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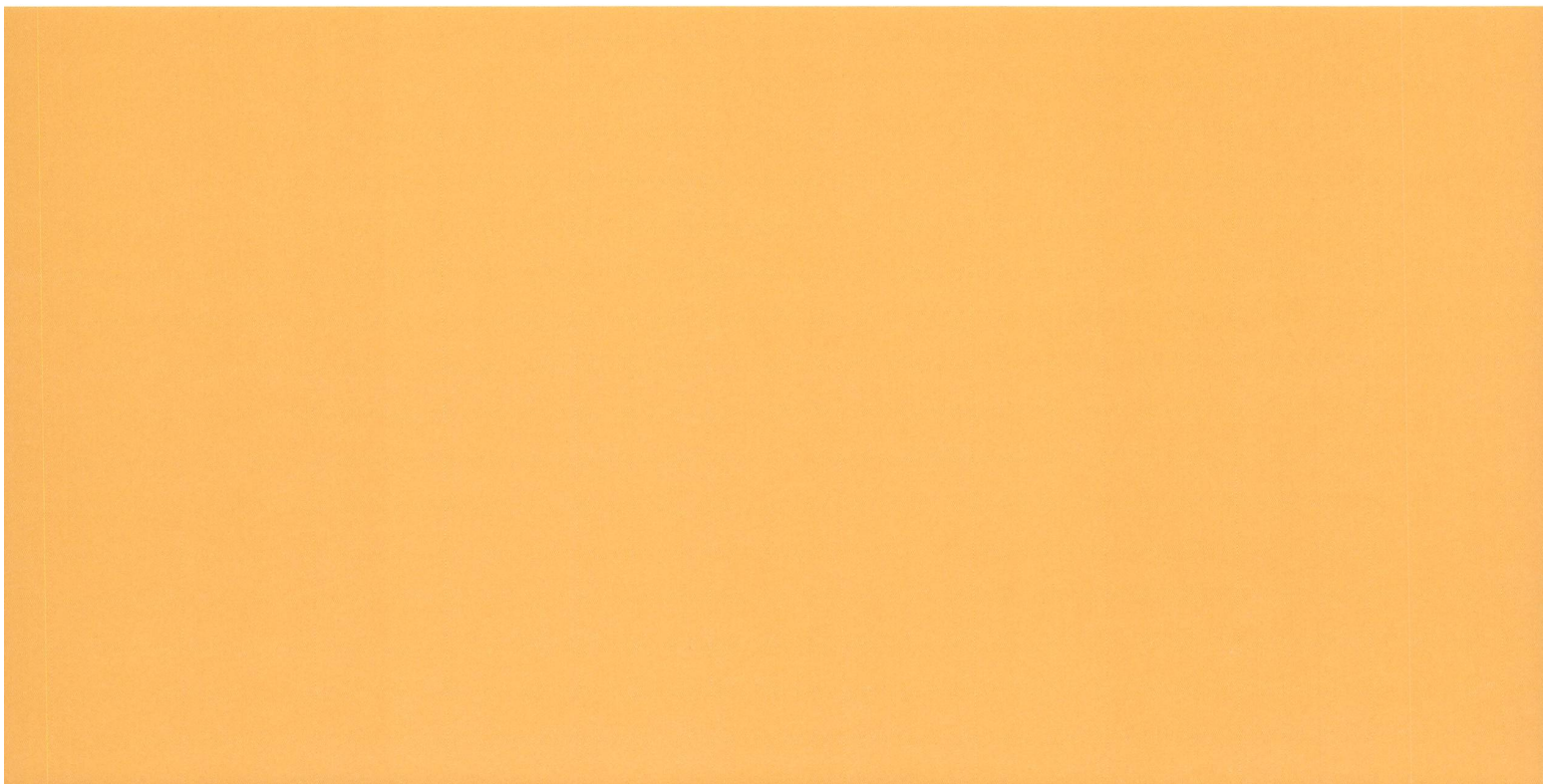
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# Evidence for wax tempera binding media in Italian technical literature of the first half of the 20th century

Paola Travaglio



## INTRODUCTION

In Italy, in the first half of the 20th century, a number of educational manuals dedicated to painting techniques appeared.<sup>1</sup> This form of publication, designed to answer the practical needs of artists, amateurs and professionals alike, was 'new' to Italy (Ferrario 1930; Travaglio 2010; Travaglio 2012), although already common in countries north of the Alps since the early decades of the previous century (Bordini 1991). Many of these manuals contained information, more or less extensive, on the specific techniques of encaustic and the general use of wax in painting. The spread of these texts may be attributed primarily to a renewed interest in 'historical' techniques, such as tempera, fresco and encaustic, in part due to the perceived 'loss of craft' and technical knowledge by artists after the industrial revolution and also to the increased commercial production of new pigments and artistic materials (Bensi 1984; Vacanti 2010). In Italy, a renewed interest in encaustic was awakened in the 1920s as a result of the discoveries made in the archaeological excavations of Pompeii and the subsequent discussions of the technical nature of Roman mural painting.<sup>2</sup>

The following study focuses on one of the myriad methods for painting with wax discussed in the Italian literature of the first half of the 20th century, i.e. the use of a particular kind of hybrid wax 'tempera' that contained emulsified wax. These wax temperas involved the production of thick water-miscible solutions made by saponifying wax with alkali and/or combining wax with polysaccharide or protein binders (gums, resins and glues), in order to maintain a relatively small amount (in proportion to the total composition of the tempera binder) of wax in suspension in an aqueous solution.

### CONTEXT FOR THE ENCAUSTIC DISCUSSION OF THE EARLY 20TH CENTURY IN ITALY

The experiments on encaustic painting of the 18th century,<sup>3</sup> some of which have been explored in earlier scholarly investigations (Rice 1999; Caracciolo 2007;

Carofano 2008; Liberati 2013; Travaglio 2015), were undoubtedly influenced by the first archaeological discoveries of the Vesuvian area and by the will to rediscover the technique of the Roman mural paintings. However, during the 19th century the study of this ancient painting technique, which had become 'somewhat disappointing in terms of mere updated repetition, and soon reduced to a pure, erudite *divertissement*' (D'Alconzo 2002, p. 86), developed along two new, main lines. On the one hand, increasingly urgent problems concerning the conservation of artworks required new solutions and strengthened the erroneous belief in the inalterability of wax (Montiani Bensi and Bensi 1986). On the other hand, in commercial and industrial applications the term 'encaustic' became synonymous with wax-based formulations, which were intended for use as coatings that were applied to protect a wide range of materials, due to the flexibility of wax and to its resistance to water. In the 19th and 20th centuries, the Italian term *encaustici* ('encaustics') was used to designate a wide range of wax-based products in which the wax had either been dissolved in a solvent or emulsified in water after saponification, conceived as coatings for various artefacts of daily use.<sup>4</sup>

In Italy in the 19th century, only two texts specifically dedicated to encaustic painting are known: the first was published by Vicente Requeno (1743–1811), one of the main scholars whose work contributed to the revival of this technique in the previous century (Requeno 1806); the second, unpublished, was written by the painter and restorer Michele Ridolfi (Nicastro 2005). In contrast, in some of the other European countries – especially England, France and Germany – the 19th century was the setting for 'great manual, historical and educational literary production' (Bordini 1991, p. 180), a context which included proliferation of technical treatises on the subject of encaustic painting. In Italy the debate on this technique only gained momentum in the early 20th century, when scholars and artists experimented with the use of wax in paint media, a technique which from now on comprises a specific chapter in the technical literature.

