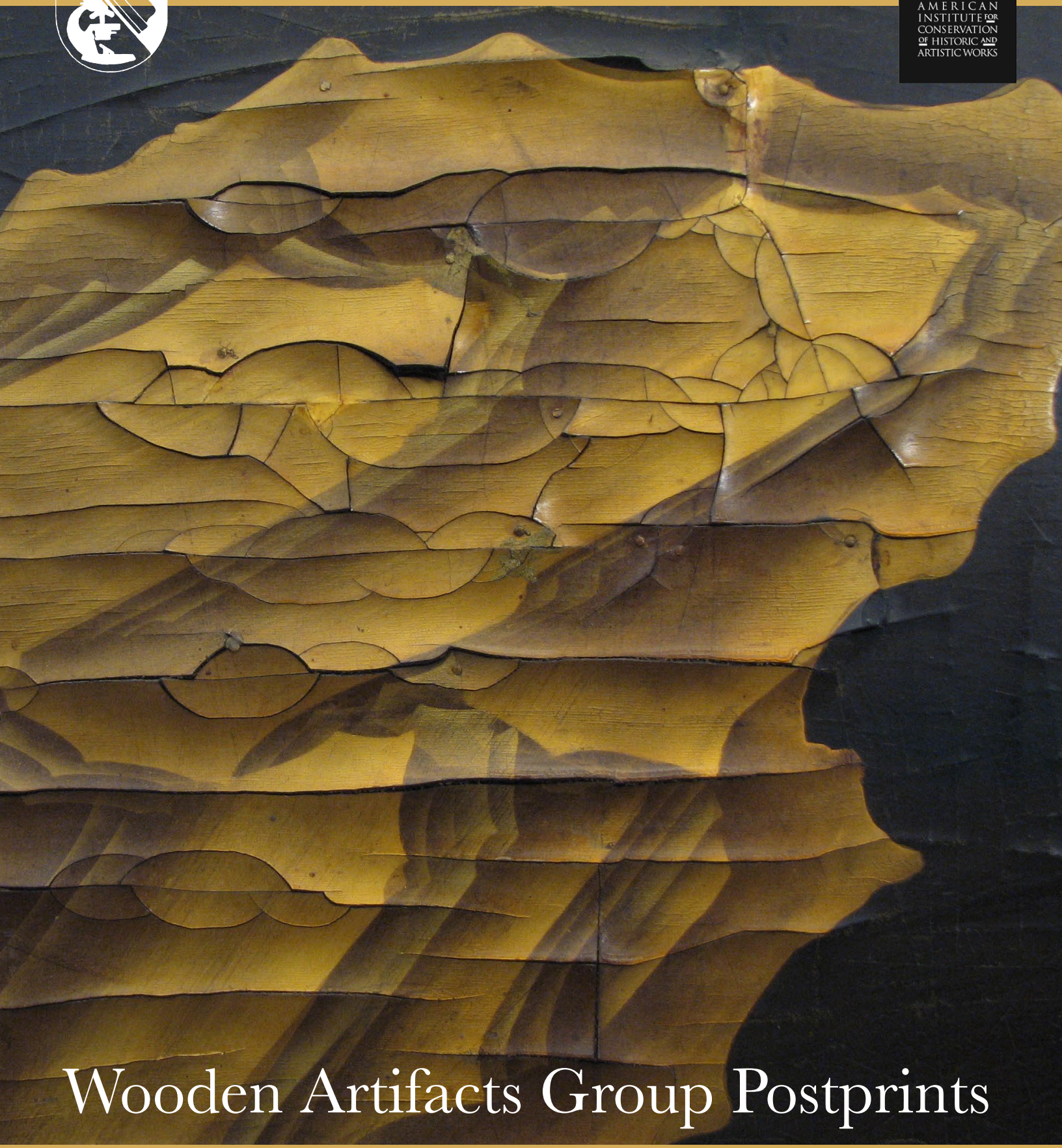

Wooden Artifacts Group Postprints

Presentations from the 2012 AIC Annual Meeting in Albuquerque, New Mexico
Wooden Artifacts Group Sessions

Wooden Artifacts Group

Postprints of the Wooden Artifacts Group Session

Albuquerque, New Mexico, 2012

40th Annual Meeting American Institute for Conservation
Albuquerque, New Mexico, 2012

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POSTPRINTS OF THE WOODEN ARTIFACTS GROUP SESSION
ANNUAL MEETING

2012 WAG INDEX

2012 ABSTRACTS (WRITTEN PAPER NOT SUBMITTED)

MARYJO LELYVELD

The Edge in Focus: The Many Stories of an 18th-Century French Frame Treatment

ABSTRACT—Given the conservators role as specialist in materials science and technical art history, much of the information we choose to present derives from this knowledge base. Whilst this underlies our expertise, it may also serve to alienate our audience and distance our message as imperially objective rather than embracing personal or emotional value. This paper outlines the use of the Integral framework to map out a more holistic approach to the preservation and conservation treatment using the treatment of the preeminent French Regence frame that houses Poussin's 'The Crossing of the Red Sea' as a case study.

1. INTRODUCTION

In 2011 the National Gallery of Victoria undertook the treatment of one of the most valuable frames in its collection, a carved and gilded Régence period frame that houses *Poussin's The Crossing of the Red Sea* (fig. 1). Its twin frame which adorns Poussin's *The Adoration of the Golden Calf* in the National Gallery of London, has been described by frame historian Paul Mitchell as *"The most stunning and majestic of all these great frames* (Mitchell et al. 1996)*"* in reference to the Régence period.

Given its prestige within the collection, the treatment of the Poussin frame, afforded a unique opportunity to present to a diverse range of audiences and forums the research, examination, and treatment that was carried out by the NGV Paintings and Frames and Furniture Conservation Department. These included

- a pamphlet to accompany the treatment of the painting with a chapter on the history and analysis of the frame (Villis 2012);
- formal presentations to gallery guides and volunteers and informal presentations to conservation students, gallery staff and corporate, and executive visitors;
- a segment on the television show "The Collectors" and an interview for "The Australian Wood Review" magazine;
- articles for Picture Framing Magazine and the National Gallery of Victoria magazine; and
- interviews with television and radio stations in conjunction with media unveilings.

Fig. 1. The *Crossing of the Red Sea* by Nicola Poussin; after treatment to both painting and frame

Concurrent to the treatment of the frame, the author was undertaking post-graduate studies in the interdisciplinary field of Foresight and one particular methodology the author came across, Integral theory, struck her as resonating well with the interdisciplinary nature of conservation, especially as a tool for informing communication. Over the course of the treatment, it was used as a framework to anticipate and steer through the diverse breadth of questions with which one is faced when the practice is opened for discussion to diverse audiences. Rather than focusing on identical content for each presentation, this systematic overview helped the author consider and articulate a more comprehensive understanding of the treatment by consciously drawing upon alternate perspectives, less commonly included or articulated by the bench conservator.

So the main focus of this article lies in the questions "What is integral theory?" and "What might it look like applied to something like the Poussin frames treatment project?" But before these aspects are examined, some background to the *Poussin Project* are provided (the conventional conservation treatment story), and how theoretical overviews or mental models have been applied to conservation practice to date are quickly reviewed.

2. THE POUSSIN PROJECT

The Poussin Project refers to the treatment of Poussin's painting *The Crossing of the Red Sea*, a treatment that took over 16 months; was sponsored by BNP Paribas; and documented in print, radio, and social media forms. Not technically part of *The Poussin Project*

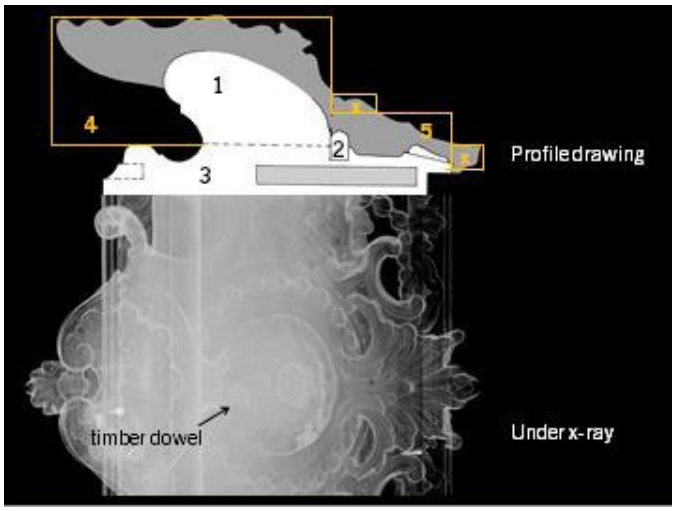

Fig. 2. The frame in cross section, describing the five solid lengths with additional timber (x) components; and the under x-ray to describe the timber pins that secure the laminates

but rather, made possible by the painting being off permanent display, was the treatment of the paintings' Régence frame.

The frame dates to 75 years or so later than the painting (ca. 1710) and was likely commissioned for *The Crossing of the Red Sea,* along with its partner frame on the *The Adoration of the Golden Calf,* by Jean-Baptiste le Ragois de Bretonvilliers for his apartment on the Ile Saint Louis, in the heart of Paris. A major restoration was carried out in the hotel in 1709, and by 1712, both works in their Régence frame appear in the hotel inventory (Roberts. 2008)

The frame chassis comprises three to five solid oak sections pinned together with wooden dowels (fig. 2). Additional timber blocks were attached to make up the terminal points of the outermost and sight edge ornament, and it is from these solid oak laminates, the ornament was carved. Originally devised with mortise and tenon mitre joins, the tenons have subsequently been decommissioned in favor of two hand-forged iron brackets at each corner and screws across the mitres.

The decorative surface schema is largely consistent with that of the steps outlined in Jean-Felix Watin's 1755 treaty L'art due peintur, doreur, vernisseur and includes: up to six layers of gesso (notably less than Watin's 12), an overall yellow bole with burnished highlights prepared with red bole; a thin water-gilded surface highlighted with dragon's blood as identified using FTIR.

Given the minimal damage and intervention that the original surface had undergone, the frame treatment focused on reinstating approximately 40 losses to the ornament, most commonly along the terminal points of overhanging and pierced ornament. This required recarving replacement ornament, to fit as closely as possible to the existing break-line, using a fine-grained dimensionally stable, pattern-making timber (Jelutong). Following testing, Grade A materials were used to readhere carved replacements, namely high-tack fish glue mixed with whiting, and to replicate the original gilded surface—gesso, bole and 23 kt gold (fig. 3).

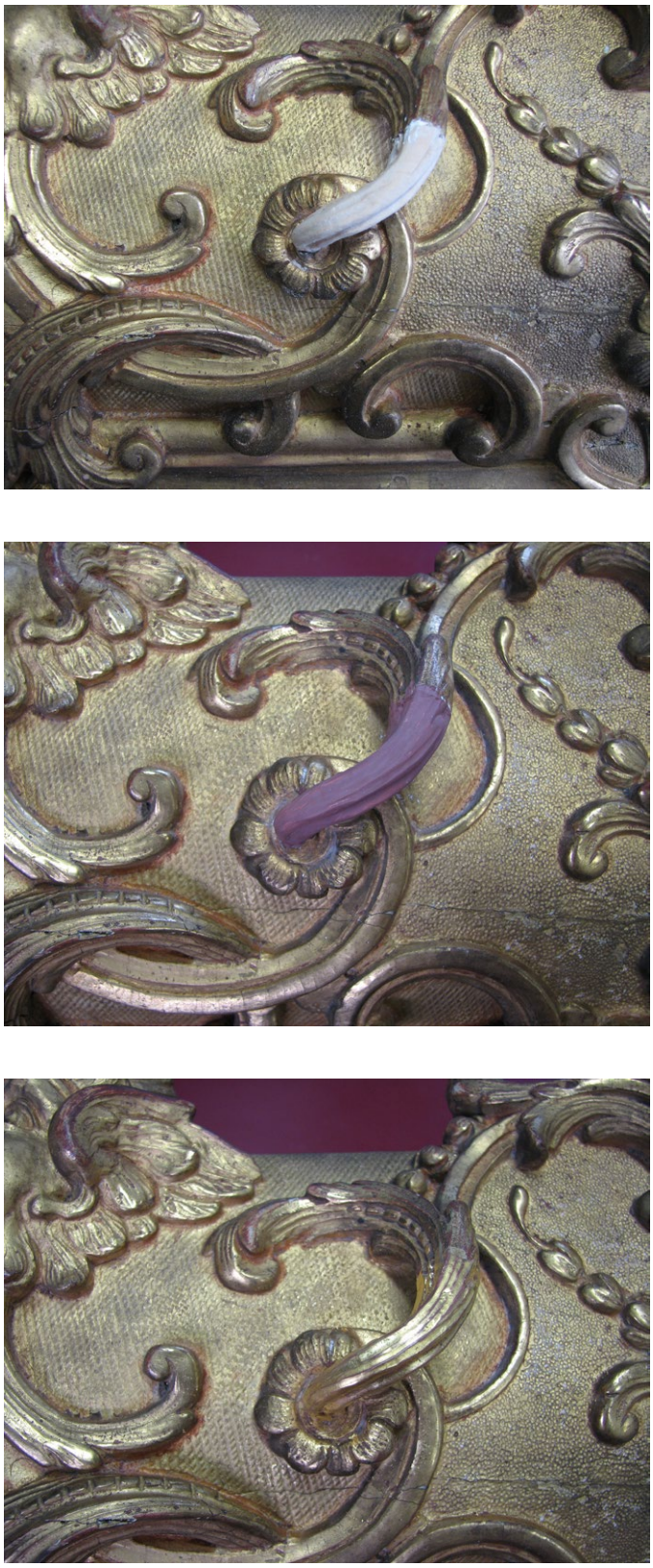

Fig. 3. Treatment in progress to reinstate losses to carved ornament, through to ingilding before toning

Synthetic media were also used. This includes an apron of Paraloid B-72 around the damage area that was used for protection during treatment and subsequently removed; a Plextol B500 mordant to best replicate water gilding yet permit retrateatability (Sawicki 2010); and a protective coating of Golden MSA matte varnish across the replacement components. Some minor cleaning was also undertaken to remove localized bronze paint and inpainting with shell gold to isolated small losses and scratches across the gilded surface.

So already we see that the story of the Poussin frame treatment is rich in artistic history to which this treatment has added new (or remembered forgotten) information by way of research and through the physical intervention with it in the present. And yet, the perspectives here only briefly scratch the surface of the stories to be told by the frame and its treatment. The remainder of the talk therefore discusses the utility of using thinking tools such as the integral-theory framework to help map some of these peripheral stories.

3. USING MENTAL MODELS FOR MAPPING STORIES

The need for thinking tools was identified over a decade ago in the GCI publication "Research into values and conservation."

Broadly, there is a lack of conceptual or theoretical overviews for modelling or mapping the interplay of economic, cultural, political, and other social contexts in which conservation is situated. Pragmatically, this kind of synthetic overview or framework would provide a context for and help to integrate the varied spheres of conservation work, with the ultimate aim of elucidating how conservation can be made more effective in serving society (Avrami et al. 2000).

Essentially, this synthetic overview, or what could also loosely be termed "mental model,"[1] provides a guide to explore the multiple ways in which to engage with an artefact or artwork. The term was first put forward by Kenneth Kraik in his 1943 publication *The nature of explanation* (Jones et al. 2011). It acts as a kind of map or visual representation that highlights the relationships between different elements such as values or understanding of significance. And just as with a map, mental models can be used to tell where one is (or where one is not); what landmarks are nearby; and, if the map is shared with others—how far apart everyone is and if so inclined, devise pathways to help reach the other on common ground.

Fundamental to Foresight studies is the use of "tools" in the form of methodologies and mental models, some of which aim toward an integrative approach when engaging with an issue or subject. By integrative, it means taking as its starting point a purposefully broad approach to explain practice in an effort to anticipate and address potentially competing or alternative perspectives; integrative approaches view holism to be normative.

Since the publication of *Research into Values and Conservation*, a number of conservators have sought to develop such mental models to help articulate practice; for example, Cane's (2009) "model of the inter-relationship of the conservation construct" and the triadic diagrams and models developed by Muñoz Viñas (2005), Eastop (2009), Kemp (2009), and Caple (2009) to help simplify the understanding of material culture, ideas of authenticity and conservation activities.

Although a comparative analysis of these tools are outside the scope of this article, the most expansive of these models is Appelbaum's "characterization grid" (2007), which provides an easily coherent and comprehensive overview of the multiple ways in which conservators engage with an artwork or artefact. It provides a meta-perspective, that is, an overarching view of the different approaches that can be taken when conserving an artefact or artwork. For those not familiar with the characterization grid, it uses a 2×2 matrix based on material/nonmaterial aspects on the one axis and object/nonobject-specific information on the other. The characterization grid was revelatory in its synthesis of what is often, very complex in practice. It is simple to understand but not simplistic. In providing a framework for an inclusive approach to conservation practice through its ability to make explicit and subsequently share through dialogue what conservators do.

This is key to engineering or designing bespoke messages for a diverse range of audiences, it requires familiarizing oneself with the breadth and depth of professional theory and practice to articulate this in a way that resonates with a given audience. But this requires an understanding of the audiences' perspective, too. Rather than delivering information or knowledge fixed only from the perspective of the expert, a framework is needed that gives some indication of what the audiences' perspective may be—a framework that not only maps conservation but places it within the broader context of human knowledge. This is what integral theory may assist with. The primary choice to use integral theory over the characterization grid is the extended history and application of the tool, to more effectively support potential cross-disciplinary engagement.

4. INTEGRAL FRAMEWORK

The integral framework seeks to synthesize insights from the major disciplines of knowledge, from the natural and social sciences to the arts and humanities, into an integrated theory. It has been described as a theory of everything, drawing heavily upon the work of philosophers (e.g., Hegel), developmental psychologists (e.g., Jung), the spiritual traditions and the sciences. As a "theory of everything," it is not without its critics; however, it can be very useful as a basic orienting framework. It emerged in the second half of the 20th century, drawing largely upon the research of the American philosopher Ken Wilber and his predecessors Sri Aurobindo (Indian philosopher), Pitirim Sorokin (Russian sociologist), and Jean Gebser (Swiss interdisciplinary scholar) and has since been applied to a diverse range of professional fields including organizational development, law, healthcare, ecology, and economics.

The theory is based on four dimensions, or "ways of knowing," that define how people engage with the world. These are divided

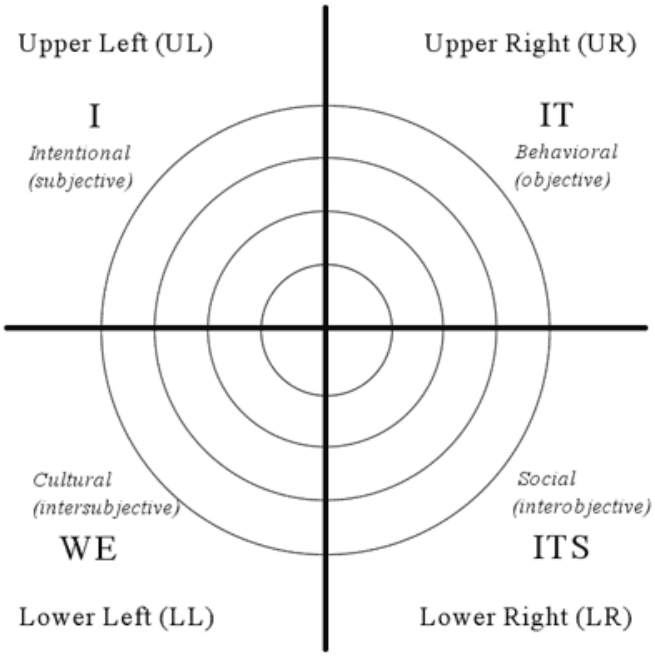

Fig. 4. The four quadrants of the integral framework (Wilber 2001)

in a 2 × 2 matrix of the individual–collective on one axis and the tangible–intangible on the other. This gives the four quadrants of the subjective, objective, inter-subjective, and inter-objective. These can also be conceived of as personal (intentional), physical (behavioural), social, and cultural realities (fig. 4).[2]

Fundamental to integral theory is the understanding that the quadrants are both distinct and synchronous. Each quadrant is irreducible with an inquiry into reality that is unique and cannot be accessed through any of the other lenses but rather coexists with the other three but is always in dynamic engagement with them, or as hinted at by the theoretical physicist David Bohm et al., "[k]nowledge of reality does not therefore lie in the subject, nor in the object, but in the dynamic flow between them" (2000).

Within the integral framework the traditional disciplines tend to fall almost exclusively within one perspective or another; for example, the hard sciences of physics and chemistry work almost exclusively in the upper-right physical quadrant, whereas the economic, legal, and political systems tend to be framed within the lower-right social quadrant. Critically, each discipline deepens specialist understanding, yet each quadrant can only ever provide a partial perspective on reality.

Conservators are engaged with a practice that is by its very nature interdisciplinary (Scott 2010). This presents a number of challenges, most notably in mediating between disciplines where no common structure of inquiry exists. Single-quadrant perspectives cannot explain the totality of knowledge and understanding from all four quadrants, but only the data that is part of their quadrants' perspective. In this respect, the science and physical treatment of conservation practice is only a partial truth to the process of cultural materials preservation, something to which few conservators would disagree, and yet most of the communications by bench conservators tends to remains focused here. This is not a problem where expertise is sought but expertise, by its very nature, has a tendency toward specialist language and reinforces assumptions within its tacit infrastructure of commonly accepted knowledge.

Consider then, what it would be like to approach communications and advocacy from the stance of how to more effectively combine partial truths to get a more holistic picture. The more of reality humans acknowledge and include, the more effective their communications as they recognize and incorporate a more comprehensive way of understanding, developing a cognitive agility and "bilingualism" to suit the needs of a particular audience.

5. INTEGRAL THEORY APPLIED TO CONSERVATION

So how might this methodology be applied to conservation? Or more specifically, communicating conservation practice? In the first instance will be briefly considered how the voice of conservation and its professional discourse expresses itself in each of these four quadrants or lenses the personal, physical, social and cultural realities (Fig. 5) before applying them to the Poussin frame treatment as a case study. As noted previously, when using mental models, it is neither feasible nor desirable to represent every detail of reality. Rather, they are best used as an orienting device that provides conservators with a framework to steer communication, clarify orientations in learning, and focus areas of personal and professional development.

5.1 PHYSICAL (UPPER RIGHT)

The upper-right physical quadrant is conceived of as being objective, empirical, and scientific. These are "measurable" in that they are observable. In its most basic form this ranges from the analysis and evaluation of the atomic and chemical structures of the materials treated, to their methods of manufacture, state of deterioration, and the manual activities undertaken through treatment to modify these. This is the lens of conservation science and technical art history.

Concurrent to the artefact, as a separate entity under consideration, it may also include the physical nature of the conservators themselves—their biology, neurobiology, and physics. Things like manual dexterity and skill development, the health of one's vision, muscle strength, and height can all have an impact upon the outcome of treatment.

5.2 SOCIAL (LOWER RIGHT)

The lower-right social quadrant refers to the inter-objective system. This quadrant focuses on social systems and institutions and the interdependence between economic, political, social, and environmental systems. The emphasis is on considering how systems work as a web. This quadrant considers the application of strategic planning and resource management principles

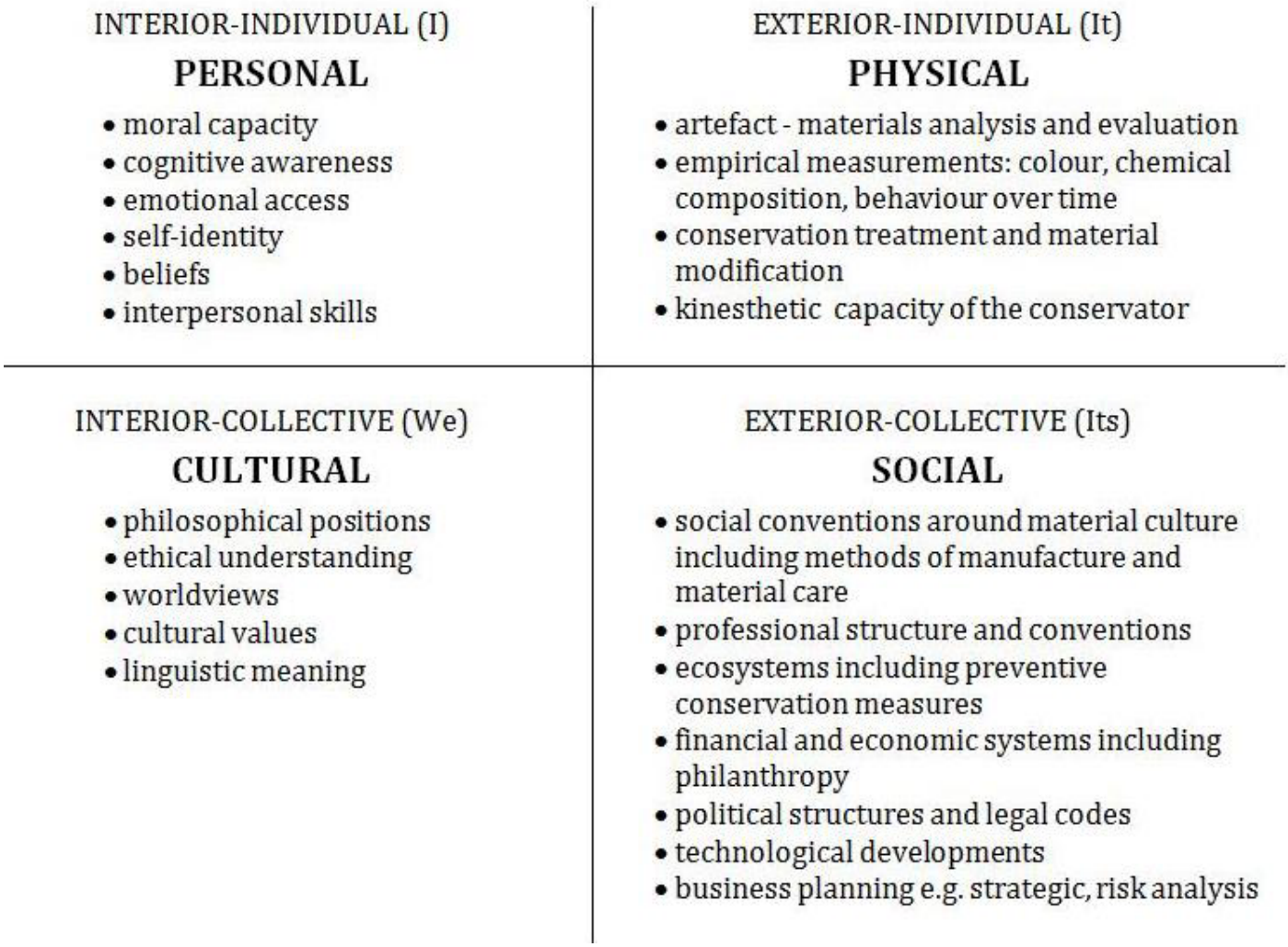

Fig. 5. An integral approach to conservation practice (adapted from Esbjörn-Hargens 2010)

(Keene 2002); the work being undertaken in risk analysis for cultural heritage (Ashley-Smith 1999; Waller 2002); as well as social engagement studies and the economics of heritage preservation (Jones et al. 2008; Throsby 2010).

Conservation practice in this quadrant commonly involves overseeing microsystems through departmental business management and preventive conservation in collecting environments. Anecdotally it seems, conservators are less inclined, to engage with macro-environments such as the broader political, social and to some extent environmental systems—the place of advocacy and policy influence.

5.3 CULTURAL (LOWER LEFT)

The lower-left quadrant refers to the intersubjective "we" cultural experience. This quadrant centers around the subjective truths of various groups or cultures. This is observable in the shift toward a growing respect of intangible values within the field of heritage preservation as Ashley-Smith notes "the growing acceptance of the intangible values associated with tangible heritage is not a sign of universal progress… It is a sign that other voices are at last being heard" (2009), as has been advocated for by, among others, Kaminitz (2009), Avrami (2009), and Munoz Vinas (2005).

Within conservation, not only may examination be sought of the cultural differences of nation states (in the present and across time) but cultures within organizations may also be considered; for example, the differences between museums and galleries, or the culture of the specific institutions themselves with their worldviews and how these affect a given approach or outcome.

