

The Fabric Support in Portable Icons: Deterioration, Documentation & Conservation

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Figure 1. Virgin Mary (*Panimnitos*), 16th c. Monastery of Vatopedi, Holy Mountain of Athos. Cracks and losses on the ground layer reveal a balance plain weave fabric.

Introduction

Traditionally and until the present time, one of the first stages in the construction of a portable icon is the application of the fabric (*pavoloko*) directly on the wooden support, using either organic or, more recently, synthetic adhesives prior to the application of the gesso layer.

The aim of this paper is to raise the awareness of the icon conservator/restorer regarding the need to adopt an informed approach in the documentation and treatment of the fabric component. This paper is split into three main sections presenting an overall view of the subject such as the deterioration factors, methods of documentation and conservation of the fabric.

It is also hoped to illustrate some basic aspects of the work from the point of view a preventive textile conservator, which may prove of interest to the icon conservators.

The textile substrate, is part of the construction of icons and, as an organic material, brings with it potential for particular types of deterioration, which can be caused by unstable environmental conditions in display and storage. This can create expansion and

contraction of both textile together with the wooden support and these are not necessarily compatible and stresses may result. There is also potential for the growth of micro organisms and development of insect infestation. Types of deterioration which have been identified relating to the fabric support are; its separation from the wood, development of splits and losses, mechanical breakdown and decomposition as a result of biological agents. These all need careful documentation when the icon is first examined and investigation undertaken. Previous restoration, which may have used a variety of varnishes, often mixed with pigments and other natural products to 'camouflage' damaged areas for aesthetic reasons, or varnishes applied also on the fabric layer as a final coating can also lead to further problems.

Although the fabric is one of the critical elements in the icon, in as much as it may secure the paint layer on to a decaying support, it has been observed that icon conservators do not always give proper attention to this material during documentation. At this point, analytical and investigative techniques could play an integral role in the identification of the fabric, its material and technological details, as part of standard documentation, prior to any treatment.

Identification of the fibres used in this support under the microscope, will show different structures by examining both longitudinal and cross sections. Thus for instance line, jute and cotton can be easily identified.

In the presentation, emphasis will also be given to two basic weaving types found in icons which are very familiar to textile conservators but perhaps not to other conservators specialising in different fields. In identifying the construction of the textile and its weaving technology, the icon conservator/restorer gains further knowledge about the

pathology of the artefact. This is important for decisions regarding the selection of appropriate materials to use in the treatment to avoid further damage to the cellulose or protein fabric structure with the use of strong alkali and acid adhesives or solvents. The paper will also propose a unified approach to the documentation of this important element of the icon's structure. This can be used across monastic and museum collections stored and displayed in Greece and elsewhere. A proforma (data base) suitable for archival purposes of both textile researchers and icon conservators is proposed.

The paper will conclude with the investigation of synthetic and organic adhesives used for the treatment of fragile historic and archaeological textiles considered for use by the icon conservator. Related case studies will also evaluate the application of these adhesives to the artefacts in various chronological periods by different workshops. This will benefit further research into the adhesive treatments that may be considered in the future.

This paper is restricted to the fabric component of icons and does not cover canvas easel painting dealt with in other scholarly texts.

Material properties

Fabric supports on icons were much the most commonly made from linen, cotton and jute. Written sources taken from Dionysios Fournas (c. 1670-1774) the famous hagiographer monk from Athos and Gennino Gennini (c. 1390) confirm and describe the different techniques, application and materials of the fabrics on the wooden panels.

Vegetable fibres such as cotton and bast fibres such as linen, jute and hemp can be found on icons from the early stage of their existence.

Properties of these materials could also be vital not only for

conservators but also for hagiographers. Fabrics made with cotton can degrade as a result of UV radiation, and acidic products from the wooden support. Hydrolytic damage can also occur as a result of the effects of acids and alkalis. Linen covered with a film of wax to prevent wetting of the fibres has suitable moisture properties. Jute as a lingo-cellulosic fibre generally has a poor environmental performance under humid conditions. From, 1945 with the introduction of acrylic fabrics placed in the market as an alternative to wool, the hagiographers tend to use synthetic fabrics in the construction of icons. The chemical properties of acrylics, show resistance to acids. There are no groups that will react with acid radicals and show slow hydrolysis in alkaline solutions which can lead to discolouration. Acrylic fabrics are generally unreactive to organic solvents, except acetone, which could lead to disintegration.