The 20th-century texts are varied in nature: some simply reproduce recipes drawn from the literature of previous centuries or slavishly copy whole passages of other contemporary authors. While interesting in terms of the literary preoccupations of the period, such works are devoid of a critical, practical interest in the subject. However, especially from the 1920s, a wave of publications appeared that considered encaustic as the subject of new experimentation and in which the renewal of 'ancient' procedures or entirely new recipes were proposed.

Taking as their starting point different interpretations of the mythologised encaustic technique, some scholars and painters attempted to develop a viable method of wax painting by dispersing wax in water by means of saponification, with or without the addition of polysaccharide- or protein-based binders. These formulations were similar to gum- and glue-based temperas, to which a small amount of wax was added. For this reason, contemporary Italian technical literature mentions a kind of painting, known variously as *tempera a cera* ('wax tempera') or *tempera encaustica* ('encaustic tempera'), which suggests an overlap between the different technical traditions of tempera and encaustic. These are different again from *tempera encausticata* ('encausticated tempera'), i.e. a tempera painting that was subsequently coated with a sealing layer of wax, which was then heated in order to fuse it with the painting below.

### 'WAX TEMPERA' IN THE ITALIAN TECHNICAL LITERATURE IN THE FIRST HALF OF THE 20TH CENTURY

I will begin by examining one of the most widely read works pertaining to wax tempera, that by the painter Giuseppe Ronchetti, the *Manuale per i dilettanti di pittura* (*Manual for the Amateurs of Painting*), edited for the Milanese publisher Hoepli in 1900, and subsequently followed by a series of 13 later editions prior to 1951 (Fig. 1). After having considered oil painting, watercolour and manuscript illumination, the author dedicated the fourth chapter of his book to a variety of

different pictorial techniques (gouache, tempera, pastel, painting on wood and fabric, etc.), encaustic painting among them (Ronchetti 1900/edn 1911, pp. 284–286). Repeating the observation of Charles Lock Eastlake (1847, p. 156), Ronchetti mentions three methods.<sup>5</sup> Two of them – not relevant to this study – vary little from technical solutions proposed in the 18th century, and describe the dissolution of wax in essential or fixed oils. The third concerns 'the dissolution of wax in lye, or, in more general terms, in any medium which serves to incorporate wax with water' (Ronchetti 1900/edn 1911, p. 284).<sup>6</sup> The painter cites two recipes drawn from older texts, albeit not explicitly identified, as his source for this technique:

Dissolving wax in lye. Having taken equal amounts of glue, water with potash added and white wax, mix them together and let them melt on the fire. Next, add the pigment; dilute the whole well, then paint with the brush [...]. Here is another. If you want to make a liquid suitable for tempering pigments, take a pound of lime and two of ashes, which you should put into hot water, bringing it to the boil. Let the whole rest and then filter it through a cloth. After that, take four pounds of this liquid and heat it up well. Take about two ounces of white wax and put it to boil in the water. Then take about one ounce of fish glue and put it in the water, leaving it until it is well softened and melted; stir it until it becomes a paste, then pour it into the water containing the wax and bring it all to the boil. While the liquid is still hot or warm, filter it into a pot through a cloth. Pigments are prepared with this tempera (Ronchetti 1900/edn 1911, pp. 284–285).<sup>7</sup>

The first recipe, which describes the production of a medium for pigments in a mixture containing strong lye, wax and glue,<sup>8</sup> is drawn from the so-called 'Mount Athos Manuscript', which had been edited in 1845 by the French archaeologist Adolphe-Napoléon Didron, with a translation from Greek into French by Paul Durand (Didron 1845; Donato Grasso 1971; Zoccatelli

2003). Didron and Durand considered the 'Mount Athos Manuscript' to be a copy of a more ancient text (*Hermeneia*), dating back to the 10th and 11th centuries and gradually extended as a result of additions and interpolations, which contained the secrets of the pictorial arts of the monks of Mount Athos. Today it is well known that the work is based on the writings by the monk Dionysius of Fourna, who lived on Mount Athos between 1701 and 1733.

The second recipe is a partial translation and revision of a text preserved in the collection assembled by Giovanni Alcherio, officer at the workshop of Milan Cathedral between 1382 and 1411, later edited in fair copy with some additions by the French notary and bibliophile Jean Le Bègue in 1431 (Paris, Bibliothèque Nationale de France, ms. Latin 6741; Merrifield 1849/edn 1967, pp. 1–321; Turner 1998; Guineau *et al.* 1998; Villela-Petit 2006).<sup>9</sup>

One of the main actors of the discussion on encaustic painting of those years was the restorer Tito Venturini Papari (1864–1937), who dedicated several studies to ancient artistic techniques and modern restoration methods. He began his research on encaustic painting towards the end of the 19th century and first presented his work in an essay read at the Commissione Archeologica Comunale in Rome and subsequently published in 1901 (Venturini Papari 1901), which found a synthesis in his book *La pittura ad encausto al tempo di Augusto* (*Encaustic Painting in the Time of Augustus*), published in 1928. Venturini Papari entered the debate regarding Roman wall painting by hypothesising that it was carried out in encaustic, i.e. as a form of *a secco* painting, laid upon a monochrome background rendered *a fresco*, using pigments distempered with wax, hydrated lime, glue or gum arabic, and water. It was 'a genre, albeit a special type, of tempera' (Venturini Papari 1928, p. 12), an emulsion consisting of a dense medium with the addition of lime which, in turn, was able to saponify the wax. Then, the tempera painting was 'encausticed' (*encausticata*) by covering it with a coat of wax and then by heating the surface.<sup>10</sup>

Also in the first decade of the 20th century, a little-known treatise – *La tecnica del dipingere a olio, a fresco, a tempera e ad encausto* (*The Technique of Painting in Oil, in Fresco, in Tempera, and in Encaustic*) – was published in 1908 in Lucca by Francesco Barsocchini. Assuming that the Roman wall painting was carried out in encaustic, the author describes this technique as the best method by which to obtain 'vivacity and freshness' in wall paintings (Barsocchini 1908, p. 7). After reviewing the work of Pliny on the subject of encaustic and some of the methods proposed in the 18th and 19th centuries, the author then notes the three procedures mentioned by Ronchetti as well as the recipes drawn from the Le Bègue and Mount Athos manuscripts. The book also includes a recipe attributed to the painter Giammaria Astori, which is based on a mixture of wax, honey and gum water.<sup>11</sup> The dispersion of the wax in honey and gum water is clearly performed by means of heat and takes advantage of the viscosity and density of the medium in order to obtain a suspension of the wax.