5.4 PERSONAL (UPPER LEFT)

Lastly, the upper-left quadrant refers to the "I" or subjective psychology of the individual. This quadrant centers on self-identity, beliefs, creativity, and the development of the self. It addresses the transformative experience that conservation and cultural heritage can provide both for the conservators and

those with whom they communicate their practice. It also includes notions of creativity that underpin artistic intent.

Given that this quadrant deals with the interior individual, understanding can only ever be gathered via communications in some form. This can be formal; for example, artists' interviews or casual, such as the discussions between colleagues over the course of a treatment. Attempts at dialogue require trying to make explicit or drawing out many of the beliefs and values the individuals involved hold, and by identifying and incorporating the qualitative experience of the individual, conservators becomes much more aware of their biases and can better engage with the needs of a given audience.

6. INTEGRAL THEORY CASE STUDY: THE TREATMENT OF THE POUSSIN FRAME

So returning to the title of this paper "The Edge in Focus: The Many Stories of an 18th-century French Frame Treatment," what might those stories be? To reiterate, it is possible only to provide a rough orientation of an otherwise very complex terrain so the following tables outlines some of these (Fig 6).

6.1 POUSSIN FRAME TREATMENT: PHYSICAL

In an earlier account, the author touched on many of the aspects that commonly relate to the upper-right physical quadrant as applied to the frame, namely, the minimal deterioration of the frame; its estimated physical integrity at the time of production and the practical treatment undertaken to address this divide. In materials terms, conservators can move from micro to macro to utilizing a range of analytical tools (e.g., FTIR, x-ray) and methodologies (e.g., solvent testing) to characterize the material.

What could also be added to the discussion is the personal physical self as a tangible entity. One could talk about the strain on one's body during the process of carving and movement around the frame that only hints at the physical skill of the original artisans or the technical professional development undertaken to acquire traditional skills in *repareur* and the use of hand tools

INTANGIBLE-INDIVIDUAL (I)	TANGIBLE-INDIVIDUAL (It)
Present • Emotions of the conservator • Emotions and reactions of the audience *Historical context* • Artistic intent of framing by the artist • Artistic intent of the designers and craftsman • Personal reactions and emotion of collectors and curators to the frame • Personal reactions of those who have interacted with the artefact (previous restorers, installation crew) • Emotional state and reactions of audiences	*Present* • Physical 'deteriorated' state of materials • Physical nature of the conservator (manual control and dexterity) • Practical treatment undertaken e.g. addition of materials and tool marks *Historical context* • Material components and methods of construction including original state of timber, whiting, glue, gold leaf • Physical nature of the craftsman (manual control and dexterity)
Present • Western approach that is artefact focused • Professional ethics • culture of conservation and conservation within our culture • Transfer of aesthetics across cultures *Historical context* • Worldviews underpinning aesthetics and ethics in the Régence period	*Present* • Philanthropy and support for training and development dependent upon conservation wage and material costs • Conservation professional standards/accreditation • Reporting and documentation • Preventive conservation • Media engagement: education, advocacy and a good 'sound bite' • Collecting institution: professionalism of collections management; finance and insurance; media and public relations. *Historical context* • Craft guild structure and accreditation • Financial status of owners and collectors • Art historical context and provenance • Physical environment of workshops, collectors' homes and methods of transportation • Globalised art economy
INTANGIBLE-COLLECTIVE (We)	TANGIBLE-COLLECTIVE (Its)

Fig. 6. An overview of perspectives relevant to the treatment of the frame on Poussin's *The Crossing of the Red Sea*

in attempts to mimic the original marks and forms made by highly skilled craftsmen (and the author's subsequent need to defer to electric tools used where these skills proved deficient!). James Elkins's "What painting is" (1998) describes a project he organized for students requiring them to reproduce the painterly techniques of van Gogh and the difficulty they found in replicating (what was proposed to be) the physical contortions required to produce the disordered sea of brushstrokes that make up the paint topography.

6.2 POUSSIN FRAME TREATMENT: SOCIAL

With regard to the lower-right social quadrant, the sponsorship of BNP Paribas in treating the painting but not the frame was noted earlier, which hints at how the social and economic values of picture frame have changed over time. But it is primarily indicative of the role of philanthropy in support of conservation practice, more common in the United States and less so in Australia. This philanthropy is underpinned by corporate social values and the structure of different economic systems around government funding and taxation.

The economics of material production and monetary value (rather than stare bemused at the question when casually asked, "so what's it worth?") could also be discussed. So could things like insurance value along with the cost of materials and production in today's terms. Even value in terms of historical context as an irreplaceable resource of Régence decorative art could also be discussed. In addition, training, both of the traditional guilds and conservators today, and the structures that have developed and evolved over time that have helped or hindered the transmission of hand skills of such crafts could also be considered in this quadrant.

6.3 POUSSIN FRAME TREATMENT: CULTURAL

The post-modern shift toward the recognition of diverse values, cultures, and worldviews has been seen; therefore, the lower-left cultural quadrant presents a very interesting discussion of the frame treatment. What is the relevance of the Poussin frame for culture today? Within a globalized culture, arts culture, Australian culture, or conservation cultural context?

How an artefact from one culture and time should be treated within the context of another culture and time, such as how much should culture of origin still influence its approach to treatment today, could discuss also be discussed.

Or the understanding of traditional and contemporary art forms and their relevance for present cultures could be explored—"is the frame on the Poussin frame an historical artefact or does is exist as a living artefact within a longer cultural 'now'?"

6.4 POUSSIN FRAME TREATMENT: PERSONAL

And finally, in the upper-left personal quadrant, the conservators' journey during treatment could be discussed. When quizzed about how it is that one approaches such a notable treatment by a conservation student, the author replied "with cautious confidence"—the process of balancing (as much as possible under a given set of conditions) an awareness of one's personal inadequacies with enough faith in one's personal intent to bring as much self as possible to the intervention process.

Some attempt could also be made at discussing the personal values, beliefs, and reactions of the various stakeholders engaged with the Poussin frame over time; however, with few accounts recorded as documentary evidence, they can only ever be speculative. What can be done is to take note of such personal reactions through dialogue in the present. What was common to many of this author's discussions were emotions that ranged from awe and the excitement of discovery to confusion and ambivalence about the conceived importance of a frame. Part of the challenge then has been how to use the knowledge as a conservator to enhance understanding and the transformative experience that such stewardship can offer in either instance.

6.5 TALKING ABOUT WHAT WHEN

Through the treatment, the integral framework was used primarily as an orienting framework for the author's discussions, to respond to (what the author was assuming to be) the interests of a given audience. Although this provided the author with a greater confidence and fluidity in discussions with stakeholders (and hence proved useful), no data were collected beyond the anecdotal as to whether conversations using this methodology would have been more successful than without. It was however interesting to note the types of questions or observations asked by different stakeholders, as grouped according to quadrants.

Anecdotally, it seemed that conservation students and conservation peers would readily ask questions about the upper-right quadrant (physical), and to a lesser extent, questions from the upper left (personal). When writing articles for publication, the author's tendency was to write in the voice of the upper-right (physical) and to a lesser extent the lower-right quadrants (social). Public visitors, benefactors, and donors tended to ask questions from the lower-right (social) and to a lesser extent the upper-right (physical) quadrants. Very few people asked questions within the lower-left quadrant (cultural). The author's approach then would be to guide discussions into quadrants that the audiences were less inclined to broach.

7. CONCLUSIONS

Conservators' practice is multidisciplinary, and they commonly engage in highly nuanced ways of thinking and engaging with an artwork or artefact. One of the greatest difficulties, however, is not determining who to tell the story to, but which story to tell in and in what circumstance so as to make it as meaningful as possible for the listener. The integral framework provides another tool for the conservator kit, albeit a thinking tool, that emphasizes the importance of engaging all quadrants to provide a comprehensive understanding of practice. This helps the user to assess, group, and articulate different perspectives as required.

Given the theme of the conference—advocacy and outreach—the aim of this article has been to stand back in order to take a look at the whole beast of conservation.[3] It is about using "thinking tools" to guide reflection and explain practice. It is about developing a meta-perspective of who conservators are and what they do that will allow them to more effectively understand their place within the "bigger picture" and take control of the message they wish to present. This is the ability that Bohm and Peat (2000) describe as underpinning a healthy scientific practice: "What is needed is for each person to be able to hold several points of view, in a sort of active suspension, while treating the ideas of others with something of the care and attention that are given his or her own." And lastly, it is about ensuring the preservation of the artefact long after treatment by adding personal, social, and cultural values to the conventional physical mix to, as Avrami (2009) notes, "assure the relevance of all conservation work to society."

ACKNOWLEDGMENT

The author would like to thank the Samuel H. Kress Foundation, FAIC, the AIC Wooden Artefacts Group, and Stephanie Auffret for their support in making her presence at the conference possible. She would also like to thank her National Gallery of Victoria colleagues Carl Villis, John Payne, and Holly McGowan-Jackson for their support throughout the treatment and Marie Dubost for her patient and generous training.

NOTES

1. Mental models are commonly described as cognitive representations of external reality that people use to understand and interact with the world around them. It is not the intention or the ability of the mental model to represent reality but rather a way of filtering information, and in the case of effective communication, identify "confirmation bias."
2. In addition to quadrants, the integral theory theorizes lines or altitudes within the latitude of the quadrants, relating to increasing levels of complexity or development. Examination of these dimensions is outside the scope of this article but may be of assistance with proposing development in practice.
3. Many readers would be familiar with the Sufi story of the "Blind men and an elephant" and its intent to highlight the deficiency of the individual perspective, without the support of effective communication, to describe (or rather hint at) the totality of reality.

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HANY HANNA

The Establishment of Collaborative Platforms in Protecting and Conserving of the Global Cultural Heritage

ABSTRACT—It is clear that our global cultural heritage strengthens identities, well-being, and respect for other societies. As it is important to establish new collaborative platforms to more effectively protect and conserve our heritage and to:

1. strengthen the investment in research and educational opportunities, and training of human resources;
2. working in development, networking, exchange, and the transfer of knowledge and resources globally;
3. define a comprehensive system of recognition of high-level professional qualifications, validated by the public authority and defined by professional organizations;
4. encourage responsible stewardship and advance sustainable conservation policies and strategies;
5. integrate cultural heritage issues and conservation projects with other sectors to provide a lever for social and economic development.

1. INTRODUCTION

"What should be the new aims and responsibilities of universities and culture heritage organizations within the framework of global issues?" This is not only just a question but a very big question.

On one hand, it is well known that the important responsibilities of universities and culture heritage organizations have traditionally been "teaching, research, and serving" which include mainly offering education and training leading to an improved profession, conducting scientific research, as well as providing several other services to the communities.

On the other hand, it is also well known that the globalization has several meanings. It broadly refers to the expansion of global linkages, organization of social life on global scale, and growth of global consciousness, and hence consolidation of world society. In other words, it describes an ongoing process by which regional economies, societies, and cultures have become integrated through a globe-spanning network of communication and trade. It is usually recognized that globalization is being driven by a combination of economic, technological, sociocultural, political, and biological factors. In such a context, several problems have resulted because of the efforts been carried out to integrate national economies, the increase in international and intercultural relations, and the disappearance of national borders in the globe of communications. Hence, the global issues are increasingly and intensively affecting our life and create a very competitive environment among our communities in order to integrate to the global network. Therefore, it seems that the universities and culture heritage organizations have a duty to suppose and take more responsibilities and tasks in comprehensive perspectives and concepts.

Back to the big question "What should be the new aims and responsibilities of universities and culture heritage organizations within the framework of global issues?".

As protecting and conserving the cultural heritage has come to be an effective approach to combat the negative impacts, which naturally arise in the age of globalization, and as conservators our main concern being cultural heritage, the question is to be modified to us to be more specific. It is to be "What should be the aims and responsibilities of universities and culture heritage organizations in protecting and conserving of global cultural heritage within the framework of global issues?". Or in another detailed form "What universities and culture heritage organizations should do to take more effective part in protecting and conserving of global cultural heritage which threatened by continuing deterioration and loss resulting from natural and man-made emergencies and environmental risks such as global climate change, environmental pollution, armed conflicts, rapid population growth with unplanned and uncontrolled construction, development, exploration and tourism, limited investment in conservation especially in the time of global poverty and a shortage of trained conservation practitioners with the inequality in educational opportunities, etc.?".

This is the big question to be discussed to re-delineate universities and culture heritage organizations' objectives, roles, and responsibilities, and to make and share views, ideas, and suggestions regarding protecting and conserving of the global cultural heritage on national, regional, and global collaborative platforms. That is what this paper tries to take part to address.

2. GLOBAL CULTURAL HERITAGE AND ITS IMPORTANCE

2.1 DEFINITION OF THE HERITAGE

Heritage ("national heritage" or just "heritage") is the legacy of tangible "physical" artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present, and bestowed for the benefit of future generations.

In other term, heritage may be described as "the actual use of the past". There are two types of heritage.

2.1.1 Tangible Heritage

It includes three types of heritage.

1. Cultural heritage: "tangible cultural heritage" is man-made heritage. It includes "immovable" monuments, groups of buildings, and historic places and sites as well as artifacts and "movable" objects…etc., which are considered worthy of preservation for the future. These include objects significant to the archeology, architecture, and science or technology of a specific culture.
2. Natural heritage: heritage in general can also include "natural heritage" that includes natural features consisting of physical and biological formations, geological and physiographical formations, and precisely delineated areas, natural sites, or precisely delineated natural areas that may have cultural attributes.
3. Cultural landscapes: heritage also includes "cultural landscapes" or "mixed cultural and natural heritage, " which are cultural properties that represent the "combined works of nature and of man," since heritage practitioners have moved from classifying heritage as natural, as man has intervened in the shaping of nature in the past four million years (World Heritage Center 1972/Articles 1, 2, 2008).

2.1.2 Intangible Cultural Heritage

On the other hand, we have "Intangible cultural heritage" which includes the practices, representations, expressions, knowledge, and skills—as well as the instruments, objects, artifacts, and cultural spaces associated therewith—that communities, groups and—in some cases—individuals recognize as part of their cultural heritage. Also called living cultural heritage, it is usually expressed in one of the following forms: oral traditions; performing arts; social practices, rituals and festive events; knowledge and practices concerning nature and the universe; and traditional craftsmanship. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity (UNESCO 2003/Article 2).

A broader definition includes intangible aspects of a particular culture, often maintained by social customs during a specific period in history as well as the ways and means of behavior in a society, and the often-formal rules for operating in a particular cultural climate. These include social values and traditions, customs and practices, aesthetic and spiritual beliefs, artistic expression, language, and other aspects of human activity.

Naturally, intangible cultural heritage is more difficult to preserve than tangible cultural.

2.2 WORLD HERITAGE

Globally, tangible and intangible cultural heritage are among the priceless and irreplaceable assets, not only of each nation, but also of humanity as a whole. The World Heritage includes the following.

2.2.1 World Tangible (Cultural and Natural) Heritage

According to UNESCO 1972 Convention concerning the Protection of World Cultural and Natural Heritage that was adopted by the General Conference of UNESCO in 1972, items of the tangible heritage, because of their exceptional qualities, can be considered to be of "outstanding universal value." This means cultural and/or natural significance, which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage against the dangers, which increasingly threaten them, is of the highest importance to the international community as a whole (World Heritage Center 2008).

As of March 2010, the World Heritage List includes 890 properties forming part of the cultural and natural heritage, which the World Heritage Committee considers as having outstanding universal value. These include 689 cultural, 176 natural, and 25 mixed properties in 148 States Parties. Each of these properties is considered important to the international community (World Heritage Center 2010).

2.2.2 World Intangible Heritage

According to UNESCO 2003 Convention for the Safeguarding of the Intangible Cultural Heritage that was adopted by the General Conference of UNESCO in 2003, several items of the intangible heritage considered important as a mainspring of cultural diversity and a guarantee of sustainable development can be considered to be of "Intangible Heritage of Humanity" and as such need to be safeguard.

As of March 2010, the Intangible Heritage Lists (the Representative List and the List of Intangible Heritage in Need of Urgent Safeguarding) include about 204 masterpieces and elements forming part of the Intangible Heritage of Humanity. These are in about 80 countries. Each of these masterpieces is considered important to the international community (UNESCO 2010).

2.3 IMPORTANCE OF CULTURAL HERITAGE

It is so clear that the global cultural heritage is very important in several aspects such as the following.

1. It displays important and characteristic aspects of the history of humanity, in particular the history of art, and science and technology.
2. It also strengthens identities, reinforces communities' sense of cultural identity; heritage is central to the recognition and maintenance of human culture. It embodies former beliefs, knowledge and skills, and secure individuals, groups, and nations in time and place.
3. It strengthens respect for other cultures and societies; heritage plays a key role in reconciliation between citizens and noncitizens of a given country. It is a powerful tool to engage communities positively as an invaluable role of the cultural heritage as a factor in bringing human beings closer together and ensuring exchange and understanding among them.
4. It helps to improve the quality of life, strengthens well-being, and increases the income (e.g., it often serves as an important component in a country's tourist industry, attracting many visitors from abroad as well as locally).

The heritage is a driving force for human development and creativity, so that an appreciation of diverse cultural heritage and its continuity for future generations promote mutual understanding between people, communities, and nations (Daniel et al. 2009).

Because of the importance of the cultural heritage, it became a part of the human cultural rights, which encompass a wide range of protections, including the right to cultural participation; the right to enjoy the arts; conservation, development, and diffusion of culture; protection of cultural heritage; and freedom for creative activity. It also includes protection of persons belonging to ethnic, religious, or linguistic minorities; freedom of assembly and association; the right to education; freedom of thought, conscience, or religion; freedom of opinion and expression; and the principle of nondiscrimination. (Ayton-Shenker 1995).

3. THE CHALLENGES OF CONSERVATION AND THE ADVANCE OF THE CULTURAL HERITAGE SECTOR

3. 1 THE CHALLENGES OF CONSERVATION

Our global cultural heritage is threatened by continuing deterioration and loss resulting from destruction and decay factors, disasters, risks, and emergencies.

It is worth noting that the heritage is increasingly threatened with destruction not only by the traditional causes of decay, but also by changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction (World Heritage Center 1972). It is true that the loss, through deterioration or disappearance, of any of heritage; these most prized assets constitute an impoverishment of the heritage of all the peoples of the world. Threats to heritage include the following.

3.1.1 Man-Made Threats

Humans themselves are almost always the source of the dangers; threats to cultural heritage come in many forms: armed conflicts and wars (e.g., Bosnia and Herzegovina in the 1990s, and Iraq in the 1990s and March 20, 2003–present); wanton destruction for religious reasons (e.g., Buddhas of Bamiyan, Afghanistan in 2001); poaching, stealing, and contraband (e.g., Egyptian, Greek, Italian, Indian, etc. heritage, long time ago–present); environmental pollution, unplanned construction with rapid population growth, unplanned development and exploration (e.g., Abu Mena, Egypt in 1990–2005) (Hanna 2009, 164); uncontrolled access and recreational use of sensitive areas and uncontrolled tourism with the growing demand on the part of international tourism for places with a cultural heritage, as well as faulty restoration and lack of maintenance (Hanna 2003, 108–110); shortage of trained conservation practitioners with the inequality in educational opportunities as well as limited investment in the field of conservation especially in the time of global poverty.

Again, the processes of globalization and social transformation, alongside the conditions they create for renewed dialogue among communities, also give rise, as does the phenomenon of intolerance, to grave threats of deterioration, disappearance, and destruction of the intangible cultural heritage, in particular owing to a lack of resources for safeguarding such heritage (e.g., the traditional Egyptian storytellers' heritage) (Hanna 2007).

3.1.2 Natural Threats

These include several natural emergencies and environmental disasters, and risks such as tsunami (e.g., Banda Aceh, Indonesia on December 26, 2004), hurricanes and fierce storms (e.g., Old Havana, Cuba in 2008 and several times in the United States), flood (e.g., Florence, Italy in 1966, Luxor, Egypt in 1994 and Prague, Czech Republic in 2002), earthquakes (e.g., Bam, Iran on December 26, 2003) as well as the other dangers being raised because of climate change.

In this list, man is indeed a real enemy. However, just as we caused the damage in the first place, we have the power to repair it, by taking our responsibility as caretakers of the world's cultural heritage seriously. So today, we are sounding the alarm, using several tools (e.g., the World Monuments Watch List) to demonstrate, through the vivid examples of beloved places around the world, the importance of working together to meet these challenges, and join forces to protect our world's shared heritage (World Monument Fund 2010).

3.2 THE ADVANCE OF THE CULTURAL HERITAGE SECTOR

Globally, the world has made tremendous gains in the cultural heritage sector in education, facilities, new technologies, and partnerships.

Several courses and education programs have been established for cultural heritage, its studies, research and conservation, etc.

The new technologies provide communities with fresh opportunities to document, digitalize, raise awareness, examine, treat, conserve, and protect their cultural heritage, meeting the strong desire of communities to preserve, promote, and pass on their cultural heritage to succeeding generations.

A key aspiration in international cultural policy, cooperation, and partnerships, emerging because of growing globalization, is to safeguard cultural diversity and to promote sustainable development in cultural heritage preservation. This global issue is discussed within several organizations (which are important vehicles for the world in cultural cooperation) such as UNESCO, World Heritage Center (WHC), ICCROM, ICOM, the EU, the Council of Europe, and the World Trade Organization. The UNESCO conventions (e.g., Convention on the Protection and Promotion of the Diversity of Cultural Expressions 2005 and Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention 1954) (UNESCO 1954 and UNESCO 2005), as well as regional conventions (e.g., the Council of Europe has three conventions, which concern the cultural environment and heritage, and certain special issues, such as architectural and archeological heritage and landscape) provide a basis for cultural cooperation.

Several organizations and groups have been successful at gaining support to preserve the heritage of many nations for the future. Again, in addition to hundreds of conservation projects, many organizations working to preserve global cultural heritage—both tangible and intangible—have been using online media to support their efforts.

For example, on October 6, the World Monument Fund (WMF) published the 2010 World Monuments Watch List plotting the dozens of villages, buildings, bridges, and monuments at risk of destruction on an interactive Google map. The WMF in New York is one of many organizations, like Global Heritage Fund and WHC financing projects to preserve world cultural heritage sites (World Monument Fund 2010).

Another example is the Global Heritage Network which is a collaborative online platform established by Global Heritage Fund and built around Google Earth that attempts to raise awareness of cultural heritage in the developing world and the threats and dangers that it frequently faces, and provides a space to network and discuss possible solutions.

4. THE UNIVERSITIES AND CULTURE HERITAGE ORGANIZATIONS' ROLES AND RESPONSIBILITIES IN THE ESTABLISHMENT OF COLLABORATIVE PLATFORMS IN PROTECTING AND CONSERVING OF THE GLOBAL CULTURAL HERITAGE

Although it is not easy to make comprehensive statements for "the universities and culture heritage organizations' roles and responsibilities, " but UNESCO points out that "teaching and research" are the "intellectual functions" of the university. They are related to the educational mission or "educational function" consisting of the "cultivation of the mind" and the "transmission of basic ideas and concepts." Therefore, the university must be a source of imagination and innovation. In addition, "service" is the "social function"; it is the social role of the university that provides the link between the intellectual and educational role of universities on the one hand and the development of society on the other. However, carrying out these functions, no matter how they are expressed or put into practice, ought to be interactive within the university and with society (Cabal 1993, 21).

Such roles and responsibilities of the university could also in several ways be set for all the culture heritage organizations.

It is important to establish new collaborative platforms to more effectively protect and conserve the global cultural heritage and address global challenges now and in the future especially by threats and disasters prevention and reduction as well as preventive conservation. The universities should work together with the other governments, nongovernmental culture heritage organizations, the cultural heritage sector, communities, and other stakeholders on the national, regional, and global levels within the main roles and responsibilities of universities and culture heritage organizations to do the following.

1. Strengthen the investment in research and educational opportunities; endeavor actively and independently towards the training of human resources and the pursuit of research necessary for international cooperation on cultural heritage and its protection and conservation, and making the results of this research widely available. Universities also should endeavor to ensure the appropriate treatment for researchers and other professionals and technicians, and the provision of well-equipped education and research facilities, so that the work and working environment of researchers and other professionals and technicians involved in international cooperation on cultural heritage shall appropriately reflect the importance of that work. In this regard, it is important to take into account respect for the independence of researchers, in addition to special features of research at educational and research institutions, when formulating and implementing matters related to educational and research institutions.

   With respect to the role of education, education is the most powerful tool the world has in threats and disasters prevention. We should take a holistic view of education and emphasize learning at all levels of society from schoolchildren to active professionals. We must address both formal education, through schools, and non-formal education, such as continuing education, community education, etc. Education also involves many stakeholders, governments, intergovernmental agencies, NGOs, civic society, and the private sector, and they all must also engage in threats and disasters reduction education (Rouhban 2005, 28).

2. Working in development, networking, exchange, and the transfer of knowledge and resources globally for intensively using them and working on the development of new preservation approaches and technological innovation in the field of conservation, threats and disasters prevention and preventive conservation.

For example, some proposals for how universities can contribute to reduce damage, threats and disasters have been suggested that are as follows.

1. Universities should not serve only as centers of knowledge development, but should also utilize that knowledge towards the mitigation and reduction of threats and disasters risk. It is often said that investing in disaster mitigation is much more economically efficient than spending the money once the disaster has happened. Policy makers must be taught about the need to invest in threats and disasters prevention and mitigation based on knowledge and scientific data in order to ensure that a budget will be allotted for disaster mitigation measures. Universities should play that part.
2. Universities and research organizations should exist as resources. The knowledge that universities possess related to disasters is critical to the recovery of a stricken area and heritage elements, and university campuses and buildings can be used as evacuation and restoration centers during a disaster. Effective threats and disasters prevention requires specialized knowledge from a variety of fields. The university has the opportunity to demonstrate great leadership, both in threats and disasters prevention and during the disasters, through a system whereby we could strengthen and broaden the network of specialists involved in threats and disasters prevention, consolidate knowledge and resources, and return that back to society.
3. It is necessary to establish a coalition among organizations. Although each individual's activities are important, our threats and disasters relief efforts would be even more effective if based on cooperation among universities and researchers. Universities are presently places for the development of knowledge and knowledge transfer to students, but we also have to utilize this knowledge in threats and disasters prevention and recovery. A strong link to the local community is also necessary for effective threats and disasters prevention and relief. The cooperation with local communities should include the media, business, professional organizations, NGOs, and other civil society's organizations. By establishing coalitions, it becomes possible for the university to do research suited to the needs of a particular community (Bendimerad 2005, 21, 22).

3. Define a comprehensive system of recognition of high-level professional qualifications, validated by the public authority and defined by professional organizations of conservators–restorers, which are represented at the national, regional, and global levels. This system must be based on the education level in conservation–restoration (university and recognized equivalent) and on the quality of the acquired professional experience, and should make provisions in case of professional malpractice.

   It is strongly suggested that a global cooperation of multinational enterprises and the world's leading universities and institutions be developed to face the global challenges in conservation. For example, setting a global standard of excellence for pre-experience programs in conservation, restoration, management, etc., providing advanced education and research for professionals who aspire to play a leading role in the development and direction of enterprises in a global context.

   These individuals will be—for example—outstanding in their

   (a) high academic standards and professional skills;

   (b) willingness to take responsibility within society;

   (c) ability to perform effectively in a fast changing environment;

   (d) knowledge of other world regions and cultures, empathy with different cultures, values, and behaviors as well as dispositions towards respect and concern for other cultures and peoples;

   (e) familiarity with international and global issues;

   (f) skills in working effectively in global or cross-cultural environments, and using information from different sources around the world; and

   (g) ability to communicate in multiple languages.

4. Encourage responsible stewardship and advance sustainable national, regional, and global conservation policies and strategies, including risk management and planning process (Aydan et al. 2006, 7). Universities also must obligate to wide involvement in risk and emergency preparedness, advocacy, response, assessment, recovery, reconstruction, and restoration (Miyahara 2005, 57), and commit to increased community engagement and raise public awareness regarding at-risk cultural heritage.

   Cultural heritage preservation is carried out following international standards by organizations such as UNESCO, ICCROM, ICOM, and ICOMOS, but it is also important to respect traditional indigenous principles and practices of building and conservation.

   It is very important to set more programs to increase awareness of the problems as well as interdisciplinary knowledge for effective conservation and management mechanisms. Universities can contribute in the following suggested ways.

