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abstract: The author, a liner with long experience in structural conservation of paintings, describes the huge changes he has seen over the past forty years, specifically in the Italian context. Along a path that has passed from tradition to alternative synthetic materials and minimalism, the author learned to adopt an attitude of respecting each painting and adapting treatment to its individual needs while maintaining safety. The essay focuses on a reconsideration and revaluation of traditional methods—whether they can be still used and if their characteristics can be better described from a chemical and mechanical perspective.

short\_title: Linking Past and Future

# <A-head> Introduction

Forty years has passed since I first stepped into a conservation studio. I have spent all those years in Italy, but I have also had the opportunity to travel and build strong friendships with colleagues over the world. Working with them, I realized that each of us comes from a specific background that has particular economic issues, culture, and conservation management, all of which has influenced our training, knowledge, approaches, methodologies, and working practice.

Italy is a small and challenging country with a huge heritage to preserve and a very long conservation history that has influenced generations of conservators in Europe. Because of this richness, in 1939, Italy established precise rules and roles to defend and protect its heritage based on central control by the Ministry of Cultural Heritage ({{Coccolo 2017}}). The ministry fixes the scale of priorities, the way projects have to be designed, and how cost estimates must be calculated (often by the square meter). It is a low-value economy, with private companies covering ninety percent of active conservation, competing to reduce prices and trying to work within tight schedules. It’s not necessary to describe in detail how this public administration manages conservation needs, but certainly one of the first concerns is how to be sustainable without sacrificing quality of treatments. Our community in Italy has suffered under this condition, and only occasionally has it been possible to share our methods, approach, problems, and concerns with an international community. For this reason, I am deeply grateful to the Getty Foundation for the great opportunity offered by the Conserving Canvas initiative.

# <A-head> Consolidation

At the Yale conference in 2019 we all focused on linings, showing different approaches and methods, but only a few presentations mentioned the need for some sort of consolidation of the paint layers. In my practice I deal with many different cases that show severe deterioration. What I see, most of the time, apart from structural damage (tears, accidents, deformation, etc.) is the loss of strength of all original materials, due mostly to inappropriate environmental conditions. I can’t mention all the different forms that the degradation takes, but what worries me most is the increase in porosity of many painting structures, the weakness of the supports, the risk of losses, and in general the fragility of these incredible artifacts ([**fig. 10.1**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/fig-10-1)).

Consolidation is an irreversible process, and for this reason it is viewed as an embarrassment, something that’s better not to talk about. The Center for the Study of Restoration Materials (CESMAR7), an Italian association devoted to research on polychrome surfaces, organized two international meetings on this specific issue in 2006 and 2008 ({{CESMAR7 2008}}; {{CESMAR7 2010}}). We realized at that time only a few publications covered the subject and little research was being done; it looked to us that everybody was trying to avoid this field full of uncertainties.

Of course, early lining methods were designed to provide some sort of strength to the grounds and paint film by infusing waxes, resins, and animal glues with the aid of huge pressures and high temperatures. But to definitively step out of this old story we have to design specific consolidation strategies that are informed by a full understanding of the mechanical stresses and damages and of the degree and speed of deterioration of each component.[[1]](#endnote-1) To do honest work we should openly discuss many of our totems and try to establish a path toward an adequate decision-making process ({{Ciatti and Signorini 2007}}; {{Michalski and Rossi-Doria 2011}}; {{Rossi-Doria 2010}}).[[2]](#endnote-2)

Consolidation involves a vast amount of knowledge and difficult ethical issues. Each of us has developed a personal framework to understand what the needs are in terms of consolidation, considering future deterioration and designing specific strategies that can guarantee efficacy and respect for the features of original materials—a difficult but necessary task—and we first must understand the best way to achieve a reliable result: from the front, or from the back? It’s a never-ending story, and each of us has his or her own ideas.

