DOWNLOAD PDF THE DETERIORATION AND CONSERVATION OF PAINTED GLASS

Chapter 1 : Museum Conservation Institute Painting Conservation Glossary of Terms

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Summary Glass is usually the most stable of archaeological materials, but glass artifacts, and 17th-century glass in particular, can undergo complex disintegration. Ideally, glass should consist of percent silica, percent alkali or soda ash sodium carbonate or potash potassium carbonate, usually derived from wood ash , and percent flux lime [calcium oxide]. Soda glass is characteristic of southern Europe, where it is made from crushed white pebbles and soda ash derived from burnt marine vegetation. Soda glass, which is often used for the manufacture of cheap glass, is twice as soluble in water as potash glass. Potash glass is more characteristic of interior Europe, where it is made from local sands and potash derived from wood ash and burnt inland vegetation. A little salt and minute amounts of manganese are added to make the glass clear, but potash glass is less clear than soda glass. Most early glass is green because of iron impurities in the materials. Alkali lowers the melting point of the sand, and the flux facilitates the mixture of the components. As long as the original glass mixture was kept in balance, the resulting glass will be stable. Problems arise when an excess of alkali and a deficiency in lime are present in the mixture, for the glass will be especially susceptible to attack by moisture. In all glass, the sodium and potassium oxides are hygroscopic; therefore, the surface of the glass absorbs moisture from the air. At a relative humidity RH of 40 percent and above and in some cases as low as 20 percent RH , drops of moisture appear on the glass surface. In water, especially salt water, the Na and K carbonates in unstable glass may leach out, leaving only a fragile, porous hydrated silica SiO_2 network. This causes the glass to craze, crack, flake, and pit, and gives the surface of the glass a frosty appearance. In some cases, there is an actual separation of layers of glass from the body. Fortunately, these problems are not commonly encountered in glass manufactured in the 18th century and later. Pearson b, d discusses glass deterioration and reviews the various glass conservation procedures. At our present state of knowledge, the decomposition of glass is imperfectly understood, but most glass technologists agree that glass decomposition is due to preferential leaching and diffusion of alkali ions Na and K across a hydrated porous silica network. Sodium ions are removed and replaced by hydrogen ions, which diffuse into the glass to preserve the electrical balance. The silicates are converted into a hydrated silica network through which sodium ions diffuse out. Decomposed glass often appears laminated, with iridescent layers on the surface. Glass retrieved from an acid environment often has an iridescent film, which is formed by the leached silica layers. The alkali which leached out is neutralized by the acid, and fewer hydroxyl ions are available to react with the silica. This causes the silica layer to thicken and become gelatinized. Glass excavated from an alkaline environment is less likely to have laminated layers because there is an abundance of hydroxyl ions to react with the silica network. Usually a protective layer does not form on glass exposed to alkaline solutions. The dissolution of the glass proceeds at a constant rate. The alkali ions are always extracted in excess of the silica, leaving an alkali-deficient layer, which continually thickens as the deterioration moves deeper into the glass. There are considerable differences of opinion as to what to do with unstable glass. Some professionals advise that the only treatment should be to keep the glass in low RH environments so the glass does not have any moisture to react with. While a RH range of percent is usually recommended, it varies in relationship to the stability of the glass. The weeping or sweaty condition is sometimes made worse by the application of a surface lacquer or sealant. No resin sealants are impervious to water vapor, and the disintegration continues under the sealant until the glass falls apart. Other glass conservators try to remove the alkalinity from the glass to halt the deterioration. Most, if not all, of the glass manufactured from the 18th century on has been produced from a stable glass formulation, and there are not likely to be any considerable problems presented to the conservator other than normal devitrification. Since the glass is impervious to salt contamination, no conservation treatment other than simple rinsing, removal of incidental stains, especially lead sulfide staining on any lead crystal, and removal of calcareous deposits is expected. The main problems will be related to gluing pieces together. All the problems likely to be encountered are discussed thoroughly Newton and Davidson It is presented below. Wash the glass thoroughly in running tap water and then soak it in distilled water. Dry the glass in two baths of alcohol. This treatment will retard the disintegration and also improves the appearance of the glass. It does not, however, always stop the breakdown of the glass. For assurance, store the glass in a dry environment with the relative humidity no higher than 40 percent; other professionals say that an RH of percent is ideal. RH 42 percent is the critical point at which KCO3 becomes moist. The above treatment does not attempt to remove any of the glass corrosion products, which often result in layers of opaque glass that may be removed with various acid treatments. The decision to remove surface corrosion products, which often mask the color of the glass, must be made on a case-by-case basis. Removal of corrosion products may also significantly reduce the thickness of the walls and weaken the piece significantly. Indiscriminate removal of surface corrosion products can weaken, blur, or alter surface details. The corrosion layers of a glass object may be deemed a part of the history of the object, and thus a diagnostic attribute, and should not be removed without good reason. It occurs naturally on flint and obsidian and is the basis for obsidian hydration dating. The surface of any glass from any time period, especially soda glass, usually becomes hydrated through time and so will eventually devitrify. Devitrification occurs when the surface of the glass becomes partly crystalline as it adsorbs moisture from the atmosphere or from a submerged environment. As it becomes crystalline, the surface becomes crazed and flakes from the body of the glass. Devitrified glass has a frosty or cloudy, iridescent appearance. Pane glass is especially susceptible. To prevent further devitrification and to consolidate the crazed surfaces, a coating of PVA or Acryloid B should be applied to the piece. Either of these surface adhesives will smooth out the irregularities in the pitted, crazed surface of the glass by filling in the small cracks and forming optical bridges, making the glass appear more transparent. Merely wetting glass will cause it to be appear clearer for the same reason. A percent hydrogen peroxide solution is used, as with ceramics, to remove these sulfide stains. Other than stain removal, strengthening of glass artifacts with a consolidating resin is often required. Fragments can be glued together with a good glue, or if deemed necessary, an epoxy, such as Araldite. Optically clear epoxy resins are generally preferred as they adhere to the smooth, non-porous glass more readily. They also dry clearer and shrink less than the solvent resins. The resulting bonds, therefore, are less noticeable and stronger than with other glues. The epoxy resins are, however, usually irreversible. Hysol Epoxy with Hardener and Araldite are the two brands most commonly used in glass repair. It is exceptionally difficult and time consuming to gap-fill glass. It requires considerable work and experience. The problem of matching transparent glass colors is equally difficult. All of these problems are adequately discussed in greater detail in Newton and Davison As is the case with all conservation, it is necessary for the conservator to be able to recognize what the problems are and to know what may be used to counter them. When lead oxides are found during glass conservation they can be removed with 10 percent nitric acid. A percent sulfuric acid solution can be used to remove iron oxide, neutralize the alkalinity of glass that is breaking down, and, occasionally, to remove calcareous deposits. Calcareous deposits are commonly removed with 10 percent hydrochloric acid and, on some occasions, by immersing the glass in 5 percent EDTA tetra sodium. Iron stains are commonly removed with 5 percent oxalic acid or 5 percent EDTA di-sodium. SUMMARY Realistically, few problems other than reconstruction and restoration are likely to be encountered on any glass objects found in archaeological sites dating from the mid 18th century to the present. In most cases, the same chemicals and equipment required for treating ceramics are also used for conserving glass.