The information contained in the literary efforts of the Neapolitan Raffaele Armando Califano Mundo (1857–1930) is also of great interest. Califano Mundo was a remarkable artist and editor (Torresi 1994), as well as the author of an informative series of booklets that covered most of the painting techniques in use at that time, edited in the collection *Biblioteca dell'artista* (*Library of the Artist*). The publication of these texts was mainly financed by manufacturers of artists' materials, who used the booklets as a means of advertising by placing advertisements of their own products in them.<sup>12</sup> One of these booklets, *Manuale della pittura a encaustica e a fresco* (*Manual of Painting in Encaustic and in Fresco*) appeared in a single edition of 1911 (Fig. 2). Among the many methods of 'modern encaustic' described, Califano Mundo mentions several procedures of wax saponification by means of soda,<sup>13</sup> although most of his recipes involve the dissolution of wax in essential or fixed oils. He noted that modern encaustic painting, which can be applied on marble, metal, wood, canvas and plaster, 'produces a very pleasant effect [...] completely opaque, very similar to tempera' (Califano Mundo 1911, p. 31). Among

the 'best methods of the modern encaustic painting' (Califano Mundo 1911, p. 18) the author lists the 'encaustic colours Cordenons', created by Federico Cordenons in Padua and produced by the manufacturer Schoenfeld of Düsseldorf in two qualities – 'superfine' in tubes, for easel paintings, and 'common' in tin cans. These colours are advertised as suitable for all types of painting, especially in regards to their durability, their ease of execution and their fast-drying properties. Califano Mundo also mentions the 'Déneux Method' of encaustic painting, based on the use of the 'encaustic colours' created by the painter Gabriel Déneux (1856–1944) and manufactured by the French firm Lefranc (Lefranc 1892), and the 'encaustic colours' produced by Calcaterra of Milan (Erbici 1900). Unfortunately Califano Mundo does not specify the composition of these products.

In another work by Califano Mundo, *Manuale della pittura a guazzo e a tempera* (*Manual for Painting in Gouache and in Tempera*), published in 1910 (Fig. 3), a 'tempera with skimmed milk and wax' is mentioned for which, however, the method of preparation is not specified. In the final part of the booklet, where the advertisements are placed, the products of the manufacturer Schoenfeld of Düsseldorf are mentioned: the 'encaustic colours Cordenons' and the 'De Pidoll Tempera' (Fig. 4). The De Pidoll Tempera (see also the contribution by Pohlmann *et al.*, in this volume), made with pigments prepared with egg yolk, wax, gum and a biocide, is further discussed by Califano Mundo in the main body of the text:

The aforementioned manufacturer Schoenfeld of Düsseldorf has been producing special tempera



Fig. 1 G. Ronchetti, *Manuale per i dilettanti di pittura*, 1911 (4th edn), cover. This publication was one of the most widely read works pertaining to painting techniques; between 1900 and 1951 it was re-edited 13 times.

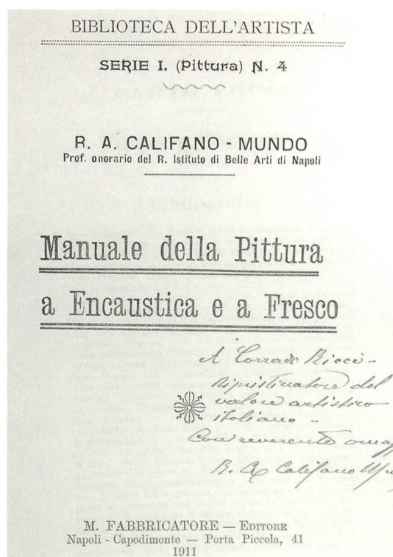


Fig. 2 R.A. Califano Mundo, *Manuale della pittura a encaustica e a fresco*, 1911, title page. This publication is one of a series of booklets by Califano Mundo that covered most of the painting techniques in use in the early 20th century (see also Fig. 3). The series was edited in the collection *Biblioteca dell'artista* and was mainly financed by manufacturers of artists' materials, who used the booklets as a means of advertising their products (see Fig. 4).

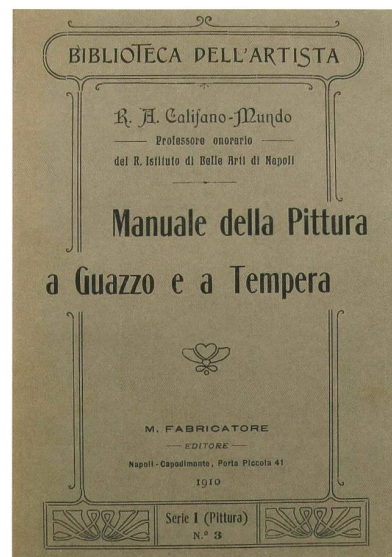


Fig. 3 R.A. Califano Mundo, *Manuale della pittura a guazzo e a tempera*, 1910, cover.

paints for some twenty years, which are very widespread in Germany, where they are considered worthy substitutes for the tempera techniques used by the old masters of the 15th century. These paints, made with the choicest pigments, are prepared with egg yolk, a small amount of wax and gum, a disinfectant and distilled water; they can be used for glazing and for substantive painting on canvas, wood panels, paper, ivory, metal, stucco, lime, prepared with either a white or a dark base (Califano Mundo 1910, p. 47).<sup>14</sup>

In the chapter *Tinte grasse* ('Fatty colours') of the well-known manual *L'imbianchino decoratore-stuccatore* (*The Maker of White Decorations and Stucco Work*), edited by Damaso Frazzoni in 1911, a detailed procedure for wax painting is presented which is not very different from version contained in the Le Bègue Manuscript.

Advantage is also taken of the density of the mixture – in this case made with water, gum arabic and mastic resin – which helped to keep the wax in suspension:

Another method of wax painting. Disperse 140 grams of gum arabic in 250 grams of cold water. Add 215 grams of powdered mastic to this gum-based solution and bring it to the boil. When the substance has become like glue, melt 150 grams of white wax into it in pieces. The whole must be stirred well until it is completely cold. Then gradually disperse this mixture in a litre of cold water. Then the composition must be passed through a white canvas and closed up in bottles; it should look like cream. To paint, the pigments must be dispersed in this mixture diluted with water. When the painting is finished and completely dry, apply a layer of melted wax (Frazzoni 1911, p. 226).<sup>15</sup>



Fig. 4 *Manuale della pittura a guazzo e a tempera* (see Fig. 3). One of the pages in the advertising section at the end showing advertisements by the paint manufacturer Dr. Fr. Schoenfeld & Co. of Düsseldorf for artists' paints that contained wax.

