old material has become so brittle that it is impossible to make stitches because the material will break off and the only result will be small holes all over. In such cases it seems that the application of adhesive can prove to be useful. Although this method of conservation has been severely criticized but it must be realized that the greater number of such objects would have been lost, if had not been preserved in this manner. (17)

Synthetic resins are widely used by conservators. Such resins are useful for conservation purposes when they have no noticeable influence on the appearance (visual and tangible), colours and flexibility of the textiles. Another very important demand is that the resins are not subject to degradation under the influence of light and surrounding atmosphere. This means that a film of the resin:

1. has to keep its solubility in its solvent.
2. must not yellow.
3. must not give noxious compounds on decomposition.
4. must not show a decrease of sticking power (bonding).
5. must not have an ill effect on the ageing of the textile material or on the fading of dyes.
6. must keep its flexibility.

There have been plenty of experiments with plastics with regard to their usefulness in textile conservation, but only a few members of the family of polyvinyl compounds and the acrylates derived from them meet the demands in an acceptable manner. (15)

The ones most commonly used in conservation (UNESCO 1968; Dowman 1970) are:

Polyvinyl Acetate (PVA) is the most commonly used thermoplastic polymer resin for organic material. It is used both as a consolidant and glue. It comes in a range of viscosities. The lower viscosity PVAs, however, have less bonding strength than those that are more viscous. It is also heat-sealable; for example, two pieces of cloth treated with PVA can be bound by ironing them together. PVA has good stability to light and does not yellow. It remains soluble and does not cross link and become irreversible. It is soluble in a number of organic solvents. Its solubility is directly related to the volatility of the solvent; the more volatile the solvent, the more soluble the PVA. The more soluble the PVA, the better the penetration of PVA into the object being treated.

Acryloid B-72 is a methyl acrylate/ethyl methacrylate copolymer and is an excellent general-purpose resin. Durable and non-yellowing Acryloid B-72 dries to a clear transparency with less gloss than PVA and is resistant to discoloration even at high temperatures. It is very durable and has excellent resistance to water, alcohol, alkalis, acid, mineral oil, vegetable oils and grease. It retains excellent flexibility and can be applied in either clear or pigmented coatings by a variety of application methods.

Polymethyl methacrylate (PMMC) resins have similar properties to PVA. These resins are stronger but have fewer solvents. Many PMMC resins require mixed solvents such as 8 parts toluene and 2 parts methanol or a combination of chloroform and ethylene dichloride. In dilute solutions, PMMCs penetrate dense material well. The PMMC consolidants are particularly useful when more than one consolidant is required on the same object or cluster of objects.

Polyvinyl alcohol (PVAl) is a very useful resin in certain circumstances because water is the only suitable solvent. They are used as consolidants and adhesives both. In general (depending on brand), PVAl dries clearer than PVA. It is more flexible and shrinks less; therefore, it exerts less contractile force than PVA when drying. For this reason, it is often used in textile conservation. It can be used on damp or dry objects. It has been used for conserving paper and textiles with water-fast dyes that are alcohol-soluble.

There are indications of a slight tendency for some PVAls to cross link in 3 to 5 years if exposed to strong light, dryness and heat; especially temperatures over 100°C. If cross linking occurs, the resin becomes less soluble but most likely never becomes completely insoluble. Some conservators recommend that objects treated with PVAl be re-treated every 3-5 years to counteract any possible cross linking.

Epoxy Resins make excellent adhesives, consolidants and gap-fillers. There are cold-setting thermosetting resins that set up with the addition of a catalyst. The most desirable characteristic, aside from their strength, is that there is no shrinkage as they set. This is in contrast to all the thermoplastic resins that set through the evaporation of a solvent, thereby undergoing some degree of shrinkage. The main disadvantages of epoxies are that they are essentially irreversible and often discolor with age. As a general rule, epoxy resins should be avoided; however, epoxies are occasionally required by conservators because nothing else has the necessary strength. They are excellent when a very strong, permanent bond is required.