I’m a witness to the changes in Italy on this issue. In the past, we infused animal glues from the reverse, controlling shrinkage dynamics, but then many liners started to consider the increase in sensitivity to moisture and mechanical stresses. After the disasters of the Florentine flood in 1966, our community made a drastic change: the adoption of a total infusion from the reverse of synthetic consolidants, such as Paraloid B‑72, Plexisol, Beva, and others. These were able to strengthen the canvas fibers, treat the excessive porosity, and consolidate degraded paint layers. My generation dedicated a lot of effort to establishing how to manage this difficult task—testing and selecting materials, looking for appropriate concentrations and applications, and finding solvents of lower toxicity. This helped to separate the structural treatment into different steps, where consolidation was one part and lining another. The impact of minimalism pushed us to always look for a compromise between respect for original materials and the need for remedial conservation, dependent on the next steps of treatment as well as the quality of the future environment (rarely stable, rarely monitored).

Synthetic consolidants, in general, produced lower mechanical stresses and had lower reactivity to moisture than traditional consolidants; this in turn stimulated the search for glue-paste linings with reduced shrinkage risk.

# <A-head> Tradition

In my presentation at the conference I showed how lining history developed in Italy through the centuries by focusing on a specific family that worked for 295 years on Roman heritage. Other contributions in this publication describe in more detail the cultural and methodological environment in which Italian liners designed different methods and approaches, mostly in Rome, Florence, Venice, Turin, Naples, Bergamo, and Bologna. It is an extraordinary history of skills, human capacities, and courage, one which produced some mistakes but also wonderful results, considering the difficulties liners had in those times.

During my career I have had to remove some of these old linings and many times I could assess how respectful they were, still showing adequate adhesion after three hundred years but also easy to remove ([**fig. 10.2**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/fig-10-2)). The most interesting observation is the stability they often show when mounted on strainers with no means of expansion. These skilled artisans changed and modified their methods over time, and this history still belongs to our cultural environment, despite huge changes in the last fifty years.

My practice was influenced by the “Roman method” designed by the Istituto Centrale per il Restauro (ICR). This method was brought to the ICR by assistants to Mauro Pelliccioli, a famous Italian restorer from Bergamo who was called to provide linings for war-damaged paintings. In 1963, facing the restoration of the three big paintings by Caravaggio, Giovanni Urbani, the head of paintings labs, refined the method by introducing the use of temporary expandable metal lining stretchers, instead of the heavy wooden looms that were unable to control tension during the lining process. The original Bergamo recipe went through some modifications, as did the ironing process.

Over the next forty years Italians continued to line paintings using traditional methods, with some modifications. The big campaigns of restoration after the war, after the Florence flood, in Venice, and in Rome from 1980 to 2000, confirmed the big differences between regional traditions. One example of this dynamic is the existence of two official Italian methods—the Florentine and the Roman—designed respectively by the Opificio delle Pietre Dure and ICR, both part of the same institution, the Ministry of Cultural Heritage ({{Phenix 1995}}; {{Stoner and Rushfield 2012}}).

# <A-head> Reevaluation of Water-Based Adhesives

Working with glue-paste adhesives has been a necessity in my work. It’s not that I thought that these methods could be applied to all kinds of paintings—many would show problems, so it was necessary to be confident in the use of other methods and materials. It has always been obvious to me that no one treatment can be the magical one that solves all problems without causing any changes. For this reason, I always tried to widen my list of options and to adapt myself to many working conditions, from minimalism and the decision to avoid lining altogether up to (respectful) ways to use synthetic adhesives.

As mentioned earlier, sustainability is a crucial issue. The traditional glue-paste methods are low cost, easily used on-site, and don’t require special equipment. Apart from being the only method that is completely nontoxic, it can be extremely effective, respectful, totally reversible, and able to provide stability and the desired stiffness. This is possible because it is adaptable and open to many modifications, as we will see later.

For these reasons, in 1995 I started to reconsider all aspects of traditional methods. It has been a long process and remains a work in progress. In the last ten years, I intensified my studies, assessed test results, worked with international researchers, and monitored long-term results.

A big concern is mold growth and attack by *Stegobium paniceum* (the only insect we find on linings). All natural materials are hygroscopic and have that element of risk, but our observations in Italy indicate that problems occur only in specific microclimates with long exposure to high RH and poor ventilation. Recent tests ({{Fuster-López et al. 2017}}; see also [Fuster-López et al. in this volume](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/paper-52)) demonstrate that the use of close-weave fabrics and some traditional ingredients—such as rye flour and molasses—can increase the risk. A good backing board, some space between the painting and the wall, and some basic control of damp will reduce this risk in a very effective way.