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Chapter 2 : Conservation and restoration of stained glass - Wikipedia

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An Introduction to the Problems Ivo Rauch 1. Introduction In all branches of learning in these enlightened times there reigns yet still among us a certain barbarity in many areas. Among other things, the unfortunate fate of most fired coloured glass panels may serve as an example, and how many, indeed how very many of these beautiful windows that were once the greatest glory of our churches have been removed from our churches in our times, on the petty pretext of allowing in more light. During the course of the nineteenth and twentieth centuries, losses to medieval churches and the glass windows with which they had been furnished increased steadily on account of harmful environmental factors. Concern has often been voiced that many historical examples of stained and painted glass are today in an alarming condition, and are in need of cleaning and conservation. A particular problem furthermore is the fact that many famous panels have been restored on several occasions over the years, and often exhibit patterns of damage that can be traced back to these restoration interventions. Even stained and painted glass of the late nineteenth and early twentieth centuries is now of an age that it will barely be possible to pass it to the next generation without intensive maintenance and preventative conservation. In view of the huge onus this constitutes in the preservation of historical monuments, it is my intention here to explain some of the types of damage that occur to historical windows, and to outline some of the measures with which these types of damage can be addressed and prevented from happening in the future. As a result of their experiences, and following the catastrophic losses of the two world wars, all European countries made particular efforts to preserve their treasure troves of historical glass panels. Since all mid-European states primarily France of course, but also Germany and England have large expanses of medieval stained glass, methods for its cleaning and conservation were developed everywhere. Fortunately, over the last decade a common approach has developed, a body of principles that remained unwritten for a long time, in accordance with which restorers in many countries in Europe and overseas can deal with stained and painted glass. This has arisen not least because of the efforts made by the international Corpus Vitrearum Medii Aevi, whose committee for the restoration of stained and painted glass drew up guidelines for the conservation and restoration of stained and painted glass for the first time in , in conjunction with ICOMOS. These guidelines were recently reformulated by an international working group and published in this form for the first time in German in Die Denkmalpflege, This progress, welcome for addressing both the technical and the ethical aspects of restoration, was occasioned by the establishment of academic training courses for glass restorers in Antwerp, Paris and Erfurt, which are further developing research and pedagogy in the field. Yet methodological and technological differences remain still today between the different countries of Europe. Consequently, what follows should provide an insight into the restoration traditions of Germany against a background of principles that are not the subject of international controversy; mention is also made of many of the methods that differ from country to country. The Production of Stained Glass To begin, we should perhaps remind ourselves of the complex processes involved in the production of stained-glass windows. The production of a stained and painted glass panel in medieval workshops has been described in detail frequently. Even though the corrosion of glass is affected to a variety of factors, we may conclude from this that as early as the thirteenth and fourteenth centuries, workshops were simultaneously using differing base materials from different, sometimes very distant glassworks. This is necessary from a purely technical point of view and is corroborated by Theophilus. This sketch was very probably drawn onto a wooden panel covered with a chalk whitewash, and an example of one such panel from mid-fourteenth-century Gerona in Spain has survived. For each colour desired, a piece of glass was cut out to the correct shape according to its planned outline by means of a hot cutting-iron; the edges were then shaped more precisely with a grozing iron. At later dates, diamond glass-cutters were increasingly used for this purpose. The design for the interior surface was then applied in a dark glass-paint and with washes of varying thicknesses; at later dates silver stain 9 and enamels, 10 with which images could be modelled, were used to create the design. In addition, the use of etching and cutting techniques, such as were applied on occasion in the late middle ages and the nineteenth century, allowed the layering of colours in multi-layered flashed glasses. These cames were cast to be H-shaped in section, and in the medieval period they were shaved and cut with a knife to the desired width and height. At later dates, the use of lead strips became the norm, whereby the raw material could be milled cold into the desired profile. It remains unclear whether the panels were then further insulated against wind and rain with putty as was normal in post-medieval times , as there is no mention of putty in contemporary art-technological handbooks, and demonstrating the presence of medieval putty on specific objects is exceptionally difficult. Panels were then secured in their stone frames with mortar and to the ironwork with iron T-bars, against which the panels were placed and secured with wedges. In later times, a whole variety of systems for holding glass panels in place developed. The Deterioration of the Stained Glass Some panels produced in this way have been able to last centuries in good condition, as is demonstrated by the panels that have been kept in museums since the beginning of the nineteenth century. However, those panels that have remained in their original locations and been exposed to the weather and perhaps suffered from inadequate maintenance today show signs of severe damage. Particularly noticeable in the first instance are the thick layers of dirt that cover the interior and exterior surfaces of nearly all historical panels. These encrustations of dirt usually constitute a firmly attached stratum of dust, soot from candles and heating systems , remains from applications of putty, and other noxious substances. The exterior surfaces can often be observed to have been dirtied with pigeon droppings, which have an etching effect on the surface of the glass. It is not just dirt that damages the panels: The layers of dirt and the corroded paint layers are usually so completely intermixed, that they can no longer be distinguished from each other. These problems are not just found on finely painted figurative panels: An even more serious problem is the corrosion within the glass itself. This starts as point-sized pits and spreads outwards from different centres figs 1 and 2. The surface of the glass breaks up, and the pock-marked and damaged core glass underneath becomes visible. This type of corrosion can cover the whole surface of the glass and make it totally opaque. How can this type of damage be explained in more detail? Images produced with a scanning electron microscope show that the glass is divided up into strata fig. In glass of