1. Deterioration Factors

In order to recognise and access the maximum information of the fabric support it is necessary to identify the chemical and physical properties of material of which it is made, to have an overview of the technology, and weave patterns.

Old linen fabrics found in various artefacts appear to have a loss of strength, a low degree of polymerisation, acidic build-up (pH 5), high overall crystallinity and are soluble with low- molecular weight. Mechanical stretch is also frequently encountered after the construction of the icons, as the hagiographers sometimes quickly apply the fabric without having all the warps and wefts lined up straight consistent to the directions of the wooden ground.

Ten main agents of deterioration that can cause damage with regards to the specific fabrics attached on to the icon such as cotton, jute, linen and possible synthetic materials or to materials adjacent to fabrics are explained below:

1. **Direct Water**

- Causes swelling to the organic materials.
- Corrodes the metal elements such as nails or covers (terms used *oklad* or *pamfila*).
- Dissolves adhesives or gesso used on the fabric.
- Causes efflorescence or tide marks in porous materials.

2. **Smoke Deposits**

- Destroys or scorches or deposits smoke on all types of fibres.

3. **Biological Agents**

Cotton fabrics are extremely highly susceptible to any biological degradation from microorganisms, fungi etc.

- All textiles are a food source of pests, especially in summer season. The most common insects found in Greece are the *Lepisma saccharina* (silverfish), *tineola biselliella* (common or webbing clothes moth), *anthrenus verbasci* (varied carpet beetle).
- In uncontrolled monastic collections certain types of rodents (mice, rats etc) will destroy the fabric or stain it with their acidic deposits.
- Mould and microbes will weaken and stain natural fibres such as cotton, flax and jute.

4. **Relative Humidity (RH)**

- As fabric is a hygroscopic material, the damp environment (over 65%) will cause chemical and mechanical decay. Mould stains, corrosion on metal parts which will weaken and often causing holes and shrinkage on tightly woven fabrics. Linen fabrics are one of the few that are stronger in wet conditions than dry. On the other hand, cotton could degraded in high relatives humidity.
- A dry environment (under 50%) will cause shrinkage to the fabric structure resulting in breakage and desiccation of any adhesive residues, make them more sensitive to mechanical damage. If the fabric is nailed or glued to a very stable support the fabric will break,

as it is not flexible enough to change dimension in this type of environment.

5. Temperature (T)

- High temperature (over 24 °C) will gradually cause disintegration especially if the material is chemically unstable. In the presence of high temperatures cotton is most likely to be affected.
- Low temperature (under 17 °C) will cause embrittlement, which results in fracture of the paint layer but also polymeric materials.
- Changes in temperature can cause mechanical damage to the fabric through the expansion and contraction of the wooden support¹.

6. Light

The parts of fabric exposed to direct radiation will suffer the following:

- Loss of flexibility and strength by breaking down the fabric structure.
- Chemical reaction with the adhesives or varnishes applied onto the fabric by the conservators and hagiographers.
- Embrittlement of the cellulose base materials.

7. Indoor Gases

- Acidic gases are frequently released from the wooden show cases, in which the icons are displayed. Un-buffered cheap wood and wood products contain damaging acids such as acetic acid² (CH₃COOH), formic acid (HCOOH), hydrogen sulphide (H₂S), butanoic and iso-butanoic (C₃H₇COOH). The organic gases except formaldehyde (methanal, HCHO) is released by the hydrolysis process (Tetreault: 1994) and can form a corrosive environment for organic materials such as textiles and other inorganic components. Formaldehyde produced from the adhesives use to bond the wood layers together, such as in the case of MDF, damage the cellulose and protein fibres and the adhesives and starches used in the finishes of the textiles (Timar- Balazsy and Eastop: 1999).



Figure 2: Pin used for fastening the loose fabric detail).