These are just a few of the most common adhesives used in conservation. They have a long, successful track record and are, therefore, widely used for an extensive variety of conservation purposes. (64)

The most suitable methods of adhesion on a base (supporting fabric) are heat and cold sealing techniques. A heat sealing technique is one whereby a weakened textile is secured to its impregnated supporting tissue with the aid of a warm iron. Moreover the adhesive being no more than a thin interlayer between the textile and its substrate, a greater degree of flexibility is retained and the surface appearance remains unchanged. Cold sealing technique involves the use of solvent that adheres the frail textiles to the reinforcing fabric. (17)

2.2 RESEARCH REVIEW

Leorna (1991) conducted an experimental research to investigate the abrasive nature of the backing surfaces for supporting historic textiles for conservation, display and storage.

Unbleached 100 per cent cotton fabrics of four different weights and construction were selected that included muslin, duck and sailcloth and warp sateen. They might function simply as a backing material for mounting, support a fragile item or even to bridge an open area where yarns or structure is lost.

Crock meter was the testing instrument adapted to test the abrasiveness of both the face and back sides of the backing fabrics. The methodology was accelerated from the actual museum conditions that allowed comparison and rating of backing fabrics while the measurement value used was the number of loosened fibre particles transferred during rubbing.

The results of the study revealed that there was no significant difference in the number of fibres removed for the face and back of the fabrics. Muslin, the plain weave fabric which was light in weight showed least abrasive nature when analyzed by one way analysis of variance. (16)

Miller et al (1989) undertook a research to characterize the physical and chemical degradation and changes in the properties of naturally aged silk. For the study 54 naturally aged, undyed, weighted and unweighted silk fabrics aging between 20 to 400 years old from various museums and historical societies were collected assuming that the manufacturing methods, use, care and storage conditions were similar. A new silk plain weave, unweighted and undyed fabric was also selected for comparison.

The methods of analysis included yarn tenacity and elongation dilute solution viscosity, amino acid content, photo acoustical infrared spectroscopy and optical and scanning electron microscopy. The metallic agents present on the weighted historic silks were identified using neutron activation analysis.

Analysis of the data revealed that of the total 54 undyed historic silk fabrics, 15 contained one per cent or more total weight of metallic elements and highest percentage of tin which was commonly used as weighting agent in late nineteenth and early twentieth centuries. The amino acid content of the new and historic silk fabrics were similar however, some of the samples exhibited a decrease in bulkier side chain amino acids with a corresponding increase in the simpler amino acids. The variety of fibre fracture patterns were observed with few differences in the infrared spectra except for flattened and less pronounced bands of tin weighted silks.

Visual assessment of the general condition of the fabric did not always correlate with tenacity, elongation or viscosity. Most of the fabric samples classified as in poor condition had low strength but, in some cases fabrics in good condition were also so weak that the yarns could not be raveled out for testing. Hence, visual examination may be inadequate to judge the condition of historic silk fabrics. (21)

According to Abdel - Kareem, (2000), there was a felt need to understand the potential of a polymer to act, play as a food source before a choice of an appropriate polymer was made for a given application. Resins of both natural and synthetic origin may be destroyed by biological agents and stimulate the growth of microorganisms on textiles. Hence the study evaluates the most suitable, effective polymer and resins that can be applied safely and successfully in treating ancient Egyptian Linen textiles.

Twelve polymers, resins and unbleached Egyptian linen fabric were selected for the study. Seven fungal strains isolated from ancient Egyptian textiles were selected and five samples were used for each fungus. The samples were treated using Agar Plate Test with application of pure strain method.

Spectrophotometer measurements of the samples were recorded as well as scanning electron microscope was used to record the changes in the surface morphology of control and treated samples. Finally tensile strength and elongation was measured.

The interpretations of the study revealed noticeable decrease in tensile strength, differences in colour change and considerable damage of surface among all consolidated samples after fungal deterioration. So, it was concluded that Linen textiles consolidated by maximum number of tested polymer are susceptible to fungal deterioration whereas Acryloid F-10 and Mowilith are the least resistant to fungal attack among the tested polymers and are more frequently used in conservation of archaeological textiles. Thus, attempts should be made to replace them with more resistant ones. (2)

Abdel - Kareem et al (2008) had conducted a study on Conservation of rare painted ancient Egyptian textile object from the Egyptian Museum in Cairo. An evaluation of the reactivation consolidation technique for reinforcement of ancient Egyptian textiles was performed.