this type and date, a zone builds up over the core glass where, over the course of time, silicate molecules originating in the centre of the glass gather. Water gets into the cracks and lead to the formation of syngenite and gypsum, causing further damage. Both syngenite and gypsum are opaque, which is why the glass seems to the viewer to become gradually darker and eventually black; both are also precipitated in crystal form. The crystals gain in volume, thereby breaking open the surface of the glass. On top of this package of corrosion is the original, endangered paint layer, as well as dirt and, very often, micro-organisms, such as mould or algae. This phenomenon, usually caused by the oxidation of the manganese present in the glass, is unfortunately quite common in glass of the thirteenth and fourteenth centuries. Restoration and Documentation How should one proceed with historical stained and painted glass in light of this complex damage situation? Before anything else, an absolutely essential requirement for these valuable works of art is research by art historians and restorers, which could include preparatory chemical analysis if need be. While the various types of browning that occur in medieval glass cannot be reversed in the present state of restoration technology, 19 in the case of the corrosion encrustations, appropriate interventions may be made. It is normally useful to thin out the corrosion encrustations, as these are hygroscopic, absorbing moisture, which can lead to further damage. It is advisable initially to try to expose the various layers of corrosion: Ideally - though in practice almost completely impracticable - the corrosion layer should be cleaned off without damaging the underlying gel layer. This layer is chemically more stable than the core glass, so less susceptible to corrosion. However, cleaning a piece of glass too hard or too deeply will probably result in increased corrosion in the future. In order to avoid this, restorers have gone over to leaving a thin layer of corrosion material in situ. This uncontroversial, common-sense approach has been adopted by all conscientious restorers and experts in Europe. However, the ways in which people try to achieve the desired level of controlled removal of corrosion encrustations are diverse. In view of the problems associated with the glass surface for most stained and painted glass, traditional cleaning methods are out of the question. Attempts to clean glass with sandpaper, steel wool, steel brushes, sponges, dipping troughs, etching acids or strong soapy water, which were still occurring in inexperienced workshops some years ago, are thankfully a thing of the past. Instead of this, different countries have developed different restorative cleaning methods. For instance, in England work is often carried out with a micro-jet process, by which the corrosion encrustations can be removed with exactly regulated pressure. In this way, the corrosion layers can be thinned out in a focused manner. Many French restorers, in agreement with the Laboratoires de recherche des Monuments historiques in Champs-sur-Marne, prefer to remove corrosion chemically, by means of poultices or gel pads. After a while, the poultice or pad can be removed and renewed if necessary. In the hands of a specialist, this method can be used for deep, focused cleaning. However, the suspicion remains that chemically cleaned surfaces corrode more swiftly, as has been shown by experiments in Vienna, where sample areas of glass that had been cleaned with EDTA developed new corrosion encrustations after only eight years. In such cases, work can be undertaken in a more controlled manner by using mechanical means. Many mechanical means are available for further cleaning of the surface, such as different varieties of hard brush, fat-absorbing powder, etc. Fortunately, opinion as to these cleaning methods is no longer divided into camps. It is also agreed that all three methods, in the hands of an inexperienced restorer, can cause extensive damage. It is therefore very important only to employ specialized and experienced restorers on a contract. As already intimated, restoration work is particularly difficult when original paint lines sit on top of the corrosion layers. These are often fragile and prone to become detached fig. Cleaning should not take place as a first step in such cases, and it may be necessary first of all to secure the original paint outlines. Under no circumstances does it make any sense to cover the whole piece of glass with synthetic resin. Such layers of resin are in danger of becoming detached in a short space of time and tearing off the painting underneath them, as has been shown by investigations on the windows of the Church of St Martha in Nuremberg, which were completely covered in the synthetic resin Paraloid B72 about twenty-five years ago. Here, the layer of synthetic resin has developed large bubbles and is becoming detached from the layer beneath over large areas. Layers of paint can also detach themselves from the glass to which they are applied, even when there is no corrosion of the glass. This often occurs in cases where enamel colours have been used. This technique, developed in the fifteenth century, involved firing ground, coloured glass onto support glass. The result is flakes that look like crystals, which are very hard to secure in place and conserve. A further significant problem is overpainting by earlier restorers. Oil- and tar-based paints were used for overpainting on many windows, particularly in the nineteenth and early twentieth centuries. Over the course of time, the overpainting has become black, and is today working its way loose in the form of large clumps, often taking large parts of the original painting with it. Although there is often a desire to remove the overpainting on aesthetic grounds, the decision requires careful consideration. For example, if the overpainting is endangering the historical paint layers underneath, one should ascertain what the binding agent in the overpainting paint is through chemical research. The layers of overpainting should then be removed layer by layer with poultices, without damaging the original layers of paint underneath by rubbing too hard or by over-wetting There are often cracks and gaps in historical panels, and the way in which these are treated from a restoration point of view throws up a large number of questions. While the decision-making process for cracks in glass is relatively simply, since repairing the crack with glue is only really necessary if there is danger of further loss, 28 the problems associated with missing areas of an image are harder to solve. However, restoring severely deteriorated glass in this state would involve destroying large parts of the object, and of course its historicity. The huge controversy as to whether partly or totally destroyed works of arts should be reconstructed has caused quite a stir in recent years. Thus in each individual case a plan of action needs to be researched and thoroughly reviewed. Results that are acceptable from an aesthetic point of view as well as from a restoration-ethics standpoint can often be achieved with suitably coloured and toned stop-gaps without any painted design on them. In addition to the different types of glass and the glass surfaces, the leading and the putty sealing usually also require restorative treatment. Many lead cames suffer from corrosion particularly around the solder points. It is often suggested that such areas should be releaded, which is usually not necessary, and is also not acceptable.