8. Past Interventions

- Strong adhesives used to consolidate the exposed fabric will polymerise though time causing chemical and mechanical damage. The fabric will disintegrate, discolour and corrode the wooden support.
- Varnishes used in the final stage of the conservation treatment of the icons applied also on the fabric areas for a more uniform appearance, will cause a gradual disintegration and probably react with the adhesive, which has been used to stabilise the fabric on to the wooden panel.
- The cutting off of loose sections of fabric by restorers to bring more aesthetic final appearance, is obviously detrimental.
- Waxes applied to seal and consolidate the edges of the paint and gesso layer (*stefanoma*), discolour and seal the fabric structure. This also adds considerable weight to the icon.
- Nails or pins used by the clergy for quickly fastening the loose fabric on to the wood causes holes and corrosion products from the metals causing local staining (Fig 2).

9. Handling

- This causes soiling and mechanical damage due to the fact that the exposed fabric is most frequently around the edges of the panel.

10. Fire

- Candles in churches placed next to icons appear to be a irreversible factor of damage, worsening overall appearance of the fabric structure.

2. Documentation

A literature study of the conservation or the documentation of icons in museum catalogues gives the reader very little information about the textile substrate.

The main aim of this section is to encourage the application of investigative and analytical approaches during the documentation of the fabric support of the icons, with the longer term objective of better informing icon conservators. The ability to identify the component materials in portable icons and document their actual state of degradation before any further interventive conservation treatments are considered here.

Besides conserving the fabric through processes such as cleaning and then adhering on the wooden support, to date little attention is given to the recording details about this material.

The study of the fabric using simple or sophisticated analytical techniques can provide vital evidence about the morphology of the material and aid its identification. Thus, a simple method of examination using microscopy could be used in order to identify the longitudinal section of the common fibres found on the icon. Each fibre has a very distinctive characteristic structure. Identification of synthetic fibres are not always easily accomplished using only microscopical observation. Cross sections using the plate method as the simplest and quickest way or polyester embedding method could reveal more reliable information about synthetic fibres as they are often irregular, and vary according to the manufacturer's instructions.

3. Weaving Characterisation

Two simple weaving patterns of interlacing have been found to be used most frequently in the fabric of the icons. A very straightforward system of interworking elements such as the warp and weft passes under or over each other (Emery: 1994). These weave patterns favoured by hagiographers include:

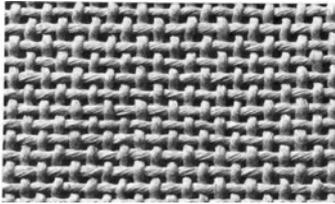


Figure 3

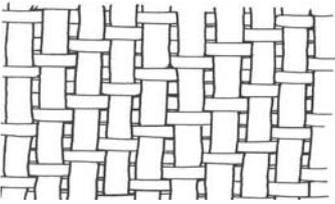


Figure 4

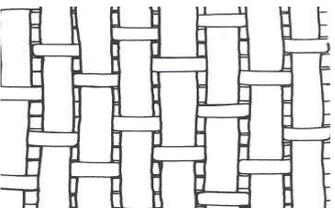


Figure 5

Figure 3: Balance plain weave (Emery.1994: 76)

Figure 4: Twill weave (Rendell.2006:406)

Figure 5: Satin weave (Rendell.2006:406)

- **Tabby weave** (or plain, or taffeta) is the most common weaving found on icons. The warps and wefts are separate into two units and passes alternatively. Tabby weave is also characterised depending of how many warps and wefts are worked together such as tabby weave with tripled warps and wefts, or tabby weave with paired warps and wefts, or tabby weave with paired warps and predominant wefts. The most common type found on icons is balanced tabby weave meaning that the elements (warps and wefts) are equal in size and number (Fig 3). As this weaving is the most ancient, it is found on icons though the ages.
- **Twill** weave is a float weave distinguished by its diagonal lines, making the fabric very hard wearing (Fig 4). This is also favourite for icon painters. Again the elements (warps and wefts) are off-set at regular intervals by a predetermined number of ply threads, described with variations as 2/1 twill weave, 2/2 twill, 3/1 etc.
- Another basic weaving which could also possible to be found on icons in more rare situations is **satin** weave (Fig 5). Satin is referred in this case as a type of woven fabric of long floats of one set of elements and not to characterise a smooth lustrous surface appearance which most of the time silk fabrics are known for. This later weaving is more rarely found in icons, mostly of 19th and 20th century.