   (a) *Risk analysis*: risk analysis can predict damage to cultural heritage based on regional, environmental, and geographical data. For example, Cairo and some other important cultural heritage cities in Egypt are located near several fault lines, which puts all of their

architectural structures in danger (e.g., earthquakes in October 1992 and November 1995) (Hanna 2003, 94). Research facilities concerned with preserving the whole structure and earthquake-resistant reinforcement work established at universities are effective. In addition, it is necessary for universities to join forces with other organizations to preserve cultural heritage.

(b) *Analysis of present conditions assessment and damage potential*: this also an important role the university can play. In addition, at the university level, it is important to secure safe structures and construction and to make threats and disasters plan to minimize damages and to prepare for the reconstruction effort.

(c) *Framework for regulation management*: networks should be established to ensure that regulations are actually put into operation. It is important to create a threats and disasters prevention system with the cooperation of government agencies and NGOs to raise awareness and prepare for threats and disasters prevention training. We need to institutionalize disaster preparedness and response plans and practices through mock drills. In all the steps of planning and preparedness, e-governance can make a difference, with an integrated, efficient, and speedy approach to resource protection threats and disaster prevention (Ghosh 2005, 46).

5. Integrate cultural heritage issues and conservation projects with other sectors to provide a lever for social and economic development, such as playing a significant role in tourism development (Daniel et al. 2009 and Overton 2000, 1).

There is no doubt that cultural heritage and related projects are important factors in attracting businesses to locate to a particular area or region. There is evidence that businesses chose places for its skills, knowledge, and creativity which is usually linked to a good sense of place as they want to situate themselves with other creative people. Nevertheless, on the other hand, it has been long counseled that the wider public benefits of heritage and related projects are difficult to present. It requires government to be engaged and for organizations interested in heritage to present evidence-based and well-structured arguments for its importance to society. For example, it is important to put values on tourism and culture. Rather, we need to demonstrate participations: What do societies get in return? How do we take it beyond speechifying? (Hanna 2010, 1313–1324).

5. DISCUSSION AND CONCLUSION

The global heritage that survives from the past is often unique and irreplaceable, which places the responsibility of preservation on the current generation. So it is important to establish new collaborative platforms to more effectively preserve this heritage and address global challenges now and in the future.

Universities and culture heritage organizations play vital roles and have great responsibilities towards this heritage and its protection and conservation. The role of universities may be characterized by the four notions: knowledge, innovation, capacity-building, and education, or in other words "use knowledge, innovation, and education to build a culture of safety and resilience at all levels." Such roles of the university could also in several ways be set for all the culture heritage organizations.

Universities and culture heritage organizations should work to strengthen the investment in research and educational opportunities, endeavor actively towards the training of human resources and the pursuit of research necessary for international cooperation on cultural heritage and its protection and conservation, as well as endeavor to ensure the appropriate treatment for researchers and professionals, and the provision of well-equipped education and research facilities. Universities should also work in development, networking, exchange, and the transfer of knowledge and resources globally, working on the development of new preservation approaches as well as defining a comprehensive system of recognition of high-level professional qualifications, validated by the public authority and defined by professional organizations.

Universities and culture heritage organizations should be the leaders, should be the core to encourage responsible stewardship and advance sustainable national, regional, and global conservation policies and strategies, and to integrate cultural heritage issues and conservation projects with other sectors to provide a lever for social and economic development.

Again, universities and culture heritage organizations should be the source of information dissemination taking into account that the adaptation of higher teaching to social needs is the main concern of institutions and individuals. Therefore, there should be backing for the masses to have access to higher education giving them adapted scientific, cultural, and civil training, and at the same time, linking higher education to society, the economy, and practical life.

1. In addition to its work on the development of new preservation approaches and technological innovation in the field of conservation and preventive conservation, the universities and culture heritage organizations should consider several other roles and responsibilities at the national, regional, and global levels. For example, universities should have wide involvement in risk and emergency preparedness and advocacy, and should include: carrying out intensive threats and disasters prevention training with the community to increase community engagement and raise public awareness regarding at-risk cultural heritage; and
2. carrying out training and education based on everyday life and develop a volunteer training program for all the students, staff and faculty, and volunteer groups.

Universities and culture heritage organizations' roles include also creating threats and disasters prevention plans for each type of possible threats and disasters for areas with specific problems such as coastal areas. This include emergency surveys with the goal of locating areas that are prone to threats and disasters, helping to create a plan to raise the capabilities of its people and create a map of evacuation routes, so that relief activities can quickly take place in threats and disasters cases for risk and emergency response, assessment, recovery, reconstruction, and restoration.

As the multidisciplinary approach to threats and disasters mitigation is essential, the universities and culture heritage organizations must gain public trust in the knowledge and know-how it produces. They must instill self-reliance of governments, intergovernmental agencies, and empower the members, NGOs, and other civil society's organizations of the communities in which the cultural heritage is at risk so that they can cooperate and deal with threats and disasters, and researchers must also demonstrate to officials and donor communities that threats and disasters prevention is cost effective. This includes supporting economic analysis that researchers, culture heritage organizations, and universities are able to provide.

Further, we suggest the world's universities and culture heritage organizations— including universities and culture heritage organizations in developing countries (e.g., Egypt)— to work on establishment of new global courses in cultural heritage, and its protection and conservation to be considered internationally as a condition or provision for recognizing the university-level education. These courses may consist of a common global part regarding the global cultural heritage, threats it faces, and its protection and conservation as well as a local part regarding the local cultural heritage in the given country, which could be changeable from one country to the other.

Again, universities and culture heritage organizations should work on establishment of more global exchange activities, which could include field visits and studies, training courses, workshops, websites and digital libraries in multilanguage, etc. It is important that universities and culture heritage organizations develop a network of "universities and culture heritage organizations without borders," no borders with each other and no borders with the societies in the field of cultural heritage and its protection and conservation issues.

ACKNOWLEDGMENTS

The author is grateful to the Ministry of State of Antiquities in Egypt and Kress Foundation for their support. Thanks are also due to members of Wood Artifacts Group, Alex Carlisle WAG chair and Stéphanie Auffret WAG program chair for their assistance and support.

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CHARLES J. MOORE

Hello Walls II: Treatment Considerations for Chinoiserie Panels in A 20th-century Gilded Age Cottage

ABSTRACT—This paper describes an in-process work. The project was briefly introduced at the American Institute for Conservation-Wooden Artifacts Group meeting in 2007 and further articulated at the Crossing Borders conference hosted by the Victoria and Albert Museum in London in October, 2009. A version of that paper, which details the research, analysis, and proposal development, may be found on the Preservation Society website (http://www.newportmansions.org/documents/the_french_connection-conserving_the_elms_breakfast_room.pdf). This work introduces certain of the more challenging specifics of the project, namely, workspace setup and logistics, glue and gluing, and varnish removal.

1. INTRODUCTION

In 1899, Horace Trumbauer, a Philadelphia architect, designed a grand summer house for Edward J. Berwind on the prestigious Bellevue Avenue in Newport, Rhode Island, USA (fig. 1). Trumbauer was a young and relatively unknown architect outside Philadelphia but was conversant in French classicism and modeled the Berwind house after the Château d'Asnières-sur-Seine, a quintessential 18th-century French country house. (After Mr. Berwind's death, his younger sister lived seasonally in the house until 1961, when it was sold and scheduled for demolition for a shopping center in 1962. Timely intervention by the Preservation Society resulted in its preservation.)

For the interiors, Trumbauer turned to the firm Allard et ses Fils of Paris. Jules Allard was well known for his work for the Vanderbilt families in New York, and he was a much sought after designer, especially among Newport society.

Fig. 1. The Elms, west elevation

In the north-west corner of the house is an oak-paneled Breakfast Room in the Regency style with chinoiserie detailing, including four very large black and gold decorated panels and three overdoor panels, similarly decorated (fig. 2). Three of the large panels are

Fig. 2. The Elms Breakfast Room, east wall showing one Chinese lacquer panel and two overdoors

Asian lacquer described as "Chinese, 18th century, K'ang Hsi period: 1662–1722." A fourth large panel was supplied by the Allard firm and was presumed to have been fabricated using European methods such as japanning or vernis Martin but is now known to be Asian lacquer also. The overdoor panels have fragments of Asian lacquer that have been filled out using European methods.

Rooms with Chinese lacquer used as wall paneling were extremely popular in Europe in the 18th century. This room was created in the 20th century and compares with those earlier ones, which today can still be found at such great sites as Schloss Schönbrunn in Austria, Schloss Falconlust in Germany, the Queen's Pavilion at Drottningholm in Sweden, and Palazzo Reale in Turin, Italy. The Elms joins these important sites as a repository for antique Chinese lacquer of this type in an architectural context.

2. DESCRIPTION

The large panels are in pairs with central designs surrounded by cartouches featuring typical landscapes, springtime motifs, and the mythical Qilin (fig. 3). Although viewed at a distance in an architectural context—the visitors see the room, not so much the objects in it—there are beautiful and charming passages of work on the panels. The figures are delicate and the rendering of architectural surfaces and nature is simple and elegant (fig. 4).

Fig. 3. The north panel, like its near-twin on the south, shows a contemplative scene featuring mortals and divine beings

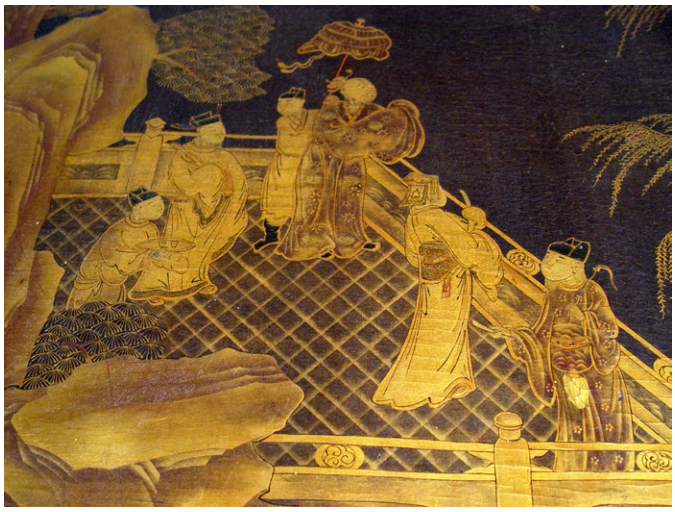

Fig. 4. Fine lacquer detailing

The antique panels are approximately 80 in. wide and 120 in. high. Each of them was initially three separate panels (perhaps a screen, though the height seems extreme). When the three separate panels were joined, an oak cradle was applied to support the large single panel. The cradle was also intended to accommodate wood movement, although the evidence 100 years later indicates limited success.

The overdoor panels are 66 in. wide and 46 in. high and are decorated more generically with rocks, plants, and birds. They have composite decoration: Asian lacquer fragments with infill of japanning.

Investigation revealed the existence of three campaigns of lacquer—the 18th-century original work, the 20th-century Allard repairs, and some presumably 19th-century repairs sandwiched between the two. The panels suffer from all of the ills one would expect considering their life: shipment from China, an unknown period of installation/use in the 18th century with attendant degradation and subsequent repair, a period of decline to the point of salvage, with storage, restoration, reinstallation, and yet another period of degradation. This includes deformation and cracking of support, cradle restraint, detaching lacquer, light and water damage, and the idiosyncrasies of several campaigns of restoration including applications of varnish (fig. 5).

3. STUDY

A preliminary conservation assessment was undertaken by Marianne Webb (then conservator at the Royal Ontario Museum). The development of a treatment proposal was supported by a Getty Foundation Architectural Planning grant and undertaken by the author, chief conservator of the Preservation Society and Melissa Carr, principal of Masterwork Conservation.

Fig. 5. Lifting lacquer with nailed repairs

Inspection and analysis in situ at the Elms included examination in visible specular and raking light, UV photography, solvent and adhesive testing, cross-section microscopy, limited pigment ID using portable XRF, and x-ray radiography for structural information. Lacquer analysis using FTIR and PY-GC/MS was performed by the Getty Conservation Institute and elemental analysis using SEM was done at Williamstown Art Conservation Center. The study also included examination of similar panels in Vienna in consultation with conservator Silvia Miklin. Initially funded by the Getty Foundation and others (Berwind, Felicia, Carpenter, etc.), the implementation of the project is presently funded by the Institute of Museum and Library Services.

4. LOGISTICS

The initial investigations and documentation in situ required the erection of a large rolling staging so that every square inch could be examined (fig. 6). The panels are 10 ft. high and sit on a wainscot approximately 5 ft. high. The staging was accessorized/modified early on to serve as a gantry of sorts. Brackets were purchased that allowed this team to put a platform at one end of the staging. This platform was carefully positioned and shimmed to be level with the bottom of the panel on the wall. To counteract the weight of the panel and its accompanying human minders, wheeled outriggers were attached to the end opposite the platform. A shelf with bags of sand for counterweights was added to counteract any inclination to tip. The panel could be released from its moldings, backed out of its inset location on the wall directly onto the level platform, and then supported safely there for subsequent examination. The panel could then be reinstalled directly or brought down to the floor.

In action, the molding holding the panel in place was first removed. To take it out, several people were on the floor and two at the top of the staging. The panel was released at the top but still resting on the ledge. A corner at a time, the panel was carefully walked onto the platform and back into an armature that was created to hold it securely.

Fig. 6. Staging has been modified to act as a gantry.

The east panel was the first chosen for examination, including by x-ray, so it needed to be brought down to the floor. Because of it being the first time, this team was extremely circumspect. A materials lift was borrowed and some accessories fabricated that would allow the team to slowly, using a hand crank, lower the panel from the staging platform to the ground. Besides being very pleased, the main takeaway for this team was that the handlers suggested the panel was not all that heavy after all; subsequent panels were removed without the lift. In either case, a surplus of people was on hand for the procedure, which in each case went very smoothly.

The panel was subsequently moved to the basement. In the projected pathway, all doors were high enough to handle the panel if it were on its side. Sleevelike support fixtures were made for the two lower corners. Outfitted with handles, they allowed the panel to be picked up as well as to slide on the floor using rug pads. With plenty of human support, the cushioned panel slipped along the waxed floors of the Dining and Ball rooms to the front door, and then was lifted down the steps and into a truck (fig. 7). The panel was raised into the truck where it rested against the wall at an angle, held in place by a cleat on the floor.

Fig. 7. Moving panel—note handled corner sleeves for protection and carrying

The truck was driven around the corner to the back entrance of the Elms, the panel was extracted, and was slid without any problem to the workspace where it was placed on the wall. Wall mounts had been previously installed to secure the panels vertically for storage, treatment, or photography.

5. WORKSPACE REQUIREMENTS/SETUP

This was the first truly large-scale treatment the team had undertaken in the time the author has been at the Preservation Society. Work hitherto had involved relatively smallish movables brought to the lab or work done in situ. The team determined this work could not be successfully done vertically in place and needed to be moved to a location for treatment. That being said, any one of the large panels would have occupied so much space in the lab and for so long that it would have inhibited other work that needed to be done. Furthermore, as the lab is in a different building, it was felt that removing the panels to a completely different environment might not make them happy. In fact, fortunately, a room in the basement was underinterpreted/utilized. As part of the "Behind the Scenes" tour of the house, it was an open space originally used as the Laundry Drying Room and being conveniently used for exhibiting trunks and clotheslines (fig. 8).

After some interdepartmental discussion, it was decided that the treatment of the lacquer panels in that space would also provide an opportunity to continue to show the room and its new purpose to the visiting public.

So, with a working space identified, the treatment proposal could be implemented. But along with treatment concerns, there was the issue of workspace preparation and panel logistics. The room had no workshop amenities, and the panels were really big. Everything from moving them to gluing would be affected by their inconvenient size.

The trunks were relocated to a storage aisle and replica clotheslines were removed. Surface-mounted electrical outlets were

Fig. 8. "Drying Room" in The Elms Basement

installed. It was understood that some kind of climate modification would be required: compared with the Breakfast Room, the basement conditions would be damper in the humid months and drier during the winter months when heat would be required. In the winter, the temperature in the Breakfast Room is kept as low as possible by closing off the heat ducts; an average might be 55°F. This keeps RH as high as possible at approximately 35% in the centrally heated building. A humidifier was required in the basement workspace to maintain this minimum for the relocated lacquer panels. Fortunately, a Nortek steam humidifier was salvaged from the Preservation Society headquarters building where it had been installed but not used for very long. Increased RH in the humid months—higher in the basement workspace than the Breakfast Room—was mitigated by a Hi-E Dry Model 100 standalone dehumidifier. Again, the unit had been purchased for a one-time-only exhibition at another property and was no longer needed, so it was repurposed to the lacquer project.

6. CHOOSING GLUE

A broad range of adhesives have been used in the conservation community to reattach detached lacquer and were assessed for service conditions, reversibility, open time, and potential hazards. These adhesives include a variety of natural and synthetic waxes, resins, starches, and proteins. Varying results have been reported for all of these. Theory and testing helped identify some specific qualities that were required. There was also some flexibility inherent in this project as opposed to other lacquer treatments. Although the lacquer surface on these panels displayed a history of light and water damage, there were several layers of varnish and a waxed surface over them that would act as a protective barrier until such time as they were removed.

Preliminary testing had demonstrated that a little moisture and some heat were necessary to make the brittle lacquer flexible, suggesting that a water-based adhesive might be effective. The sensitivity of aged and degraded lacquer to water is well

reported in the literature as is high heat; however, it was observed that the presence of multiple layers of varnish served to protect the degraded lacquer surface, suggesting that water-based adhesives could be safely employed. Further, the ground layers in these panels are bound with lacquer and not glue, which means that the solubility in water of the ground layers was not an issue. The team was also advised that the temperature to be employed (145°F) would not damage the lacquer.

The ideal adhesive would be strong enough to hold the lacquer down, be retreatable, not creep, have a workable open/closed time, be stable under exhibition conditions, and not threaten the lacquer surface during use.

Discussions with consultants and reviews of the literature, in concert with the team members' experiences and preferences, indicated that protein glues would be good choices. In the end, it was a choice between fish and hide glue. Although fish glue would have been a good and popular choice, because of the positive gelling characteristics of hide glue, that material was chosen. A chart in Adhesives Handbook[1] shows the percent glue/water to make a workable consistency glue with the different gram strengths available. A mid-range #192 gram strength sold by Behlen was chosen for the best average of open time (long), water-to-solids ratio (low), hygroscopicity (low), and tendency to be brittle (low). At the recommendation of a colleague,[2] the water used to make the glue contained 1% low-molecular-weight (LMW) PVOH to further counteract embrittlement and loss of cohesive strength. The team used 28.3 g of hide glue to 46 g water (prepared with 1% LMW polyvinyl alcohol), which was made fresh every week. The warm glue at the recommended ratios will flow through a 22 g needle, which is very useful for injecting into low-relief cracks. The relatively high percentage of solids allows for some thinning if necessary.

7. GLUING AND CLAMPING

One of the big problems with gluing down the lifting lacquer was the distance to the middle of the panel. Whereas narrow or screen-sized panels seen in a European 18th-century context, such as Schloss Shönbrunn or Palais Esterházy in Vienna, were butted or had a molding placed over the joint, these panels were edge-glued to form a single large panel with the subsequent application of a cradle on the back. This made for an 83 in. wide panel to deal with. A clamping table to accommodate a narrow panel would have been easy. It would have been possible to use C-clamps around the perimeter and go-bars or shimbari; within easy reach. A setup for panels 83 in. W is different. A table was designed to accommodate a panel with the capability of locating horizontal beams anywhere along the width (fig. 9). Once an area of delaminating lacquer was identified, the beam would be placed over it and the gluing process would begin. The beam allows the use of go-bars or shimbari to apply pressure from the beam to the surface to press the lacquer flat. The table is completely contained and on wheels so it can be moved to any location in the lab. This is an important feature when shuffling

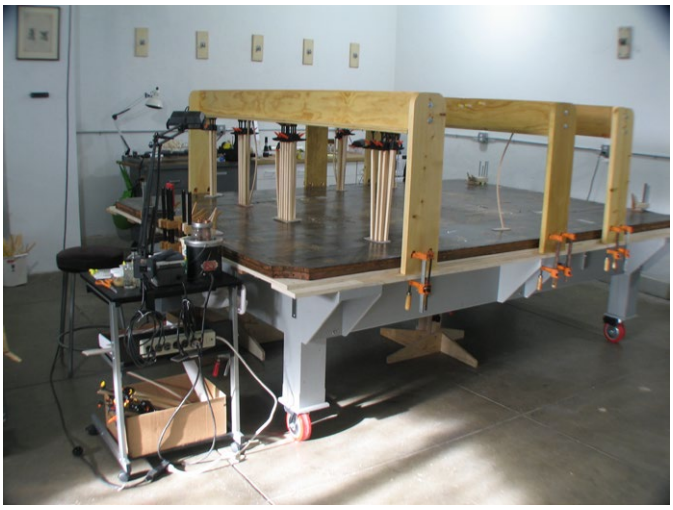

Fig. 9. Custom-designed rolling table for gluing

panels around during documentation and treatment. A similar table was made for the smaller overdoor panels.

8. CLAMPS

The large clamp table has an overhang that allows the use of C-clamps up to about 6 in. from the edge. Anything more requires a different solution. The best one is the use of go-bars or shimbari. These can range from pieces of wood—bamboo is good—to fiber glass, to whatever else one can come up with; this team made some from ash. The idea is simply to have enough pressure brought to bear upon the work. In the end, small commercially available clamps were modified to use as fairly low-profile, vertical jacks. The idea was to make a spreader clamp/jack out of a micro-sized bar clamp to take the place of go-bars or shimbari as used under a beam or canopy. The clamps used here have been sold for as little as $1.99 each at Harbor Freight. (They give out after a while; perhaps the metal in the gripping plates and bar are too soft. Irwins and such will last much longer but also cost more).

The clamp is prepared by cutting off the jaws on the band saw. The head is attached with a small nut and bolt so it can be reversed on the bar. It is turned over so the flat part is at the top to bear on the beam. A pin needs to be removed from the bar to allow the head to slide on.

An extension bar of any suitable size can be fabricated out of wood in which one contrives a long-enclosed slot for the metal clamp bar. The author's wood stakes are 1/2 × 9/16, which is only serendipitous: a nominal piece of three-fourth pine is ripped to half or so. The resulting cutoff should have the same thickness as the kerf of the saw blade. Groove the larger piece, use clamp bars as spacers, and glue the thin ripping into the kerf. Clean up as one likes. Make a bunch and cut to the suitable-length. The clamp bars will slide right in.

A compression spring is placed between the wood stake and the clamping mechanism. This feature compensates for any

Fig. 10. Modified micro bar clamps

Fig. 11. Adjustable jack for supporting bottom of panel

flexing of the beam or canopy when one applies a lot of clamps, which is an upside of traditional shimbari and other flexible go-bars. Even a little movement will cause the carefully placed forest of rigid clamps to fall out. This is always a bummer (fig. 10).

The same theory was used to make a set of large, adjustable jacks—these are used to support the back side of the lacquer panels when applying pressure from above (fig. 11). The issue of the pressure of the clamps in a localized area was a concern early on. Clamping pressure could put too much strain on glued joints, repairs, or shrinkage cracks especially since the panel is not perfectly flat. To counteract this, the top of the table is simply a frame that has cross members that reflect the cross bars of the panel's cradle. The open areas within the framework allow access to the bottom of the panel where the jacks can be placed for support. The jacks are moved whenever there is a significant change in clamping location.

9. CLAMPING IN THE MIDDLE

Of course work on the panel is limited to a person's reach—arms are only so long and can only work so far out. Getting a person to the middle of the panel was a challenge: Everything was considered, including the Mission Impossible solution, fairy wings, levitation, etc. In the end, a little research showed that a laminated OSHA-approved staging plank would bend very little with one person over the 83 in. span. Two planks would be even better. Placed on staging supports, this worked very well as long as one has a willing, able, and tolerant practitioner to station him/herself along with his/her equipment out there for a lengthy hover. This team was fortunate to have that practitioner (fig. 12).

10. GLUING PROCESS

Working over relatively long periods of time requires that the glue be kept warm or reliquified in the repair using heat, which requires equipment. Work stations were set up based on low-cost computer stations from Staples. In close arrangement could be kept a task light source, a warming plate for shot bags, water bath for glue and syringes, clamps, Plexi cauls, silicone release paper, etc. Closed-end copper tubes are used in the water bath to isolate the syringes from water but keep the glue in them warm (fig. 13).

In action, first a little water and ethanol (or detergent) is injected in to the crack to hydrate the lacquer coating and also

Fig. 12. Contract Conservator Maria JoãoPetisca on plank

pre-wet the area to allow the glue to flow better. Excess moisture is blotted away. A warm shot bag (145°F) is placed on top of the lacquer with silicone-release Mylar underneath to protect the surface. The warm bag is removed after some minutes, and if the lacquer is flexible enough to lay flat then glue is injected. If glue application takes longer than expected and the adhesive begins to gel, it can be re-liquified using the warm shot bag at any time. The area is cleaned of excess glue, protected with silicone-release Mylar, and a piece of softening (cork, rubber) to compensate for surface irregularities is placed with a piece of rigid acrylic piece on top where the clamp will be applied. After some minutes of pressure and allowing the warm glue to set and gel, the entire "sandwich" is taken off, the area is cleaned again of remaining squeeze-out or traces of glue and all the pressure system is applied again and left in place for 48 hours.

A purely subjective note regarding the PVOH: Hide glue was tried with and without the PVOH and it is believed that, besides benefitting cohesion, the PVOH has a surfactant quality—the glue seemed to flow better.

11. VARNISH REMOVAL

Following the securing of all delaminating lacquer, modern varnish could be removed. Discolored coatings had built up on all the panels. The effect was most severe on the antique panels where darkening and blanching were distracting. Although the most recent coating on the Allard panel was in relatively good condition, there was entrained dirt and dust from the environment. The decision was made to remove the surface layers of varnish while leaving the more "historic" coatings. It could be seen that the latest coatings had been applied in situ; the moldings protected that part of the surface.

Solvent testing showed that isopropanol cut with mineral spirits was an effective solvent for the upper varnishes. Visual inspection was satisfactory, but the examination of a cross-section of a cleaned sample showed definite erosion of the layers

Fig. 13. Work station setup

that the team wanted to keep. Experimentation with a Pemulen gel ultimately provided very good results.[3] An emulsion containing 100 mL water, 1 g Pemulen TR2, 1.5 mL TEA, and 100 mL isopropanol was made. pH was raised to 8.5 with sodium hydroxide. This worked well on the top coatings on the antique panels. The Allard panel required the addition of 5 mL mineral spirits. Varnish residues were removed with a solution of two parts isopropanol with one part mineral spirits. For removing any residual Pemulen, a final wipe was done with water raised to a pH of 8.5. In each case, the pH needed to be at 8.5 in order to work well (fig. 14).

There were some difficulties with maintaining the pH (measured with papers). Mixing fresh gel every day or two minimized the problem. Varnish removal was monitored using the excellent Inova X5 LED UV flashlight. UV lighting for digital photography of the panels was provided using a pair of Spectroline Model XX 40 Longwave UV fixtures (fig. 15).

12. CONCLUSIONS

The implementation of this treatment required a great deal of problem-solving. All the solutions have worked very well, however, and the initial challenges have resolved into a more routine

Fig. 14. UV light setup

Fig. 15. Layers of varnish partially removed—UV light image

operation. This stabilization phase will be followed by a campaign of filling losses and compensating for missing decorative material, which will no doubt have complications all its own.

NOTES

1. Chart from Hubbard, John R. 1962. Animal Glues. In *Adhesives Handbook,* ed. Irving Skeist: Reinhold Publishing Corp. p.117.
2. Conversation with Don Williams, Senior Furniture Conservator, Museum Conservation Institute, Smithsonian Institution.
3. Link to Nancy Ravenal's Pemulen site—useful information at http://pemulentr2.pbworks.com/w/page/15636416/FrontPage

AUTHOR BIOGRAPHY

CHARLES J. MOORE was Chief Conservator, Museum Affairs Department, at the Preservation Society of Newport County, retiring after 31 years. Following a 10-year career as a cabinet maker, which culminated in being Chief Carpenter of the Washington National Cathedral in DC, Jeff was fortunate to obtain a position at the Preservation Society, during which time he completed his BS in Historic Preservation from Roger Williams University and was a Fellow in the Furniture Conservation Training Program, at the Smithsonian's Conservation Analytical Laboratory. He has served as Program Chair and Chair of the Wooden Artifacts Group.

