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Editorial

When bad things happen to good art

A fascinating aspect of the art field is that art may be composed of any material. Artists, past and present, incorporate the materials extant in their society; these range from "traditional" materials, such as stone, paper, cotton, and metal, to modern ones — Masonite®, acrylic paints, plastics, and synthetic fibers and resins. All may be subject to biological attack. Any study published in IBB may have relevance to an art object. This special issue and the preceding one provide papers on some of the most active and interesting areas of biodeterioration of art at the present time.

Saving our cultural heritage, whether it is in the form of buildings and monuments or paintings, sculpture, or documents, has become a major obsession of many modern societies. As we attempt to preserve objects for posterity, the way we go about the process, and the mistakes we make, become a part of the history of the object. An awareness of past mistakes can provide insight and, one hopes, knowledge about how to reduce future errors. Scientists entering the art conservation field need to remember the focus of the field — halting or reducing deterioration without altering the work of art or the informational content of the object.

Bad things happen to good art for a variety of reasons — physical, chemical, or biological. Among the biological factors are microbes, insects, and plants, but perhaps the most deleterious organism is man. By acts of both commission and omission, people can be responsible for a great deal of damage.

A monastic muddle

As to microbial decay of artwork, most of the problems here result from the presence of water — rising, falling, flooding, or pooling. Once enough water is present, the art can support microbial growth, and the result is a variety of kinds of damage. If the material is paper or parchment, "foxing" may occur. This refers to reddish-brown circular spots (although other colors and shapes can also occur), and it can be an intractable problem. One interesting example I have come across was at the Great Lavra Monastery on Mount Athos.

Mount Athos is the name of both a mountain and a region in Greece's Helkitiki peninsula, near Turkey. There are about 25 monasteries, many from the 10th and 11th centuries, in this region, which has become a preserve, or place of solitude and worship, for the residents of the monasteries there. The Great Lavra, the oldest and largest of them all, was founded in the 10th century, and has an extensive collection of rare religious manuscripts — about a thousand parchment books and 40,000 paper books. For centuries the rare books were housed in a Roman–Medieval-type tower with thick walls that insulated the books from rapid changes in temperature and from condensing moisture. In the 19th century, however, the books were moved to a new building constructed especially for them. Unfortunately, the new building had relatively thin walls, no gutters and leaders, and poor water drainage, and these construction errors led to rising damp in the walls. The problem was compounded by the design of the shelving within the structure. All of the manuscripts were placed in shelves abutting the walls, which meant that the rising damp wicked right onto the parchment. What is more is that, the wicking problem was compounded in recent times when the Greek Cultural Ministry undertook a project to preserve and record all of the manuscripts and books in the Mount Athos monasteries. During the condition-assessment phase, each book or manuscript was encased in a cotton sleeve. The cotton-encased books were then put back on the shelves, where they proceeded to absorb water — no doubt more efficiently than before — and so the parchment was kept damp for long periods.

Things got worse (as they usually do in biodeteriorative situations!). Damp parchment provides a good environment for fungi to grow, which is what happened. Once the fungus grew, insects that eat fungus (book lice, or psocids) started appearing. These insects, while grazing on the fungus, eroded the surface layers of the parchment. At this point, a team was called in by monastic officials, and solutions were proposed that would have removed the source of water, redesigned the library layout, and treated the insect and fungal infestations. This was several years ago, but unfortunately, no action has been taken and the rare manuscripts are still getting wet. Undoubtedly, new insects, ones that predate on psocids, have appeared on the scene and perhaps new foxing spots have become evident. This situation is certainly an example of how man can be the most damaging among the organisms!

The case of the creeping fog

Another noteworthy instance of microbial attack on art occurred on a modern egg tempera painting by the American artist Chumley. The work, entitled "Autumn", was a beautiful pastoral scene of hills and forest. But there was a mystery attached to this painting: Over time there seemed to be a fog moving across the landscape! Not unattractive,

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perhaps, but puzzling — was some sort of supernatural phenomenon at play? It turned out that "Autumn" was painted on Masonite®, a modern wallboard material that is hygroscopic. The painting was supposed to have been kept in a temperature- and humidity-controlled house, and indeed, the day I measured the house environment, the relative humidity was about 30%. But there must have been an environmental glitch at some point, and the Masonite® seemed to be behaving like cotton or silk, which absorb moisture rapidly, but take months to equilibrate with lower-humidity environments once they have done so. Rapid uptake of moisture and slow release must have been the explanation for that autumn fog.