Chapter 3 : Conservation and restoration of painting frames - Wikipedia

Deterioration of stained glass. The primary aim of conservation is to slow the rate of deterioration, caused by various factors, to the point where the loss of significance, such as historic information and/or aesthetic value can be kept to a minimum (Pye , Ch. 5).

Under Construction August 1. Unfortunately, even with the proper care, this is not always the case as some glass is known to deteriorate rapidly over time. On a chemical level, most glass is stable. However, some glass artifacts are known to undergo a complex disintegration. This chemical breakdown of glass is commonly known as glass disease. The main component in glass is silicon dioxide, also known as silica. Silica occurs naturally in three forms. Its solid form is known as quartz, its amorphous or non-crystalline form is known as opal, and it is commonly found in its impure form as sand. Quite often, the alkali material used was either soda ash, a sodium carbonate which is obtained from burnt plant material, or potash, a potassium carbonate usually derived from wood ash. The sodium carbonate in soda ash produces a clearer glass than potash, so it was â€" and still is â€" more commonly used in glass manufacture. However, when sodium carbonate is added to silica, the resulting glass is water soluble â€" meaning it will dissolve in water. This is generally an undesirable characteristic for glass. For that reason, lime calcium oxide is often added along with other minerals for better durability. The addition of lime also helps the different components to mix together more easily. Abrasion, ghosting, mold, and previous treatments have also been seen on glass. Glass Disease While glass disease is seen on various kinds of glass objects, the most common Alaskan artifacts we have seen it on are glass beads. This damage might be historically interesting, as it might suggest a very old bead. By the 16th century in western Europe, the production of glass and beads in particular became central to the economic and political endeavors of the time. Production continued to increase throughout the centuries and bead making techniques were adjusted to meet the increasing demand and to decrease production costs as much as possible. Chemical compounds that were added to glass mixtures to lower the glass melting point began to be added in even larger amounts. This reduced the amount of fuel needed to run the furnaces and sped up the process overall. As mentioned above, most glass consists of approximately three-quarters silica with sodium carbonate added to lower the melting point and calcium oxide to stabilize the mixture. If this combination is kept in balance, the glass is likely to remain stable. However, when there is an imbalance in the proportion of these components, problems can arise. If there is an excess of alkali and too little lime as was happening in Murano , the surface of the glass may begin to react with moisture in the air and start to break down. This is the major cause of glass disease. Glass disease is therefore inherent in the chemical makeup of certain glasses. This is both good and bad news. The bad news is that if the chemical composition of the bead lends itself to glass disease, there is nothing that can be done to stop it from breaking down. The corrosive nature of glass disease causes a snowball effect of sorts on objects that succumb to it. Once the process begins, there is no known treatment that can reverse the effects or stop it from proceeding. At the present time, it is not fully understood how this decomposition of glass proceeds on a molecular level. However, we do know that in all glass the sodium and potassium carbonates are hygroscopic. This means that they readily take up and retain moisture from the air. Once these salts become hydrated, they can leach out of the glass and form crusty deposits on the surface. As the sodium and potassium ions are removed from the chemical structure they are replaced by hydrogen ions, which diffuse throughout the glass. This creates a hydrated silica network which is inherently weaker. As the deterioration of the glass progresses, the surface of the glass becomes increasingly alkaline. An alkaline substance is one the measures above 7 on the pH scale. A bead with glass disease will show many symptoms, some of which can be seen easily and others that may require the use of a magnifying lens or microscope. There are five signs of glass disease which are commonly cited by conservators. Additionally, as glass begins to deteriorate, it will quite often have a dull, foggy appearance. This results from deposits left on the surface of the glass, as well as crizzling altering the reflectivity of the glass. In certain environments, droplets of moisture may appear on the surface of a glass bead. This is known as sweating or weeping. This occurs when atmospheric moisture combines with the alkali material used in the manufacture of the glass and causes the hygroscopic alkali salts leech out. These salts migrate to the surface forming a soapy, sticky alkaline solution. This soapy residue forms abrasive and caustic by-products, which draws dust and dirt to the surface. This in turn attracts more moisture to the glass and facilitates the progression of the glass bead deterioration. Glass beads may have a white, fuzzy look to them as salts from these residues crystallize, as well as from the dust and dirt attracted to the soapy alkaline residue. Unstable glass and high humidity can also result in the formation of crusty deposits on the surface of beads. As discussed earlier, alkaline products that migrate out of the beads turn into alkaline salts, which are left on the surface of the bead or adjacent material. This produces a hard alkaline coating which can give glass a white, dusty appearance. As the deterioration of unstable glass progress, small fissures in the surface of the glass start to become visible. This is known as crizzling and it is characterized by a fine all-over cracking or fracturing of glass. This step in the degradation of the glass can also lead to flaking and pitting on the surface of the bead. Crizzling of the glass surface can cause transparent beads to look opaque and also contributes to the appearance of a whitish haze. Like all glass objects, glass beads can crack, break, or become easily scratched if they, or the objects to which they are attached, are not carefully handled. Abrasion and scratches interfere with the way light passes through the glass and can cause a whitish, opaque haze. Think of glass fishing floats, for example, which can appear hazy if they have been abraded by sand. It seems rather unlikely, however, to have a mold that grew in such a specific pattern as to duplicate an image. When the white accretions making up transferred images were analyzed in the s, they were discovered to be made primarily from ketones and sodium soaps Williams , The overall hypothesis for this is that ketones volatilize from the paint, condense on the glass and then oxidize into carboxylic acids. These acids then react with sodium in the glass to form the sodium soaps that make up the images Williams , This is a similar reaction to that found happening in glass beads â€" particularly those in contact with lipid-containing ethnographic materials. Rather, a halo of clear glass remained around the point of contact with the transfer image forming again beyond this halo Williams , Since the transfer images are composed of organic compounds, they have poor solubility in water. To test this, take a small sample of the white stuff and place it on a glass slide or similar. Add a couple drops of water. If the compound does not appear to dissolve, this would rule out a soluble salt and may indicate the presence of insoluble organic compound. Glass used to frame a photo at the Alaska State Museum once had branch-like mold on the inside of the glass, suggesting the gelatin of the photo might have provided enough nutrients for mold. Additionally, dust and grime that accumulate on glass can provide the necessary materials to allow for mold growth. Mold was once seen on the glass touching the surface of a framed photograph at the Alaska State Museum. When viewed under a microscope, the vegetative part of mold known as mycelium http: Previous treatment Different types of treatments may have been used in the past on glass beaded objects that could cause a white or hazy appearance. Adhesives may have been used to reattach beads, and these often can look cloudy and opaque as they age. Pesticide residues can create a whitish haze over the surface of materials, including beads. Pesticides were commonly applied during the early 20th century to collections containing natural history specimens and ethnographic artifacts made of organic materials such as leather, fur, and feathers. Aspects of Manufacture, Use and Conservation. Edited by Margot M. Most impacted beads fell into one of two categories: Sometimes kaolin clays used to whiten leather show up as white powder on beads but are not harmful. Spot testing was also able to ID chlorides on beads throught to have contact with salt water. Harry N Abrams, Inc. Date for beads entering Alaska is unknown; however trade may have brought them into the region long before the first contact with non-indigenous explorers. Gives an insightful and thorough history of bead trading and the value of beads along the NW coast. Provides many images of different types of bead and objects beads were used in the manufacture of. Barclay et al Ottawa, Canadian Conservation Institute. Controlling RH is the best solution for beads that exhibit early symptoms of glass dieases such as broken beads, sweating beads, crusts on bead or thread, crizzling, bleached spot below the bead on a textile, darkening of leather in contact with the bead.