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F. CAREY HOWLETT

Making the Case for Conservation or An Inward Look at Conservation Outreach

ABSTRACT— Aristotle's *Art of Rhetoric,* a discourse on three techniques for persuasive speaking, provides insight into ways conservators publicly present our work. We seem to relate best to Aristotle's ideas regarding Ethos and Logos, focusing on ethical principles and logical understanding of artifact deterioration and the means for preservation. We usually downplay Pathos, Aristotle's third technique, which persuades by appealing to listener emotions. The article contends that outreach appealing mainly to ethical and logical sensibilities can produce neutral or negative responses. Conversely, emotional appeals, often considered the tricks of marketers and politicians, can serve as powerful tools to engage our audience.

1. INTRODUCTION

The 2011 theme for the AIC Annual Meeting in Philadelphia was inadvertently telling. The title—"Ethos, Logos, Pathos"—was drawn from Aristotle's *Art of Rhetoric*, the philosopher's discourse on the three primary means to make a persuasive argument. As a one-time humanities student with a passing familiarity with Aristotle's work, I assumed the conference would be all about conservation outreach when I first saw this theme —after all, what better way to make the case for conservation than to persuade the public of its importance using the three pillars of Aristotle's rhetoric? 1(Aristotle 1991)?

The explanatory subtitle for the 2011 theme—"Ethical principles and critical thinking in conservation"—and the subsequent descriptive paragraph proposed an entirely different focus for the program. Instead of drawing on Aristotle's rhetorical principles as a means for communication, the text put forth an inwardly focused theme with no expressed acknowledgment of ethos, logos, and pathos as tools for successful persuasion. Even more telling, the text referred only to the first two principles: ethos (ethical principles) and logos (critical thinking). Pathos, the third leg of Aristotle's rhetoric, was curiously omitted.

Why was pathos left out? Aristotle defined pathos as rhetoric that targets the emotions, engendering feelings of pride, indignation, fear, well-being, good will, pity, or any other emotion intended to make a listener receptive to a particular argument. Emotional appeals, common in the realms of marketing and politics, may not seem valid to us as conservators: such appeals are often viewed as superficial or deceptive. There is no question that we are passionate about our work, but if one stops to think about how we generally express that passion, it is usually in terms that probably seem a bit dry to an outsider: trotting out our Code of Ethics, proclaiming the years of study necessary to become a conservator, focusing on our fight against forces of deterioration and stressing the role of science in our work. Ethical principles and critical thinking seem paramount, and we rarely employ the rhetorical tool of pathos put forward by Aristotle. Perhaps this is a reason conservators are sometimes branded as "too analytical," "too rigid" in our thinking, and "unable to see the forest for the trees."

So how do we develop emotionally based messages that appeal to our current audience and attract a new public? There is no question that art and artifacts can inspire the imagination and foster a beneficial historic consciousness—a unifying emotional connection to the past that draws upon but is deeper than mere historic knowledge. Objects have the power to sound the "mystic chords of memory" as evoked by Lincoln in his first inaugural address. We need to proclaim conservation as a value-added enterprise, as a field uniquely positioned to help discover, preserve, and give voice to the messages inherent in objects, just as we analyze, preserve, and maintain their physical integrity.

This is a lofty goal, but let's take a look at a few preoccupations of our profession to see how they serve this goal. I've chosen just two aspects of our field that help identify us as conservators and color the way we present our work to the world: our interest in understanding the forces of deterioration, and our consequent focus on preventive conservation. These are both GOOD things, right?

Of course they are—they are important and can be useful tools for successful outreach, but in the past, these have sometimes become impediments to conservators' ability to broaden the appeal of conservation to the public, sometimes even engendering negative reactions. The fact is that both these aspects of conservation are more suited for outreach using Aristotle's ethos and logos than they are to any pathos-based emotional appeal. Unfortunately, this is a world where emotional appeals often seem to take precedence over ethics and logic. Going public with outreach more geared to an observer's ethical and logical sensibilities (which may or may not exist) risks putting out messages that are at best neutral and, at worst, emotionally negative.

Following is a look at these aspects of our profession from the perspective of an outsider and an examination of their potential for negative emotional impact. Ways to turn them into positive pathos-based appeals are also discussed.

2. A FOCUS ON DETERIORATION

For years, I was one of several conservators at Colonial Williamsburg who regularly conducted conservation awareness training sessions for interpretive staff, custodians, security guards, and others who worked around the collections. Sessions were about two hours' long, and most of that time was spent discussing the myriad problems associated with historic objects: damage from environmental pollutants, damage from temperature/R.H. fluctuations, damage from light, damage from handling, damage from wood's uneven shrinkage, damage from alterations, damage from mold, damage from inherent vice—a comprehensive catalogue of damage. We used wonderfully graphic images of all types of deterioration, and a few people in the audience seemed to share our fascination with them. (it became obvious these were the collectors, interested in tips and techniques for preserving their own prized possessions.) But many in the audience seemed to go somewhat numb after 20 minutes of exposure to the enthralling world of deterioration. It was evident that the approach had to change, and shortly I will discuss the changes made that resulted in a somewhat more enthusiastic audience. But first, let us examine another aspect of our profession that sometimes engenders negative responses: our focus on preventive conservation.

3. PREVENTIVE CONSERVATION AS PROSCRIPTIVE CONSERVATION

Because of training in the causes and effects of deterioration, conservators are charged with the responsibility for developing policies and procedures beneficial to preservation. These policies work—attention to preventive conservation by a single conservator in a museum is undoubtedly better for the general preservation of the institution's collections than years of laboratory treatment by a team of conservators. But there's a downside—preventive conservation is sometimes perceived by colleagues and by the public as proscriptive conservation. We are sometimes viewed as a police force intent upon limiting access, preventing enjoyment of the collections, sterilizing the experience of a museum, and generally acting as obstructionists.

A few years ago I took on a summer-long project at the 18th-century home of one of Virginia's prominent founding fathers, a historic house museum and plantation that has long been open to the public. The director of the site and the curator of collections were both dedicated to the preservation and interpretation of the house, and I and my assistants enjoyed working with them. But it became clear as time went on that these museum professionals, though not conservators, had adopted some very stringent approaches to preservation. They had implemented some standard preventive conservation safeguards—done away with policies permitting receptions to be held in the house, curtailed the use of cut flowers, etc., but we began to hear rumblings from interpretive staff about other changes made in the name of preservation—the dismantling of a longstanding "Rare Breeds" program of farm animals ("the critters attracted more insects"), doing away with revolutionary and civil war reenactments on the property ("unnecessary wear and tear on the house") and several other restrictive changes, including new and somewhat condescending limitations on the duties of historic interpreters, some of whom had been loyal staff for more than 30 years. The curator left halfway through the project to go back to graduate school, but confided that she realized she was not in the good graces of the staff, having heard she was, among other things, branded a "sheepkiller" for her role in sending the animals packing. It was not surprising to hear later that the board of regents had asked for the resignation of the director.

One of the articles about the changes at this historic site contained a telling comment by one of the state legislators who had pushed for the ouster of the director :

"He's really good at preserving antiquities; he did that very well. He just didn't get along with the neighborhood too well, and you certainly need those skills for that job" (Cullum 2012).

4. A FAULTY ASSUMPTION

The foregoing examples demonstrate the potential for conservators and custodians of collections to foster neutral or even negative emotional reactions to our work. In both cases, the problem was essentially the same. In setting up conservation awareness sessions that focused on lessons about deterioration processes, I made the assumption that the preservation of historic objects was of importance to everyone in the room, hence they would obviously respond to a discussion of the causes and effects of deterioration. But an ethic of preservation is by no means universal, and even if it were, deterioration is an inherently negative concept. It is particularly negative when presented as an abstraction: image after image of different types of deterioration without any context for the objects and without fostering any concern for whether a particular object is worth saving.

Likewise, by establishing a stringent approach to policies and procedures for collections care, the director and curator at the Virginia historic site were apparently convinced that all parties would willingly comply because, after all, preservation of the house and its collections was everyone's primary concern. Right?

Not really. To those of us in the museum conservation field, the concept of preservation is understood as a given and viewed as a laudable enterprise. We forget that in and of itself, the concept of preservation may seem somewhat humdrum to an outsider. There is no immediately obvious net gain to its practice: Is it really any different than simply maintaining the status quo? From the standpoint of Aristotle's principle of pathos, the emotional appeal of the concept of preservation is at best probably neutral, particularly in current culture where so many people have adopted a throwaway mentality. Even worse, if addressed inappropriately and without thorough explanation of its value, a central focus on preservation can produce decidedly negative emotional responses, as were seen following the implementation of overly restrictive preservation standards at the Virginia house museum. Here, the staff and ultimately the board inevitably came to associate preservation with limitations, loss of valued programs, and police-state collection care tactics.

5. THE MEANING OF OBJECTS

If the preservation of historic artifacts is not a universally valued undertaking, what do we need to do to make its value clear to our audience?

With regard to conservation awareness training at Colonial Williamsburg, it was necessary to articulate the sensibility we as conservators and custodians of historic artifacts bring to our work—to address the ways in which we value historic objects—before launching into any discussion of the mechanisms of deterioration. I incorporated a preamble and a conclusion to each session that focused on one or two particular objects at Colonial Williamsburg, usually selecting from the most highly recognizable pieces in the collection. Rather than addressing these as fragile physical objects in danger of falling to pieces, I addressed the stories behind these objects. A favorites was the Masonic master's chair made and signed by Williamsburg cabinetmaker Benjamin Bucktrout, an object that not only provides wonderful insight into the skills of an eighteenth 18th-century Virginia artisan and the aspirations of his patrons, but serves as a springboard for a discussion of pre-Revolutionary American social, political, and intellectual history (Fig. 1) (Howlett 1996).

Relating our work to the overall interpretation and understanding of objects is important. As conservators and custodians of historic objects, we are not simply engaged in the nuts-and-bolts process of preserving old materials, we are preserving the meaning embodied in these tangible remnants of history. If we can successfully engage listeners in the stories behind the objects we care for, even the least object-oriented members of an audience can understand, if not entirely share, our obsession with slowing the processes of deterioration.

6. VALUE-ADDED CONSERVATION

Beyond engaging the public in the reasons we preserve objects, we need to present our work as a value-added enterprise.

We rarely stress to our clients and the public the fact that the practice of conservation—making use of scientific analysis, a knowledge of materials, an artistic sensibility and highly-developed hand skills, all informed by a good understanding of the history and the context of the object we are working on—can be much more than a simple act of preservation. At its best, thorough conservation examination and treatment is an act of applied technical art history—a mission to retrieve, understand, and reinterpret lost or obscured physical and historic information. The act of conservation can have profound emotionally positive benefits: Our understanding of an object is greatly enhanced, and the object's intrinsic historic value, not to mention its monetary value, may increase significantly (Bomford 1998).

The notion that conservation adds value to an artifact, whether monetary or intrinsic, may be somewhat foreign to us, as we have generally prided ourselves on our ability to make our work invisible—in a sense, to maintain anonymity. Indeed, those of us who trained as recently as 20 years ago were taught to strive for objectivity and to avoid value judgements in our work. But there is no question that presenting conservation as a value-added enterprise is a positive means to emotionally engage clients and the public in the importance of conservation—as a means to apply Aristotle's rhetorical tool of pathos to persuade others of the importance of our work.

Fig. 1. The Masonic Master's Chair signed by 18th-century Williamsburg cabinetmaker Benjamin Bucktrout is one of the iconic pieces from the Colonial Williamsburg collection. It is an ideal object for demonstrating the role of conservators not only in the preservation of the physical object but in the revelation of its multiple layers of meaning.

Following are a few of the ways we commonly communicate our work to others, with some thoughts on ways to encourage the positive emotional engagement of our audiences.

6.1 TREATMENT REPORTS

It may seem curious to consider treatment reports a form of conservation outreach, but they are a primary means of conveying information about our work to immediate clients and to convince them of its value. To the extent possible, we should view treatment reports as more than simply a list of condition concerns followed by the materials and techniques used to address them. If new information comes to light during a treatment, we need to ensure it becomes part of the historic record. In the past, conservators have sometimes omitted this

Figs. 2, 3. X-ray radiographs taken of Jefferson's model for the capitol of Virginia, initially taken for a structural evaluation, revealed a wealth of architectural detail hidden for nearly 200 years beneath multiple layers of overpaint. The radiographs provided information for a full-scale plaster copy of the model showing all of its original detail.

information, simply conveyed it verbally, or buried it in the text of their reports, not necessarily viewing it as a primary conservation function.

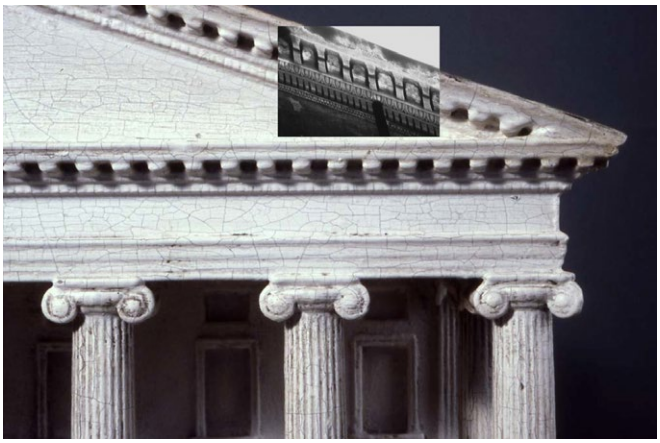
When applicable, it is important to include a prominent summary section entitled "Findings from examination and treatment." This section should be placed near the beginning of the report, and should describe the means of discovery and summarize the significance of any unusual or pertinent historic materials, methods of construction, inscriptions, or other notable findings. In this way, clients will not only appreciate the skills we bring to conservation treatment, but will value any new information we contribute because of our unique perspective on the object.

6.2 CONSERVATION EXHIBITIONS

It is gratifying to see the proliferation of exhibitions featuring conservation—traditionally a behind-the-scenes activity at most institutions. When examinations and treatment result in information-rich findings, the presentation of our work in an exhibition can be an outstanding means to emotionally engage visitors in the importance of conservation.

Some years ago I was asked by the Library of Virginia to treat the 18th-century plaster model commissioned in France by Thomas Jefferson as an embodiment of his design for the Virginia capitol, a model commissioned by Thomas Jefferson. The course of work was initially intended to be a simple structural evaluation followed by a suitable minimal remedy, but the findings from examination of the original plaster beneath as many as 20 layers of overpaint provided fascinating new in-sights into Jefferson's original design as well as the changes in appearance of the capitol over the ensuing 200 years (figs. 2, 3) (Howlett 2002a).[1]

The newly discovered multiple layers of meaning prompted a multifaceted treatment, including the fabrication of a copy of the model as it appeared when new as well as the careful revelation of five of the historic paint schemes on the original model, uncovered on a rear wooden wall that was added shortly after the model came to Virginia (figs. 4, 5) (Howlett 2002b).[2]



Figs. 4, 5. Paint analysis combined with documentary research demonstrated that each time the color scheme of the capitol was altered, the model was repainted accordingly. The heavily painted plaster model was simply cleaned over most of its surface, but the rear wooden wall, added soon after the model arrived in Virginia, was cleaned to reveal five of the capitol's historic paint schemes. The conservation treatment serves as a didactic visual aid in understanding the evolution of the Virginia state capitol.

The conserved original model, the replica, and photographs and x-ray radiographs that informed the treatment are part of the permanent exhibition at the Virginia Capitol Visitors Center. In this instance, the conservation project itself provided most of the didactic information presented in the exhibition, serving as a powerful example of the positive benefits ur work can have on the understanding of objects.

6.3 PRESENTATIONS

Verbal presentations are a common means of presenting conservation work, whether in a lab, a gallery walk-through or a more formal auditorium setting. In most cases, we are speaking to an interested group of museum-goers, students, collectors, or other museum professionals, people who share our basic assumptions about the importance of preservation and have at least a modicum of understanding of the approaches we take to our work.

Museums are increasing their efforts to reach ever broader audiences, and conservators need to be open to some of the occasionally outlandish efforts made by the museum public relations staff to increase attendance at special events. I was recently asked to give a talk on a project to conserve and install a period room at the Virginia Museum of Fine Arts, an 1881 Aesthetic Movement bedroom from a New York townhouse that originally belonged to Richmonder Arabella Worsham, who later sold it to John D. Rockefeller.I proposed a simple, straightforward, very conservator-like title for the talk: "The Conservation of the Worsham-Rockefeller Bedroom" only to be taken aback when the PR department e-mailed with a strong request to use their own title, an obvious take-off on the grabby titles associated with reality television: "Extreme Makeover: The Boudoir Edition."

Initially reluctant, I ultimately agreed to their request, especially after realizing I could use a photo taken during the room's installation as part of the title slide—an image worthy of any reality TV hook (fig. 6).

Fig. 6. The title slide for a presentation on the conservation of the Worsham-Rockefeller bedroom at the Virginia Museum of Fine Arts.

Attendance at the presentation was good—probably far better than it would have been had the straightforward title been used. The new title proved an appropriate tie-in for the discussion, which featured not only our conservation team's own "extreme makeover" of the room, but also presented evidence we found of an "extreme makeover" that occurred during the original construction of the room. Even better, the title slide brought in a light touch at the outset of the program, resulting in an engaged, responsive audience for the entire presentation.

6.4 THE PEN IS MIGHTIER THAN THE SWAB

We may tell ourselves that we enable the objects we treat to speak for themselves. Perhaps in some ways they do, but it is clear that they never let on about our role in their preservation and interpretation. It is up to us to make this known. To this end, the pen is far mightier than the swab. We may take pride in our skills and in our ability to make new discoveries about the objects in our care and to incorporate these discoveries into a successful conservation treatment, but if we never take time to fully convey these accomplishments in an engaging manner, they will go unnoticed. It is extremely important for conservators to contribute to the professional literature, adding to the base of knowledge of materials, examination methods, and treatment approaches. It is of even greater importance to the field for us to seek venues that take our message to broader audiences.

Because of the labor-intensive nature of conservation work, it is often difficult to create time for writing, curating, speaking, and publishing. But the need for successful conservation outreach is undeniable, and the message we convey is important. We need to cultivate our ability to communicate the benefits of our work and learn to view this as one of our primary tasks—not simply as an add-on that takes time away from our real work. Ultimately, our ability to demonstrate the impact of our work upon the emotional reach and the depth of understanding of objects is paramount not only to the success of our profession, but to success in our never-ending task to raise the awareness of new generations to the value of preserving cultural artifacts.

NOTES

1. This document was named Notable Document of 2002 by the American Library Association.
2. In addition to the author, conservators at Colonial Williamsburg who contributed to the Jefferson model project included Amy Fernandez, John Watson, Christopher Swan, Thomas Snyder, Albert Skutans, and Emily Williams.

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CYNTHIA MOYER

Ornamental Opulence: The French *Régence* Frame in the Metropolitan Museum of Art

ABSTRACT—This paper addresses the study and treatment of an 18th-century French *Régence* frame (1715–1725) and its pairing with Peter Paul Rubens' 17th-century panel painting, *Atalanta and Meleager*, in the Metropolitan Museum of Art collection (44.22). It describes the form and traditions of the joiner, wood carver, and gilder and analyzes the structure and the materials. The paper examines the conservation treatment and the materials and methods chosen. It explores the painting's provenance to help understand the decision-making of dealers, collectors, donors, and curators who place fine 18th-century French frames on 17th-century Dutch and 19th-century Impressionist paintings in the collection.

1. INTRODUCTION

The conservation treatment of *Atalanta and Meleager,* a panel painting by Peter Paul Rubens (Flemish, 1577–1640) in the collection of the Metropolitan Museum of Art (44.22) (fig. 1) by Michael Gallagher, conservator in charge, provided the opportunity for the study and treatment of its frame. Records suggest that a magnificent French *Régence*-period frame from the first quarter of the 18th century has been on the Rubens panel at least since its acquisition by the museum in 1944. The painting's provenance can be traced as far back as the Duke of Marlborough's collection at Blenheim Palace in 1772 where it then passed through the hands of noted collectors and dealers including Rodolphe Kann and Joseph Duveen (Liedtke 1990). Despite being an important and striking example of the artist's early style, the painting's poor appearance and complicated condition had kept it off view for almost 40 years. Its frame was also compromised but clearly exceptional from the perspective of design and craftsmanship. Noted frame dealer and historian, Paul Levi (d. 2008), commented that the frame was of "very high quality." (Baetjer 2012).

The painting depicts a tale from Homer's *Iliad*. Meleager, the illustrious warrior and son of the King of Calydon, presents Atalanta with the head of the Calydonian Boar. The boar had been released upon the Aetolian forests by the Goddess Diana in an act of vengeance upon the king, ravaging and terrorizing the Calydon countryside and its inhabitants. Atalanta, an accomplished runner and hunter herself, had first wounded the creature. Meleager, clearly enamored of her, successfully hunted the boar down with his dogs and, having slayed it, bestowed the prize of the head and pelt upon her with an Aetolian muse and a Fury looking on.

One of the giants of the Baroque period, Peter Paul Rubens lived a long prolific life traveling throughout Europe both as a court painter and as a master statesman during the Hapsburg Empire. Born in 1577 to a Calvinist father and a Catholic mother in a well-to-do family in Antwerp, he received a humanist education, studying the classics. He entered into an artist's apprenticeship at the age of 14 and became a master in the Guild of St. Luke at the age of 21. Rubens travelled to Italy in 1600 to study the Masters and to work. Travels through Venice, the Mantuan court, Florence and Rome resulted in receiving his first major altarpiece commission in Rome. On returning to Antwerp in 1609, he married Isabella Brant from a prominent family and while building an art collection and library and establishing a studio workshop with a large staff, he raised a family. Traveling to Spain as a diplomat to the court of Philip III, studying Raphael and Titian collected by Philip II, Rubens continued to paint grand historical and mythological subjects and receive portrait commissions. He served as ambassador to the court of Albert VII, Archduke of Austria, and Infanta Isabella of Spain. Travel to France in 1626 resulted in a commission to paint the Maria de Medici cycle in the Palais du Luxembourg, now in the Louvre. He is credited with bringing the Baroque taste to France (Vial et al. 1922). Rubens helped negotiate peace between England and Spain between 1627 and 1630 and was knighted by Philip IV of Spain in 1624 and by Charles I of England in 1630. Upon the death of his first wife in 1626, he remarried and fathered five more children. Both the Louvre and the Prado have dedicated significant gallery space to his magnificent mythological and history paintings.

2. DESCRIPTION

This frame is a superb example from an important period in French craftsmanship and design. It is primarily made of oak *(Quercus* sp.*)* with secondary and tertiary basswood or limewood *(Tileul* sp.*)* applied carvings. It has mitered corners secured with a tapered dovetail spline perpendicular to each corner, a

Fig. 1. Peter Paul Rubens *Atalanta and Meleager,* ca. 1720, Oil on panel, the Metropolitan Museum of Art, New York, Fletcher Fund 1944, 44.22, the painting in its French *Régence* frame after treatment

Fig. 2. Frame detail of corner and center. Courtesy of Cynthia Moyer.

device characteristic of French construction. The frame has an acanthus-carved sight edge within a narrow sand-textured plate within a small astragal molding. The scotia is ornamented with carved strapwork passages with acanthus floral bosses, a very typical *Régence* motif. This molding is punctuated by elaborate shell-carved corners and plume-carved centers with acanthus leaf scrolls and floral tendrils flanking both (fig. 2). Laurel leaf and berry carving adorns the top edge. The inward curving sides terminate at the back edge in a flat step with acanthus carving. The meticulously designed ornament reveals the frame's original orientation to have been in landscape format. The elaborately carved plume centers continue with foliate forms behind the top edge, within the inward-curving sides. This detail is not executed on the long sides, which originally would have been at the top and bottom and presumably would not have been visible to the viewer.

The entire surface is gessoed and the gesso is recarved or recut, which serves to better define the leaves and ornament. This extremely skillful technique was brought to virtuosic heights in 18th-century French gilding. The backgrounds are also tooled using punchwork within the corner and center fields and hatchwork on the balance of the face. The frame is water gilded overall, incorporating distinctive areas of smooth and textured matte passages using ocher glue wash and deep red bole on the highlights and burnished passages. The sides are presently burnished. In its original condition, it is virtually indistinguishable from chased, fire-gilded cast brass. There is an umber/orangey toning coating in place that has been augmented by additional inpaint and toning.

3. HISTORICAL BACKGROUND

Louis XIV, XV, and XVI gave enormous financial support to the decorative arts as royal chateaux such as Versailles and Fontainbleau were continuously remodeled to accommodate the family and the court. The design of the *Régence* frame is part of a larger design vocabulary that was strictly overseen by the *Batiments du Roi* or royal architect and to which craftsmen adhered. The designs of frames were closely related to the architectural interiors and the room panel moldings and ornament that they complimented. Frame designers for the royal collections took them to another level. The quality of the design and ornament suggests that this frame may have been a royal commission (Considine 2012). The ornament may have been inspired by the illustrations of Gilles-Marie Oppenord, the chief royal architect and designer of the period, or by others such as Jean Berain, Robert de Cotte, or by the engravings of François Roumier or Juste-Aurèle Meissonier (Pons 1987). According to guild rules, the fabrication of a frame was divided between the

joiner and the carver. This distinction could be blurred, however, due to craftsmen possessing both joinery and carving qualifications and to the degree of adherence to and the rewriting of statute regulations. Frame makers were part of the *menuisiers de bâtiments* and were not required to stamp their work, so many of the makers of these pieces remain anonymous. It continues to be very difficult to attribute these frames; however, comparable examples with similar design elements can be found in dealer inventories and museum collections including that of Galerie Georges Bac (Bac Gross et al. 1991, 61) and the Musée d'Angers (Roche 1931). The intricacies and idiosyncrasies of the guild system and its division of labor in Paris during the *Ancien Regime* for manufacturers of carved wooden objects have been covered extensively by Bill Pallot and thoroughly by Brian Considine in their writings (Pallot 1989, Considine 1991).

The *Régence* period of Philippe II, duc d'Orléans, regent for Louis XV, is a brief interval between 1715 and 1723, which extends stylistically from approximately 1710 to 1730. It bridges the period from the long evolution of the Louis XIV style of the monumental, majestic Baroque to the more organic, Rococo character of the Louis XV style. It corresponds to the time when the court returned to Paris from Versailles and when living quarters and strict protocols of behavior became less formal and more intimate. Courtiers moved from the marble halls and grand reception rooms of the palace to the wood-paneled interiors of small apartments. In frames, *Régence* style can be identified by a straight molding profile punctuated by corners and centers incorporating shells and stylized acanthus leaves. The passages in between often have strapwork with floral bosses.

4. CONDITION

4.1 SUBSTRATE

The original construction of the frame is visible at the mitered joins and where the applied buildup on the face and the double buildups at the corners and centers were added. Some of the alterations to the frame are visible in x-ray radiographic images that were taken of the upper-left corner and the sides flanking it. The small inserts on the sides where the frame has been altered are visible in these images. They flank the floral bosses on the short sides and are adjacent to the centers on the long sides; inserts are also visible in the acanthus carving at the sight edge.[1] The cymareversa or ogee is a more typical molding profile for the early *Régence*-period frame. As is evident in the profile illustration, this frame has a scoop profile which comes into greater use in the Louis XV period. The profile image illustrates the alteration that took place when the sight edge of the frame was modified to accommodate the depth of the Rubens panel, which was fitted with a wooden addition, a fillet, at some point before its arrival at The Metropolitan. Half of the small cavetto or hollow was cut away and a flat slip was added to reduce the sight size. Two buildups were also added to the back. The first is an oak support, complete with a tapered dovetail spline, at each mitered corner; it completely covers the original back and serves to strengthen the frame after it was cut through and resized[2] (fig. 3). The second is a more recent beveled buildup that was screwed in place to support the weight of the cradled panel. In addition to the alterations, there was significant damage to the protruding carved ornament, which distracted the viewer from the design of the ornament. This included 29 losses to the leaf tips and volutes of the limewood carving.