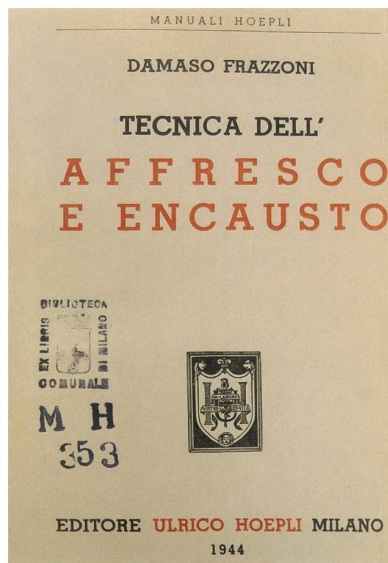


Fig. 5 D. Frazzoni, *Tecnica dell'affresco e encausto*, 1944, title page. The author describes a procedure for wax painting similar to the version contained in a manuscript of 1431 by the French notary and bibliophile Jean Le Bègue.

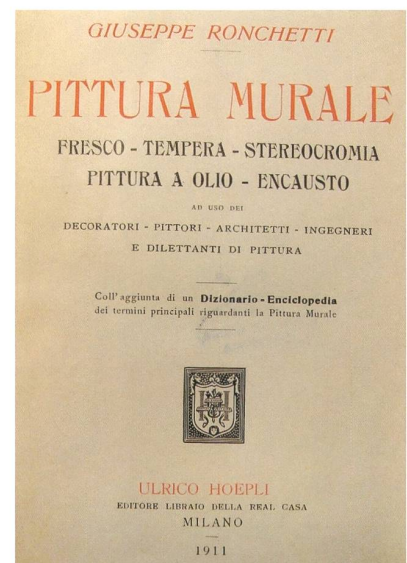


Fig. 6 G. Ronchetti, *Pittura murale*, 1911, title page. An entire chapter of this work is devoted to encaustic painting.

Three decades later (1944) Frazzoni dedicated to encaustic painting a specific manual, *Tecnica dell'affresco e encausto* (*Technique of Fresco and Encaustic Painting*) (Fig. 5), in which, among the various recipes taken from other authors, he proposed a procedure consisting of the use of virgin wax, linseed oil and white spirit, suitable for mural decoration.

Among the well-known manuals written by Giuseppe Ronchetti and published by Hoepli, can be found *Pittura murale: fresco, tempera, stereocromia, pittura a olio, encausto, ad uso dei decoratori, pittori, architetti, ingegneri e dilettanti di pittura* (*Wall Painting: Fresco, Tempera, Stereochromy, Oil, Encaustic, for Decorators, Painters, Architects, Engineers, and Painting Amateurs*), edited in 1911 (and later in editions of 1922, 1927, 1937, 1947 and 1955) (Fig. 6). In this treatise, which contains references to wall painting techniques and a detailed description of the materials necessary for their execution, an entire chapter is devoted to encaustic painting. In the first part, of a historical nature, Ronchetti gives his interpretation of the passages on encaustic painting in Pliny's *Naturalis historia* (1st century AD) and briefly recounts the earlier history of experiments conducted in France by Count Caylus (Caylus 1755) and Jean-Jacques Bachelier (Diderot 1755), and in Italy by Vicente Requeno (Requeno 1784), Philipp Hackert (Lohse 1936), and Michele Ridolfi (Nicastro 2005). In the second part – of a more technical nature – the painter presents the three methods as formulated previously in the *Manuale per dilettanti di pittura* (*Manual for Amateur Painters*), with particular consideration given to the 'solution of wax in lye, or [...] in any medium which is necessary to incorporate the wax with water' (Ronchetti 1911, p. 94) and again reproduces the procedures drawn from the Le Bègue and Mount Athos manuscripts. Furthermore, Ronchetti, like Barsocchini, hints at Astori's method (the mixture of wax, honey, and gum water) and then describes one of Requeno's techniques, based on the grinding of pigments in water, with a composition of wax, mastic resin and water:

The wax, melted together with mastic resin and then immersed in cold water, makes a

composition which can be ground easily and which can therefore be mullied with pigments dis-tempered in water [...]; a work painted with such colours (if the melted-wax varnish is applied) solidifies and fuses by means of heat (Ronchetti 1911, p. 95).<sup>16</sup>

Moving on to specifically describing the true 'Practice of encaustic painting', whose 'execution depends on the personal manner of the artist', Ronchetti (1911, p. 98) generally suggests the use of pigments mixed with wax and turpentine, but also a particular *acquarello di cera* ('wax watercolour'), made by grinding the pigments with a composition of water, white wax, gum arabic and mastic resin. It is essentially the same recipe as the one in Frazzoni's manual, with variations related to the amount of materials and to the last part of the procedure, which does not include the final encaustication of the painting with an additional application of wax.

A sort of *wax watercolour* was found, and for those who wish to try it out, here is the way to prepare the vehicle with which the pigments are dis-tempered. In a glazed vessel, dissolve 130 grams of gum arabic in about 245 grams of water, then adding 215 grams of powdered mastic. Once the container has been placed over a moderate flame, stir everything until a homogeneous, opaque mass is obtained, to which you then add 155 grams of white wax. Bring it back to the boil, at which point, remove the vessel from the fire and, stirring the whole continuously, pour 185 decilitres of water into it, little by little. Grind the pigments with this composition, with its consistency similar to cream and cooled, diluting them with water while working (Ronchetti 1911, pp. 100–101).<sup>17</sup>

A dense solution, in which the melted wax can be suspended, is also described in *La pittura: i diversi processi, le malattie dei colori, i quadri falsi* (*The [Technique of] Painting: The Various Processes, Maladies of Colours, False Pictures*), the Italian translation of the manual by Charles



Moreau-Vauthier (1857–1924) (originally published in 1912) edited by Ugo Ojetti in 1913, who also made additions and comments to the original text (Moreau-Vauthier 1912/edn 1913). In the preface, written by the painter Giulio Aristide Sartorio (1860–1932),<sup>18</sup> the importance of knowledge of traditional paint materials is emphasised, especially as the industrial production of colours had then become the norm. Distancing its views from the 'modern inventions', Sartorio wrote: 'nowadays, every year, we see the announcement of some new discovery, baptized with the most sibylline names, and these are the inventions of the industrialists. But how many secrets are not jealously guarded by the inventors? Have you ever heard of the "hot-cold" painting? Of the fresco painting on canvas? Of the oil painting which does not ever dry?' (Moreau-Vauthier 1912/edn 1913, p. VII). The manual deals with encaustic painting within the context of so-called 'mixed media', indicating a technique based on the use of pigments distempered with hot wax and colophony.<sup>19</sup> The coloured waxes, placed on a heated palette, could be used to paint on any material.