Ordonez, Eugenia and John Twilley, John. Research, Practice and Training. Edited by Johanna G.

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Chapter 4 : GLASS | What's That White Stuff?

The paint layers on stained glass can serve to protect glass or can be damaged due to different factors. The paint is often more stable than the glass substrate. Yellow stain and grisaille, fired onto the glass at about Ëš F, can serve either as a protective layer or cause deterioration of the glass surface (Davison).

A paint loss caused by excess friction during improper varnish removal or a varnish loss caused by friction. A family of synthetic resins made by polymerizing esters of acrylic acids. A synthetic resin which is the condensation product of a polybasic acid such as phthalic, a polyhydric alcohol such as glycerin and an oil fatty acid. An Italian phrase meaning painted solely wet in wet and usually, but not necessarily, at a single sitting. It is used most commonly with reference to oil painting. The nonvolatile portion of a coating vehicle which is the film-forming ingredient used to bind the pigment particles together. A term applied to lacquer when they become partially opaque, cloudy or transparent upon application or drying. Fast-evaporating solvents may cool the film enough to cause water condensation, precipitating solid materials. Blending is most commonly used with reference to academic painting to mean the blending together of separate touches of color for half tones until the graduations of tone and the marks of the brush are imperceptible. Usually refers to the broad application of masses of light, shade, and color, in the early stages of a painting. It helped to obliterated rapidly the glaring bright of the ground. A bluish fluorescent coat which forms on the surface of some films. Common term for the degree of viscosity of a paint or varnish, as "a lot of body" or "not much body. The presence of a loose powder on the surface of a paint after exposure to the elements. The use of graduation of light and dark to describe forms in drawing and painting. A generic term referring exclusively to all colors of the spectrum, including white and black. Color is described by three properties: A pattern of cracks that develops on the surface of a painting as a result of the natural drying and aging of the paint film. The tendency of a liquid to draw up and bead on the surface. Fine lines or minute surface cracks occurring on painted surfaces due to unequal contraction in drying or cooling. Removal of color on abrasion or rubbing. Any catalytic material which when added to a drying oil accelerates drying or hardening of the film. Oils which have the property of forming a solid, elastic surface when exposed to air in thin layers. The drying oils most commonly used in oil painting were linseed oil, walnut oil and poppy oil. Examples of non-drying oil unsuitable for painting are olive oil and almond oil. A phenomena whereby a whitish crust of fine crystals forms on a painted surface. These are usually sodium salts which diffuse through the paint film from the substrate. Egg either whole, yolk or white can be used as a pigment binder. Tempera painting was very popular until the late fifteenth century. A suspension of fine particles or globules of a liquid within a liquid. Historically, enamel has described decorative and protective glassy coatings on metal as well as glassy, decorative coatings on glass. Enamel has also implied certain organic coating such as paints or lacquers. A pigment which contributes very little hiding to the system, but does reinforce the film and alter the gloss. The bodily waste discharged by flies. Fresh specks can be cleaned off with moistened cotton swabs; however, aged specks can not be cleaned off at all. Traditionally a lean layer of size and chalk to form a ground on which to paint. It is used in egg tempera painting and as a coating material. Traditionally used to add color to forms modeled in monochrome opaque paint. Aged glaze is very sensitive to solvents. The shine, sheen or luster of the surface of a coating. Most common are angles of 20, 60 and 85 degrees. Dirt can be in the varnish, on top of the paint layer, or on top of the varnish. A layer of opaque paint applied to a support to provide a suitable color and texture on which to draw or paint. It usually results from faulty solvent balance or incompatibility of ingredients. The texture created in a paint surface by the movement of the brush. Impasto usually implies thick, heavy brushwork, but the term also refers to the crisp, delicate textures found in smoother paint surfaces. Paint applied over losses only. This is a technique commonly used by conservators to unify a painting that has suffered paint loss. A term which usually indicates that the material dries by evaporation and forms a film from the nonvolatile constituents. A colored natural or synthetic dye absorbed onto a semi-transparent base and used as a pigment. When solvents are applied to a paint film, solvent soluble compounds are removed and the film becomes more brittle. Lean oil color is paint in which the oil or fat content has been reduced, usually by indirect means such as diluting the paint with turpentine. Brightness, reflectance, value Position on the grey scale between pure black and pure white. The most popular drying oil used as paint medium. The medium hardens over several weeks as components of the oil polymerize to form an insoluble matrix. Driers can be added to accelerate this process. A painting is said to be loaded when it is painted thickly, often with a heavy impasto. A loaded brush is one charged to its full capacity with paint. The gloss of a finish. The component of paint in which the pigment is dispersed. Organic surfaces exposed to high temperature-humidity atmospheres are attacked by fungus growth. This dark discoloration, usually a mold type of fungus but more commonly called "mildew. A film defect associated with spraying. Appears as circular imperfections. Tree resins mastic and dammar , fossil resins copal and amber , and insect resin secretions shellac. A general term from a water-insoluble viscous liquid oleoresinous: Indicating a material which has been made by the combination of an oil and a resin. Hiding power or the degree of obliteration. Impervious to light or not translucent. A pebbled film surface similar to the skin of an orange in appearance. It is caused by too rapid drying before leveling takes place. This paint was not applied by the artist but applied at a later date. It not only covers the original paint, but its presence often indicates an excessive alteration of the image. Over painting is not an acceptable conservation technique. The paint layer is the actual layer or layers of color more-or-less opaque applied by the artist in the execution of the painting. Derived from the Italian meaning "repentance. These alterations are often visible in the infra-red, to x-rays and sometimes to the naked eye. A finely divided, insoluble substance which imparts color to the material to which it is added. Solvents such as alcohols, ketones, etc. These have high dielectric constants. A large molecule formed when many molecules are linked together by polymerization. An organic polymer in the form of a crystalline or amorphous solid, or viscous liquid, of wither natural or synthetic origins. The work done by a restorer to replace areas of loss or damage in a painting. The tendency of a wet paint film to flow downward and become thicker on vertical surfaces. Purity or intensity of color. Degree of freedom from grayness. Very thin layer of opaque or semi-opaque paint that partially hides the underlayer. The difference in appearance between colors of similar hue. A specular reflectance taken at a low angle, usually 85 degrees. The absorption of paint medium by a lean underlayer to produce a matte or dead surface. An adhesive diluted in water. Usually means and animal glue consisting of collagen and gelatin, rabbit skin glue, parchment glue, and edible jelly are all forms of gelatin. A rigid wooden frame over which a canvas is usually stretched. The stretcher can be expanded by tapping keys wedges inserted at the corners. A stretcher from with fixed corners. It cannot be expanded. Complex, substantially amorphous organic semi-solid or solid materials built up by chemical reaction of simple molecules. The outside edges of a stretched canvas through which tacks are inserted attaching it onto the stretcher. Usually refers to egg either whole, yolk, or white used as the medium but can also refer to glue size.