3.1 Database

The purpose of this section is primarily to examine the documentation of features of each item, and to create a database indexing information about the weaving, the component material and the twist of the fibre³.

This work could be undertaken by the collaboration of icon and textile conservators providing data serving as a basic point of reference and consultation.

A basic documentation format which could accompany each icon and serve as a database of all the icons stored and displayed in Greece is shown in the below table:

Ref No.	Icon Details	Component Material	Twist	Twist Direction	Weaving	Notes Before Treatment	Conservation Treatment	Notes After Treatment
1.	Virgin Mary, 16 th c. (Private Collection)	Cotton	2 ply thread	Z-twist	Plain weave	The fabric is highly degraded and a large part of the material has losses and extensive evidence of deterioration.	Surface chemical cleaning and consolidation with adhesive treatment. Paraloid® B72 in acetone 2%.	The fabric appears to be stable. However handling around the edges should be avoided.

4. Conservation Treatment

Following modern principles, it should be stressed that the concept of conservation involves both interventive treatments in respect of damage which is already apparent and preservation, the best form of conservation, consisting of preventive action designed to forestall and prevent the processes which lead to alteration. If preventive conservation is effective there will be no need for restoration, a procedure that can actually affect directly the nature of the materials. At an extreme the process frequently used in the 18th and 19th century, of complete removal of the image and transfer to a new support illustrates this point. Cleaning of the paint film or the fabric

considered also a controversial issue in the treatment of icons as 'patina' has different contexts and interpretations depending on the conservator's perspective.

Three main aspects have appeared to be important for the fabric during the conservation treatment. They are as follows: the type of the adhesive method of application used in consolidation, the 'camouflage' materials used by restorers to cover as much as possible of the exposed weaving and the application of the final varnish also on to the fabric to give a more uniform appearance.

4.1 Adhesives

Fabrics attached on deteriorated wooden supports are likely to absorb acids and various, become brittle and fragile; an adhesive will offer a method of maintaining cohesion in the fabric in this situation. However, if the bond with the chosen adhesive is stronger than the fibre itself then the fibre will break down at the point of adhesion (Brooks, Eastop, Hillyer, Lister: 1995).

Generally, the subject of adhesives forms one of the key topics in debate about supporting and consolidation of the fabric component of the icons. The use of adhesives has raised and continues to raise a number of ethical issues including: compatibility, properties of adhesives, effectiveness of treatment and practical issues. This section aims only to review the adhesives used in textile conservation for supporting and consolidating degraded fabrics, where the use of stitching techniques would not be suitable. Nevertheless the presentation of adhesives used in textile conservation in this paper will not bring absolute solutions, but will bring more awareness about the type and the properties of the suitable adhesives, depending on the structure and condition of the fabric and the practical needs of the artefact. Strong alkaline or

acidic solutions will disintegrate the cellulose fabrics which are mainly used on icons. Cotton will not be affected by weak acids and is extremely resistant to alkalis. Choice can be made such as pH of the adhesive and whether it should be applied in a hot or cold process. The author proposes that those adhesives used by the textile conservators may have application in this context.

Proteinaceous adhesives have been considered and used for supporting of the fabric and placing it back on to its wooden support. As these adhesives are polymers of amino acids and have an acidic/basic nature, their pH varies with the pH of the liquid they are dissolved in. When the basic and acidic sections are in equilibrium, this is said to be the isoelectric point of the amino acid. At this point, the molecule is electronically neutral and in its zwitterions state (Ashley-Smith: 1992 and Comyn: 1997). Acids will quickly weaken and destroy linen and cotton fabric structures.