A 'particular kind of tempera' is described in 1924 by the painter Maria Immacolata Zaffuto (1888–1942). A pupil of Sartorio and Venturini Papari, she penned a brief work on encaustic painting in which she essentially reiterated the theory of Venturini Papari. The painter distinguished between a 'French encaustic', based on the dissolution of wax in white spirit, turpentine or other essential oil, and a 'real encaustic', made using 'colours as follows: pigments in powder, wax, resin, lime' (Zaffuto 1924, p. 18), which is finished by the addition of a coating of wax and oil, as described by Vitruvius and Pliny.<sup>20</sup>

The most interesting remarks regarding the mixture of 'encaustic' and 'tempera' seem to derive from one of the more remarkable early 20th-century Italian literary works of a technical and artistic nature: *Piccolo trattato di tecnica pittorica* (*Small Treatise of Painting Technique*), written by Giorgio de Chirico (1888–1978) in 1928 for the Milanese publisher Scheiwiller (de Chirico 1928/edn 2001a; de Chirico 1928/edn 2001b; Vacanti 2014). The treatise deals with tempera, oil and varnish painting,

with a presentation that follows the artist's personal experience. A whole chapter is dedicated to what de Chirico calls 'wax tempera or cold encaustic' (de Chirico 1928/edn 2001a, pp. 38–42), in which the author exploits the ambivalence of the terms 'encaustic' and 'wax painting' and especially the oxymoron of the second definition, which apparently denies the concept itself of 'encaustic' by not requiring the use of fire. De Chirico observed, 'But I wrote it this way in order to make more explicit the close relationship and, I would almost say, the perfect resemblance between this tempera [...] and the encaustic of the ancient Greeks and Romans [...] Through the wax tempera one can obtain an equally beautiful painting, and especially that grain that is so mysterious and that profound softness which make this method of painting different from all the others' (de Chirico 1928/edn 2001a, p. 38).<sup>21</sup>

If the ancient encaustic painting, which no one 'can say to have thorough knowledge of with absolute accuracy', is extremely complicated 'for us modern people' (de Chirico 1928/edn 2001a, p. 39) – as had been shown by the experiments made in the previous centuries (from Count Caylus to Cros and Henry) – the wax tempera (which de Chirico reports he has used in many works) is described as a technique that was simple to execute. Wrongly attributed to Requeno by de Chirico, the recipe consists of an emulsion of beeswax, water and laundry soap, with which one can paint on firm supports, such as board and cardboard, prepared with gypsum and an emulsion of egg and linseed oil ('like for the glue-tempera', de Chirico 1928/edn 2001a, p. 41). When dry, the painting must be heated and then coated with wax dissolved in turpentine:

The wax tempera with which I have repeatedly painted [...] is an emulsion of wax, water, and laundry soap. Wax, like oil, is not soluble in water; but, just as egg yolk enables oil to form an emulsion with water, fatty substances, and especially the potash contained in laundry soap, do the same for wax. Now here is what you have to do to obtain this kind of tempera. Put equal quantities

of water, virgin wax and laundry soap in a container; the soap must be white; Marseilles soap is the best. Let them boil slowly on a fire, perhaps made of sweet coal, and stir the mixture with a stick so that the wax and soap disperse well. The lather which appears while the mixture is boiling must be taken off carefully with a spoon and thrown away; this lather, nine tenths of which consists of fat less pure than the soap, would be a serious danger to the painting if it stayed in the emulsion. When the solid substances are well dispersed, and once you have skimmed it carefully, pour the mixture into a wide container, for example a bowl. Cover it carefully and let it rest for a day; then uncover it and skim it again, because a thin layer of lather still goes on developing; let it rest again for a few hours, and skim it again, and so on until no trace of lather appears any more. At this point, one can grind the pigments with the liquid that remains and paint. One has to paint on solid surfaces with this tempera: panels and boards, not because this kind of tempera is fragile, but because at the end a solid surface is needed, on which one can press hard, since it is necessary to rub the painting down with a wax solution. One paints with this tempera in the same way as with others, except that the panels and boards must be prepared with gesso and then with two layers of egg and linseed oil emulsion, as for glue-tempera. Once the painting is finished, let it dry for a couple of days. Then heat its surface up near a fire (in summer in the sun) and, at the same time, disperse some virgin wax in turpentine (in equal quantities) in a bain-marie, and apply the wax solution to the whole painting using a soft, flexible brush, brushing it out rapidly vertically and horizontally so that the wax spreads evenly over the whole painting; then let it cool for half an hour. Finally, heat the painted surface again, but only very slightly, and at the same time heat the whole painting strongly until it begins to shine. In this way, one arrives at a very beautiful and brilliant material, whose

appearance is somewhat reminiscent of ivory. Furthermore, by means of the rubbing down, the wax penetrates into the pores of the painted surface and, by softening the outlines, produces that tender and mysterious quality (*troublant*, as the French say) that makes Pompeian paintings so evocative. The painting could also be varnished after the application of the wax. The disadvantage of this tempera, as with the glue one, is that it darkens quite a bit when varnished (de Chirico 1928/edn 2001a, pp. 40–42).<sup>22</sup>

This brief presentation ends with the well-known *Abeccedario pittorico* (*Pictorial Spelling-book*), edited by the restorer Maria Bazzi in 1956 and translated into English four years later, with the title *The Artist's Methods and Materials*. This work, of note for its valuable bibliography of about 150 titles relating to the technical literature from antiquity to the first half of the 20th century, deals with painting materials (supports, pigments and dyeing, glues, oils, resins, gums, waxes, varnishes) and methods (pastel, illumination, watercolour, tempera, oil, fresco). Among the latter can also be found encaustic painting, for which various recipes are presented.

If the greater number of the procedures mentioned involve dissolving wax in essential oils (generally, turpentine or white spirit), with or without the heat of a fire, there are a number of methods that consider a form of 'encaustic' that is much closer to tempera painting. For instance, there are several recipes in which saponified wax is mentioned, which 'must be thinned with water and applied cold', that Bazzi (1960, p. 162) refers to in the context of the Le Bègue and Mount Athos manuscripts<sup>23</sup> and of the experiments by the Italian mathematician Anton Maria Lorgna.<sup>24</sup> Particular attention is drawn to the emulsion referred to by the American artist Hilaire Hiler (1934), where the wax is saponified using ammonia:

Water	10 parts
Pure white wax	1 part
Ammonia	as much as is necessary

Boil the water, add the wax in thin flakes and mix in the ammonia drop by drop, shaking the liquid until it is completely emulsified and looks like milk. Let it cool down and, after a dozen hours, you will see that the wax is floating. Remove the excess water and cover the wax with spike oil; leave it in a warm place for a few days. Then add as much turpentine as is necessary to give the mixture the consistency of a cream. Put it in a bottle and stop it when the excess ammonia has evaporated. An excellent mixture: while drying, it becomes perfectly opaque, like a tempera. If the components of this emulsion separate over time, you can shake it before use. These paints give the effect of gouache, when applied on paper, without having its fragility [...]. One can use both powder pigments and those in oil (Bazzi 1960, p. 160).<sup>25</sup>

The 'modern version of the Le Bègue recipe' follows, taken from Hiler's work, and the so-called 'Berger's recipe'. In the first case the white wax is melted in hot water and then put in suspension in a dense and viscous liquid made with fish glue, parchment glue and water:

Take some fish and parchment glue in equal parts and let them swell in water for a night. Add water and warm it up until it boils. When it has cooled, the mixture must be as dense as a gelatinous cream. Chop up some white wax finely and sprinkle it into boiling water (wax, 1 part; water, 10 parts). When the wax is melted, add it hot to the prepared glues, which should also be hot. Pour it into a bottle and shake it every now and then while it is cooling. A little oil or varnish can be added to this mixture. From ½ to 1 per cent of sodium benzoate preserves the emulsion for a long time (Bazzi 1960, p. 162).<sup>26</sup>

The second recipe is taken from the monumental work by Ernst Berger (1904) which describes the grinding of pigments with a hot mixture of whitened wax, potash and distilled water, then diluted in water:

Whitened wax	100 parts
Potash	10 parts
Distilled water	150 parts

mixed together while hot.