Chapter 5 : Conservation and restoration of glass objects - Wikipedia

The deterioration and conservation of painted glass: a critical bibliography and three research papers / R. G. Newton Published for the British Academy by Oxford University Press London Australian/Harvard Citation.

However, in the case of stained glass, these efforts are complicated by the nature of the medium itself. The condition of each component is important for the overall preservation of the window, as deterioration within one material can affect the others with varying degrees of severity. Causes[edit] The vast majority of stained glass was originally created to function as part of the building envelope, separating the interior of the structure from exterior environmental conditions. As a result, most historic glazing that has been left in situ is subjected to a constant onslaught of harmful conditions including but not limited to: UV light from sunlight, extreme weather conditions, indoor and outdoor man-made pollution, and biological damage caused by pests such as pigeons, bats, and various micro-organisms Rauch , 3. As a result, panels often become encrusted with thick layers of dirt that eventually become quite firmly affixed, and can even begin to intermingle with the underlying, corroded layers of paint Rauch , 3. Environmental influences also play a role in the continuing deterioration of metal cames and frameworks, which can cause significant structural damage. In addition to these environmental stressors, further deterioration can also result from the myriad of other factors that influence the materials out of which the window is constructed, such as vibration from building use and the remains of previous treatments and repairs that have since deteriorated and increased the corrosion processes of other materials Rauch , 3. Although glass as a material is known for its chemical stability resistance to natural deterioration, impurities and variations in glass composition can cause considerable chemical instability that may further destructive processes Vogel et al. Glass is also susceptible to atmospheric pollution, and high levels of humidity or moisture over long periods of time, both of which can speed up the corrosion rate of chemically unstable glass. Over time, corrosion, marked by pitting or pocking of the glass, can deepen and spread until the surface layer itself breaks apart, uncovering the vulnerable, damaged core, until it becomes opaque Rauch , 3. This opacification occurs as water seeps through the subsequent cracks, causing the formation of opaque syngenite and gypsum crystals that block light from filtering through the previously translucent glass Rauch , 3. As these crystals continue to grow, they pose an even greater danger to the glass, eventually breaking through the surface and dislodging the delicate paint layer, or even causing cracks Rauch , 4. Glass plates can also darken or cloud as the result of the oxidisation of certain metals, such as manganese, which was a common addition to late medieval glass Rauch , 4. Painted surfaces that would have been applied to glass cold and fired on, are especially vulnerable to damage from condensation or weathering, if they were fired improperly during the production process Vogel , 7. This is often the case with the fading or disappearance of fine detail, such as faces, in figural stained glass art fig. Over time, enamels can begin to flake off of glass panels, and certain types or colours of stains can discolour with continued UV exposure, all of which significantly alters the aesthetic impact of the work as a whole Brown et al. Structural deformation and deterioration[edit] Figure 3 â€” The leaded clerestory windows of Holy Trinity Church have been weakened by time and the elements. The breakdown of the skeletal structure that holds the glass in place, such as damage to tracery and the corrosion of metal cames and fixing systems, often poses the greatest, imminent risk to stained glass work Vogel et al. Although stone elements are not prone to excessive change due to environmental conditions, this is not the case with metals, which are much more likely to deteriorate from prolonged exposure to the elements. For example, the cames that make up the matrix of a stained glass window, for which lead and zinc were most commonly used, undergo quite a bit of thermal expansion and contraction, eventually resulting in metal fatigue, which in turn weakens the joints between the plates, causing whole panels to deform or simply fall apart Vogel et al. Additionally, metal matrixes and frames may weaken with stress, such as that which has occurred at Holy Trinity Church in Stratford-upon-Avon, UK, where years of wind buffeting the leaded clerestory windows has endangered the structural integrity of not only the glazing, but also, the upper portion of building itself fig. The conservator must be familiar with not only the general materials with which he or she is working, but also the details specific to the project at hand, in order to understand and address the needs of a particular window or building. Using this knowledge, conservators can develop a conservation plan that can be used throughout the project, to ensure that all decisions are made with the aims of the project and the needs of the object in mind CVMA Basic conservation philosophy[edit] In J. All materials and procedures should be reversible without affecting the piece All intervention must be the least required to achieve the desired end. Original materials should be retained so far as is possible. All conditions, procedures, materials and processes must be recorded. The hand or style of the conservator should not be visible to the casual observer on the object. However, all restoration should be discernable to future conservators. The conservator is ethically bound to provide the highest quality restoration within his [or her] power without regard for his [or her] personal opinion of the value While this list is not exhaustive, it does illustrate the basic foundations upon which responsible conservation decisions should be made. Of utmost importance in this list are the fundamental ideas of minimal intervention and reversibility of treatment, both of which are necessary to ensure that the overall integrity of the windows, as historic and artistically valuable objects, is not compromised. Research[edit] Owing to the incredible amount of chemical and methodological variability to be found when dealing with stained glass, research into the general production habits of pertinent regions or eras may provide clues that can help conservators understand the overall significance of the piece, anticipate what to expect from the materials, and determine how to proceed Sloan , 28; Vogel , 5. For example, a conservator working on a set of windows in the United States, will want to ascertain whether the glass was produced before, during, or after the midth century, as changes to general glass composition were made during this time that could influence the types of impuritiesâ€”and subsequently, some of the deteriorationâ€”to be expected Vogel et al. This research phase should also include a full condition report on the current condition of the stained glass that includes a record of any and all evidence of past intervention or repair CVMA Decision making and implementation[edit] Decisions should be made using the information gathered during research, and implemented by experienced conservators. As much as possible, benefit to the historic glazing should come before all other considerations Vogel et al. At all stages, steps should be taken to ensure that the actions taken are in keeping with the aims of the conservation plan. Documentation[edit] Proper documentation plays an extremely important role throughout this entire process and should be considered obligatory. All aspects of this process including preliminary research, condition surveys, conservation plans, and all the methods and materials used throughout treatment should be duly recorded, and the documents be preserved and made accessible in the long-term for future reference CVMA Types of treatments[edit] In general it is best to keep interventive treatments at a minimum: However, more serious damage that either detracts from the aesthetic or practical functions of the glass, or indicates active deterioration may require more extensive treatment. Cleaning[edit] Careful cleaning of stained glass can be a very effective means of improving its overall condition, because its appearance and function are so heavily dependent on its ability to transmit light. Unfortunately, owing to the fragility of corroded glass, nearly all cleaning treatments can cause changes in the surface of the glass that can expedite corrosion rates, or damage delicate paint layers Romich et al. Thus, cleaning efforts should not necessarily be concerned with the complete removal of all encrustrations, but rather the careful thinning of these layers to a point where light can be transmitted through the glass at an acceptable level Rauch , 5. The simplest cleaning can be performed using carefully applied deionised water, although other mechanical or chemical means are often necessary, and must always be done slowly, in a controlled and focused manner Rauch , 5â€”6; Vogel et al. With any of these methods, care must be taken to ensure the stability of painted layers, before treatment can take place. In the event that these layers appear particularly friable, it is necessary to clean the glass delicately with cotton swabs, and in more extreme cases, manually affix the original paint lines to the surface, under a microscope, by applying small tiny drops of resin at specific points Rauch , 6; Vogel et al. Care should be taken not to remove any later over-painting without due consideration, as such layers may have historic value, in their own right Rauch , 7. Repairs and replacements[edit] Within conservation, repairs are meant to last, but should also be as reversible as possible, in keeping with the general ethical guidelines of modern conservation practice Sloane , In the context of stained glass, repairs can involve treatment of the glass itself, treatment of missing areas, or structural consolidation of the matrix or surrounding architectural fabric. Broken glass is typically repaired in one of three ways: Each of these has its own inherent benefits and problems. For instance, copper foiling produces a strong, reversible, attractive repair, but is unsuitable for use with unstable glass because of the heat involved in the application process. Epoxy edge-gluing on the other hand is strong and nearly invisible, but deteriorates in direct sunlight, while silicone edge-gluing dries clear and is easily reversible, but unfortunately refracts light differently from glass, making such repairs more readily apparent Vogel et al. Missing areas can be filled or replaced but should be done so with caution. All additions must be marked as such, and documented. Instead it is preferable to use similarly coloured, but clearly differentiated glass in order to preserve the aesthetic effect of the stained glass without sacrificing the integrity of the original Rauch , 7; Vogel et al. Structurally speaking it is most important to keep the frame intact and in good condition, to ensure the overall safety of the window Vogel et al. That being said, the original materials that make up this matrix are also integral aspects of the historic value and artistic design of the panel and should be preserved. Steps should always be taken to ensure that panels retain their current matrix whenever possible, rather than opting for replacement CVMA Protective glazing[edit] Figure 5 â€” A protective grill on the gothic-style windows of a chapel in London, UK. Protective glazing is one of the few ways conservators can attempt to preventively conserve stained glass in situ. While this practice can offer many benefits, as with most other treatments, it is not without drawbacks. Unfortunately, in practice this is not always the case, and it is well known that unsuitable, or improperly ventilated protective glazing can actually create an overly hot or humid microclimate around the historic glass that increases the rate of deterioration Vogel et al. Alternatively, protective screens or grills can be installed on the exterior of windows to prevent mechanical damage like vandalism, however this can have a significant, negative impact on the aesthetic value of the windows from both the exterior and interior figs. Other options and considerations[edit] Figure 6 â€” A view of the conservation-related scaffolding around the east end of York Minster, York, UK. In some cases, a project may be so extensive that it requires the complete removal of a panel, or set of panels from public view, which in turn raises other considerations concerning public access. An excellent example of such a case is the current, on-going project to conserve York Minster funded by the Heritage Lottery Fund HLF , which raises the question: This is not the first time that York Minster has employed a variety of methods to maintain and increase public access while also facilitating the conservation of its stained glass legacy. Currently, conserved sections of panels that have been permanently removed from their original context due to conservation concerns can be viewed on display near the choir fig. Although it is rare that a perfect solution to these concerns can be found, it is a necessary part of conservation planning to take public interest and access into consideration. Figure 8 â€” Detail of a removed and restored panel from York Minster.

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Chapter 6 : Care of Paintings on Ivory, Metal and Glass â€” CCI Notes 10/14 - calendrierdelascience.com