What worries me most about traditional linings is the amount of adhesive applied to the reverse of the painting. Excessive amounts (we might say abusive amounts) of adhesive, of very strong glues, increase the sensitivity to humidity variations, resulting in mechanical stresses being transmitted to the paint layers.

The results of the ICOM-CC International Working Group, available in this publication ([Fuster-López et al. 2022](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/paper-52)), represent the first attempt at a scientific assessment of glue-paste linings. Some conservators have published results before this of experiments with modified recipes ({{Ackroyd 1995}}), but a full understanding was missing. Now, for the first time, it has become possible to study the influence of different materials and different application methods from a mechanical, physical, chemical, and biological point of view, and to establish precise parameters for further investigation.

# <A-head> Materials Selection

Geographically, the list of materials used in traditional linings is more or less similar, with local variations in the natural fabrics and adhesive mixtures. This section is based on my research and experience.

## <B-head> Fabrics

Over the centuries, liners have never stopped discussing the selection of the best lining canvas to use, and the search continues to this day—although we now use a more quantitative approach ({{Young 1999}}). The selection of the fabric affects the method, the adhesive application, and many other factors.

### <C-head> *Close-weave canvases*

Liners have used close-weave canvases across many local traditions: Florence, France, the UK, the Netherlands, Belgium, Denmark. The shared concept is uniform glue application between the two canvases: the original and the lining. The canvas behaves as a semirigid support stiffened by animal glue, and adhesion is optimized by ironing, which dries the adhesive while applying pressure on the painting surface to flatten deformation or cupping. The glue layer, applied in an even adhesive film (in some traditions quite thickly), carries most of the load of the painting because close-weave fabrics provide poor grip, have high elastic modulus, but develop more mechanical stresses.

Observations from monitoring insect infestations shows an increase of deterioration in close-weave linings due to the fact that insects living in the glue layer are protected from ventilation, light, and predators.

### <C-head> *Open-weave canvases*

Open-weave fabrics are part of the Italian and Spanish traditions. In Italy, all methods apart from the Florentine apply open-weave canvases. Often, on big, heavy, damaged paintings, two similar fabrics were stretched on the same loom to obtain a stiffer support.

In my experience, open-weave fabrics don’t need to be washed (unless thread count exceeds 12 to 14 threads per square centimeter), so one can keep the stable materials introduced during production that are used to protect the fibers, such as starches, methylcellulose, and butyl acrylates. They provide a better grip than close-weave fabrics, and the glue film is not continuous, similar to a nap bond. These fabrics are lighter, they transmit less mechanical stress, and are less reactive to RH variation. Mold can develop more easily than on close-weave fabrics, but insects, on the other hand, have a more difficult life.

These results confirmed my attitude to using them as lining canvases. Open-weave fabrics can have various fiber densities (from 8 x 8 to 14 x 12), as well as various thread dimensions and torsions, thereby providing a range of performance in terms of support, stiffness, and capacity to stabilize deformations.

## <B-head> *Adhesives*

The revalidation of traditional materials and methods led me to study and then compare recipes used in glue-paste linings. First, I asked myself if the term *glue paste* properly describes these mixtures. I looked for a more precise name, settling on *water-based adhesive gels.* The name identifies the principal features of the two main ingredients—flour and animal gelatin—and their unique capacity to trap water for a long time. As they were only adhesive materials available for centuries, it is interesting to assess how restorers varied the way they used them.

Then I started to study what these ingredients are from a chemical, physical-mechanical, and biological point of view. I had to admit that many of the notions I had received during training were totally insufficient or, in many cases, simply wrong. It took time to realize that conservation science rarely looked at other fields that research these natural materials, such as the food industry, cosmetics, and pharmaceuticals. Multinational companies invest heavily in ongoing studies to optimize their products and their ability to manipulate these natural materials.

Apart from the Russian tradition, where only sturgeon glue and some honey was used, all other methods built their recipes using three main groups of ingredients: fillers (wheat and rye flours), materials with adhesive properties (animal gelatins), and additives that modify some of the mechanical properties (honey, molasses, Venetian turpentine, linseed mucilage, vinegar, oxgall, glycerin, oils). I will not focus on this last class of materials because, in reality, they have a marginal role in mechanical behavior in glue-paste linings. Instead, I think it is useful to focus on the two main ingredients: animal gels and flours.