Once cooled, this mixture can be diluted with water. It is possible to add a little oil to it too. A similar recipe is included in the work of Werner of Neustadt (Bazzi 1960, p. 163).<sup>27</sup>

Bazzi also dedicates a paragraph to the 'wax emulsions and egg tempera', where she describes the so-called '[Max] Doerner's tempera', a tempera formulation published by the German painter and professor at the Munich art academy Max Doerner (1870–1939) (Doerner 1921). It is based on the mixture of white wax, turpentine, potash and water; this must be emulsified with egg and diluted in water:

Melt in a bain-marie:

pure white wax	25 grams
turpentine	25 grams
potash dissolved in water	5 grams ¼ litre

to the appearance of a fluid and uniform cream. It can form an emulsion with egg and can be diluted with water. These temperas should not be varnished; once finished, they can be polished by rubbing with a silk cloth: the colours come out with a clear, mellow tone. A pleasing paint, which produces a beautiful effect above all in decorative painting, is produced by melting 1 part wax and 2 parts turpentine in a bain-marie and then diluting them with an equal amount of egg tempera. These are especially useful for decorating large surfaces, thanks to their brightness (Bazzi 1960, pp. 165–166).<sup>28</sup>

## CONCLUSION

The Italian debate on encaustic and the use of wax in painting, which began in the mid-18th century, continued over almost two centuries. In the 1800s it took on a

more 'scientific' character and also became part of the discussions concerning the field of conservation, reaching its final phase in the technical literature of the first half of the 20th century. However, if the first experiments were aimed at a philological investigation of ancient encaustic painting, based on the reading of the literary sources, between the 19th and 20th century descriptions of the use of various materials and procedures prevailed. The main objective seemed to have been to emulate the visual effect achieved by Roman paintings in order to lend artworks a particular 'antique aura'. As Barsocchini noted, 'in recent vicissitudes of the art, all sorts of painting were labelled with the generic name of "encaustic"' (Barsocchini 1908, p. 85).

From the debate on encaustic painting arose a parallel discussion of binding media mixtures that contained wax that were actually true tempera paints – paints in which only a small amount of wax (or wax soaps) were introduced into tempera formulations. With the exception of the De Pidoll temperas, we do not have evidence of the industrial production of such hybrid tempera formulations. The research, both from the documentary and analytical point of view, raises many questions which remain unresolved. Nevertheless, such 'wax temperas' were undoubtedly used in a period in which, in contemporary descriptions, 'the crowd of artists uses formulas and recipes of every age and every school, speaks all languages, both living and dead' (Moreau-Vauthier 1912/edn 1913, p. 76).

1 The Italian technical literature between the 19th and 20th century is currently under investigation by the author. This study is part of the author's PhD thesis in Preservation of the Architectural Heritage (Politecnico di Milano), *La pittura a encausto tra revival e invenzione: il dibattito nella letteratura tecnico-artistica e le prime realizzazioni su intonaco a Mantova, Verona e Cremona tra Sette e Ottocento (Encaustic Painting between Revival and Invention: The Debate in the Technical Literature and the First Uses for Wall Painting in Mantua, Verona and Cremona between the 18th and 19th Century)*.

2 Investigations into the technique of the ancients had already started from the early 1890s onwards in Germany (see the contribution by Kinseher, in this volume).

3 From the 18th century onwards, the technique known as 'encaustic', mentioned in ancient documentary sources, was of great interest to scholars of art. Encaustic was considered the most important of the ancient painting techniques: based on the limited information provided by Vitruvius and Pliny (Rinaldi 2012), the 18th century saw considerable experimentation with wax-based media which hoped to 'rediscover' lost methods. Inevitably, experimentation took many paths; in such cases, use of the term 'encaustic' only implied the use of wax in some manner. With this designation scholars and artists variously described variants such as: 1. painting with coloured waxes, kept liquid by means of heat treatments and heating the tools, with or without encaustication; 2. painting with wax solutions, such as with wax dissolved in essential oils or solvents (in Italy called 'French encaustic'), with or without encaustication; 3. painting with wax in emulsion, i.e. thick water-miscible solutions made by combining wax with polysaccharide or protein binders (gums, resins or glues) or saponifying wax with alkali, with or without encaustication; 4. painting with wax and oil (mainly drying oils), with or without encaustication; 5. combinations of these techniques; 6. wax, tempera or fresco painting then covered with a wax coating that was then heated (encaustication); 7.

wax, tempera or fresco painting just heated without waxing (*abbruciamento* or *inustione*; Travaglio 2015).

4 For instance: "'Encaustics" are wax- or resin-based preparations used to polish wooden objects, furniture, floors, stoves, leather objects, and so on, as well as to paint with wax colours' (*Gli encaustici sono preparazioni a base di cera o di resine, che si impiegano per lucidare gli oggetti di legno, i mobili, i pavimenti, le stufe, gli oggetti di pelle, ecc., come pure per dipingere con colori a cera*) (Ghersi 1906, p. 327). See also *encaustica* in *Nuovo dizionario* 1838 and in Turco 1955.

5 The same three methods of encaustic painting were described a few years later by Previati 1905.

6 *'La soluzione della cera nel ranno, ovvero, in termini più generali, in qualunque mezzo che valga ad incorporare la cera coll'acqua.'*

7 *'Soluzione della cera nel ranno. Prendete della colla, dell'acqua seconda potassa e della cera bianca, in quantità eguale, mescolatele insieme e fatele fondere a fuoco. Aggiungete in seguito il colore; diluite bene la massa, poi dipingete col pennello. Un'altra è questa. Se voi volete fare un liquido acconcio per temperare i colori, prendete una libbra di calce e due di ceneri, che metterete in acqua calda facendola bollire; lasciate riposare la massa, per poi filtrarla per pannolino. Prendete in seguito libbre quattro di questo liquido e fatelo riscaldar bene. Prendete circa due onces di cera bianca e mettetela a bollire nell'acqua. Poi prendete circa un'oncia di colla di pesce, mettetela nell'acqua, lasciandola fintanto che sia mollificata bene e sciolta; rimenatela tanto da renderla in istato di pasta, per poi versarla nell'acqua contenente la cera facendo bollire il tutto. Ancora caldo o tepido il liquido, colatelo in un vaso attraverso un pannolino. Con questa tempera si preparano i colori.'*

8 *'Comment il faut faire la peinture pour donner du lustre. Prenez de la colle, de l'eau forte et de la cire blanche en égale*

*quantité; mêlez-les ensemble et placez-les sur le feu pour les faire fondre. Ajoutez la couleur dans ce mélange; délayez-la bien, et peignez ce que vous voudrez avec un pinceau. Laissez d'abord cette couleur sécher, et ensuite vous pourrez la rendre brillante. L'or, si vous en mettez, deviendra très-brillant; il est inutile de mettre du vernis'* (Didron 1845, p. 44).