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Contact Us Care and conservation of stained glass "Stained glass" is an all-encompassing term used to describe decorative windows. This note is relevant for all decorated glass from door-panels in a domestic interior to major collections of windows within a church or cathedral. Stained glass is made up from a number of elements â€" small sections of coloured, textured glass, held within a lead network although other metals such as zinc and copper foil have also been used and then secured as a panel within a timber, metal or stone and mortar framework. Stained glass may have been painted with a variety of glassy enamels. These are usually dark reddish brown, but can also be red, blue, green or black. They are made from a dry glass powder incorporating metallic oxides which is then mixed with a variety of binders such as water, gum arabic, clove oil, sugar, or vinegar. These kiln-fired enamels are often painted on the front interior of the window, whilst the back exterior may have a yellow stain - a compound of silver which is fired onto the reverse side of the glass from the paint. A waterproofing compound is usually used to seal the glass and the lead. What can go wrong? Each of the elements from paint to fixing method plays a critical role in the long-term survival of a window. A failure of one or more of these may have a "knock-on" effect, and eventually over time, the entire window may fail. There is no rule as to how long a stained glass window should last without being re-leaded. A well-made, well-protected window can last for centuries. Conversely, a poorly-made, badly-exposed window may fail within a few years. Glass Each sheet of hand-made antique glass or machine-made cathedral glass is unique, and may contain tiny bubbles, thin criss-cross lines, and a variety of textures. These should not be regarded as faults, as they have been chosen for their effect by the original artist. Look out for cracks, however, as these may suggest that there is other deterioration in the window. Single cracks may be caused by internal stresses, multiple cracks by damage from an impact vandalism and accident or from external stress. They are usually a sign that conservation is necessary. Signs of pitting or discolouration of the surface may suggest corrosion or deterioration of the glass; excess water is often but not always the cause of such surface problems. If you observe any of these defects in your window, a conservator can carry out a survey and advise you on what to do. Lead Lead is by nature soft, malleable and easily soldered. This means that it can also sag easily and lose its structural role. External signs of failure to look out for are: The latter basic lead carbonate is a toxic substance and you should call in a conservator rather than attempt to remove it yourself. Paint The original kiln firing of the pigments is not always successful, and poorly-fired paint can be very vulnerable and fragile, looking pale and thin as the surface is gently washed away over time. Over-fired paint looks hard and cracked on the surface, attracts moisture, and eventually blisters and peels off. Inspect and monitor glass regularly for these signs. Putty and cement Over time, the waterproofing compounds used to seal a structure go hard, crack, and fall out, leaving the lead and glass exposed to water damage, if it is external. At this point the window may be seen to be leaking - letting in water between the lead and the glass. Window structure If the window or panel is sagging and bulging, it may be due to poor installation techniques which have left it without sufficient support from the frame or the ties. If it is an old window, this may be acceptable settlement which is best left alone. A conservator can best advise you about structural security of a sagging window or panel â€" and will not recommend work be done unless absolutely necessary. What you can do to help The most useful thing an owner can do is to regularly inspect and monitor the piece or window and note problems such as cracking, bowing, paint deterioration or excessive condensation and leaks. Call in a stained glass conservator before problems become insurmountable. Regular inspection and maintenance of the building the windows are sited in, particularly roof, wall, rainwater goods and pointing will ensure that knock-on problems from the exterior do not affect the window. In the case of external windows, be aware that - unlike normal glazing - stained glass is vulnerable to the elements and can suffer stress from excessive wind, heat and movement. Secondary glazing is an option for stained glass, but only when designed and installed by a conservator specialised in this field. Ordinary secondary glazing â€” as well as being unsightly - will trap moisture and set up a potentially aggressive environment which could exacerbate existing problems. A conservator can explain the effects of internal and external environment on your window and advise you on how best to protect it. Cleaning These windows should not be wet-cleaned on the inner surface as water can do excessive damage to the glass, the paint, the lead, the putty, and the metal components. Even with an internal panel, dusting with a very soft bristle brush is better than using a liquid method. Often a single crack within a glass panel may be a tell-tale sign of other internal stresses, which may be due to lead fatigue or insufficient support. If necessary, a stained glass conservator can give you advice on how to remove surface dirt without harming the surface or compromising any decoration. Summary of signs of potential problems Regular inspection and monitoring of stained glass is extremely important. Determining the actual reason for failure is often extremely complex, and requires a familiarity with the materials, an understanding of the causes of deterioration, and experience in stained glass conservation. An experienced conservator can diagnose the cause s of any of any of the signs above and recommend suitable conservation treatment and preventive care. Use the Conservation Register to Find a conservator. This article offers general guidance and is not intended to be a substitute for the professional advice of an accredited conservator. The views expressed are those of the author or authors, and do not necessarily represent the views of the Institute of Conservation. The Institute of Conservation would like to acknowledge the support of The Royal Commission for the Exhibition of in the production of this guidance information. Further information on The Royal Commission for the Exhibition of and its work is available at www.

Chapter 7 : Conservation | Art Glass

*The deterioration and conservation of painted glass: A critical bibliography and three research papers (Corpus vitrearum Medii Aevi) [R. G Newton] on calendrierdelascience.com *FREE* shipping on qualifying offers.*

Authenticity of frames[edit] An example of a gilded frame with heavy ornamentation. For the safety of the art, authentic frames can be modified to include glazing and backboards. Frequent handling, redecoration, modification, atmospheric pollution , and deterioration are some of the many issues that have given cause for conservators to specialize in the preservation of frames. Although wood is the most common material used in the creation of painting frames, other materials such as gesso , glass , plastic , and metal are also used. Inherent vice[edit] Vices inherent to the material the frame is composed of poses potential risks. The most commonly used material used in the production of frames is wood. Wood is highly susceptible to environmental conditions, [4] as well as infestation from pests and general deterioration. Likewise, metals are susceptible to rust, plastics are susceptible to deformity, and glass is susceptible to breakage. Humidity and temperature[edit] Changes in humidity and temperature cause major structural damage to frames, such as warping and splitting. This damage makes the frame susceptible to loss of ornamentation from mishandling. In addition, the damage to the frame can endanger the art. Animal glues, which were typically used to join a frame together, are susceptible to changes in temperature and humidity, which may cause the adhesives to give due to the warping of the frame. It is also possible that the adhesives themselves might simply deteriorate over time. Delamination[edit] Delamination can occur on the surface of a painted or gilded frame. When moisture travels through a crack in the gilded or painted surface, the support is subsequently weakened and the gilded or painted layers begin to lift. Other pollution risks include factors such as light, sneezing, and spillage. Integrated Pest Management IPM is a non-toxic approach that creates an inhospitable environment for pests. Preventative treatment[edit] The simplest step in treating a frame is dry dusting. Vacuums, sponges, erasers, brushes, [3] and solvent wipes [4] are all tools and methods that should be used regularly to prevent dust build up. Conservation and restoration[edit] Taking an initial assessment of the frame will determine the extent of treatment needed. Below are some of the following steps that may be necessary in the following processes: Disassembly[edit] In some cases, the frame may require disassembly. Disassembling the frame will also allow the conservator to assess damaged ornamentation and easily replicate necessary elements. Cleaning[edit] Testing small portions of the frame may be necessary to determine which method is best used to clean the frame. Replacement of ornamentation[edit] Lost or damaged ornamentation may need to be replaced. It is not uncommon to see ornamentation that has been clumsily re-adhered by past restorations that include unoriginal elements. Depending on the type of ornamentation and the extent of the damage, elements may need to be recarved by a master carver, recast in plaster, or infilled with a reversible gesso [9] One common material used in the recreation of ornamentation is composition, a mixture of animal glue, resin, linseed oil, and venetian turpentine. Once major structural treatments have been performed and the gesso layer stabilized, it is necessary to assess the bole layer of the frame. Bole is a mixture of colored clay, glue size, and fat, which is applied on the frame as a base coat for the gilding [4] Typically, the bole layer, which is either red or gray, is revealed in the points of contact of the frame where the gilding has worn off. The color of the bole layer must be closely matched to that of the original bole, as the bole affects the overall tone of the frame. It is essential to determine which gilding process was used before proceeding with the in-gilding process. The two common gilding processes are water gilding and oil gilding. The difference in the two processes is in adhesive coating base. Water gilding is the traditional, more difficult method, which must be cleaned using a mineral spirit or denatured alcohol. Oil gilding can be cleaned with a mild water based soap solution. Toning is usually done by creating layers of color made out of animal glue and watercolor paint.

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Chapter 8 : Corpus Vitrearum Medii Aevi | The British Academy

vitreous paint, ground glass mixed with metallic ox- deterioration of the colored enamel. The restorer who Conservation and Restoration of Stained Glass -An.