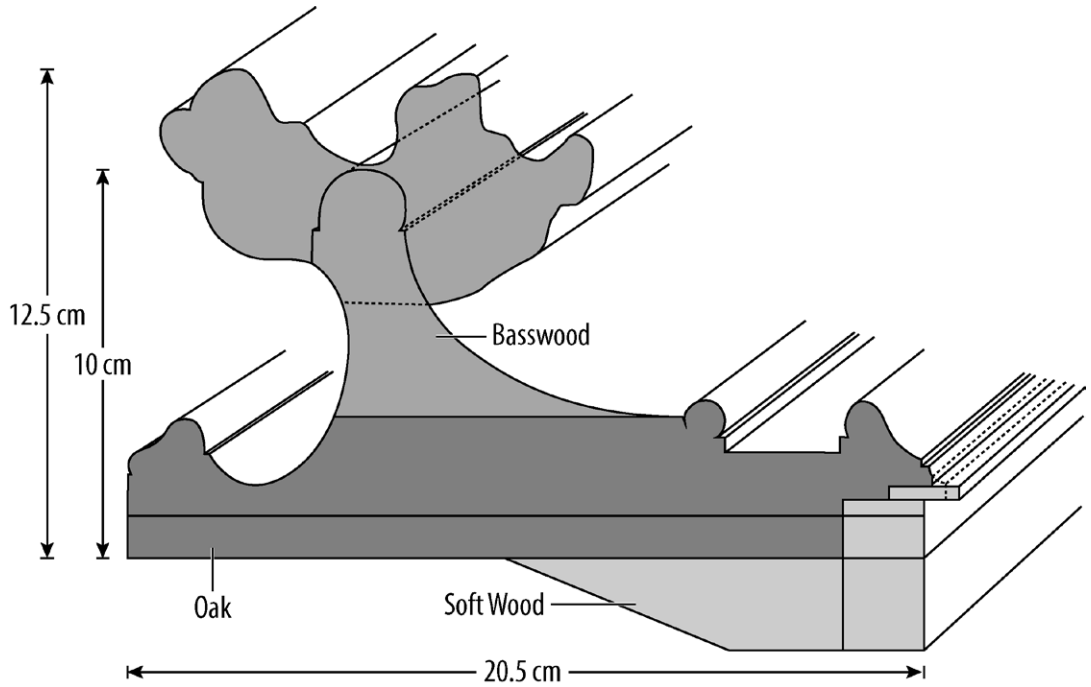

Fig. 3. Profile drawing, Joseph Godla, 2012 with amendments by Evan Read.

Fig. 4. The Gilder's Shop from "Behind the Scenes," the Metropolitan Museum of Art, Office of Cinema Works, ca. 1928. Courtesy of Robin Schwalb in The Digital Media Department, MMA.

4.2 SURFACE

Over the course of its history, the gilding has been restored and refreshed, resulting in additional layers of gesso, bole, and gold leaf in many places on the frame. There remain areas of original gilding overall, but much of the surface has newer coatings. Despite the extensive information on the painting's provenance and exhibition history in the curatorial files at the museum, there is no written documentation pertaining to or images of the frame; however in the Metropolitan Museum archives is a 19-minute film that was shot in 1928 by the Department of Cinema Works, which existed at the museum from 1922 to 1935. The film, "Behind the Scenes: The Working Side of the Museum," shows various museum practices taking place at that time, including gallery installations and art handling. A brief segment of a mere 17 seconds of footage subtitled "The Gilding Shop" includes two gentlemen dressed in neckties, wearing white aprons and working on picture frames, including cutting and laying gold leaf onto a giltwood corner shell, part of a large *Régence* frame (fig. 4) It is possible, therefore, that at least some of these coatings may have been applied after the painting entered the collection, assuming the gilding shop still existed post 1944. Before the present treatment, there were numerous losses to the gesso and many unstable areas of gilded gesso, especially in areas of later restoration. Many of the losses had been inpainted with water-soluble color, oil paint wash, or three different bronze paint campaigns. The new fillet at the sight edge had been augmented with plaster to simulate the scoop profile of the cavetto and painted with bronze paint. To blend this edge, reddish transparent toner and imitation fly specks were applied to the acanthus sight edge and to areas within the cove.

5. ANALYSIS

Samples were taken of the matte and burnished gilded areas and mounted in Technovit resin and polished to study the materials (fig. 5). After initial examination of the samples under

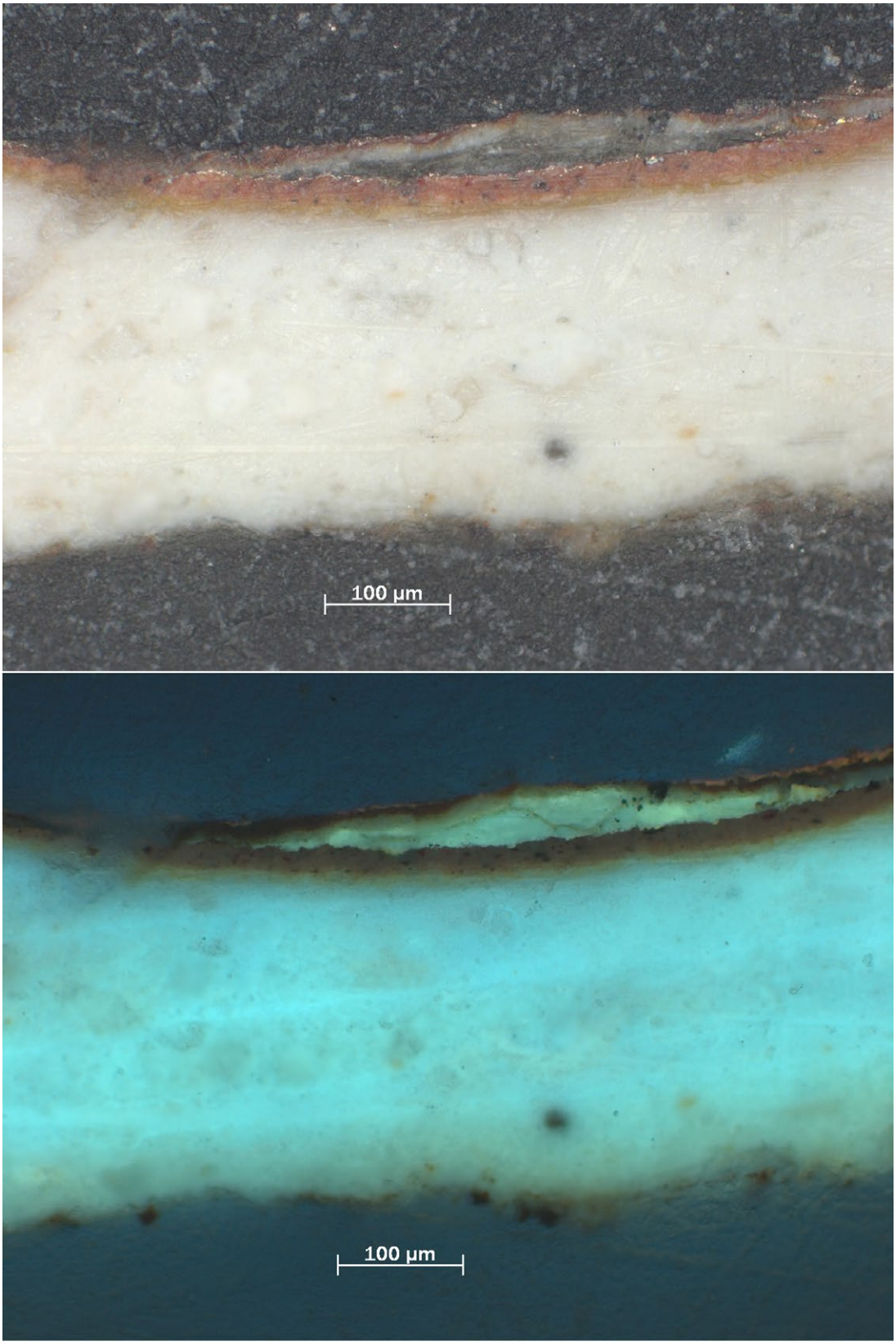

Fig. 5. Water gilding sample cross section, original layers 20x, reflective and UV light, 02 DAPI. Courtesy of Cynthia Moyer.

20x magnification with a polarized stereomicroscope (a Zeiss Axio Imager Z2m materials microscope) under reflected polarized light as well as UV illumination with UVA and UVB filters, analytical work was undertaken using Raman, ATR–FTIR, and SEM–EDS. This investigation confirmed that the matte water gilding was applied to a preparation of calcium carbonate in a proteinaceous binder on which was a thin ocher ground composed primarily of hematite in a proteinaceous binder. The coating on top of this system, above the first gold layer, was also a proteinaceous material. The burnished system had the same components with the addition of a reddish-orange earth bound with a proteinaceous binder on top of the ocher layer.[3] This was a typical water-gilded system. The toner was further identified with solvent tests.

6. TREATMENT

6.1 SURFACE CONSOLIDATION

The goal was to stabilize the gesso surface overall to secure fragile original gilding and to prevent further gesso losses. Unstable areas of gesso were consolidated with Lascaux 4176.

6.2 SURFACE CLEANING

The goal of the treatment of the toned gilding was to reduce later toner and remove inpaint that appeared in contrast to the prevailing honey-colored glue size/shellac-based toner. The transparent reddish toner and imitation fly specks on the greater sight edge were found to be water soluble and were carefully reduced or removed with a damp swab. Inpaintings were removed with 3:1 acetone:benzyl alcohol or proprietary paint remover and cleared with acetone. The uniform, slightly opaque honey-colored toner that coated the gilded surface, including later gilding restorations, was left in place and served as an example for toning the ingilded repairs. Originally the gilded surface of this frame was intended to mimic metalwork, specifically fire-gilded brass used for luxury decorative elements such as wall lights, fire dogs, clocks, door and window hardware, and furniture mounts. It was also a surface that reflected light, another luxury of the period. The aesthetic now is different, influenced, and dictated by the aged appearance of the painting within its frame and gilded surfaces on frames for Old Master paintings in general. Though probably not original and obviously a subjective judgment on the part of the conservators and curators, retaining the toned surface created a suitably uniform and subdued appearance of the gilding and visually balanced this frame with other gilded frames in the collection.

6.3 SUBSTRATE COMPENSATION

The goal of the structural repairs was to retain evidence of construction and wood movement over time and yet to restore the design of the carved ornament. It was decided that no further structural alterations would be undertaken to the frame in its current state and that the slight gaps in the wood substrate would be left visible as they are neither jarring in appearance nor structurally unstable and serve to illustrate the original construction of the frame. However, the carving losses broke up the sweep and dynamic of the design of the carved ornament. After careful examination of the carving losses, it became apparent that 12 molds could be made from existing carvings in order to replicate the 29 wood losses. A two-part silicone putty was used to make the molds (fig. 6) Losses to the carving were cast out of Araldite AV 1253, a two-part epoxy putty that simulates the density of wood. It was bulked with 30% glass microballoons to alter and improve its working properties. Carving losses on the frame were isolated with 10% B72 in 1-methoxy-2-propanol. After fabricating the required number of castings, they were adhered with additional bulked Araldite AV 1253. Because the frame is hand carved, no two leaves are the same. The carving repairs were therefore reworked using both carving and recutting tools, paying particular attention to the outer perimeters of the corners and centers and balancing each repair with its corresponding intact element. This reworking of the material also opens up the surface of the Araldite so that a more mechanical bond can be attained when the gesso coating is applied. The fillet was retained and scraped to bare wood (fig. 7).

Fig. 6. Frame detail of corner showing losses marked with blue arrows and silicone putty molds. Courtesy of Cynthia Moyer.

6.4 SURFACE COMPENSATION

A nontraditional gesso was used to differentiate it from the earlier gesso preparations. Araldite repairs, a few select areas of gesso loss, and the fillet were coated with 6% high-molecular-weight polyvinyl alcohol in water and allowed to dry in preparation for gesso. These areas were coated with a nontraditional gesso made with one part 6% PVOH bulked with three parts of a 9:1 Champagne chalk: kaolin mixture. After the fills were

Fig. 7. Frame detail of corner showing Araldite carving repairs in place. Courtesy of Cynthia Moyer.

Fig. 8. Frame detail of corner showing gesso repairs. Courtesy of Cynthia Moyer.

sufficiently built up, they were traditionally recut and/or sanded and wet smoothed (fig. 8). Two coats of traditional ocher-tinted glue wash bound in a 3:2 solution of 10% rabbit-skin glue (RSG) and water was applied to the gesso. Select areas to be burnished as well as the fillet had three deep red coats of bole in the same 3:2 RSG solution applied to them. Select areas of bole were burnished before leafing. The prepared repairs were water gilded using a traditional gilder's liquor to adhere the gold leaf consisting of one part ethanol to four parts water with a few drops of RSG. The ingilding required two books of 23-karat gold leaf. Select areas were burnished as appropriate, and the ingilding was distressed. Toning was carried out using a mixture of Soluvar matte and gloss thinned with Mineral Spirits 66/3 mixed with dry pigments and Transtint dyes (fig. 9).

7. DOCUMENTARY HISTORY

There is a tremendous amount of documentary evidence on French royal decorative arts of the 18th century. During the 17th and 18th centuries in France, the *Bâtiments du Roi* maintained inventories of the royal collections to keep track of their location as the court travelled from chateau to palace. The system was maintained when the court settled at Versailles. These records included orders placed with workshops for tapestries, textiles, and suites of furniture and luxury items made for the royal family to furnish their houses. During the reign of Louis XVI, the collection warehouse in Paris was located in the present *Ministère de la Marine* and was even opened to the public at times for viewing. Many of these records were protected during the French Revolution and remain available for study in the *Archives Nationales*. Further study of this resource may yield more information about the maker(s) of the *Régence* frame.

In the absence of archival references other sources for evidence of framing choices are sought out.

Paintings that retain their original frames or period paintings that depict contemporary interiors provide invaluable evidence. For example, a 1628 painting by Willem van Haecht entitled "The Picture Gallery of Cornelis van der Geest" shows the interior of a gallery in van der Geest's house in Antwerp, the walls covered with framed paintings including at least one Rubens (Baudoin 1977) (fig. 10). On the basis of this visual source, it can be concluded that a Flemish frame from 1616, the date of the Rubens painting, would have been a simple wood molding profile incorporating perhaps a discreet gilded molding component. The craftsmen who created paintings of this period and those who fabricated frames were both trained within the rigorous guild system of their region and period. The artists may well have had as much influence in framing decisions for their work as their patron and client.

More recently, documentary photographs of studios, galleries, and interiors can also provide evidence of framing decisions. Unfortunately, catalogs from dealers, auction sales, and museums did not typically include frames in the images of paintings. Frequently,

Fig. 9. Frame detail of corner, after treatment. Courtesy of Cynthia Moyer.

Fig. 10. Willem van Haecht, *The Picture Gallery of Cornelis van der Geest*, 1628, Rubens House, Antwerp, Rubenianum. Used with permission: Art Resource. www.artres.com

in the absence of the artist's input, framing choices have been dictated by dealers, collectors, and curators, reflecting gallery homogeneity, the importance of the painting, or often the taste and fashion of the moment. The level to which the importance of the frame associated with a painting had fallen in the mid-20th century can be illustrated by this anecdote. In 1946, Harry Sperling, the assistant to the New York art dealer F. Kleinberger, commented on the framing decisions of Michael Freidsam, a noted collector and Metropolitan Museum benefactor. Friedsam was noted collector Benjamin Altman's business partner, and both men were responsible for making important donations to the Metropolitan Museum of Art in the 20th century. Sperling wrote: "Friedsam had the habit of taking old frames from pictures and having new carved frames made. This he did without consulting anyone except his favorite frame maker. At the time the Friedsam pictures and other art objects had already been removed from his house after his death I had to go there to see about something and was asked if I wanted a batch of old frames which were about to be thrown to the junk man. I was naturally very pleased to get them, but apparently it was the habit to throw away the old frames."[4]

8. PROVENANCE HISTORY OF THE PAINTING

Since *Atalanta and Meleager*'s ownership and exhibition history is relatively well documented, it was hoped that the study of both might shed some light on the moment painting and frame were brought together. Unfortunately the trail is complex. The Rubens is first recorded in the Duke of Marlborough's collection at Blenheim in 1772 where it remained through most of the 19th century. It was exhibited in London in 1861. Passage of the Land Settlement Act in 1882 permitted the sale of land and chattels in Britain that had previously been restricted. In 1886,

the Duke of Marlborough put dozens of paintings including 18 Rubens from Blenheim Palace on the block. *Atalanta and Meleager* sold at Christies, London July 24, 1886, no. 61. (Saltzman 2008, 28). It was first privately purchased and then sold to the Paris dealer Charles Sedelmeyer who lent it to the Metropolitan Museum of Art in 1886 for an exhibition in New York. Sedelmeyer sold it in 1898 in Paris to noted collector Rodolphe Kann who published catalogs of his extensive collection. Similar to the influential Rothschild family's taste, Kann collected Old Master paintings and 18th-century French Decorative Arts that were installed in recreations of period 18th-century architectural interiors. Because the high-quality *Régence* frame that is now on the Rubens is derived from architectural *boiseries* or room paneling of the period, there may be reason to believe that Kann had the Rubens framed to complement his collection—or possibly even by Sedelmeyer prior to purchase. A description of the Kann collection and house is provided in the introduction of Sedelmeyer's 1907 catalog (Mannheim 1907). However, Joseph Duveen, the noted dealer who supplied many of the great American collections with paintings and decorative arts at the turn of the 20th century, purchased the Rubens from the Kann sale in 1907. It is known that he had skilled craftsmen working in Paris reproducing and undoubtedly resizing period frames; therefore, he may well have framed it for resale.[5] Kleinberger purchased it in 1915, exhibited it at the inaugural Cleveland Museum of Art exhibition in 1916 and sold it to a Mr. and Mrs. Henry Goldman. After Mr. Goldman's death, Mrs. Goldman exhibited it at the 1939 New York World's Fair and then sold it back to the Duveen Brothers the same year. The Metropolitan Museum purchased it from them in 1944. With so many changes of ownership—passing from important dealers to important private collectors—and without further documentary evidence, it remains pure speculation as to when the painting and frame were joined together.

Fig. 11. Rembrandt van Rijn, *The Standard Bearer (Floris Soop)*, 1654, the Metropolitan Museum of Art, New York, The Jules Bache Collection, 1949, 49.7.35 in its frame. Courtesy of Cynthia Moyer.

9. COMPARABLE EXAMPLES

Within the Metropolitan Museum's collection, there are numerous important paintings of various periods framed in these extraordinary frames of the *Ancien Régime*. The Robert Lehman Collection has several fine examples of late Louis XIV frames as well as an exquisite early Louis XV frame of comparable quality. A particularly splendid *Régence* example of 1720 frames Rembrandt's portrait of Floris Soop, known as *The Standard Bearer* (1664) (fig. 11). A period frame is found on Jean Baptiste Joseph Pater's *The Fair at Bezons* (1730). Another superlative example is the French *Régence* frame on Jean Antoine Watteau's painting *The French Comedians* (1720). All three of the paintings entered the museum as part of the Jules Bache Collection.

As gilded 18th-century French frames fell out of fashion and lost value, they were frequently employed for French Impressionist paintings in the 19th and early 20th centuries. The dealer Wildenstein used them consistently, often adding a linen liner with a gilded cavetto "to give the eye rest between painting and frame" (Gross 2012). Many of these frames are included in the Annenberg bequest to the museum and often have a slurried, opaque toner over the degraded gilded surface that reflects an aesthetic preference of the time. They include a high style *Régence* frame on Paul Cézanne's portrait of *The Artist's Uncle as a Monk* (1866), a very high-style *Régence* frame on Toulouse Lautrec's *Portrait of The Streetwalker* (1890) (fig. 12), and an early *Régence* frame from 1715 with very understated corners and centers framing Matisse's *Odalisque with Grey Trousers* (1927). A simpler late *Régence* frame is to be found on Claude Monet's *Bouquet of Sunflowers* (1881) from the Havemeyer Collection.

10. CONCLUSIONS

In the case of Rubens' *Atalanta and Meleager*, a bold and powerful Baroque painting was at some point paired with a grand *Régence* frame. It is a telling indication of just how successful a "marriage" was created that at no point during the recent conservation campaign was any consideration given to obtaining a different or more historically accurate frame; nevertheless, one of the most common questions asked by the public about the frames on view in the galleries of the Metropolitan Museum of Art is whether they are original to the paintings they embrace. Occasionally the answer is yes, but the more usual negative

Fig. 12. Henri de Toulouse-Lautrec, *The Streetwalker*, 1890, the Metropolitan Museum of Art, New York, Bequest of Walter H. Annenberg, 2002, 2003.20.13 in its frame. Courtesy of Cynthia Moyer.

response does not indicate the rich story of change and choice that these objects represent. More recently, a frame's intrinsic historical significance and value is amplified by its association with an important painting and an accelerating market in antique frames. Clearly, the inverse has been true in the past. The dedication of curators and conservators addressing these associations creates an opportunity to assemble pieces of a fascinating puzzle through research and documentation. The challenge in the study and treatment of frames is to reveal and make relevant a complex story that is as much about the objects themselves as the people who owned them and the value of the art they adorn.

ACKNOWLEDGMENTS

The author would like to thank all of the members of the Paintings Conservation Department at the Metropolitan Museum of Art, particularly Michael Gallagher, George Bisacca, Alan Miller, Evan Read, and Sarah Kleiner, Samuel R. Kress Fellow 2011–2012, The Department of Scientific Research, especially Sylvia Centeno, Julie Arslanoglu and Mark Wypiski, and The Department of European Paintings, especially Keith Christianson, the John Pope Hennessy chairman. Also providing help and insight were Brian Considine, conservator at The J. Paul Getty Museum, Joe Godla, conservator at The Frick Collection, and Stephen Gross of Georges Bac Frames.

NOTES

1. Five plates shot with the help of Sarah Kleiner at 40kV, 5MA, 50sec with the Zeiss AxioImager Z2m materials microscope under visible and UV light.
2. Adobe Illustrator drawing executed by Joe Godla, conservator, The Frick Collection, with whom George Bisacca and the author have been assisting undertake a survey of their frame collection, with amendments by Evan Read.
3. Raman: Terracotta with black particles, it also has dark red particles: red iron earth, C black, hematite particles (dark red). In uniform, orangey areas: peaks at ~143 cm-1: anatase from clay. Calcite ground. SEM-EDS: Ground: $CaCO_3$, Bottom gilding layer: 98% Au, less that 1% Ag and less than 1% Cu, Top gilding layer: 95% Au, 3.5% Ag and less that 1% Cu. Bottom red: Fe, Si, Al, K, Ti, Ca (red clay), Top (later) red: Fe, Si, Al, K, Ti, Ca (red clay), a lot more Fe than the bottom red layer. In the SEM-EDS image the yellow layer does not appear as a separate layer. ATR-FTR: Pale yellow translucent layer: contains calcite (chalk) and a protein binder, possibly animal glue. The (white) ground also contains calcite and a protein (animal glue) binder.
4. Letter to Elizabeth Gardner, Curator of European Paintings at the MMA, dated February 6, 1946 from Harry Sperling who worked for F. Kleinberger and Co., Inc., (dealer in) Paintings and Objects of Art, 11 East 57th Street, New York, The Department of European Paintings curatorial file.
5. European Sculpture and Decorative Arts archives, MMA

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SOURCE OF MATERIALS

Lascaux 4176
Talasonline.com

HMW Polyvinyl Alcohol Resin
ConservationResources.com

Soluvar Matte and Gloss Varnishes
Liquitex.com

Araldite AV 1253 US
Huntsman Advanced Materials Americas, Inc.
5121 San Fernando Road West
Los Angeles, CA 90039
800-257-5547

Calcium Carbonate Whiting, Rabbit Skin Glue
KremerPigments.com

Gilder's Clay
International Gilder's Supplies
12-1541 Startop Road, Ottawa, Ontario
Canada K1B 5P2
613-744-4282

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Photogrammetric Lines Documentation of Traditional Wooden Boats

ABSTRACT—Photogrammetry is the science and art of extracting measurements from photographs. Recent advancement in digital photography, computers, and software facilitates the creation of accurate 3D computer models from 2D photographs, with only one known measurement. With additional processing, these models can be turned into measured lines drawings. The need to quickly record complicated 3D information from an at-risk collection is the catalyst for this research. The goals of this research are (1) to facilitate preservation through documentation; (2) to accurately and rapidly record hull shapes and construction details of boats using digital photographs; and (3) to create lines drawings, which along with the photographic record, may serve as the exclusive means of preserving cultural information of vessels.

1. INTRODUCTION

Jared Diamond states that (human) "occupation of Australia . . . is momentous in that it demanded watercraft and provides by far the earliest evidence of their use in history" (Diamond 1997). This was about thirty-five to forty-five thousand years ago. Homo sapiens have been using wooden watercraft for tens of thousands of years. It was not until after the Civil War that iron and steel ships began to dominate the seas. As late as the 1940s, most small boats were constructed of wood (fig. 1). After the Second World War, plywood, fiberglass, aluminum, and plastic boats became increasingly common, replacing traditional wooden boats. As central objects in the development of human history, wooden boats, particularly working vessels, are vanishing rapidly (fig. 2).

Existing maritime museums are limited in what they can collect due to the logistical complications of storing large-scale composite artifacts. Moreover, there are countless unique and historically important wooden boats that are in too poor condition, and/or too large, to collect. The purpose of this ongoing research is to find a method of creating dimensionally accurate boat lines drawings, using currently available technology that is portable, flexible, relatively time efficient, and cost effective.

2. PHOTOGRAMMETRY

Photogrammetry, the science of extracting measurements from photographs, is almost as old as photography itself. Its most common application, until recent times, was in mapping. Modern expansion of this science has been made possible due to (1) the availability of high-quality digital cameras and personal computers, (2) the dramatic improvements in computer performance, and (3) new software utilizing powerful mathematical algorithms.

2.1 TYPES OF PHOTOGRAMMETRY

Stereo photogrammetry or stereography formed the foundation of the field and was primarily used for aerial mapping. Multiple overlapping photos are taken perpendicular to the surface being measured. Specialized metric cameras were used including dual lens stereo camera or dual cameras for small objects or a single camera in an aircraft for aerial mapping. Stereo pairs of images were interpreted manually using stereo-plotters. Historically, this technology was not readily available to the general public.

Photo scanning is the modern equivalent to stereography. It requires multiple overlapping photographs of an object with both surface pattern and texture to be effective. The resulting data form a cloud of points which then has to be interpreted. It is not effective on smooth monochromatic surfaces such as painted boat hulls. Severe cupping of paint layers can significantly reduce accuracy (as it can with structured light and laser scanning mentioned below) if trying to capture the underlying hull surface. This technique is currently under evaluation to determine its usefulness for boat documentation purposes.

Structured light scanning is a form of no-touch photogrammetry that projects patterns onto surfaces. The photographs of these projected patterns are then analyzed by computer programs to create a cloud of points. The size of an object which can be included in a single scan is generally limited to a scale that is considerably smaller than most boats. It may require two cameras, a projector, and a low light environment. The necessary environmental controls are particularly difficult to achieve when working with boats in open storage or in field conditions. Structured light scanning units are commercially available, but the total equipment cost is much greater than that for some other forms of photogrammetry.

