Canadian Conservation Institute
Institut canadien de conservation

CCI Notes 10/14

Care of Paintings on Ivory, Metal, and Glass

Introduction

When we think of paintings, we generally think of works painted on canvas, panel, or card. Many other materials, however, have been used as supports for painting. Three in particular – ivory, metal, and glass – will be discussed here. This Note is not all encompassing; it briefly introduces the vulnerabilities and general care of these three support materials.

Lighting

Any amount of light is damaging to pigments that fade, so light levels for display should be as low as possible. A level of 50 lux should be sufficient for most paintings to be clearly visible. In some situations (e.g., for viewing paintings with dark areas; for older visitors), a higher light level may be required for adequate visibility. Even at low levels, however, light will cause the more sensitive colours to fade noticeably over time (i.e., a matter of decades). Intermittent display (shortening the periods of exposure to light) will slow this process and will extend the useful life of a painting.

Ivory

Paintings on ivory are generally quite small. They are often called "miniatures", although miniatures may also be paintings on other support materials such as vellum, paper, metal, or porcelain. The use of ivory as a support for painting miniatures originated in England in the early eighteenth century.

The medium most commonly used for painting on ivory was watercolour or gouache paint applied directly. As a paint support, ivory is usually very thin, often translucent. For protection or for visual effect, the reverse of the ivory was often painted or attached to a secondary support made of paper or card. Metal foil was sometimes inserted between the translucent ivory and its backing or secondary support. Miniatures were frequently sealed in intricate lockets or cases, which often incorporated glass covers (crystals).

Deterioration

Ivory is very sensitive to changes in environmental conditions, and is prone to warping, cracking, and splitting in fluctuating relative humidity (RH). Damage may occur if the natural movement of the ivory in response to changes in RH is restricted by a tight-fitting case or frame. The problem is compounded when the ivory has been attached to a secondary support. Both the support and the glue that attaches it will move with changes in RH. This may result in corrugated buckling or even in dimples in the ivory, if it is glued to the support only at points rather than across the entire surface.

Water damage to ivory can completely obliterate both brush strokes

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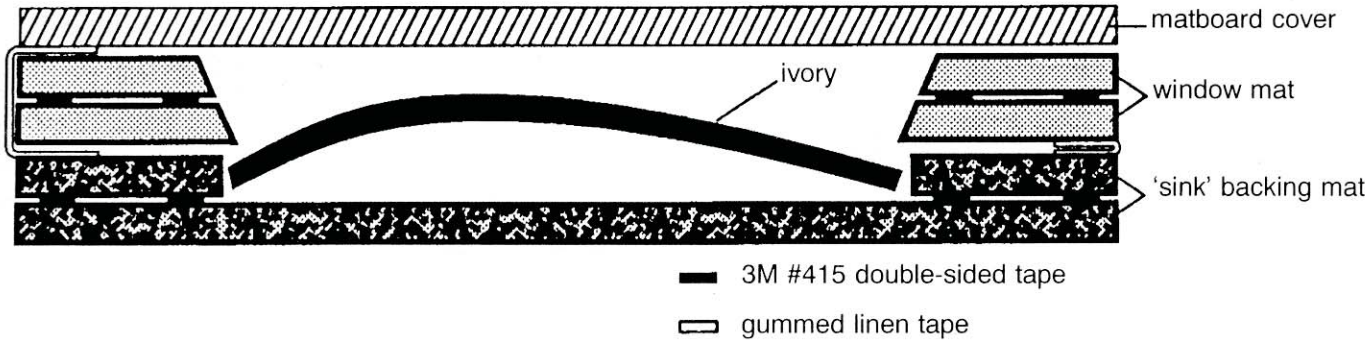

Figure 1
Variation of sink mat

and image. Water damage can occur if the enclosing case or frame is improperly cleaned, or if condensation forms on the inside of the case or crystal. Moisture can seep to the edges and be absorbed by the ivory and by the paint film. Residue from a cleaning compound can also contribute to the corrosion of the metal case, and can stain the ivory.

Paint flaking and "alligatoring" occurs when the bond of the paint to the ivory is not strong enough to withstand the natural movements of the ivory or the shrinkage of the paint film.

Gums and additives (e.g., honey) used in the paint may support mould growth. High RH conditions, which encourage biological activity, must therefore be avoided.

Paintings on ivory are extremely fragile. The delicate paint surface can easily be rubbed off by mishandling. If the ivory itself is held by the sides, even slight pressure can cause it to bend or split. If held in the palm of the hand, the skin's moisture could quickly cause the ivory to warp.

Recommendations

The RH for a painting on ivory should be kept constant between 40% and 60%. While it is very difficult to maintain a constant RH in a room, a sealed, airtight display case or storage box will reduce RH fluctuations, particularly if it incorporates a humidity-buffering material such as silica gel (see CCI Technical Bulletin No. 10, *Silica Gel*). 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 to prevent dust from collecting in any cracks in the ivory. Since ivory is easily stained, avoid direct contact with non-colourfast materials or with metals that corrode.