The following adhesives may be found:

- Glues made from bone and skins of animals by heating to extract collagen have been used to consolidate the fabric support as this material is compatible with the gesso mixture used in producing the icons.
- Casein as a mixture of proteins containing phosphorous has also been used to consolidate the loose fabric edges.
- Strong films sensitive to moisture of fish glues extracted from fish skins and bones made up of gelatin have also been used in the past by icon painters to consolidate the fabric areas.
- Isinglass, a gelatinous base material extracted from collagen from fish, has also been used as a size and an adhesive on icons, especially in Russia, often mixed with a honey plasticiser and also used in textile conservation. This material is more preferable than the above because of its low viscosity when it is warm, long chain cross-

linked polymers having good cohesive forces. It appears to be very effective in up to 50% RH and plastic at 68%. (Wyeth: 2003)

The glass transition temperature, T_g^4 , is an important property of a potential adhesive and plays an integral part in the decision making process for the textile conservator (Schiling: 1989). A good adhesive bond is more suitable rather than a strong one. A very weak fibre may require a slightly weaker bond to consolidate it than a stronger material. Reversibility⁵ also is not always a practical issue. For example the adhesive may be consolidating friable cotton, reversing this would result in a pile of powder.

The desired properties for adhesives used in textile conservation adopted by many scholars such as Uytebogaart and Leene (1995-6) are:

- The adhesive must be transparent and not be yellow in a short period of time.
- It must be flexible, retaining this property over time.
- It must be durable to light, oxygen and damp environment.
- It must retain its solubility in solvents, not be harmful to the textile, pigments or dyes.
- Provide reversibility
- Be capable of being applied at room temperature.
- Produce a matt surface appearance.
- Little dirt pick up.
- It should not have any chemical reaction effect with any other component material.
- Safe to the conservator and those who may handle the object in the future.

Synthetic thermoplastic adhesives used since the 1950s by textile conservators on fabric artifacts, could be considered, depending their T_g , by icon painters. Study cases of adhesive treatments and their results used in various textile objects are also listed below giving advice for further reading and research on the analogous treated materials.

Acrylic resins

- Paraloid® (or Acryloid) B72 having a Tg 40 °C is good material to consider for the Greek environment. This polymer, in different formulation and concentration has been applied tested for various conservation processes (as adhesive, consolidation, surface coating and retouching medium)⁶. As Paraloid® has low reactivity with pigments, it has been used as a isolating coating before aqueous cleaning of textiles and as been used to consolidate pigments prior to any supporting or cleaning treatment (Hillyer: 1984)
- Lascaux® 498 HV containing 56% butyl methacrylates with other acrylates having Tg 6°C and Lascaux® 360 HV containing 50% butyl methacrylates and other acrylates having a Tg -28 °C. The two Lascaux® are often mixed at different proportions (1:1, 1:2) reactivated with heat or acetone, and industrial methylated spirit (IMS) to achieve appropriate properties during the treatment due to their difference Tg (498: 13 °C and 360: -8 °C) Horie (1987) reports that they have better resistance to yellowing than the PVAC. It is considered to be nowadays a favorite combination of adhesives for the textile conservators. Both adhesives mixed together in 1:1 ratio have a good colour stability and slightly alkaline pH. (Parker: 2005).

PVAC Poly (vinyl acetate)

A number of formulations are available⁷:

- Vinnapas® EP1 containing 7% vinyl acetate and 7% ethane having a Tg 3°C. Vinnapas is more sticky than Vinamul 3252®.
- Vinamul® 3254 containing 45% ethylene and 55% vinyl acetate having a Tg 0°C.

- Vinamul® 3252 containing 50% ethylene and 50% vinyl acetate having a Tg 3°C. Can be either heat or solvent reactivated. The most commonly used adhesive in the British Museum.
- Vinamul® N. 6515. Used to repair an early Tlingit blanket (Gowers: 1968).
- Mowilith® DM5 containing 65% vinyl acetate and 35% butyl acrylate having a Tg 2°C is more tacky at room temperatures.
- Mowilith® DMC2 containing 65% vinyl acetate and 35% di-n-butyl maleate acting as plasticiser having a Tg 10°C. This is used extensively by the British museum and the Victoria and Albert textile conservation studio from 1967. Mowilith® DMC2 has been replaced by Mowilith® DM427.