A painted Egyptian textile object was chosen as a sample for the case study. Further, scoured unbleached plain linen fabric was selected to prepare aged model samples and two types of support fabrics used for testing were silk screen and polyester. The aged textile samples were treated with three selected adhesives and concentrations.

The results of the study confirmed that Lascaux 498HV (E) i.e. Butyl acrylate/Methyl methacrylate at a concentration of 10 per cent was found to be the most preferred choice among the tested adhesives i.e. Vinyl acetate and Methyl hydroxyethyl cellulose as well as the silk screen was found better than polyester. (1)

The rate of fading and degradation of textiles and other organic materials on display is influenced by the intensity and wavelength distribution of the light source to which they are exposed and by other environmental factors such as temperature, relative humidity and atmospheric pollutants. Hence, **Patricia & Barbara (1987)** undertook a research on Ultraviolet Absorbers: A Treatment to Reduce Fading and Degradation of Textiles to investigate the following objectives: (a) to screen commercially available ultraviolet absorbers and identify those with characteristics suitable for use by fiber artists and conservators, (b) to determine if ultraviolet absorbers applied by an immersion procedure could reduce fading of textiles coloured with natural dyes and (c) to determine if ultraviolet absorbers applied by an immersion procedure could reduce photo degradation in undyed cotton, linen, silk and wool and wool dyed with natural dyes.

For the experimental procedure, cotton, linen, silk and wool fabrics were selected as samples of the study and the natural dyes evaluated were cochineal, madder, fustic, weld, turmeric and indigo. Most ultraviolet absorbers commercially available in the United States were initially screened for potential use on textiles on the basis of colour, toxicity, solubility and ability to reduce fading. After preliminary evaluations, four benzophenone-based absorbers were selected for further study. The UV absorbers were applied to coloured wool textiles, undyed cotton, linen, silk and wool by an immersion procedure. After treatment, the specimens were exposed to light in a xenon-arc Weather-O-meter, an accelerated light fastness testing instrument. Total colour change was instrumentally measured using a Hunter Lab tristimulus colorimeter. Strength loss was evaluated by breaking strength tests using a CRE Scott Tester.

Results of the study revealed that three of the UV absorbers modestly reduced fading in approximately fifty per cent of the dyed wool specimens. Although most of the absorbers failed to significantly reduce the strength losses in the majority of the wool, cotton and silk samples but they did slightly suppress degradation in these fabrics. Hence the treatment shows promise for the use on wool textiles such as tapestries coloured with natural dyes. (22)

Evenson & Patricia (2004) studied the effects of Light and ageing on selected quilting products containing adhesives. Conservators and conservation scientists have evaluated archival quality adhesive products and determined which ones are acceptable for use in conservation treatments but there were no published results concerning the long-term performance of adhesive-containing products available to quilt makers and home sewers. Consequently, they could not make informed choices. Therefore, the study was undertaken to determine whether the selected adhesive-containing products for quilters specifically quilt basting sprays, fusible webs and fusible battings contribute to discoloration or promote degradation of fabrics over time.

Fabric assemblies were created using three categories of adhesive-containing products. The adhesive in fusible webs and battings activate when an iron applies heat, thereby bonding fabric to the batting. Adhesive sprays are not heat activated; rather they are pressure sensitive adhesives. The adhesive spray products were sprayed on the backside of fabrics, left to dry until tacky and then attached to the batting.