9 In this case the pigments must be mixed with a 'tempera' made of lye of lime and ashes, first brought to boil and then filtered through cloth, to which white wax and fish glue, earlier softened in water was added, then the whole brought to a boil. When a mixture with the consistency of a glue was obtained, it was to be filtered and allowed to stand in a closed container in order to obtain a liquid suitable for use as a medium for pigments. Le Bègue's recipe however contains mastic resin, which is not mentioned by Ronchetti: '[f. 96 r] Se vous voulez faire yaue cososite a destremper toutes couleurs. Prenez une livre de chaux et douze de flandres, puis prenez eaue bouillant et metez tout ensamble et les faictes assez bouilir; puis le laissez bien reposer, puis le coulez bien parmy un drapel. Et de celle yaue prenez livres quatre et la faictes bien ardoir, puis prenez cire blanche environ II onces et la mettez bouilir avec lyau. Puis prenez cole de poisson environ I once et ½, et la mettez en eaue et li laissez tant quelle soit bien amolie [f. 97r] et si comme fondue; puis la maniez tant que elle soit comme paste, puis la mettez en lyaue avec la cire et la faictes ensamble bouilir, et mettez mastic dedens environ once et demie et faictes bouilir ensamble. Puis prenez de ceste eaue et mettez sur un coustel ou sur fer pour savoir sil est bien cuit: et sil est comme glue, il est bien. Puis adonc coulez celle yaue chaude ou tiede parmi ung drap linge en un vaissel net, et laissez reposer et la covrez bien. Et de celle eaue povez destremper toutes manieres de couleurs.'

10 In 1905 Venturini Papari and the painter Mario Spinetti executed decorations in encaustic at the Villa Astor in Sorrento, taking inspiration from the decorations of the House of the Vettii in Pompeii. The villa, currently part of the

Hotel Bellevue Syrene, is the subject of an investigation by the Istituto Superiore per la Conservazione ed il Restauro, Rome (Prisco 2013, p. 67). In 1912 Venturini Papari also promoted the creation of a school of encaustic painting within the Scuola preparatoria alle Arti Ornamentali in Rome (Venturini Papari 1928, p. 22).

11 Astori experimented with a 'wax water' prepared by mixing wax with a soda solution and a small quantity of honey (Astori 1785).

12 Among the advertising companies were Kaspar & Vogl in Vienna (Tintoretto oil paints and Pereira tempera colours); Günther Wagner of Hannover (Pelikan colours); Blockx of Terwagne; Talens & Zoon of Apeldoorn; Schmincke (Mussini oil paints and Horadam watercolours) and Schoenfeld (Lechner and De Pidoll temperas and Ludwig petroleum paints) of Düsseldorf; Winsor & Newton and Reeves & Sons of London; Lefranc in Paris (Muzii and Raffaelli colours); Ferrario in Rovereto and Maimeri in Milan. Califano Mundo had also set up a special technical office for the analysis of the products which were sent by manufacturers, of which a review was provided in a specific section within the manuals.

13 *Metodo d'encausto saponaceo* ('Soapy encaustic method'): hot soapy emulsion made with white wax, soda and water; *Metodo d'encaustica alcalina* ('Alkaline encaustic method'): as the previous, but with a greater amount of alkali (Califano Mundo 1911, pp. 20–21).

14 'Da circa venti anni la succitata casa Schoenfeld di Düsseldorf fabbrica dei speciali colori a tempera, i quali sono diffusissimi in Germania, ove sono giudicati degni succedanei dei processi a tempera dei vecchi maestri del XV secolo. Questi colori di pigmenti sceltissimi, sono preparati con giallo d'uovo, una piccola quantità di cera e di gomma, un disinfettante e dell'acqua distillata, e possono usarsi a velatura e ad impasto su tela, pannelli di legno, carta, avorio, metallo, stucco, calce, preparati a fondo bianco o oscuro.'

15 'Altra pittura alla cera. Fare sciogliere 140 grammi di gomma arabica in 250 grammi d'acqua fredda. A questa soluzione gommata si aggiungono 215 grammi di mastice in polvere e si porta all'ebollizione. Quando la materia è divenuta come della colla, vi si fa fondere 150 grammi di cera bianca in pezzi. Il tutto va ben rimescolato fino al completo raffreddamento. Si scioglie allora gradatamente questo miscuglio in un litro d'acqua fredda. La composizione viene allora passata a traverso a una tela bianca e chiusa in bottiglie; essa deve avere l'apparenza di crema. Per dipingere, si sciolgono i colori con questa composizione diluita d'acqua. Dopo terminata la pittura e quando è ben asciutta, si passa uno strato di cera fusa.'

16 '[...] la cera liquefatta insieme con resina mastice e immersa poi in acqua fredda produce una composizione di facile attrito, la quale si può quindi macinare con colori stemperati in acqua [...]; un'opera dipinta con tali colori (se le si dà la vernice di cera liquefatta) si ferma e si fonde per mezzo del calore.'

17 'Venne anche trovato una specie di acquarello a cera, e per chi volesse esperimentarlo, ecco il modo di preparare il veicolo col quale si stemperano i colori. In un vaso di terra smerigliata, si sciolgono 130 grammi di gomma arabica in circa 245 gr d'acqua, aggiungendovi in seguito 215 gr di mastice in polvere. Messo il recipiente su fuoco moderato, si rimescola il tutto fintanto che si ottiene una massa omogenea e opaca, alla quale poi si addiziona 155 gr di cera bianca, rimanendo fino alla bollitura, nel qual momento si ritira il vaso dal fuoco e, dimenando sempre la massa, vi si versa dentro, a poco a poco, 185 decilitri d'acqua. Con questa composizione, della consistenza simile alla panna, e raffreddata, si macinano i colori, diluendoli durante il lavoro con l'acqua.'

18 For example, Ogetti also describes a 'cold wax painting', used by Sartorio in the frieze of the parliament in Rome (Moreau-Vauthier 1912/edn 1913, pp. 110–112).

19 It is the same procedure proposed by Cros and Henry 1884.

20 Zaffuto realised various encaustic paintings, especially decorative panels in the Art Deco style, representing animals. Two of these were published in her book and others are preserved in the Galleria Nazionale d'Arte Moderna and Galleria Comunale d'Arte Moderna in Rome (Vacanti 2010, pp. 139–140).