### <C-head> *Animal gels*

These amazing materials are used in many steps of treatment—as an adhesive for facings, a consolidant for paint film decohesion, an ingredient in glue-paste compositions, and as a binder for fillings. In tests over the years, animal glues were chosen for their high strength compared to all synthetic materials. I think it is useful, therefore, to establish some essential information that will guide how and why they can be used ({{Pearson 2003}}; {{Schellmann 2007}}; {{Bigi, Panzavolta, and Rubini 2004}}).

Animal gels are produced in two different ways: Type 1 with acid, and Type 2 with alkaline treatments. Mostly conservators work with Type 1 for their higher adhesive properties and gel strength. Manufacturers and mostly wholesale sellers and traders established in Asia (China, Vietnam, Cambodia, India), and to a lesser extend in North America, produce a huge variety of blends for food, cosmetics, and pharmaceuticals.

Gel strength (GS) is measured in terms of the Bloom number.[[3]](#endnote-3) Manufacturers produce gelatins with different Bloom values for different intended uses by varying the fundamental steps in biochemical treatments and number of extractions. Of course, the quality of collagen and basic materials plays a big role, as do other additives.

Depending on Bloom value, gelatins vary their behavior with moisture and their rate of sorption and desorption. Mechanical tests in the conservation literature show curves measured at different RH values but, until now, none of them has specified the gel strength, only the general type of gelatin: rabbit, sturgeon, hide, or bone. Because it’s difficult to find precise technical data on gelatin suppliers’ labeling, it’s probably necessary to develop our manual and sensory skills to (at least) establish a method to estimate gel strength. Specific features can be interpreted and evaluated to correlate with the Bloom scale: speed and quantity of water absorption/release, speed of gel degradation, color, smell, viscosity, time of tack, and gel stiffness. Sturgeon bladder glue Bloom values have only recently been investigated. (All the samples I tried had different Bloom values, as did other gelatins, and any considerations related to flexibility or the higher stability of bladder collagen are not correct if not related to measured Bloom and RH values [[**fig. 10.3**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/fig-10-3)] ({{Bridarolli et al. 2022}}).

The range of Bloom values for an animal glue suitable for paintings conservation starts at approximately 150 to 400. Bloom 250 is an average that can be used for most of the purposes mentioned, but it is also possible to define more precise values for each use. Lower Bloom solutions have lower viscosity and longer setting/gelling times (but less strength), so these are useful when better penetration is needed.

Higher Bloom values provide the opposite: higher viscosity at a given concentration, higher adhesive capacities and tack, faster setting times, less response to short-term RH fluctuations, and more resistance to biological deterioration. They also require higher water temperature for dissolution. Bloom 250 can be used for effective facings and for fillings. Higher values, up to 350, can be used in glue-paste mixtures. Working concentrations vary depending on the gel strength. Working temperatures of 50°C–65°C play a crucial role in reducing viscosity so as to facilitate penetration, whereas room temperatures facilitate the gelling process and reduce penetration.

Animal glues lose their properties if exposed to high temperature or if reheated too many times.

### <C-head> *Flours*

Liners have used flours from various grains since the beginning. The reason is simple: they were easy to find and prepare, they were (and remain) very cheap, and they provide good adhesion, tack, and a nice stiffness. Their unbelievable mechanical properties ({{Delcour and Hoseney 2010}}) have been exploited by humans in thousands of different ways, depending on materials’ availability and local culture.

Flour plus water plus heat produces a gel with amazing capacities to trap water and keep it suspended for a long time. Properties can be varied depending on the type of grain and the complex biochemical reactions of their preparation. In conservation, only wheat and rye flours were used since they had better mechanical properties than other grains.

Each flour has a different ratio of the two main components: starches and proteins. Wheat flour contains 70%–75% starch, 8%–14% proteins, and other substances in small amounts (lipids, polysaccharides, fibers). Cereal and food science produces thousands of research articles about the manipulation of flour properties by the variety of grain and variation in the enzymes of starch and protein.

The capacity to easily manipulate any single component gives the possibility of designing specific blends depending on needs. In 2018, while looking at these possibilities, I thought it would be valuable to follow some of this research to understand if, going outside the limits of edibility, it was possible to design a blend that could be used as an adhesive generally—specifically as a lining adhesive.