Bye-bye biocides

Once a bad thing — e.g., microbial attack — has happened to good art, how does one treat it? This is often a difficult question to answer. As of yet, there is no one best method for destroying microbes. Often a biocide is used-too often. The problem with biocides is that they may react with more components than they are meant to. Thus, they may cause a visual, structural, or informational change in the art. A visual change is obvious and immediately recognizable. But a structural change may not be immediately evident and an informational change may only become evident when an analytical procedure is attempted to derive historical or time-related information from an object.

The history of attempted conservation of art objects is filled with examples of damage caused by formerly in-vogue biocides. I accidentally came across a recent example when I was assessing the effect of fungicides on oil-based easel painting material. Although I was actually interested in how to remove fungi from easel paintings, I had an opportunity to subject the test material to our then current insect treatment, Vikane®, a sulfuryl fluoride. Much to my surprise, the Vikane® caused 10 out of 11 pigment systems I was testing to change visually! This was a fortuitious finding, because not long after that the Met found one of its most important paintings, Andrea del Sarto's "The Holy Family with the Infant Saint John the Baptist," to be infested with drywood termites. The panel painting was composed of the same type of pigment systems that I had just studied, and if the Vikane® treatment, which was the usual one at that time, had been used on it, it might have been unacceptably altered. Once the possible danger was realized, the Met took immediate steps to reduce the risk to its art by prohibiting the use of Vikane® on any of its holdings. The effect of this development for me was that, I then had to invent an alternative, safe method of insect control, switching much of my research direction from fungal problems to insect-related ones. This was about 10 years ago, and I am happy to say that we now have an effective, safe treatment system for insect elimination that uses an anoxic environment created by the inert gas argon. Also, we can now detect the presence of insects in objects by measuring the CO_2 produced by their respiration.

The questions continue

It is not surprising that biodeterioration of stone receives so much attention. For thousands of years, stone was the durable and widely used material, when grandeur and beauty were the goals. The problem today is that many of the structures and sculptures we wish to preserve are coated with or contain microbes, and it is not always clear if the microbes are deteriorating, or preserving the objects. I think of the Met's Carrara marble statue of Hiawatha, by the American sculptor St. Gaudens. This work had sat in the subtropical environment of Florida for about 80 years before coming to the museum. When it arrived, it had an extensive coating of flora. Bacteria, algae, lichen remnants, yeast, and at least six fungal species were present. It was clear that the stone had been discolored, and in some areas mildly pitted, but how much of the damage to the stone was the result of microbial activity and how much was due to other environmental factors were unclear.

And it still is. In fact, this is one of the most interesting topics currently under study. To bring you up to date, the sculpture was cleaned and went out on exhibit. During movement, however, an accident occurred that caused a piece of the sculpture to break off. Underneath this roughly circular break, of about 15 mm, under the surface, was a band of green microbial growth of about 20 mm wide. The cleaning treatment had penetrated only about 15 mm into the stone, and, beneath this depth, microbes were still existing. (Repairs were made by our conservation staff before sampling could be done, so the identity of the microbes remains speculative.) A few years later, after discussions with Cesareo Saiz-Jimenez, it became clear to us that the marble of Hiawatha probably had a population of cyanobacteria living inside it. The insolation in Florida was strong enough to permit growth of about 35 mm into the stone. At other sites, such as Italica, near Sevilla, Spain, Saiz-Jimenez has found cyanobacteria can grow even deeper into the stone — more than 2 cm in some cases. How worried we should be about this is not clear at present.

Sometimes it is clear, when something bad is happening to good art, and sometimes we know what to do and are permitted to treat, and presumably solve the problem.

Sometimes we know what to do but are not permitted to treat the object due to circumstances beyond our control.

And sometimes we do not know what to do.

Nevertheless, we persevere, and what this issue shows is that, we are on the way to identifying, understanding, and solving some of the problems of biodeterioration of art.

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