21 'Ma l'ho scritta così per meglio specificare la stretta parentela e, direi quasi, la perfetta somiglianza che questa tempera [...] ha con l'encausto dei Greci e dei Romani. [...] Con la tempera a cera si ottiene una pittura altrettanto bella e specialmente quella grana tanto misteriosa e quella profonda morbidezza che distingue questo modo di dipingere d'infrà tutti gli altri.'

22 'La tempera a cera con cui ho parecchie volte dipinto [...] consiste in un'emulsione di cera, d'acqua e di sapone da bucato. La cera, come l'olio, non è solubile nell'acqua; ma, così come l'olio diventa emulsionabile con l'acqua per mezzo del torlo d'uovo, la cera lo diventa per mezzo delle sostanze grasse e specialmente della potassa contenuta nel sapone da bucato. Ecco ora come si procede per ottenere questa tempera. In un recipiente si mette a parti eguali acqua, cera vergine e sapone da bucato; il sapone dev'essere bianco; quello di Marsiglia è il migliore. Si fa bollire lentamente sopra un fuoco possibilmente di carbon dolce e si mescola la miscela con una bacchetta perché la cera e il sapone si sciolgano bene. La schiuma che si forma mentre bolle la miscela va tolta accuratamente con un cucchiaino, e getta via; tale schiuma, formata per nove decimi dai grassi meno puri del sapone, se rimanesse nell'emulsione sarebbe un gran pericolo per la pittura. Quando le sostanze solide si sono ben disciolte, e dopo averla ben schiumata, si versa la miscela in un recipiente largo, una fondina per esempio. Si copre con cura e si lascia stare per una giornata; indi si scopre e si schiuma di nuovo poiché un leggero strato di schiuma continua ancora a formarsi, si lascia di nuovo riposare per qualche ora e si rischiuma di nuovo; così via fintanto che non

appoia più traccia alcuna di schiuma. Allora, con il liquido rimasto, si possono macinare i colori e dipingere. Bisogna con questa tempera dipingere su superfici solide: tavole e cartoni, e ciò non perché tale tempera sia fragile ma perché alla fine, dovendo sfregare la pittura con una soluzione di cera, bisogna avere una superficie solida ove si possa premere con forza. Con questa tempera si dipinge come con le altre, soltanto che le tavole e i cartoni si preparano a gesso e poi con due mani d'emulsione d'uovo e d'olio di lino, come per la tempera a colla. Finito il dipinto, si lascia asciugare un paio di giorni. Poi se ne scalda la superficie presso il fuoco (d'estate al sole) e contemporaneamente si scioglie a bagno maria della cera vergine nell'essenza di trementina (a parti eguali) e con un pennello morbido e flessibile si dà a tutto il dipinto la soluzione di cera spennellando rapidamente in lungo e in largo perché la cera vada egualmente su tutta la pittura; poi si lascia freddare per una mezz'ora. Finalmente si scalda di nuovo, ma pochissimo, la pittura e nello stesso tempo si scalda forte tutto il dipinto finché esso cominci a lustrare. Si ottiene così una materia bellissima e preziosa il cui aspetto ricorda un po' l'avorio. Inoltre la cera per via dello sfregamento penetra nei pori della pittura e sfumando i contorni da quel ch'è di tenero e misterioso (troublant, come dicono i francesi) che rende tanto suggestive le pitture pompeiane. Si può anche verniciare il dipinto dopo averci dato la cera. Lo svantaggio di questa tempera, come quella a colla, è di scurire alquanto sotto l'azione della vernice.'

23 'Recipe of the Byzantine MS. Take equal quantities of glue, a strong solution of potash and white wax. Mix and melt over heat. Add the ground pigment; thin with water when painting' (Bazzi 1960, pp. 162–163).

24 Bazzi wrongly attributes to Lorgna a method based on the saponification of wax with potassium nitrate: 'Lorgna's recipe. Melt over heat in an iron vessel 10 to 20 parts wax and 1 part nitre. Allow to cool and harden; it can be thinned with cold water until the density of milk is obtained' (Bazzi 1960, p. 163).

25 'Acqua 10 parti, cera bianca pura 1 parte, ammoniaca quanto basta. Si fa bollire l'acqua, si mette la cera in scaglie sottili e vi si unisce a goccia a goccia l'ammoniaca agitando il liquido finché sia perfettamente emulsionato e abbia l'apparenza di un latte. Si lascia raffreddare e dopo una dozzina di ore si vedrà che la cera galleggerà: si toglie l'eccesso di acqua e si copre la cera con olio di spigo lasciandola in luogo tiepido per qualche giorno. Si aggiunge poi tanta trementina, quanta è necessaria per dare alla miscela la consistenza di una crema. Si mette in bottiglia, tappandola dopo alcun tempo quando sia evaporato l'eccesso di ammoniaca. Ottima miscela: asciugando si fa completamente opaca come una tempera. Se col tempo gli ingredienti di questa emulsione si separano, si può scuoterla prima dell'uso. I colori applicati su carta danno l'effetto del guazzo senza averne la fragilità [...] Si usa tanto con colore in polvere, quanto con quelli ad olio' (Bazzi 1956, pp. 219–220).

26 'Si prende della colla di pesce e di pergamina in egual dose e si fa gonfiare in acqua per una notte; si aggiunge acqua e si riscalda fino al bollore: una volta raffreddata deve essere densa come una crema gelatinosa. Si tagliuzzo finemente della cera bianca e si lascia cadere a pioggia in acqua bollente (cera 1 parte e acqua 10 parti). Una volta sciolta, la cera si aggiunge a caldo alle colle preparate, pure calde. Si versa in una bottiglia e si scuote di tempo in tempo, mentre si raffredda. Si può aggiungere poco olio o vernice a questa miscela. Da 1/2 a 1 per cento di benzoato di soda conserva a lungo l'emulsione' (Bazzi 1956, pp. 221–222).

27 'Cera imbiancata 100 parti, potassa 10 parti, acqua distillata 150 parti, incorporate a caldo. Questa miscela, una volta fredda, si può diluire con acqua. Vi si può unire anche poco olio. Una ricetta simile è data anche da Werner di Neustadt' (Bazzi 1956, p. 222).

28 'Fondere a bagnomaria: Cera bianca pura 25 grammi, trementina 25 grammi, potassa sciolta in 5 grammi, acqua 1/4 litro, sino ad ottenere l'aspetto di crema fluida ed uniforme. Si può emulsionare con uovo e

diluire con acqua. Queste tempere non vanno verniciate; una volta finite si possono lucidare sfregandole con un cencio di seta: i colori risultano di un tono chiaro, pastoso. Un impasto piacevole, di bell'effetto soprattutto per pitture decorative, si ottiene sciogliendo a bagnomaria 1 parte di cera e 2 parti di trementina e diluendo poi con altrettanta tempera d'uovo. Sono soprattutto consigliabili per la decorazione di ampie superfici, data la loro chiarezza' (Bazzi 1956, p. 225).