Starches contain two different polysaccharides—amylopectin and amylase—in an 80:20 ratio, both insoluble in water without heat (>65°C). By slightly changing this ratio we can change the stiffness: greater flexibility by increasing amylopectine or greater stiffness by increasing amylose. This ratio is reflected in the protein content of a specific flour.

Proteins in wheat starch are mostly composed of glutenin and gliadin, which form, when hydrated, gluten. By changing the ratio of these two proteins or modifying the total amount, the food industry produces different blends that differ in their “strength.” Strength is measured by the W index, which tells us how resistant a dough is in the rising process and how long it retains water and fermentation gas (carbon dioxide). For conservation purposes, a low W (120–170) provides a stiffer film when dry; conversely, increasing the protein content and W to 350–400 makes the film softer and more flexible. Results coming from the ICOM-CC glue-paste project (see [Fuster- López et al. 2022](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/paper-52)) suggest that a higher gluten content reduces water absorption, provides lower wetting capacities, and reduces reactivity to RH variations.

All additional substances, such as raising agents baking powders, flavorings, sugars, and the like must be avoided.

# <A-head> Manipulating Natural Materials

As we get more confident with these methods and manipulate them better, we will be able to vary them according to our needs.

* Variation of density and viscosity could be achieved by adding or reducing the amount of water or by adding natural and synthetic materials, such as alum salts, or chia or carob seed powder, high-gluten flours, Klucel G and carboxymethyl cellulose (CMC), Carbopol, and other thickeners ([**fig. 10.4**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/fig-10-4)).
* Variation of adhesive properties by increasing or reducing the amount of natural and synthetic adhesives in the mixtures and, potentially, using specific flour blends.
* Variation of elasticity/stiffness and wetting properties by using flours with different strengths (W), greater or less animal glue gel strength (Bloom), adding synthetic materials such as acrylic emulsions, or pretreating the lining support.

Although I avoid standardizing recipes, the mixture described below is more or less in the middle of all the considerations described above.

The filler part is a mixture of two different wheat flours with different gluten content and strength, in a ratio of 70:30. The first is W 180–250 and the second W 350. The flour blend is dissolved in water in a ratio of 1:3, then heated at 65°C–70°C until a gel develops.

Animal glue gel (Bloom 250–350) that has been previously prepared in water in a ratio of 1:3 at 55°C is then dissolved into the warm flour mixture. A small amount of alum salts is also added at this stage as a biocide and thickener. The amount of animal glue in the recipe can vary but it is always much less than in most traditional methods. This drastic reduction in glue is necessary to decrease reactivity and mechanical stresses. All additional substances are, in my opinion, useless, and should be avoided.

Once the mixture has cooled to room temperature, it is possible to add variable amounts of Plextol 500 acrylic dispersion: 2% to 10%, depending on needs. This product, low cost and easy to find, can improve the adhesive bonding that was lost due to the reduction of animal glue, as well as increase flexibility. At the same time, it drastically decreases water capacity, thereby speeding the drying process, while providing good initial tack. Further research will probably confirm the amount of risk reduction in terms of reactivity and biodeterioration reduction. This adhesive mixture will always be easily reversible, being soluble in water. Any residue can be gently rubbed off.

# <A-head> Application Method

My reevaluation addressed not only the materials but also focused on the way they were used by the traditional liner. My question has always been whether these kinds of procedures are needed in order to guarantee a good result. Following this track as I worked on my experiments, I realized it was possible to change many steps of traditional treatments that I thought were wrong, excessive, drastic, useless, or even damaging.

As noted earlier, liners over time have designed specific strategies to control forces during glue paste application—using pressure, tension, or heat—and further reduced lining canvas reactivity by infusing hydrophobic substances such as wax and synthetic polymers.

Many conservators treat support and surface deformations using a combination of tension, pressure, humidity, and such procedures as low-pressure, vacuum, and others. I do that too, and results can be extremely successful, but without any stabilization, the “memory” of deformations will cause them to reappear, sooner or later. It’s an old story, but we still need to discuss it.