The adhesive is generally used on dyed silk crepe line applied to loose fibre samples using hot spatula (Owens: 1991). A previous support treatment using possibly DMC2 on an 18th century petticoat has been identified as possible failure (Kite and Cogram: 2006). A Egyptian linen tunic dated from 3100-2890 B.C was fully supported with adhesive treatment with the use of DMC2 in water (Landi and Hall: 1979) and also used for the consolidation of a 16th century cap (Landi: 1986). Dore (1978) also reports on an adhesive treatment with Mowilith® on two 18th c. English court mantuas. Marko and Dobbie (1982) use the same adhesive for fully supporting a linen 8th century Coptic tunic.

PVAC adhesives as Horie (1987) also report has been shown to be one of the most stable adhesives to light ageing. PVAC is been used in textile conservation studios to support fragile textiles made by silk, cotton or linen giving a clean film on drying. PVAC was also discovered after further analytical techniques to be used as a consolidant in 1959 for full support of the fragments from the Princess garment of Mystra in Peloponnese. The fragments after a

period of time were found to be very fragile, losing their flexibility and difficult to handle (Fiette: 2000).

EVA Ethylene- vinyl acetate

Beva® 371, used extensively in paintings conservation since its introduction in 1972 for full or partially lining, has also been used in textile conservation as an adhesive treatment on several case studies. The treatment of painted silk panels undertaken in the Victoria & Albert workshops using this adhesive is Wagstaff: 1979. Beva has also been extensively used in the conservation treatment of painted banners where strength is appropriate (Lonhhead: 1995). Its Tg has not been published as it can vary according to the proportions of the components used. Beva® Gel as an aqueous dispersion of ethylene vinyl acetate and acrylic resins it can also be considered and tested for cold lining small areas of fabric.

Cellulose derivatives such as Klucel® L and G (low molecular weight, solvent activated adhesive) and SCMC (or Blanose®) having no plasticizers are used extensively in paper conservation have also been applied for consolidating small areas or on full linings to fragile objects since the 1980's. Klucel® after tested into several fabrics it is well known to create relatively weak bonds compared to other adhesives (Gill and Boersma: 1997) used in conservation such as PVA and acrylic emulsions. Singer and Wylie (1997) report the use of SCMC for consolidating parts of a state fabric bed. Cellulose base adhesives have been used to seal edges of patches to prevent fraying. Klucel® has been used successfully to support painted areas of embroidered and painted silk pictures (Brooks, Eastop, Hillyer and Lister: 1995).

In Greece acrylic dispersion Primal® 532K (previous AC 33®) has been considered as a favourite material for consolidating paint film on icons and used in higher concentrations (5%, 15%) for attaching the fabric on to the wooden support. Nevertheless Primal® AC33 has been classified as a tough and hard adhesive by Howells et al (1984) and also Horie (1987) also reports it having a alkaline pH 9.2 with Tg 16 °C making it an uncertain choice when taking into consideration its aging properties. However it is suitable for using with cellulose materials such as cotton and jute as they are far more resistant to alkaline treatment. Although vegetable fibres such as linen used as a support on icons are considered highly resistant to acidic and alkalis, the degraded fibres can be very sensitive to even the mildest acid or alkaline treatment (Timar-Balazsy and Eastop: 1999). Recent research by the Science Department of the British Museum testing, adhesive emulsion for use in the conservation of ethnographic materials, conclude that Primal® B60A which is similar material to Primal® AC33 has a pH of 3.8 after light ageing. The adhesive could also be removed with the use of acetone and IMS after the artificial ageing tests (Parker: 2005).

An Etruscan cloak dated between 800 and 600 B.C, was found to be treated with Primal® AC33. After 20 years the adhesive had lost its flexibility and softness. Removing the adhesive posed many problems with regard to the stability of the object (Weibe and Stauffer: 1999).

Although the preferred adhesive can actually be removed with organic solvents, complete removal is often not achieved leaving residues of the resin on the fabric structure. The effectiveness of the choice of the adhesives in supporting the fabric on the icons still needs consideration and evaluation taking also account of storage and display facilities. Many icons are returned to churches, chapels

and monasteries in which they are going to be venerated by believers. This is their fundamental and prior function and had to be considered in making treatment choices.