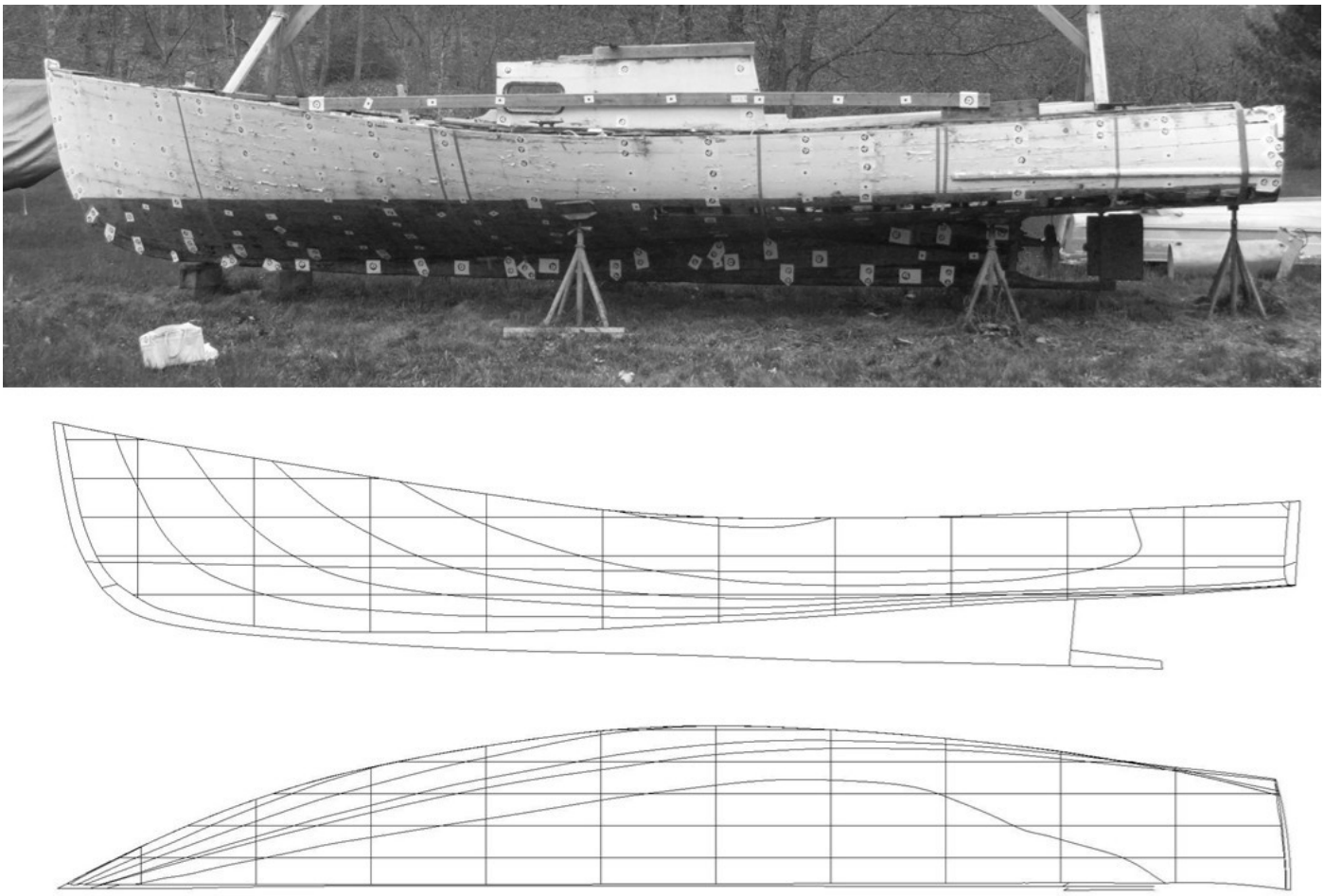

Fig. 1. Harold Gower lobsterboats are thought to "represent the pinnacle of wooden lobsterboat construction" (Maine Boats, Homes and Harbors 2009). This boat is slated for demolition, kept only for its lines. (Courtesy of Jonathan Taggart)

Some types of *laser scanners* incorporate photogrammetry as a means of orienting multiple scans in 3D space. There are a number of types of laser scanners available, most of which work on the principles of time of flight. For the purpose of this research, the use of laser scanners was considered cost prohibitive and not sufficiently portable for our purposes.

Convergent (close-range) photogrammetry utilizes multiple photographs of an object taken at different angles to each other and to the object. It is good for creating 3D models to be used to create drawings. Properly executed, it produces results with a high degree of accuracy. It requires only a decent digital camera, computer, and software. It works on the principle that individual points on an object are located and cross-referenced between photos. With sufficient points referenced, the moderately priced software can process the data to calculate the camera positions and orientations in 3D space, and then determine the positions of the referenced points. Additional points can then be added by referencing more points between photographs. It is relatively cost effective and portable, utilizing available technologies and equipment already commonly owned. Convergent photogrammetry is particularly useful at capturing complicated interior boat details, with only a small number of photographs. To capture the same amount of information with some of the other techniques would require multiple setups and cross-referencing of data. Convergent photogrammetry was selected for this project as it best suited the requirements.

2.2 POINTS, TAPE, AND TARGETS

Convergent photogrammetry is based on the points that appear in multiple photos and are then marked and measured manually within the photographs imported into the computer software. These points can be features of the object including ends, corners, and intersections of edges and seams, corners of painted lettering and decorations, surface staining, material defects including knots and checks, ends of fasteners, holes, slots, etc. The location of each point needs to be marked using the

Fig. 2. Timber Barge in the Sile River, Treviso, Italy. (Courtesy of Evelyn Ansel)

software in a minimum of two photographs, although more, marked in photos taken at divergent angles, is preferable. This marking can be tedious, and the accuracy of the marking directly affects the accuracy of the final results. With practice and care marking accuracy within two or three pixels can be achieved, though human error is always a factor to be considered with this method.

Tape: an alternative to using features of the object for the points is to apply tape to the surface of the object. Corners of tape strips can be used as features for marking points within the computer software. Tape can be applied in strips that intersect with each other or intersect with object features such as seams and edges, which can be marked. Once photographs have been oriented in 3D space, with the aid of the software, the edge of a tape strip alone can be used to mark a point, if referenced in at least two photographs from different angles. Points using tape need to be manually marked.

Coded targets: another method for providing the points is the use of applied targets. Modern photogrammetry programs are capable of automatically recognizing circular dots in photos and marking their centers with a high degree of accuracy (typically less than one pixel) even when the circular dot is at an oblique angle and appears as an ellipse. The use of circular dot targets with automatic marking provides a major reduction in both the labor and time required for processing (fig. 3.).

Coded targets have a dot that is surrounded by a unique pattern recognizable by the computer as an individual number, facilitating automatic identification of the targets as well as automatic marking. They can be printed either as black on a white background or the inverse. Targets must have sufficient background space surrounding them, and be sufficiently large in the photographs to be recognized by the computer software.

Fig. 3. Coded targets in various sizes and configurations printed on digital polyester.

Retro-reflective targets can be purchased and will slightly increase accuracy, but were considered excessive for the purposes of this research. Two targets can be paired together to indicate a third point offset from the pair. This offset point can be placed at an edge where the targets could not be placed because they must remain essentially flat to be accurate.

Some convergent photogrammetry software does not provide for the manual marking of points or the use of simple circular dot targets but rather the points are restricted to coded targets. This can be a significant limitation compared to other software which provides for the manual marking of points. Even when coded targets are used with the plan that all the points will be represented by the coded targets, it is not uncommon to discover during processing of the photos or building of the 3D models that additional, unplanned points are desirable or even required. Typically, it is possible to locate such points based on object features, corners, and edges of applied targets, etc.

It is frequently beneficial to have a set of coded targets located off the object. The use of such targets can significantly simplify and speed up the processing of the photos, particularly when it is not appropriate to apply pressure-sensitive adhesive to an object.

Tape and targets are usually held in place with pressure-sensitive adhesive on the reverse surface. If not self-adhesive, targets can be taped in place. For this research, targets could be applied directly to the boat hulls to create sets of curves to define the hull shape. The application of pressure-sensitive adhesives materials to the object may not be appropriate. In this case, photogrammetry is still possible if the object has sufficient natural features and/or background coded

targets. Smooth featureless objects that cannot have taped or targets applied would need to be measured by other technologies.

3. PRACTICAL ASPECTS OF APPLIED TARGETS

The coded targets used in this research were numbered from 1—999, each with its own unique pattern. They can be printed in a range of sizes to fit the scale of the project. It is essential that no two numbered targets are repeated because the program will combine those two locations, distorting the model and creating a high total error to the project.

Printing targets on digital polyester on a laser printer creates a reusable set which is durable and can be washed, reducing ongoing project cost. It is best to hand-feed digital polyester because of its slippery nature. Misprints waste limited materials, and cause confusion and unnecessary work when trying to print a sequence of numbered targets or offset pairs.

4. TAKING QUALITY PHOTOGRAPHS FOR CONVERGENT PHOTOGRAMMETRY

Most of what is done to produce high-quality conservation documentation photographs is applicable to taking photographs for convergent photogrammetry. Higher quality high-resolution photographs increase the accuracy of the final results. Ideally, the technician taking the photographs should have some working knowledge of boat forms and plans, as well as an understanding of the software processing procedures as mentioned below (fig. 4).

1. Determine a working method and develop a plan including (A) what points are to be measured; (B) the approximate locations and orientations of the camera when the photos are taken; (C) whether applied targets and/or tape will be used; and (D) a minimum of —six to nine points/targets to appear in multiple photographs to orient the camera positions in 3D space. It should be noted that once oriented, each

Fig. 4. Field documentation of a collection of at-risk Venetian boats. (Courtesy of Jonathan Taggart)

point/target must appear in a minimum of two photos and preferable more, from divergent angles, to create new 3D points. Targets, cross-referenced between multiple photographs, significantly reduce the amount of manual processing required.

2. Apply tape and or targets, if used, to the object. Locate coded targets off the object if used.
3. The distance between two points needs to be known to scale the results. This can be a measurement from the centers of two coded targets or other distinguishable points, measured in a straight line without bend or sag in the tape. Ideally, it should be a long distance to reduce error. The actual measurement, along with an indication of the two end points, should be included in the photographs to ensure that the data stay associated with the photographs. A scale stick could serve this purpose and be reused on other artifacts; however, the shorter length might compound measure and marking error.
4. The relationship between the object, measurement, targets, and end points cannot change during the photogrammetry photo session. The whole could be set up on a lazy Susan and rotated, but the relationships between object, targets, and measurement cannot change.
5. Photographs should be taken from multiple angles, as well as shooting up at, and down to the object, creating a sphere of photographs around the object.
6. Consider also taking offset stereo pairs (shift over a foot or so and take a second photograph) to facilitate the potential use of photo scanning as well as convergent photogrammetry.
7. Do not use the camera's zoom. Fixed focal length lenses are preferred.
8. Turn off image stabilization.
9. If possible, use a single focus distance for all photos; the same one that was used in calibration (or plan on reverse or field calibration). Turn off autofocus. Focus at infinity is preferred for larger objects. (Having photographs in clear focus is probably more important than strict adherence to this guideline. Working with a single focus distance is more critical when working with small objects and shooting at short focus distances.)
10. Take photographs with as small an aperture as possible to provide greater depth of field.
11. Use a tripod if necessary due to longer exposures required by small apertures and/or low light settings.
12. Tethering your camera to your computer and putting the camera on an extendable painter's pole can facilitate the capture of photographs from angles and in positions that would otherwise be unobtainable, especially with larger objects.

It should be noted that these recommendations are intended to facilitate a high degree of accuracy in the final project. If it is not possible to meet all of these recommendations, it is still possible to create a quality result with only a slightly lower degree of accuracy.

4.1 Spherical lens distortion

Almost all camera lenses have some degree of spherical lens distortion. Distortion used to be a major limitation in the accuracy of photogrammetry and special, high-quality, and expensive lenses needed to be used to achieve high accuracy; however, today the distortion can be compensated for by the software using calibration coefficients. These coefficients can be obtained from a separate set of calibration photographs or from the project photographs if sufficient photos and points are available. Calibration is not required prior to taking the project photographs. If the camera used to create a set of photographs is unknown, the distortion can be reverse calibrated.

4.2 Point clouds to finished drawings

All of the data collection tools listed above result in a cloud of points as their output. Lines, curves, and surfaces are created from the points to represent the features, edges, and surfaces of the boat. This is usually done using Computer Aided Design (CAD) software, though some photogrammetry software has this capability. Complete lines drawings of a boat hull traditionally require the additional steps of slicing the completed hull form model up into sections, waterlines, and buttock lines, and creating tables of offsets.

4.2.1 Photomodeler

PhotoModeler (PM) (Eos Systems. www.photomodeler.com [accessed August 11, 2014]) software was chosen for use with boat lines documentation because it did not require the use of coded targets or even dots. Individual intersections can be manually marked and cross-referenced between photographs and then processed to create photo orientation in 3D space and 3D models. Dots and coded targets can make the process faster and easier, but are not required. This is actually one of the strengths of this program. In addition to creating 3D point sets, PM allows for lines, edges, curves, and surfaces to be created.

The recommended work flow with PM is to import three to five photographs at a time, and then work through the process of target marking (automated for circular dots and coded targets), referencing points between photographs (automated for coded targets), and then processing by the software which results in the orientation of the camera positions in 3D space and the creation of the points in 3D space (fig. 5). Additional photographs can then be imported and run through the same process until sufficient photographs are oriented to facilitate the creation of the entire 3D model. Once the photographs are oriented, only two marks on photos from divergent angles are needed to create a new 3D point. It is also possible to directly mark edges, curves, and cylinders in multiple photos and cross-reference them. The software will determine their position and orientation in 3D space, again, provided that the photos are from sufficiently different directions.

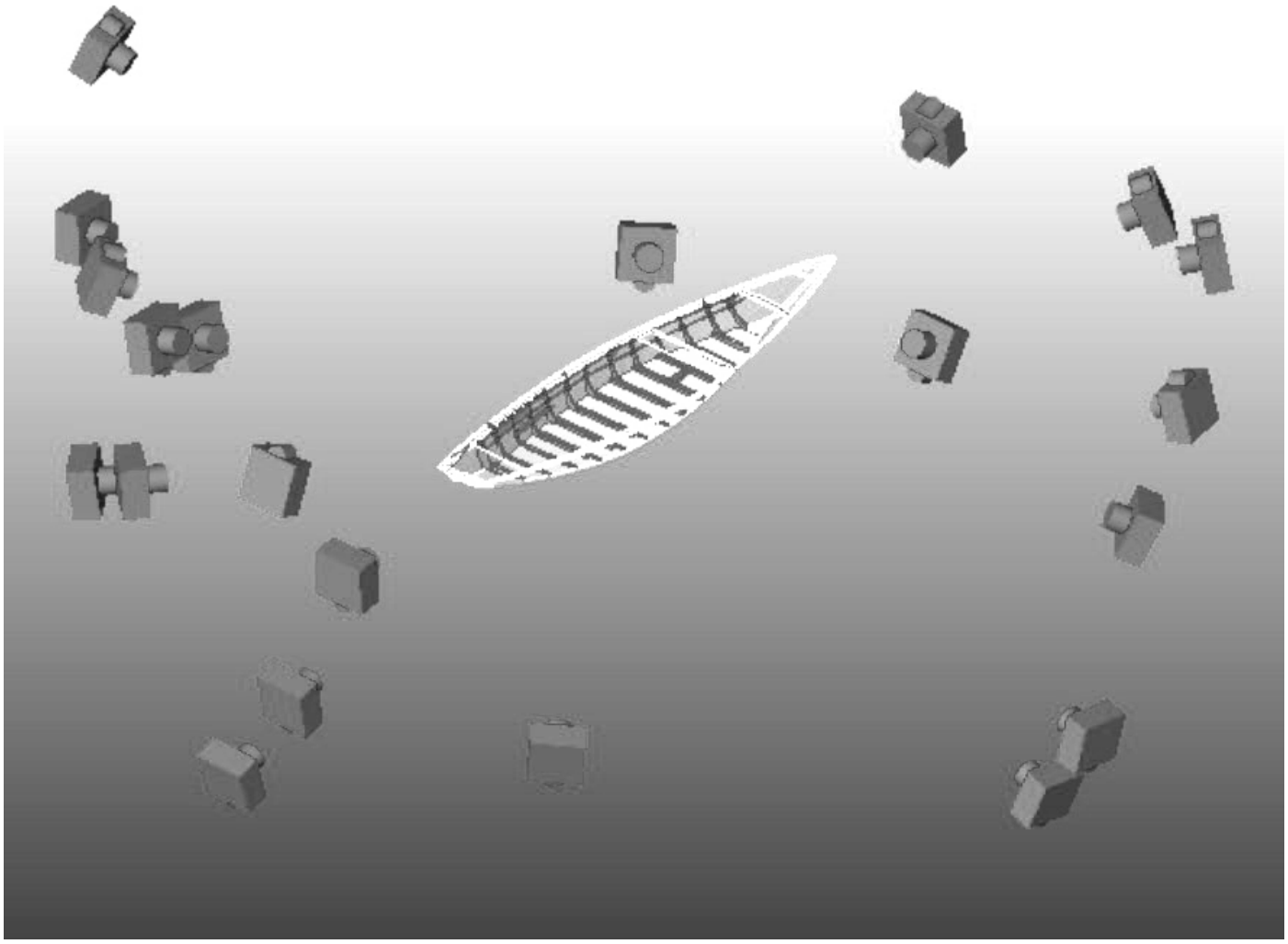

Fig. 5. Partially developed model of a Venetian *sandolo* showing calculated camera positions. Because all of the reference coded targets were on the boat, it was possible to turn the boat over for photography resulting in the upside-down camera representations.

Points can then be connected to create lines, curves, and surfaces (fig. 6). The growing body of data can be organized into layers so that some of the data can be temporarily turned off. Working in this way, one section of the model, such as a line or surface, can be worked on at one time without the confusion of having the entire model on the screen at the same time.

Scale is added to the model by highlighting the end points and adding the measured distance that is included in the photographs to the model. Once this information is added, the distance between any two points in the model can be rapidly calculated by the software. The model can be oriented in 3D space so that it faces in a particular direction with the top up and the bottom down by indicating points that correspond to axis in a normal orientation of an x, y, z Cartesian coordinate system. This orientation influences how the top, front, and side views will look in the 2D drawings.

There are a number of ways to check the accuracy of the model, such as overlaying the model on the photographs for comparison. The software is also capable of indicating in the 3D model which points it has the least confidence in and are therefore probably the least accurate and need further evaluation. There are additional quality-evaluation tools that aid in improving the overall accuracy of a project.

4.2.1.1 Comparative Accuracy

As a way to verify the accuracy of models created through PM, the same boat was recorded using photogrammetry and a "Total Station" or electronic distance measuring device (EDM). Two models were created and the resulting measurements were compared. The results were essentially the same, with the small inconsistency being within the limit of human error of measuring using tape and holding the targets for the EDM.

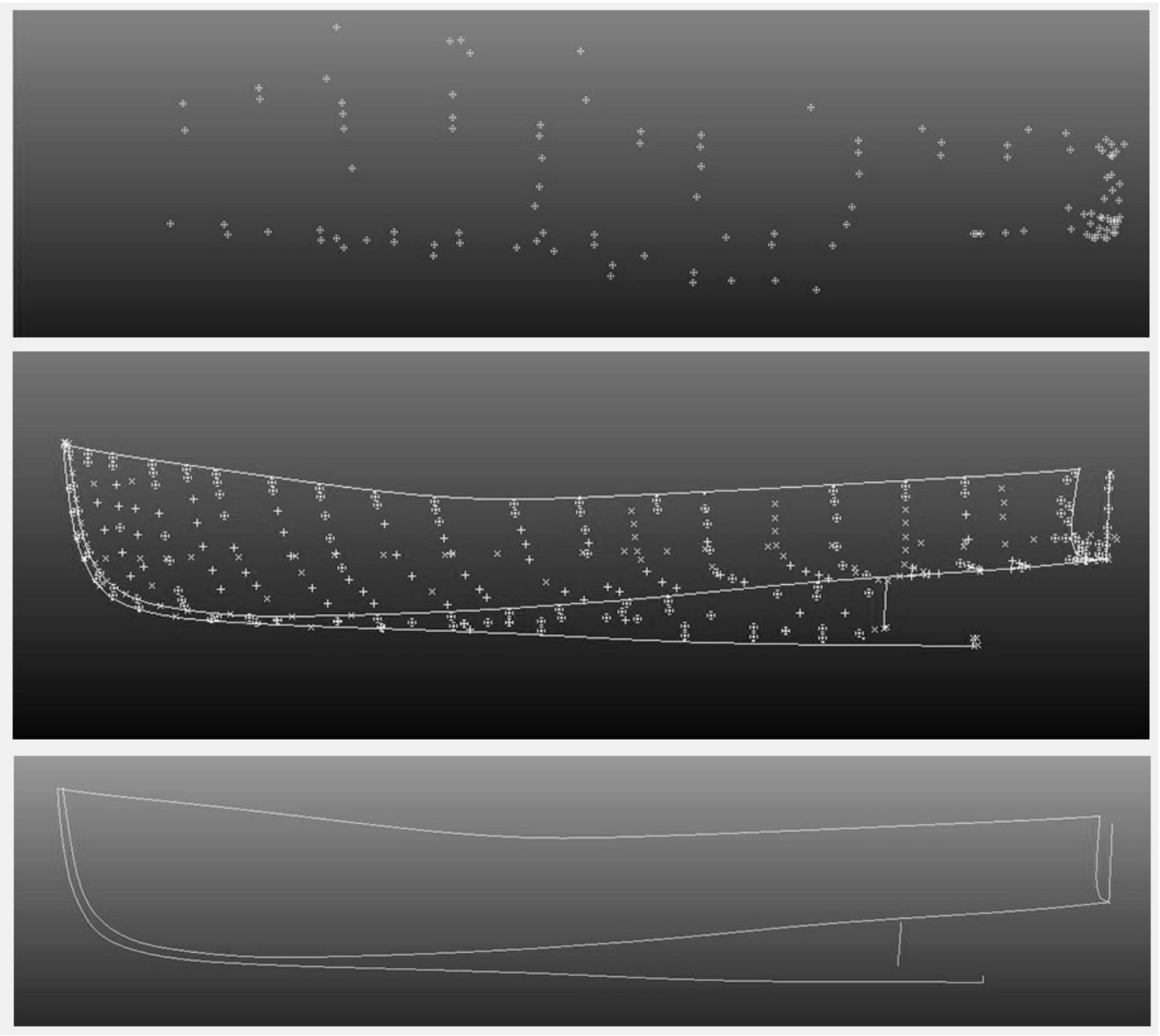

Fig. 6. Gower lobsterboat. Top: model of coded targets after automatic processing. Middle: model with added manual points and lines through points. Bottom: point layers turned off to aid in visualization.

4.2.2 Rhino 3D

Rhino 3D (www.rhino3d.com [accessed August 11, 2014]) was chosen for the CAD software to be used to take the 3D model and translate it into a 2D format. Other software is capable of doing the same thing. Rhino was chosen because it is relatively cost-effective and easy to learn, as well as rapidly growing in popularity and user base. Rhino utilizes non-uniform rational B-splines (NURBS) to create and edit simple to complex lines, curves, surfaces, and solids. The 3D model is exported from PM as a 3dm file which imports directly into Rhino (fig. 7).

The curves and surfaces created in PM are intended to help keep organization amongst the growing number of points in a 3D model; however, they do not always exactly fit all of the set of points. Rhino is able to create complicated curves and surfaces that pass through all of the appropriate points. This creates a final result that appears to be truer to form.

There are a number of different ways to create a hull surface in Rhino. One method is to loft the surface through a series of vertical curves located along the length of the hull. The spacing between these curves does not have to be consistent. The

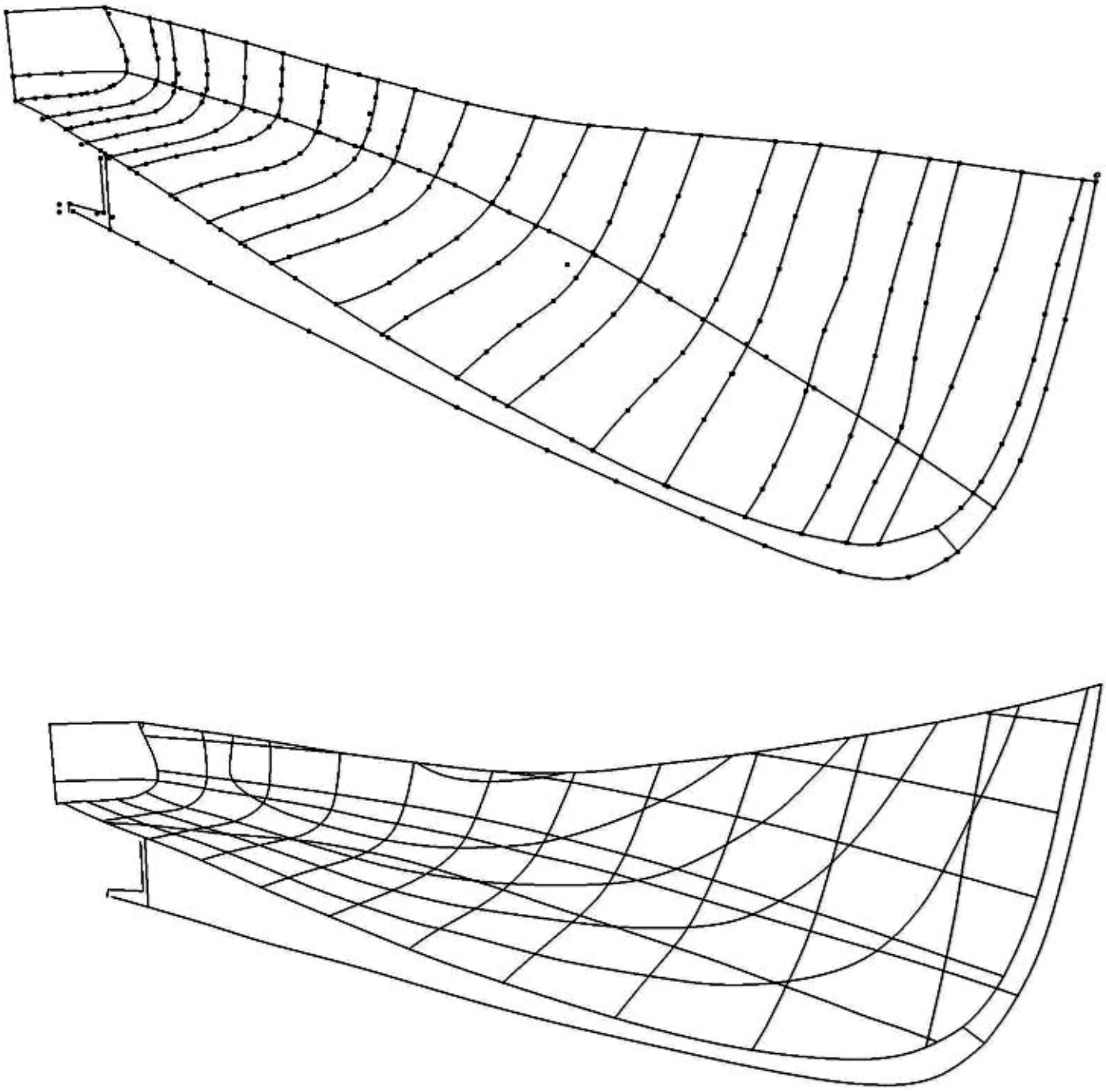

Fig. 7. Gower lobsterboat. Top: hull curves are created by drawing curves through points. These curves are then lofted to create the hull surface. Bottom: the hull surface is cut in layers perpendicular to the *x, y,* and *z* axes. The intersections of these cutting planes with the surface create the lines known as waterlines, sections, and buttocks.

individual curves are created by connecting a series of points on the hull created in PM. The newly created hull surface is then contoured (sliced) to create a new set of curves known as sections, buttocks, and waterlines, corresponding to slices transverse to the *x*, *y*, and *z* coordinate lines. (Fig. 7) The spacing and number of these contours can be changed as needed. These curves define the shape of the hull surface and create the 2D line drawing. A table of the intersections of these lines is called a table of offsets and is the fundamental tool that a boat builder will use when creating a full size drawing, known as a lofting, as

the first step in building a new hull. In Rhino, this table of offsets has to be created manually.

4.2.3 Orca 3D

Orca 3D (www.orca3d.com [accessed August 11, 2014]) is a naval architecture program that is an add-on to Rhino. It facilitates the process of contouring a hull surface with a user interface specific to naval architecture and assists with the creation of a table of offsets. (Table 1)It has a number of tools to evaluate the hull's properties such as stability, center of gravity, speed, and hydrostatics. Additional information or estimates may be needed to perform these analyses.

5. DRAWINGS

2D drawings of the hull contours can be created using either Rhino 3D by itself or Rhino 3D with the Orca 3D add-on. A typical lines drawing includes the contours of the sections, buttocks, and waterlines (fig. 8) as well as a table of offsets. To create final drawings, text blocks, borders, dimensions, annotations, etc. have to be added to these drawings.