# <A-head> The Lining Process

## <B-head> *Facing*

This crucial step of structural treatment is not always necessary, but it is if one has fragile paint that is at high risk of paint loss during subsequent steps of treatment, especially when removing previous lining materials. In that case, any glue or adhesive applied on the front will try to flow through the porosity and fill the gaps caused by cleavage, delamination, and losses. The selection of a respectful facing adhesive depends on the nature of the paint layers, and wrong decisions can cause damage.

As a facing material I selected a pure-cellulose tissue with 13 grams wet strength that has been calendared to be water resistant. The adhesive is applied through the tissue, as with Japanese paper facings. It sets quickly and adapts well to a variety of surface morphologies. Wrinkles are easy to remove.

The glue can be applied in different ways depending on the needs of the treatment plan—by brush or sprayed gently on the surface. It is easy to manipulate the concentration, Bloom values (200–250), and viscosities to achieve the desired result in terms of adhesion, preconsolidation, or treatment of deformations, by exploiting a mix of traditional Japanese paper conservation techniques with similar Italian traditions.

When dry, the wet strength tissue provides good protection from mechanical stresses applied from the back to remove old canvases and glues. It also provides a barrier to infused consolidants, avoiding solvent migration to the front, and also really helps in stabilizing surface deformations such as bad crack patterns. In addition, these facing are easy to remove and do not leave fibers on the paint surface.

## <B-head> *Lining*

The lining process is extremely simplified. The selected open weave canvas is stretched on a provisional expandable lining stretcher that can accommodate a wide range of dimensions and consistently control canvas tension ([**fig. 10.5**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/fig-10-5)).

The adhesive mixture is then applied on the reverse of the painting in an even coat, and the working stretcher is correctly positioned on top of it. More adhesive is applied to wet the new canvas and provide a first bonding ([**figs. 10.6**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/fig-10-6) and [**10.7**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/10-Rossi%20Doria/fig-10-7)).

The glue application behaves as a very slow humidifier that relaxes deformation and distortions. It is possible to set the time for an even humidification process, depending on the degree of deformation. In cases where deformations have been pretreated and the painting is flat, one can immediately apply gentle tension to the lining canvas and remove excess adhesive by manually pressing with wooden spatulas and other tools for an even application.

Drying time can vary depending on the need for additional humidification to soften hard cracks and surface deformation. In cases where we don’t have such needs, the painting can dry without any additional operation, and ironing can be avoided.

Manual ironing is an option to treat surface deformation once it has been humidified by the glue during the lining process. It is possible to achieve great results without using huge pressure or high temperatures. Bad crack patterns can be flattened by locally applying additional moisture.

At the end of the drying process, the facing can be removed easily.

# <A-head> Conclusion

Looking ahead, it is possible that these methods will disappear from the accepted list of lining options and be mentioned only in lectures on the history of conservation—or will remain in use only by traditional liners in the private sector. However, I think that omitting this information risks the next generation of conservators losing a full understanding of how to properly preserve many thousands of glue-paste-lined paintings all over the world. I hope this paper can contribute to a better understanding of the potentialities, features, and behavior of water-based adhesives, as well as stimulate the curiosity to finally assess them in a rational, open-minded way ({{Rossi-Doria 2013}}).

As mentioned, I do work with other materials—Beva and acrylics—as other options. These alternative methods have their advantages and disadvantages, the latter mostly due to the use of high temperatures or solvents for reactivation; these linings have low elastic modulus and are quite difficult to remove without additional heat or solvents. The recent habit to use Beva film extensively worries me, just as Vishwa Mehra in 1970 was scared by wax and its abuse. I hope we can soon reconsider this habit.

Even when using these modern procedures, I try to apply the same approach I use for traditional materials—looking for more respectful applications and avoiding flow of the adhesive inside the painting structure. I hope it will soon be possible to dedicate another paper to this topic.

# <A-head> Notes

1. Of the various texts on the mechanics of paintings, adhesives and consolidants from a conservation perspective, I particularly value {{CCI 2011}}, {{Clarricoates et al. 2012}}, {{Mecklenburg and Tumosa 1991b}}, and {{Michalski 1991}}. [↑](#endnote-ref-1)
2. {{Ciatti and Signorini 2007}} is the postprints of a one-day meeting dedicated to traditional Italian lining methods and is the only book that contains a good comparison of Florentine and Roman methods. [↑](#endnote-ref-2)
3. . See https://www.sizes.com/units/bloom.htm. [↑](#endnote-ref-3)