4.2 Application

Large parts of fabrics can be revealed without having any overlying gesso layer or any pigment or layer of gold leaf (Fig 6). Extremely deteriorated parts of the fabric or the total surface be supported by using the adhesive applied by spraying⁸ (especially when the fabric is situated on the edges) rather than in being brushed or applied with syringes. The adhesive as a spray form will actually not impregnate a large proportion of the textile but enough to give more it strength⁹ and retain part of its flexibility. Fewer layers of adhesive will also minimize the shiny appearance produced by the use of brushes. Final presentation is also a dominating concern for these spiritual objects. This idea is to attempt to reduce the effects of all aspects of heterogeneous instability from the behaviour of the fabric to the wood support. It provides a minimal intervention without any difficulties and implications other than H&S.



Figure 6. Virgin Mary. 19th c. Private Collection. Large areas of paint losses revealing the fabric support (detail).

4.3 Camouflaging

In certain situations in the past it was seen as perfectly acceptable to paint the fabric, mainly with a brownish colour imitating the wood support to make it less distracting to the viewer. Some icon conservation labs have agreed policies not to conceal areas of damage or restoration on certain groups of objects and restrict any retouching to any part of the icon to a minimum. On the other hand, some large icon collections have a different policy. There the damage areas of the object, such as the fabric weaving structure exposed after the loss of the gesso layers, are made invisible or

'camouflaged' in order to respect the sacred nature of the object and its appearance to the viewer. This is done to preserve theological meaning and not just as a purely cosmetic treatment. Different materials such as egg tempera mixed with pigments or shellac, *kassia* or varnishes have been used as a retouching paint medium for the fabric support. However, applying extensive layers of paint on to the fabric has been proved to actually damage the delicate fabric structure stiffening the surface. Judging from the above information, questions can be raised from the point of a textile conservator. Should the icon conservator use reversible and few coatings to camouflage the white appearance of the fabric and the gesso layer? Should the conservator leave the area as it is? Should keep camouflages or fill the gaps and continue with a full retouching procedure?

4.4 Final Coating

Final coatings are applied on the surface as a protective layer. Nevertheless icon conservators are often apply the varnish to all the areas of the icon even to the fabric damages creating a more uniform aesthetic appearance. Again it should be considered that synthetic or even organic varnishes could also accelerate the aging process and create mechanical damage to the fabric.

Conclusion

To study the fabric on the icons in every period and school is to become aware of the importance of this material and its fundamental role supporting the paint film of an icon. The technical examination of this item prior to the treatment will actually serve as an indication of what type of adhesive or application method the material will require. High quantities of adhesives, camouflage paint films and

varnishes will cause future breakdown to the fabric structure. Even though, despite the confusion, lack of evidence in previous restoration treatments and little documentation, icon conservators might be more aware about the fabric support and its properties.

The author is also giving to the icon conservators attending the conference to complete a questionnaire on approaches to the treatment of the textile substances of the icon, to contribute to his further research.

Material Suppliers

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¹ The expansion is proportional to the temperature rise and can be expressed as the *co-efficient of linear expansion* for a particular material. Wood (pine) 0.000055 per °C along the grain and 0.000034 across the grain (Child:2006).

² As a volatile weak acid has been shown to accelerate acid-catalysed hydrolysis of cellulose. In seal areas the effects would be more dramatic due to its longer residence time.

³ Cellulose fibres are spun into yarns, which is used as thread together to make a two or three ply thread in most common. A simple spinning technique which has to be document of how many fibres have been twisted to manufacture the fabric. Giving with this way information about the mechanical strength of the fabric.

⁴ Tg is normally a temperature below the maximum continuous operating temperature. Is defined as the temperature which the cured adhesive transitions from 'a glass - hard' to a 'rubber- soft' state. Tg is affected by the cure and temperature.

⁵ A new term is considered as the techniques which are applied on the artefacts there are not reversibly. Retreatability in the other hand provide the ability to retreat an object when necessary and appropriate in the future, by removing past treatments such as adhesives or adding new ones to the already existing treatment.

⁶ See more Horie, CV.1987: 22, 80, 35, 46.

⁷ The adhesives could be founded in Timar-Balazsy and Eastop. 1998:310 and Horie, C.V.1987:182-185.

⁸ Extraction must be provided.

⁹ Polyester film could be use to cover the paint area so to not be exposed to spray adhesive.