Fabric assemblies were constructed using mercerized and bleached 100 per cent cotton muslin (Test fabrics) as the top layer and Hobbs Heirloom® bleached 100 per cent cotton batting as the bottom layer. The two layers were bonded together with an adhesive spray or a fusible web. Fourier transformed infrared (FTIR) spectroscopy was employed to determine the chemical classification of the adhesive sprays. The three adhesive sprays were identified as polyvinyl acetate (PVAC) products. Archival-quality PVAC is known to be a stable adhesive and has been used in conservation treatments for more than sixty years. Fusible batting adhesives were examined by proton nuclear magnetic resonance (NMR). The findings suggested that all three fusible battings incorporated similar adhesive compounds; all contained ether or epoxy groups. Specimens were exposed to 6 and 36 hours of accelerated ageing at 135°C since this temperature did not exceed the recommended application temperature of the fusible webs. Similarly exposed to 40 and 80 hours of artificial light as selected household textiles (e.g. draperies) are expected to withstand 40 hours of accelerated xenon light exposure. Following light exposure and ageing, changes in colour, breaking strength and stiffness were also measured.

The results showed that some adhesive sprays yellowed more than others. The differences observed between adhesive sprays were probably due to differences in additives incorporated in the product formulations. None of the fusible webs exhibited significant yellowing, stiffening or strength losses following 6 hours of ageing or 40 hours of light exposure. On the other hand, following 36 hours of accelerated ageing all of the fusible webs exhibited undesirable yellowing that suggest the fusible webs should not be incorporated in quilts that makers hope will become heirlooms. The adhesives used in the fusible battings proved to be the most stable to heat, light, strength and stiffness than any of the adhesive-containing products evaluated in this study.

Hence, the researchers concluded that the fusible battings evaluated were the only adhesive containing products that appear acceptable for quilts intended as heirlooms and those made for shorter term enjoyment during one's lifetime. (9)

Ragauskiene et al (2003) carried out a study on evaluation of the most preserving and secure method of adhesive lining for ancient textiles. The following series of samples prepared for investigation included ancient silk fabric, open weave supporting textile (gauze) sprayed and brushed by selected acrylic adhesive in solution or dispersion form, lined textiles where ancient textile was iron pressed to the supporting textile and detached textiles where supporting textile was carefully peeled off the ancient textiles lined by adhesive.

Scanning Electron Microscopy was used to observe a micro structural homogeneity and surface topography of the samples after various treatments. The results revealed that the method of application by brushing of dispersion solution covered the yarns of the supporting material evenly and in thinner layer of adhesive without forming webs. After application on the ancient textiles with warm iron, formed a film between the two layers and during peeling off; the ancient silk was left without any aggregations of adhesive.

Hence, concluded that the best method for lining of ancient textiles that enables to preserve and retain its authentic properties was the treatment of supporting textiles by brushing with dilute acrylic dispersion. (23)

Clare (2009) research entitled Digitized Historic Costume Collections: Inspiring the Future While Preserving the Past, discussed that many historic costume collections were found specifically to educate and inspire designers and students. However, conservators and curators knew that excessive handling was ultimately damaging the fragile antique garments and so preliminary research using these objects had been restricted if the objects were to be preserved for future generations. But the question arose to the investigator, "How can the maintenance of these collections be justified if equal access is not available to all researchers ?"

As well while traditional research took a hands-on approach to using these collections, students and designers increasingly these days rely on the Internet and other digital resources for inspiration. Hence the study developed database of Drexel Historic Costume Collection was found to be the easiest and most user-friendly approach to design research and allow users to discover items they might not have found otherwise and further a well-designed site would engage audiences, provide a forum for creative scholarship and preserve collections for future generations. (7)

Luxford et al (2009) studied the factors that led to the deterioration of silk causing embrittlement of the textile leading to splits and tears and eventually a powdery fragile fabric. Light has long been considered the major cause of damage to silk objects which has led to lower light levels for displays. However, recent research on medieval tapestries casts doubt on this. Other environmental factors are important and circumstantial evidence implicates raised humidity (RH), although there has been little research on this factor.

Thus the preliminary experiments investigated the effects of RH, as well as light, on the deterioration of new silk. Relative humidity was chosen to reflect a variety of typical display conditions. The temperature and RH dependent kinetics of silk ageing were determined by assessing the changes in mechanical properties and silk fibroin molecular weight. The initial results confirmed that light (with the UV component excluded) was not necessarily the critical factor causing damage to silk objects. The implications for the collections management and display of historic silks led to reassessment of the most appropriate environmental parameters for the preservation of silk objects. (18)