PDF Version , KB Introduction When we think of paintings, we generally think of works painted on canvas, wood panel, hardboard or rigid card. Many other materials, however, have been used as supports for paintings. Three in particularâ€"ivory, metal and glassâ€"will be discussed here. This Note briefly addresses some of the vulnerabilities and general recommendations for paintings on these three support materials. Lighting for Paintings Any amount of light is damaging to a painting that has pigments that fade; therefore, light levels for display should be as low as possible. A level of 50 lux should be enough for most paintings to be clearly visible. In some situations e. Even at low levels, however, light will cause more sensitive colours to fade noticeably over time i. Intermittent display shortening the periods of exposure to light and reducing light levels will slow this fading process. Fluctuations in RH , which damage paintings, are to be avoided. Temperature has an effect on RH level in an enclosed space such as a room, a building or a vehicle. Also, temperature that is too low or too high will have a direct effect on the reactions and vulnerabilities of materials in paintings. The lower temperature is better for slowing down the rate of deterioration, but it will increase the brittleness of paint, making a painting more vulnerable to damage if handled. Specific recommendations for paintings on ivory, metal and glass, relating to temperature and RH , will be covered under their respective sections in this Note. Transporting paintings can sometimes put the works of art in situations where RH and temperature will fluctuate or become too high or too low. It also involves multiple stages of handling, and a high potential for experiencing shock and vibration. Paintings on Ivory Paintings on ivory are generally quite small. They are often called miniatures. Using ivory as a support for painting miniatures was popular in the 18th century and into the 19th, when photography was invented. As a paint support for miniatures, ivory was usually made very thin, making it quite translucent. The thin ivory was often attached to a secondary support made of paper or card. For visual effect, the reverse of the translucent ivory was often painted, or a metal foil inserted between the ivory and its paper or card backing. Sometimes, a lock of woven hair was included inside the casing. Deterioration Paintings on ivory are very fragile. The thin and delicate paint surface can easily be rubbed off or soiled by mishandling. If the ivory itself is held by the sides, even slight pressure can cause it to bend or split. Removing an ivory from its case should only be carried out in an emergency situation or by a conservation professional, if treatment is required. Even a very small amount of water on a painted ivory can affect or obliterate brush strokes and image. Water damage can occur if a person simply speaks over an uncovered ivory; if an enclosing case or frame is improperly cleaned; or if condensation forms on the inside of a case or crystal. Residue from a cleaning compound can contribute to the corrosion of a metal case, which will also stain the ivory. Ivory is very sensitive to changes in environmental conditions. Ivory supports are very prone to warping and splitting in fluctuating RH. Damage will occur if the natural movement of the ivory in response to changes in RH is restricted, as in a tight-fitting case or frame. The problem is compounded when the ivory has been attached to a secondary supportâ€"both the support and the glue used will move with changes in RH. This may result in corrugated buckling or even in dimples in the ivory, depending on whether the ivory is glued to the secondary support across the entire surface or only at selected points. A change in temperature can also result in the damages noted above, due to its effect on changing the RH level. Organic materials used for and enclosed with the paintings can support mould growth. Therefore, avoid high RH conditions, which encourage biological activity and warping of the ivory. Low RH will also make the ivory and paint more brittle, which will also make the painting more susceptible to mechanical damage. Paint flaking can occur if not enough medium was used in the paint; or if the bond of the paint to the ivory is not strong enough; or if the paint medium cannot withstand without cracking or separating from the ivory the natural movements of the ivory in fluctuating RH conditions. While it is very difficult to maintain a constant

RH in a room, a sealed and airtight display case or a box will reduce RH fluctuations, particularly if the enclosure incorporates a humidity-buffering material such as acid-free card or silica gel see CCI Technical Bulletin No. Storage or display in a cabinet or drawer that contains a relatively large amount of hygroscopic buffering material, such as acid-free blotter or matboard, will provide considerable protection. An enclosure will also help prevent dust from collecting in any cracks in the ivory. Because ivory is easily stained, avoid direct contact with non-colourfast materials or with metals that corrode. Because paintings on ivory are extremely fragile and require a stable RH , do not allow them to travel without ensuring safe environmental conditions and handling procedures. Handling these paintings should be kept to a minimum. Restrict handling to one or two people familiar with their fragility. Avoid handling an ivory directly. Paintings that must be moved and that do not have their own protective cases can be supported temporarily by gently sliding a piece of card under them. Never press on a warped ivoryâ€"it will crack. CCI Figure 1: Variation of a sink mat for flat display. This sink mat has three levels. The backing mat is made of a window mat and a back mat, taped together with double-sided tape to form a recess for the ivory. A window mat, made of two pieces of matboard taped together and hinged along one side to the back mat with gummed linen tape, exposes the ivory while gently holding its edges. A matboard cover, hinged to the top of the backing mat and the bottom of the cover with gummed linen tape, can be opened to expose the matted ivory. Original lockets or cases are integral parts of the objects. Ivories still in their original enclosures should be left intact. Opening the lockets may require specialized expertise to avoid damaging the crystal, locket, or the painted ivory itself. Refer any treatment of paintings on ivory, including cleaning their enclosing lockets or cases, to a qualified conservator. Paintings on Metal Various metals have been used as supports for paintings throughout the centuries. These include silver, tin leaf, iron with tin on either side, copper, or copper coated with silver, tin, lead, or zinc. Copper seems to have been the most popular metal support. The metal plates used for painting are thin and are not usually very large. Although painting enamel on copper flourished in the 16th century, oil was generally chosen for painting on metal into the 18th century. Oil grounds were normally used, but artists sometimes painted directly on the copper because of the visual effect its colour created. Deterioration Metal does not expand or contract in response to changes in RH as many other materials do. Some paintings on metal are very stable and remain in good condition over long periods of time. However, on others the paint will crack and have adhesion problems that result in flaking. Metal is durable in some respects, but paintings on thin metal often buckle or bend from mishandling or from too-tight framing. The lower level is better for metal because it lowers the chance of corrosion, but the paint materials will be more brittle and more easily damaged from handling. Because corrosion is a risk with metal, avoid higher levels of RH. Also, inspect paintings regularly for flaking paint and for evidence of corrosion that shows as spots or eruptions in the paint and change in surface texture. Any attempt to flatten a dented or buckled metal support may cause paint to flake off. Consult a qualified conservator on any such treatment. Paintings, including those on metal, should not be tight in their frames. If a painting on metal is not framed, it is easily damaged. Until framed, the painting can be stored face up in a shallow box where it cannot shift, or in a sink mat see the recommendations for ivory. A simple rigid cover can be made to protect the work from dust. Paintings on Glass Glass has been used as a painting support since the Middle Ages. Although many glass paintings stand as complete works in themselves, others are incorporated into other objects such as clock doors and mirrors. Unlike most other paint supports, the glass usually forms the front of the painting rather than the back. The paint is applied to the back of the glass, and the finished painting is turned and viewed through the glass. The traditional media used for painting on glass varied e. They were applied either directly to the glass or over a clear preparatory layer of oil, varnish, glue or even a garlic rub. Gold leaf, metal foil and mother-of-pearl are also often incorporated in these paintings. Backings of paper, card or wood were common. The print was thinned by dampening it and then most of the paper was removed, leaving the ink outlines and a very thin layer of paper on the glass. The paper that remained was then painted. Deterioration Glass responds minimally to changes in RH and, therefore, does not contribute greatly to movement in the painting, unlike supports such as canvas and wood. However, because glass is non-porous and slick, the adhesion of paint to glass is generally poor. Therefore, cleavage separation of the paint from the glass and flaking on these paintings are very common. If there is paint cleavage, the appearance of the painting changes. Areas affected by this separation, when seen through the glass, appear lighter in colour than the well-attached paint. These areas are sometimes easier to detect when viewed at an angle rather than straight on. If a varnish or glue was applied to the glass before painting, the image may be disfigured because the layer has yellowed or darkened. The fragility of glass also means that cracks and breaks from handling are quite common. Because paint adheres to glass so poorly and glass is fragile, handling and vibration of these paintings should be kept to a minimum. Paint becomes even more brittle as temperatures decrease, so do not handle or transport paintings in cool conditions.