6. PROJECT OVERVIEW

This research project began as an effort to document a collection of twenty-three at-risk Venetian traditional wooden boats belonging to Arzanà , an association for the preservation of traditional Venetian maritime materials, culture, and skills. Based on the principles of sound conservation, the project has developed into a program of collaboration, advocacy, and outreach which includes students and faculty at Worcester Polytechnic Institute (WPI) and its Venice Project Center, a Royce Fellow from Brown university, the Museum Small Craft Association, The Center for Wooden Boats, Columbia River Maritime Museum, Penobscot Marine Museum, National Park System, Historic American Engineering Record (HAER) and others. To date ten of these boats have been photographed and 3D models created, along with a number of other boats used as training exercises. Workshops have been held to collaborate with others engaged in similar documentation activities.

7. CONCLUSIONS

Photogrammetry is a powerful tool which can be used to transform a set of photographs of the complicated structure of wooden boats into a set of accurate measured line drawings. These drawings can be used for a range of purposes from archival study to the construction of reproductions. The creation of sets of photographs for photogrammetry may be all that is possible as a form of preservation for some degraded cultural materials. Preservation and migration of the digital data is clearly a concern. Will future generations have the ability to read current file formats? How much will the data degrade over time? The immediate translation of photographs into 3D models, and then into 2D hard copy drawings appropriate for submission to the HAER collection at the Library of Congress, or kept to be kept in museum libraries and/or archives, may be the only sure way of preserving this information.

The fundamental tools needed for photogrammetric documentation, a moderate- to high-resolution digital camera, a laptop computer, and a tape measure, already owned by most conservators, can be carried into the field in a small back pack.

Table 1. The table of offsets represents the coordinates of the intersections of the boat lines. It is all that a builder needs to create a full size drawing of a boat hull; the first step in creating a new boat based on this set of lines.

TABLE OF OFFSETS

File Name: Gower Working Model 9-24-11 Untwisted 007.3dm
Units: Inches
Absolute Tolerance: 0.001

	WATERLINE HALF-BREADTHS FROM THE CENTER LINE							**BUTTOCK HEIGHTHS ABOVE THE BASELINE**							
	Waterline	**Waterline**	**Waterline**	**Waterline**	**Waterline**			**Buttock**	**Buttock**	**Buttock**	**Buttock**	**Buttock**			
Station	24.000	36.000	48.000	60.000	72.000	Rabbet	Sheer	10.000	20.000	30.000	40.000	50.000	Sheer	Rabbet	Station
Transom		34.502	30.821				29.245	26.868	26.923	28.834			52.700		Transom
Trm fm AP		4.795	3.080				3.264	1.981	3.065	4.494					Trm fm AP
36.000		38.137	37.681			2.078	37.014	24.772	25.491	26.511			51.064	24.205	36.000
72.000	15.603	42.327	43.127			2.047	43.024	23.321	24.383	25.521	30.515		49.594	22.428	72.000
108.000	29.027	45.393	47.195			2.021	47.200	21.835	23.029	24.109	27.486		48.131	20.380	108.000
144.000	34.194	46.610				1.914	49.942	19.334	21.132	22.800	26.790		47.666	17.595	144.000
180.000	32.597	45.461				1.746	51.149	17.391	19.764	22.906	28.725	45.237	47.821	15.397	180.000
216.000	27.926	41.276	48.433			1.648	49.601	16.912	20.423	25.205	34.228		50.204	13.316	216.000
252.000	22.074	34.706	41.263			1.567	44.868	17.249	22.798	30.052	45.525		55.098	12.315	252.000
288.000	16.311	26.327	32.567	37.965		1.534	38.157	19.143	27.363	42.707			60.446	12.299	288.000
324.000	9.376	16.565	21.368	25.789		1.469	28.227	24.875	44.396				66.257	14.201	324.000
360.000	1.980	5.524	8.190	10.629	13.357	1.632	13.440	57.138					72.348	22.889	360.000
Stm Rabbet		1.560	1.609	1.545	1.727		1.814						76.809	27.190	Stm Rabbet
SR fm WL 360		12.959	17.575	20.172	22.398		23.336								SR fm WL 360

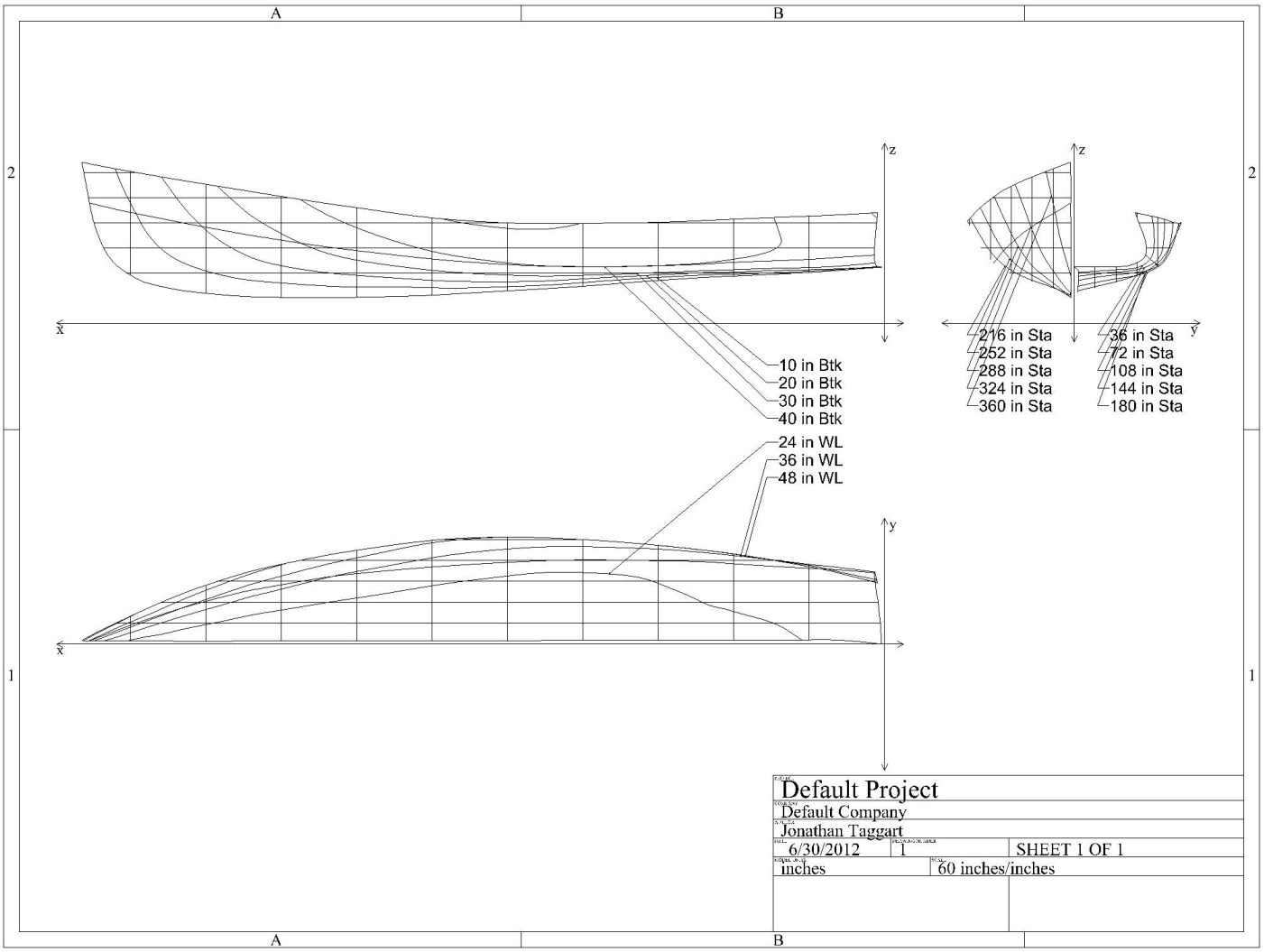

Fig. 8. Gower lobsterboat. Computer-generated lines drawing. Dimensions and text still need to be added.

Coded targets applied to surrounding surfaces can facilitate computer processing without ever applying pressure-sensitive adhesives to the object if there are sufficient features for manual marking. It appears that for boat documentation, photogrammetry may be most useful for field documentation where time, access, and resources are limited.

NOTES

Recent advancements in photogrammetry software (such as Agisoft Photoscan, http://www.agisoft.ru/products/photoscan [accessed August 11, 2014]) greatly simplify the process data capture and point cloud creation as reported in this paper.

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DAVID COCKEY is an engineer and consultant on the use of photogrammetry for boat documentation. He has an MA in Naval Architecture from the University of Michigan and a PhD in Aerospace and Mechanical Engineering from Princeton. He has been a student of traditional boat design for four decades and is currently president of the Museum Small Craft Association.

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EVELYN ANSEL has a Bachelor of Arts in Art History and Visual Arts from Brown University and is preparing for graduate programs in conservation. She has worked as a conservation technician in special collections at the John Hay Library Conservation Lab and as a research assistant for the Brown University Center for Digital Scholarship. She has interned with Jonathan Taggart and Ron Harvey, and worked for Museum Insights, the John D. Rockefeller Library, the RISD Art Museum, the Joukowsky Institute for Archaeology, and Mystic Seaport Museum. She has received an Andrew W. Mellon Grant, a BIAP/AIP Award, and an Undergraduate Research & Teaching Award to pursue independent research, as well as the 2011 Brown University Award for Excellence in Library Research. Currently, she is working on the development of photogrammetric documentation techniques focusing on historic Venetian boats under the auspices of a Royce Fellowship.

ALYSSA ASCARE studied Biomedical Engineering at Worcester Polytechnic Institute (WPI). She completed her Interactive Qualifying Project (IQP) in Venice, Italy, focusing on the documentation of traditional Venetian watercraft. As part of this IQP she analyzed different measuring techniques, including photogrammetry, to determine their relevance as a way to measure and record the lines of these traditional wooden boats. She received her Bachelor of Science degree from WPI in May, 2012.

DELPHINE ELIE-LEFEBVRE, RICHARD WOLBERS, ELENA TOROK, STÉPHANIE AUFFRET, MARK ANDERSON

Recent Investigations Into A Mechanical–Chemical Method For Removing Brass Corrosion From Furniture Brass

ABSTRACT—Tests at the *Centre de Recherche et de Restauration des Musées de France* (C2RMF) and Winterthur Museum evaluated the efficacy of using animal protein glue on a Japanese tissue matrix for direct removal of copper alloy corrosion products. Test coupons and actual furniture brasses were subjected to applications of protein glues and prepared test mixtures, which included both natural protein and peptide fragments. The reduction of Cu^{+2} to Cu^{+} via bicinchoninic acid and amide-containing moieties was tested, and the role of pH and amino acid content was evaluated. The practical ramification of this technique in furniture conservation is presented.

1. INTRODUCTION

To polish brass ornaments inlaid in wood; take some Tripoli, powdered very fine, and mix with linseed oil, and with a rubber made from a piece of old hat, or felt, you polish the work as you would polish varnish (The Cabinet Makers Guide 1837).

It is immediately obvious to the furniture conservator that the recommendation from the Cabinet Makers Guide is not useful in conservation treatment. Ironically we are often faced with this very situation, where the brass ornament that is not removable from the furniture object is masked, micro abraded, or chemically cleaned in place. Even hardware that is removable is difficult to clean or polish to a level that is not highly lustrous, a presentation that is often not appropriate to the age and overall patination of the furniture.

Observation is often the mother of invention and so it is with recent investigations into a less invasive technique for cleaning furniture brass. Recently work at the furniture facility of the Institut National du Patrimoine, C2RMF in France, identified removal of corrosion from brass by using animal protein glue. When dried glue on brass ornament was pulled away, the brass appeared brighter. Moving to the next logical step, the glue was applied on a matrix of Japanese paper which was stripped off after drying with the same but more controllable result.

Clearly, portions of the patinated layer on the surface of the copper alloy were removed. The process seemed more than a simple, mechanical Strappo mechanism, though that too aids in the removal of the built-up colorant materials, particularly the familiar crust formed as a result of multiacting ammonia/abrasive polishes.

The French proposed a possible amino acid driven chemical process. Subsequent evaluations by American conservators identified mechanisms utilized in a colorimetric protein assay known as the Smith reaction, or Bicinchoninic acid (BCA) Protein Assay as having value in the mechanical–chemical removal of corrosion products.

In the Smith reaction, copper ions are first reduced by specific amino acids, some of which are contained in the animal glue, and second by BCA reacting with the resulting cuprous ion to form a water-soluble BCA/copper complex. Targeted amino acid cleaning for furniture brass seems to show promise for cleaning furniture brass.

2. EXPERIMENTATIONS IN CLEANING BRASS COMPONENTS OF BOULLE MARQUETRY WITH ANIMAL GLUE

This research started in 2010 when Delphine Elie-Lefebvre, co-author of this article, was faced with the treatment of a French Napoléon III *vitrine* (1869–1879) from the collections of the *Musée National du Château de Compiègne*, signed on its lock by Frédéric Roux (fig. 1). This project was carried out as part of an internship at the *Centre de Recherche et de Restauration des Musées de France* (C2RMF), under the supervision of Agnès Mathieu-Daudé, then curator of Decorative Arts at the C2RMF, and Marc-André Paulin, head of the Furniture Conservation laboratory at the C2RMF.

This piece is part of a pair. The other *vitrine* had already been treated in 2004. At that time, its brasses were cleaned by abrasion. Since both *vitrines* were to be exhibited in the same room, Emmanuel Starky, curator in charge of the direction of the *Musée National du Château de Compiègne*, requested that the treatment of the second *vitrine* would provide an aesthetic result close to the one obtained on the already-treated piece, but not necessarily using the same techniques.

This low *vitrine* opens with one door and is covered with a white marble. The case is made out of oak and poplar veneered with ebonized pear wood and brass decorative

Fig. 1. Vitrine (1869–1879), signed on its lock by Frédéric Roux, *Musée National du Château de Compiègne* C.38.3342, condition before treatment.

elements. It is also ornated with gilded mounts. The door and sides are composed of framed glass, while the back panel holds a mirror.

The examination of the *vitrine* raised several issues (fig. 2), which are as follows:

1. Numerous losses of brass stringing
2. Major loss of the black stain that was used to ebonize the pear wood, which resulted in a grayish appearance
3. But most importantly, a very advanced oxidation of the brass elements

Worn or even missing engraving on brass elements, due to abrasive cleaning methods, is a well-known phenomenon on French furniture, often encountered on Boulle or Napoleon III furniture. Moreover, in the situation where the marquetry is not flat, originally or as a result of a shock, the level of

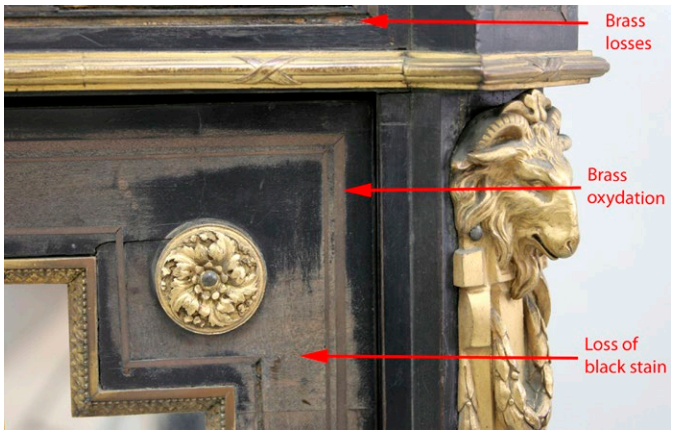

Fig. 2. Different condition issues observed on the vitrine

abrasion required to clean recessed areas is major and the resulting damage is amplified. Familiar with these problems, the aim of this treatment was to find an alternative method to the traditional abrasion technique used to clean and polish brass elements.

The techniques often used by metal conservators, like the ones based on ethylenediaminetetraacetic acid (EDTA), could not be applied on this *vitrine*, as they require major rinsing. Indeed, when brass elements are integrated to a wooden veneered surface, it is necessary to find a method that will not affect the surrounding materials, such as wood or tortoiseshell on Boulle marquetry.

At the time of the treatment, Frédéric Leblanc, furniture conservator at the C2RMF, had mentioned that when brass marquetry was being glued with cold setting fish glue, the excess glue "stained" the brass with which it was in contact. This observation led to conclude that glue had a tendency to deoxidize brass, but in a nonuniform way. Based on this observation, several animal glues were tested, aiming to develop a gel that could be peeled off, allowing for an easier use on vertical surfaces.

The following animal glues were tested (fig. 3):

- Glue GT 58, distributed in Paris by HMB. It is a mix of beef bone, nerve, tendon, and hide glues
- Nerve glue, which is in fact a mix of tendon, nerve, and hide glues
- Pork gelatin

The glue GT 58 contains collagen derived from not only beef tendons, nerves, and hide but also bone, which made it too brittle and difficult to remove after a 20-minute waiting time. The pork gelatin is in fact made of a denatured collagen from pork hide. In this case, the low-molecular-weight molecule does not have high adhesion strength, resulting in a less efficient cleaning. On the other hand, the nerve glue perfectly satisfies the requirements of this cleaning system as it forms a viscous

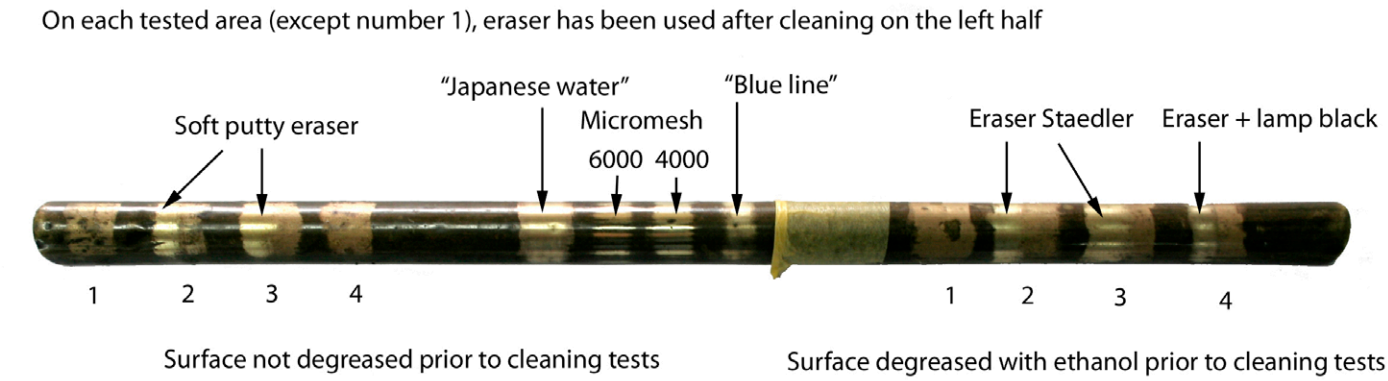

Fig. 3. Cleaning tests carried out in France in 2010–2011. 1. Nerve glue 2. Pork gelatin pH 4 3. Glue GT 58 pH 4 4. Pork gelatin pH 3

solution at 35°C, which gels as soon as it is in contact with the brass surface. The pH was initially brought down to 4 with acetic acid to match the pH of the glue found at the wood/brass interface. To ease the process, a layer of Japanese paper was added on top of the glue, allowing to peel it off efficiently. An extra layer of glue can be added on top of the Japanese paper to enhance the bond between the glue and the paper (fig. 4). After about 20–30 minutes, the glue and paper can be peeled off the brass. To homogenize the surface after cleaning, the brass was rubbed with a Staedtler eraser, which was selected because there is no abrasive and no sulfur in it.

It is to be noted that after cleaning with this method, the brass appears more pinkish than when abraded with Micromesh in which case it looks more whitish. A very simplified explanation of that observation is that during the oxidation process of brass, the least noble metal gets oxidized first. Zinc, which is one of the two components of brass, gets oxidized before copper and forms a black oxidation layer on the surface.

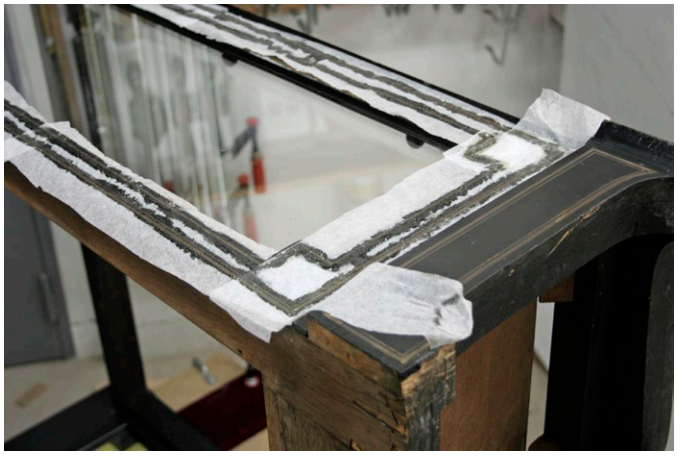

Fig. 4. Nerve glue and Japanese paper applied to the surface.

Under that layer is a surface that is richer in copper as a result of de-zincification.

This de-zincification process has been characterized by Romain Morini at the *Ecole des Mines Paristech* to answer a request from the C2RMF. In his report, he explains:

The ratio Copper to zinc (in atomic concentration) informs us about the zinc concentration of the alloy. In the analyses conducted with SEM (Scanning Electron Microscope) by Jeol et Philips, the ratio Cu/Zn =5.3 ± 0.6 indicates that the alloy contains little zinc on its surface. This can be explained by a phenomenon of de-zincification of brass elements in Boulle marquetry through time.

This cleaning system with a collagen-based glue removes less material than when the brass is cleaned by abrasion and, as a result, deoxidizes up to the copper-rich zone. This explains why, after cleaning with this technique, brass elements appear slightly more pinkish. Figures 5a and 5b illustrate the *vitrine's* side before and after the treatment. Note that the surface has been coated with shellac.

After this first experimentation of cleaning furniture brasses, it was clear that this technique combined a mechanical cleaning by peeling off corrosion products and a chemical cleaning since it was discovered that certain sulfurous amino acids such as cysteine act as a chelator. Those amino acids have the property of creating a bond by their sulfur element with metals such as copper and zinc.

While Delphine Elie-Lefebvre was an intern at the Winterthur Museum in June 2011, this brass cleaning experimentation was discussed with Richard Wolbers, who offered to pursue more research to fully understand the chemical process involved and to test cleaning systems based on other sources of amino acids than collagen glues.

The technique designed by Delphine was tested at Winterthur by Stéphanie Auffret for the treatment of an Empire New York console table by Michael Allison (Winterthur Museum, accession number 1974.2). Gilded mounts located at the top and bottom of the two front marble columns exhibited greenish residue from corrosion and associated polishing materials. The cleaning system proved very efficient at lifting off the greenish

Fig. 5a. Vitrine's side before treatment; 5b Vitrine's side after treatment.

residue from the recesses (fig. 6). Tests were performed at pH 4 and pH 7. At a pH of 7, the result was slightly slower but close to equal. The surface was rubbed with a Staedtler eraser, as in the initial experiment in Paris.

3. DESIGN AND EXPERIMENTATION OF NEW PROTEIN-BASED CLEANING SYSTEMS

In the spring of 2012, a number of experiments were pursued at the Winterthur/University of Delaware Program in Art Conservation in order to glean more information about the chemical mechanisms associated with a number of protein-based cleaning systems, including the ones listed above. Experimentation was conducted by Richard Wolbers, Elena Torok, and Stéphanie Auffret.

It was evident that protein-based systems effectively remove or reduce surface corrosion products on these types of metal surfaces and that cleaned metal surfaces also generally appeared quite bright post treatment. However, although it was known that these systems were effective, the specific chemical mechanisms involved with them had not yet been studied. It was important to understand these chemical mechanisms in order to avoid potential adverse effects when using these materials in the treatment.

Fig. 6. Detail of gilded capitals before and after cleaning, with Japanese paper peeled off the surface. (Console table by Michael Allison, Winterthur Museum 1974.0002)

The cleaning effect of collagen-based glue layers on metallic surfaces appeared to be largely physical. However, the evenness of the recovered metallic surface suggested that chemical factors were at work, as well. One possibility was simply that under acidic conditions, the copper-containing alloys were simply being dissolved by a kind of uniform corrosion mechanism. Another possibility however was that Biuret-type reactions were occurring with the applied glues. The classic Biuret reaction is a complex formation between Cu^{2+} and amides, like those found in the peptide bonds in proteins, that results in the net reduction of the bound Cu^{2+} to Cu^{+}. It was hypothesized, therefore, that the presence of complex amides might also be responsible for the cleaning effect on treated brass surfaces. The reduction of Cu^{2+} to Cu^{+} can be detected using a chelator (bicinchoninic acid or 'BCA'). This latter reaction has long been the basis for protein detection reagents (BCA type assays).

The nerve glue-based techniques were utilized under acidic conditions (pH ~4–7). However, under alkaline conditions (pH ~8.0 and above), copper should be less likely to corrode and more likely to form stable, passivating oxides. Any corrosion products with sulfides present should be more likely to dissolve or be removed without any dissolution of the copper alloy substrate itself.

To test this theory, a series of experiments were proposed that were conducted specifically under alkaline pHs, and that involved other protein- or peptide-based gel systems. They were similarly effective in cleaning ability but had two additional benefits: general uniform corrosion effects could be eliminated at more elevated pHs and they contained a better defined set of peptide/protein reagents. In general, these solutions were aqueous and contained, in at least two trials, synthetic dipeptides that potentially could act as reducing agents for Cu^{2+}. The dipeptides chosen in particular contained cysteine, tryptophan, and tyrosine residues, as these amino acids have been reported as yielding the highest reduction

yields of Cu^{2+} to Cu^{+}. The dipeptides were less likely to form complete films and mechanically act as physical films to pull away corrosion products or layers. BCA served as both chelator and indicator that copper reduction/complexion was taking place.

Cleaning experiments were thus designed and carried out to learn more information about the chemical mechanisms associated with protein-based cleaning solutions for metal surfaces, and then also to assess and evaluate any visual and chemical effects on the metal substrates being cleaned by using a number of instrumental techniques.

3.1 Experiment 1: Aesthetic Evaluation of Cleaning Ability

A number of different protein-based solutions were used to clean multiple copper alloy objects and coupons with different applied surface patinas. The solutions tested included suitable controls (including a nerve glue preparation), low-molecular-weight collagen ("Collagen M"), high-molecular-weight collagen ("Sea Gel"), as well as two dipeptides ("Tyr-Ala" and "Gly-Trp" from Sigma-Aldrich). In general, cleaning solutions tested also included all the other reagents normally included in BCA assay systems:

- 100 mL deionized water
- 1 g bicinchoninic acid
- 0.16 g sodium tartrate
- 0.95 g sodium bicarbonate
- 2.0 g sodium carbonate
- 0.5 g protein/peptide

In order to enable these solutions to sit on testing substrate surfaces for extended periods of time, they were also mixed ~1:1 with a 2% xanthan gel (composed of 2 g xanthan powder and 100 mL deionized water). The pH of this solution was brought to approximately 9 using triethanolamine.