Handling of these paintings should be kept to a minimum. Restrict handling to one or two people familiar with their fragility. Avoid handling the ivory directly.

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.

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. They should, however, be more permanently protected by enclosing them in individual custom-made matboard "boxes" (see CCI Notes 11/1, *Protective Enclosures for Books and Paper Artifacts*) or in modified "sink" mats (Figure 1). An enclosure must not be so snug that it restricts the ivory's natural movement.

Merrily Smith's *Matting and Hinging of Works on Paper* describes how to make various types of mats (see "Suggested Further Reading"). The "Standard Mat with Wrapper: Variation" on pages 11 to 13 can be modified to include the recessed backing of a sink mat described on pages 14 to 16. Ignore references to hinging the objects.

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 ivory.

Never try to flatten a warped ivory – it may crack.

Refer any treatment of paintings on ivory, including cleaning lockets, to a qualified conservator.

Metal

Various metals have traditionally been used as supports for paintings. These include silver; tin leaf; iron with tin on either side; and copper or copper coated with silver, tin, lead, or zinc. Copper seems to have been the most popular metal support.

The metal plates are thin and are not usually very large. Although painting enamel on copper flourished in the sixteenth century, oil was generally used for painting on metal. Oil grounds were normally used on the metal, but copper was sometimes

painted on directly because of the visual effect its colour created.

Deterioration
Metal does not expand or contract in response to changes in RH as much as many other materials do. However, it does corrode, which causes paint to flake off.

Although some paintings on metal are very stable and remain in good condition over long periods of time, others crack and have adhesion problems that can result in flaking. Metal is durable in some respects, but, because of its thinness as a painting support, paintings on metal often buckle or bend from mishandling.

Recommendations
RH should be kept constant between 40% and 50%. The lower level is better for metal because it inhibits corrosion. Since corrosion is always a risk, avoid higher levels of RH, and inspect paintings regularly for flaking paint and for evidence of corrosion, such as changes in surface texture.

Any attempt to flatten a buckled metal support may cause paint to flake off. Consult a qualified conservator on any such treatment.

Contact between different metals may result in corrosion at their juncture, so avoid storing or displaying these paintings directly on bare metal surfaces such as shelves or cabinets. Proper framing is recommended and will prevent such contact (see CCI Notes 10/8, *Framing a Painting*, under the subtitle "Special Cases: Paintings on Rigid Card").

If a painting on metal is not framed, it may be easily damaged. Until framed, the painting should be stored face up and dust-free on a surface that will not allow it to shift. A shallow box or sink mat (see the recommendations for ivory) could provide temporary protection. A sink mat may also be used for permanent storage or display.

Glass

Glass has been used as a painting support since the Middle Ages. Although many stand as complete works in themselves, paintings on glass are often incorporated into other objects, such as clock doors and mirrors.

Reverse glass painting is also called backpainted glass or *Hinterglasmalerei*. Unlike most paint supports, this glass 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 viewed **through** the glass, with the glass acting as a kind of varnish.

The media used on this kind of support vary (e.g., watercolour, oil, egg tempera). They were applied either directly to the glass or over a clear preparatory layer of oil, varnish, or glue. Gold leaf, metal foil, and mother-of-pearl are also found in these paintings.

A variation of this type of painting is the "transfer print". A transfer print was created by using varnish to attach a paper print to the back of a piece of glass. The print was "thinned" by dampening it and then removing most of the paper, leaving the ink outlines and a very thin layer of paper. The paper that remained was then painted.

Deterioration
Glass responds minimally to changes in RH and, therefore, does not contribute greatly to movement within 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.

Cleavage changes the appearance of the paint. Areas affected by this separation, when seen through the glass, seem lighter in colour. These areas are sometimes easier to detect when viewed at an angle rather than straight on.

If a varnish has been applied to the glass, the image may be disfigured because of yellowing or darkening of the varnish layer. The fragility of glass also means that cracks and breaks are quite common.

Recommendations
A constant RH between 40% and 60% will reduce movement of the paint and will, therefore, reduce the chances of loss of adhesion to the glass.

Because paint adheres to glass so poorly, vibration and handling of these paintings should be kept to a minimum. Travel for these paintings should be restricted.

If cleavage is noticed or suspected, the painting should be kept horizontal with the paint side up. If the glass is broken, the pieces should be kept paint side up and should be stored so that they do not shift or overlap.

The backing layers of these paintings are against the fragile paint side; do not try to remove them. Refer reframing or any other treatment to a qualified conservator.

Conclusion

Rigid supports for paintings, such as ivory, metal, and glass, have some advantages over more pliable ones, such as canvas. They do not flex as easily, and metal and glass have a negligible response to RH changes. Each of them, however, has an associated set of problems and weaknesses that must also be considered.

As with any work of art, proper framing, controlled environmental conditions, and careful, infrequent handling of paintings on ivory, metal, or glass will help to ensure their survival.

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Suggested Further Reading

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