Eight identical brass furniture fittings were used as coupons for test cleaning (fig. 7). Cleaning ability was evaluated aesthetically

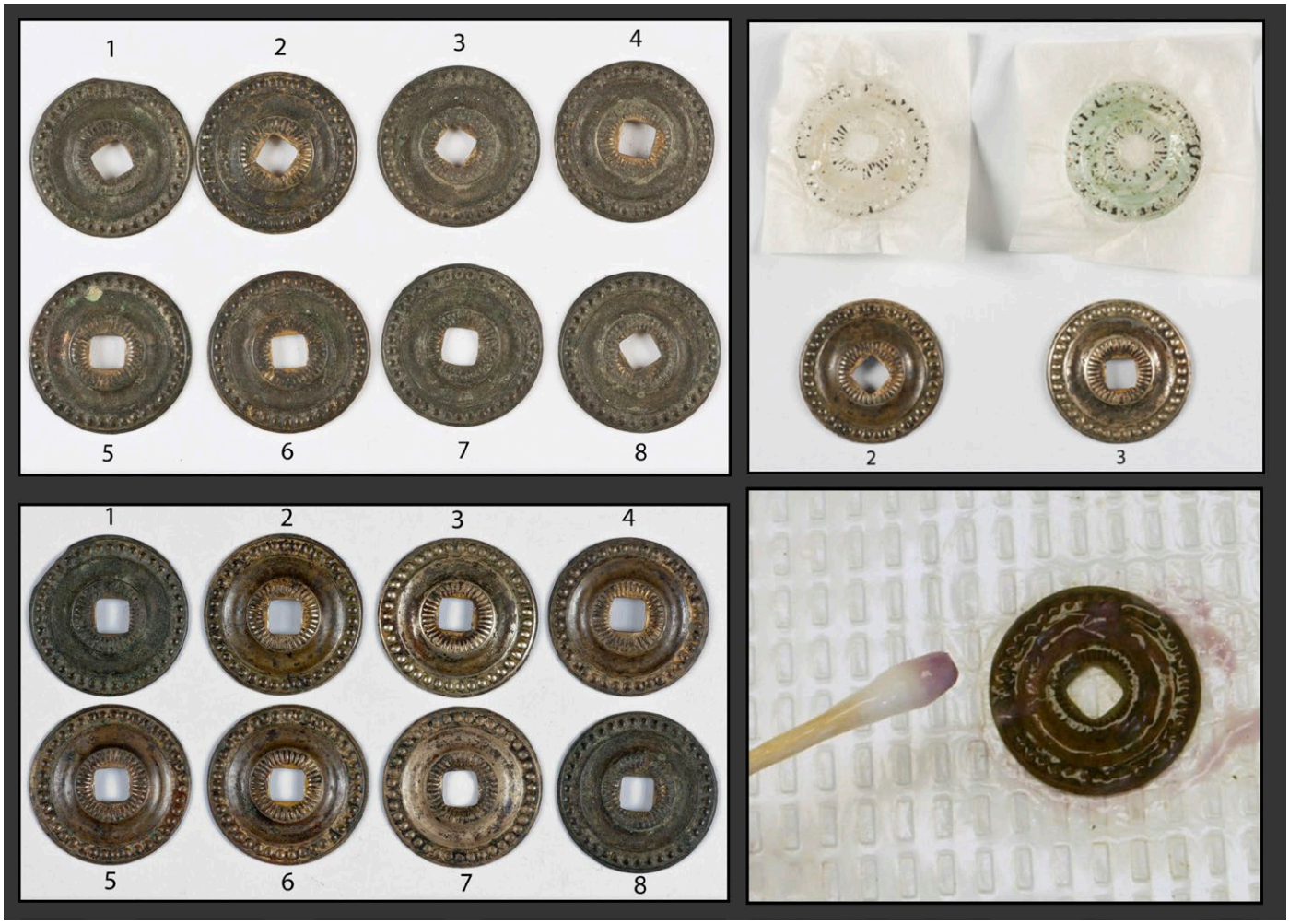

Fig. 7. All eight coupons before cleaning (left, top) and after cleaning (left, bottom) (Courtesy of Jim Schneck, Winterthur Museum). Overall, uncleaned controls were compared to nerve glue-based cleaning techniques (right, top) and protein gel-based cleaning techniques (right, bottom).

and compared visually to uncleaned controls and coupons cleaned using the nerve glue technique. All coupons were first degreased using acetone on a rolled cotton swab. Coupons 1 and 8 served as controls and were not cleaned. Coupons 2 and 3 were cleaned using nerve glue (at pH 7 and pH 4, respectively). Nerve glue was applied, faced with Japanese tissue, allowed to dry, and then removed mechanically. Surfaces were then cleaned with a Staedtler Mars white vinyl eraser. Coupons 4, 5, 6, and 7 were cleaned using each of the four proteins listed above in the BCA-based solution in xanthan gel; Coupon 4 was cleaned with Collagen M (pH 9.5), Coupon 5 was cleaned with Tyr-Ala (pH 9.5), Coupon 6 was cleaned with Trp-Gly hydrochloride (pH 9.5), and Coupon 7 was cleaned with Sea Gel (pH 9.5). Each protein-based solution in xanthan gel was applied to the surface using a cotton swab, where it was allowed to sit on the surface of the coupon (and agitated with the swab) for approximately 2 minutes. The color of the gel changed from clear to blue-purple as corrosion products were reduced. Surfaces were then rinsed using deionized water.

After cleaning, all six cleaned coupons were evaluated aesthetically and compared to the two uncleaned controls. In general, coupons cleaned using each technique were much brighter and contained much fewer surface corrosion products than both uncleaned control surfaces. Overall, there was no discernible visual difference between coupons cleaned using a nerve glue technique and coupons cleaned using a protein-based xanthan gel technique.

3.2 Experiment 2: Examining post-cleaned surface topography and elemental composition using SEM

When it was observed that the protein-based cleaning gels were as effective in reducing corrosion products as the nerve glue technique was, it was necessary to understand more information about the mechanisms involved and also investigate if the protein-based gel caused any deleterious effect to the cleaned surface's overall topography or elemental composition during cleaning. This was done using scanning electron microscopy (SEM) and energy dispersive spectroscopy (SEM-EDS) in the Scientific Research and Analysis Laboratory at the Winterthur Museum with Associate Scientist Catherine Matsen.

First, bronze alloy coupons of identical elemental composition that had been patinated with barium sulfide (to create a layer of CuS surface corrosion) were cleaned using four separate techniques (fig. 8): a Sea Gel-based BCA solution in xanthan gel (pH ~9), a Collagen M-based BCA solution in xanthan gel (pH ~9), nerve glue (pH ~7), and nerve glue (pH ~4). An additional coupon served as a control and was left uncleaned.

After cleaning, the surface topography of all coupons was visually examined at 200×, 400×, 1200×, and 1500× using SEM and compared to the uncleaned coupon. Overall, the aesthetic appearance of all four cleaned surfaces did not seem to differ from the control (fig. 9).

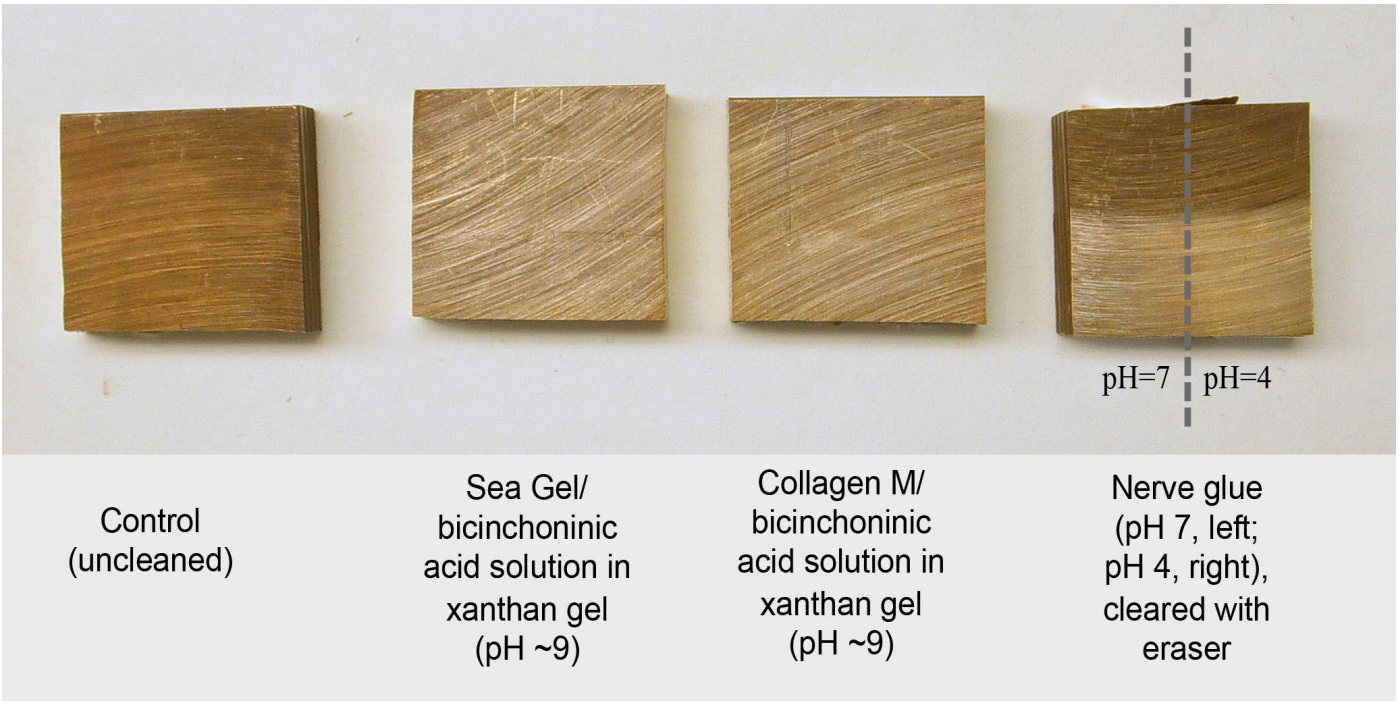

Fig. 8. Copper alloy coupons with CuS surface corrosion products were cleaned using different techniques prior to examination with SEM-EDS.

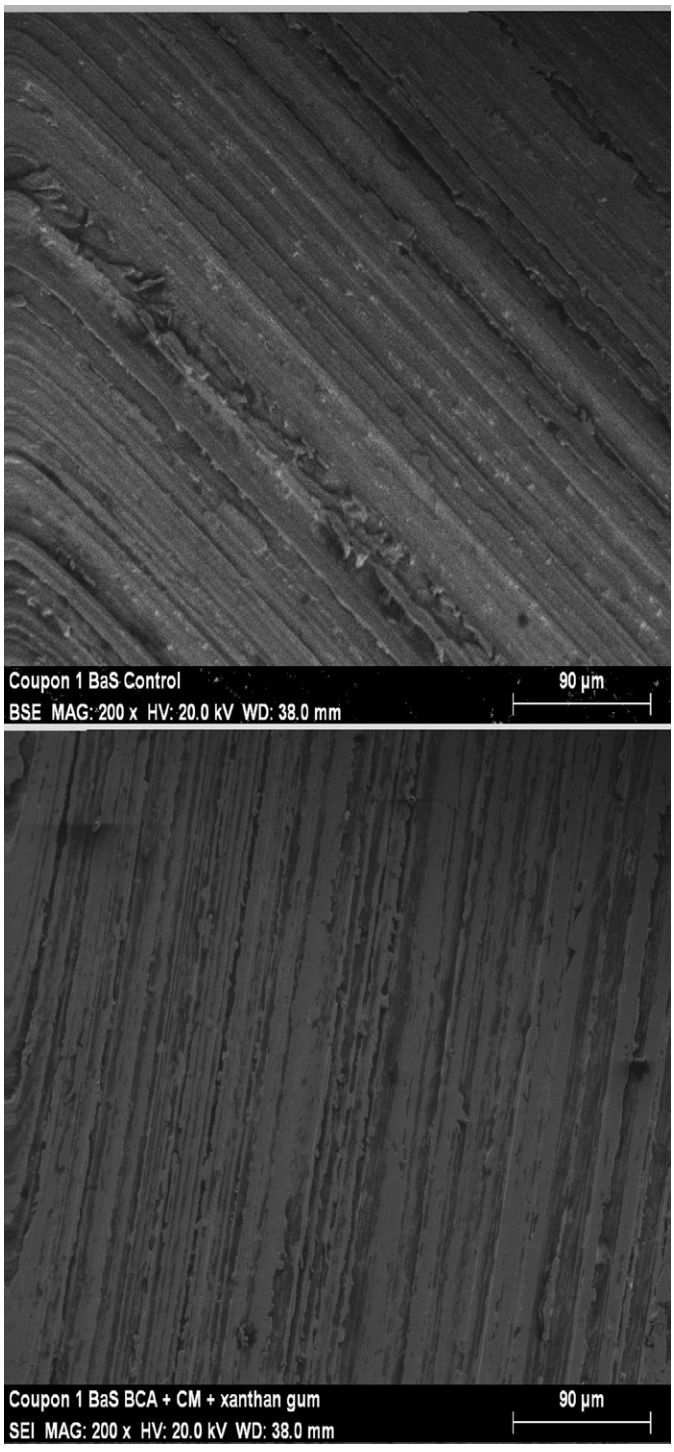

Fig. 9. Surface topography of cleaned coupons was examined and compared to an uncleaned control using SEM. Here, the uncleaned control (top) and a coupon cleaned with Collagen M/bicinchoninic acid solution in xanthan gel (pH ~9) are visually similar at 200×. (Courtesy of Catherine Matsen, Winterthur Museum)

SEM-EDS and elemental mapping were then used to examine the elemental surface composition of cleaned coupons, as well, in order to see if it was possible to determine if certain elements were being removed from the coupon's surface during cleaning. SEM-EDS data were taken from the surfaces of all cleaned coupons and then compared to the uncleaned control. Overall, some differences existed; however, they appeared to be minor, and it was unclear how much of these differences could be attributed to the fact that the surfaces of metal alloys are already nonhomogenous in nature. Findings, therefore, were inconclusive.

In the future, it would be beneficial to not only examine the surfaces of cleaned substrates, but also look at the composition of samples of the cleaning solution itself after cleaning these substrates. If solutions used during cleaning could be collected from the surfaces of the coupons, and information on elements present in these samples could be collected using x-ray fluorescence spectroscopy (XRF), this would provide more information on specific elements being removed during cleaning. However, time did not allow for this type of examination during the course of this study.

3.3 Experiment 3: Measuring Corrosion Current During Cleaning

As a simple method of determining if dissolution of the metal was occurring during cleaning using the protein-based gel solutions, electrical current (amperage) was measured during cleaning of a bronze alloy coupon using a micro-ammeter. When the surface of this coupon was cleaned using one of the four protein-based gel solutions at an alkaline pH, zero amperage was recorded, indicating that no dissolution of the metal was taking place. However, when the surface of the coupon was cleaned using nerve glue at pH ~4, amperage of more than zero was recorded, indicating that some dissolution of the metal was taking place.

4. FUTURE DIRECTIONS AND CONCLUSIONS

Overall, several methods for cleaning copper alloy surfaces have proven to be effective in removing corrosion products. The protein- and peptide-based gel cleaning solutions do not appear to be causing any type of general or uniform corrosion to the metal surface, but further investigation is still needed to determine this for certain. In the future, further study is also needed for learning more information about the removal of corrosion products on varied types of copper alloys, the effect of pH on amino acid cleaning systems on different furniture finishes, the mechanism for final unification of alloy surfaces with the white vinyl eraser, and working in safe pH ranges.

NOTES

1. http://www.jbc.org/content/89/1/1.full.pdf

FURTHER READING

http://www.piercenet.com/method/chemistry-protein-assays

AUTHOR BIOGRAPHIES

DELPHINE ELIE-LEFEBVRE was a biology and biotechnology teacher for 10 years in France. She graduated in 2012 from the Furniture Conservation Program of the Institut National du Patrimoine (INP) in Paris. She was an intern at the C2RMF, the Musée des Arts Décoratifs, the Winterthur Museum, and the Metropolitan Museum of Art.
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STÉPHANIE AUFFRET, FOR THE WOODEN ARTIFACTS GROUP OF THE AMERICAN INSTITUTE FOR CONSERVATION

Tomorrow's Furniture Conservator: Who Are You, Where Are You, and What Skills Will You Need?

ABSTRACT—This paper was originally written as the lead article for the March 2014 issue of the American Institute for Conservation's *News*. It is based on a roundtable held at the 2012 Annual meeting of the AIC in Albuquerque, NM, which was dedicated to the training of furniture conservators. Through a review of what was discussed in Albuquerque, it raises issues related to the evolution of the profile of a furniture conservator and resulting education needs.

1. INTRODUCTION

In the past 15 years, U.S. conservation training programs have graduated very few furniture conservators. This phenomenon has generated concerns from programs as well as employers who are looking to hire furniture specialists, especially because the number of practicing furniture conservators will likely diminish in the next two decades as current professionals retire. Recent discussions have raised questions about the profile of tomorrow's furniture conservator and this article aims to present these issues to the AIC membership at large.

2. A SEED PLANTED: ROUNDTABLE ON EDUCATION IN FURNITURE CONSERVATION; ALBUQUERQUE, NM, MAY 2012

During the AIC 40th Annual Meeting in Albuquerque, NM, in 2012, the Wooden Artifacts Group of the AIC (WAG) hosted a roundtable discussion on education in furniture conservation. The panel, moderated by Debra Hess Norris and including five panelists from cultural institutions and training programs (1), was brought together to address the following points:

- Concerns about lack of recent U.S. graduates in furniture conservation.
- Concerns from employers regarding lack of specific skills from graduates, underlying the need for the development of targeted training opportunities.
- Evolution of the needs and reality of the furniture conservation market. In preparation for the panel discussion, a survey was conducted by sending three sets of questions to several audiences: the panelists, international graduate programs offering furniture/wood conservation as a specialty, and potential employers of furniture conservators, both in museums and private practice. Potential employers included WAG/AIC members in private practice and 15 institutional furniture conservators who were contacted via personal e-mail message. The preparatory survey addressed the following questions:
  - What core competencies are required today from a furniture conservator?
  - Are there sufficient training opportunities available for students (pre-program or graduate) as well as practicing conservators (especially entering the field) to improve their skills where they feel deficient?
  - Employers (institutions and private practitioners) were asked if they were hosting graduate students as interns or fellows (during or after program). If not, would they consider doing this?
  - Would graduate programs be interested in more collaboration with international programs?
  - How can we best strengthen furniture conservation training globally in those countries where this area of study does not exist? What international initiatives and partnerships might we pursue?
  - How can we better promote furniture conservation as a specialty and recruit the next generation of furniture conservators?

The survey revealed different levels of expectations regarding core competencies for furniture conservators, making it clear that the concept of a furniture conservator is not so easy to define. Respondent answers also indicated that the field of furniture conservation is evolving and that new areas of competency are emerging (for example, modern materials). Narrative responses pointed to a strong interest in the development of additional training opportunities for furniture conservators and several topics were suggested. The desire to create more venues to exchange information and training among graduate programs and practicing conservators internationally was also expressed by many. After continued discussion between panelists and WAG leadership in the months that followed, the WAG Education and Training Committee (WAG ETC) was created. The role of this committee is to address the questions raised at the roundtable,

and to take actions to address the needs that were identified. The committee established the following steps to be taken:

- Create a list of workshop topics for practicing conservators (recent graduates or mid-career conservators) and develop a selection in the coming years.
- Work on developing a woodworking summer course for pre-program and graduate students who want to specialize in wooden artifacts conservation. The course could also be offered to students or practicing conservators from other specialties, such as those who need to develop in-depth knowledge of wood and woodworking hand skills (panel paintings or objects conservators).
- Urge WAG members to offer and promote pre-program internships, and to provide some modest funding when possible. Additionally, the Committee would like to focus on how to best promote emerging professionals and preprogram interns who are interested specifically in furniture conservation.
- Organize an international meeting of furniture conservation educators and practicing professionals to pursue the goals suggested by the survey and roundtable discussion.
- Consider a demographic study of the field.

John Childs submitted a summary of the session available at http://www.conservators-converse.org/2012/05/40th-annual-meeting-wag-afternoon-session-may-11-training-the-next-generation-of-furniture-conservators-mark-anderson-steve-brown-maryjo-lelyveld-jonathon-thornton-antoine-wilmering-debbie/

3. THE SEED IS GERMINATING: WHAT WILL THE PLANT LOOK LIKE?

As the seed was planted in the arid climate of New Mexico, the germination process has begun—but there is still a lot of work ahead if we wish to see a strong plant rise from its roots. Some of the steps identified by the WAG ETC Committee, listed above, are already well underway whereas others are still in development (2). One of the most crucial points of discussion involves creating a current definition of a furniture conservator.

What is the Profile of the Furniture Conservator in the 21st Century?

Valuable insights were gleaned from both survey respondents and attendees at the roundtable in Albuquerque, as they shared how they define "furniture conservator" as well as the range and level of skills needed for today's market. Traditionally, craftsmen woodworkers performed furniture restoration and it has taken a long time to move towards a conservation approach that respects the history of the piece, materials preserved on the object, and instances of past intervention.

The history of the development of furniture restoration/conservation has been studied in depth and was published in a 2005 WAG Postprints article, "Traditions and Trends in Furniture Conservation," by WAG member Antoine Wilmering. The craft tradition set the stage for a global perception that the furniture conservator is first a woodworker who is trained as a cabinetmaker. Conversations with students at Winterthur/UD reveal their belief that established woodworking skills are essential as a prerequisite and are therefore a potential barrier to pursuing this area of study. Though among the core competencies listed in the survey, not all respondents indicated that woodworking was the "must have" skill for those who wish to specialize in furniture conservation when entering a graduate level program in conservation.

Obviously, a furniture conservator works with wood, and thus must address structural issues, be able to replace missing elements that may be carved or turned, and might treat marquetry. However, wood is certainly not the only material that comes into play. For example, within marquetry alone, the range of materials encountered is large: mother of pearl, tortoiseshell, horn, bone, ivory, metal, as well as a large variety of woods and other organic materials. A furniture conservator also regularly works with metals that are present in mounts, locks, keys, nails and screws, and inner mechanisms. Upholstered furniture presents yet another set of materials, such as leather and a variety of foundation structures and textile coverings. Other furniture items incorporate such materials as marble, mirrored glass, and cut glass. An area that has garnered more focused attention in the recent past is the treatment of surfaces, including those varnished with clear coatings, or painted, gilded, or lacquered. And, more recently, the treatment of furniture that is made from synthetic materials is now requiring an entirely new set of skills.

Although the range of materials the furniture conservator must treat has not changed all that dramatically (apart from modern materials), the focus and approach to evaluation and treatment has evolved. As with other specialties (albeit a bit later for furniture), an awareness and ability to interpret and discuss scientific techniques and data has become more significant; for example, the interpretation of finish cross-sections or of data about coating composition is now considered part of a standard examination in many institutional settings. A more scientific approach to cleaning techniques has also grown in the past decade, especially as the role of targeted cleaning systems has developed in other conservation specialties. Additionally, preventive conservation requires a more holistic approach that requires conservators in every specialty to have a basic foundation in general collections care. Finally, growing collections of modern design and furniture are promulgating the need for a new set of skills (3).

These recent developments have generated a shift from the furniture conservator as a "woodworker" to a new type of professional. This furniture conservator is yet to be clearly defined, and the training required is still under discussion. Should one individual be "multi-skilled" or could several individuals with narrower but very specialized expertise fill these needs; for example, should some furniture conservators mainly focus on surfaces instead of on structural issues? Interestingly, European objects conservators specialize in one material instead of becoming generalists. Could this serve as a possible model for American furniture conservators?

The survey revealed that international conservation training programs do not all require woodworking skills as pre-requisite to enter furniture as a specialty. During the roundtable discussion in Albuquerque, several people recognized that even though cabinetmaking skills were certainly important as part of a treatment and in the interpretation of an object, perhaps they are not mandatory for entering graduate school when planning to specialize in furniture conservation. The argument was that if a student could demonstrate good hand skills when working with another material and a strong ability to work with wood, these skills could be transferred to cabinetry and fine wood working during and after graduate school training. The need for a larger "toolbox" than the traditional woodworking skills was brought up as crucial in the current economic climate for conservators.

Lastly, furniture conservator positions within institutions are decreasing as museums strive to limit the number of specialized professionals. This will mean that conservators from other specialties (mainly objects and to some extent, paintings) will increasingly treat furniture collections, or that furniture conservators will need to demonstrate skills beyond their traditional scope. In both cases, a multidisciplinary approach and additional specialized post-graduate training is essential for growth.

4. CONCLUSION: WILL ONE SINGLE PLANT BE ENOUGH TO FEED ALL THE BEES?

The debate raises the question of whether the traditional furniture conservator with a woodworking-centered background can still effectively respond to the growing needs of a quickly evolving field. Though this professional will always remain an important pillar of furniture conservation, we may want to join efforts to develop a new breed of conservators from different backgrounds, who would not replace but complement the more traditionally trained furniture conservator. The delineation between specialties might seem even more difficult to define with the emergence of new materials that are present on artifacts entering the scope of both furniture and objects specialists. This will not necessarily result in the fusion of specialties but instead may lead to a collaborative approach with associated training opportunities. With a wider range of materials to study and treat, the exchange of specialized knowledge and a multidisciplinary approach to training are crucial. It is hoped that this discussion, which relates the thoughts of many individuals, will raise awareness of how the profile(s) of the furniture conservator is evolving as the face of our profession changes. WAG and its Education and Training Committee are open to suggestions, collaboration, and the energetic involvement of pre-program interns, graduate students, and emerging professionals with an interest in the future of furniture conservation. "For tomorrow belongs to the people who prepare for it today" (African proverb); only our efforts will shape what we want to accomplish.

NOTES

1. Panelists at the AIC meeting roundtable were: Debra Hess Norris, panel discussion moderator, Winterthur/University of Delaware Program in Art Conservation; Antoine Wilmering, Getty Foundation; Mark Anderson, Winterthur/University of Delaware Program in Art Conservation; Jonathan Thornton, Buffalo State's Art Conservation Department; Steve Brown, North Bennet Street School; MaryJo Lelyveld, National Gallery of Art, Australia.
2. A very successful workshop on airbrushing techniques took place in December 2013, hosted in Haverhill, MA, in the conservation facilities of Historic New England. A second venue is already being considered to satisfy requests coming from many specialty groups' members. Also, an FAIC workshop on cleaning wooden surfaces (varnished, gilded and painted) taught by Richard Wolbers will take place during the summer of 2015, and a workshop on Asian lacquer is being considered for 2015.
3. Along with this article, the *AIC News* included two "points of view" from Seven Pine, Senior Conservator of Decorative Arts at The Museum of Fine Arts, Houston, who deals with modern furniture in his collection; and Genevieve Bieniosek who is a recent furniture conservation graduate from Buffalo, currently working as an Associate Conservator at Biltmore, VA. AIC News, March 2014, p. 5.

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STÉPHANIE AUFFRET, Ph.D. has joined Winterthur in 2008 as an Associate Furniture Conservator and Affiliated Assistant Instructor within the Winterthur/University of Delaware Program in Art Conservation. A native from France, she started working as a furniture conservator in 1995 in private practice in Paris and Bordeaux before to come to the US, first as an intern at the J.P. Getty Museum, fellow at Historic New England and the Metropolitan Museum; then as an assistant furniture conservator at the Museum of Fine Arts Boston. She received a Master degree in Art History from the University of Paris IV-Sorbonne in 1998, a Master degree in Art Conservation from the University of Paris I-Panthéon Sorbonne in 2006, and a PhD in Art History from the University of Paris IV-Sorbonne in 2010. Her dissertation focused on the authenticity of French furniture, its interpretation, evaluation and preservation. At the time this article was published in the *AIC News*, Stéphanie was Chair of the Wooden Artifacts Group of the American Institute for Conservation. Contact: Winterthur, Conservation Department. 5105 Kennett Pike. Winterthur, DE 19735. E-mail: sauffret@winterthur.org

Conservation Training at the Forbidden City

Antoine Wilmering, Senior Program Officer, the Getty Foundation

In December 2009, The Palace Museum (PM), Beijing, and World Monuments Fund (WMF) established CRAFT, a new and unique conservation training program and facility for fine furniture and historic interiors in the Forbidden City (Palace Museum), Beijing, as part of their collaborative conservation program for the Qianlong Garden (QLG). The garden, located in the northeast section of the Forbidden City, was built as a private, two-acre garden between 1771 and 1776 by the Qianlong emperor. Encompassing four courtyards with elaborate rockeries and 27 pavilions and structures, the garden was largely left dormant after the last emperor left the Forbidden City in 1924. Its buildings have never been open to the public.

Known as Conservation Resources for Architectural Interiors/Furniture, and Training, or CRAFT, the program combines training in traditional Chinese craftsmanship with modern conservation science and philosophical approaches.

CRAFT is structured as an on-the-job training program that focuses on the fine furniture and historic interiors commissioned by the Qianlong emperor, and on long-term preventive conservation strategies through the design and implementation of internal environmental control systems. CRAFT has enrolled 10 trainees for the first two-years of the program that include participants from the disciplines of conservation, conservation science, traditional architecture, and history. The training sessions include side-by-side instruction with master craftsmen for building traditional furniture making and restoration skills, combined with a formal scientific conservation curriculum delivered by international and Chinese conservation professionals. CRAFT is designed as a six- to eight-module training program aimed specifically at the conservation challenges of Qianlong's furniture and interiors. The length of each module varies between three and four months, and each consists of various classes, workshops, and seminars. A new cycle of classes is scheduled to begin every two years. Courses are intended to help craftsmen embrace modern conservation approaches, materials, and techniques in their work.