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Tempera paints in Italy in the first half of the 20th century, with a special focus on '*tempera grassa*' by Maimeri

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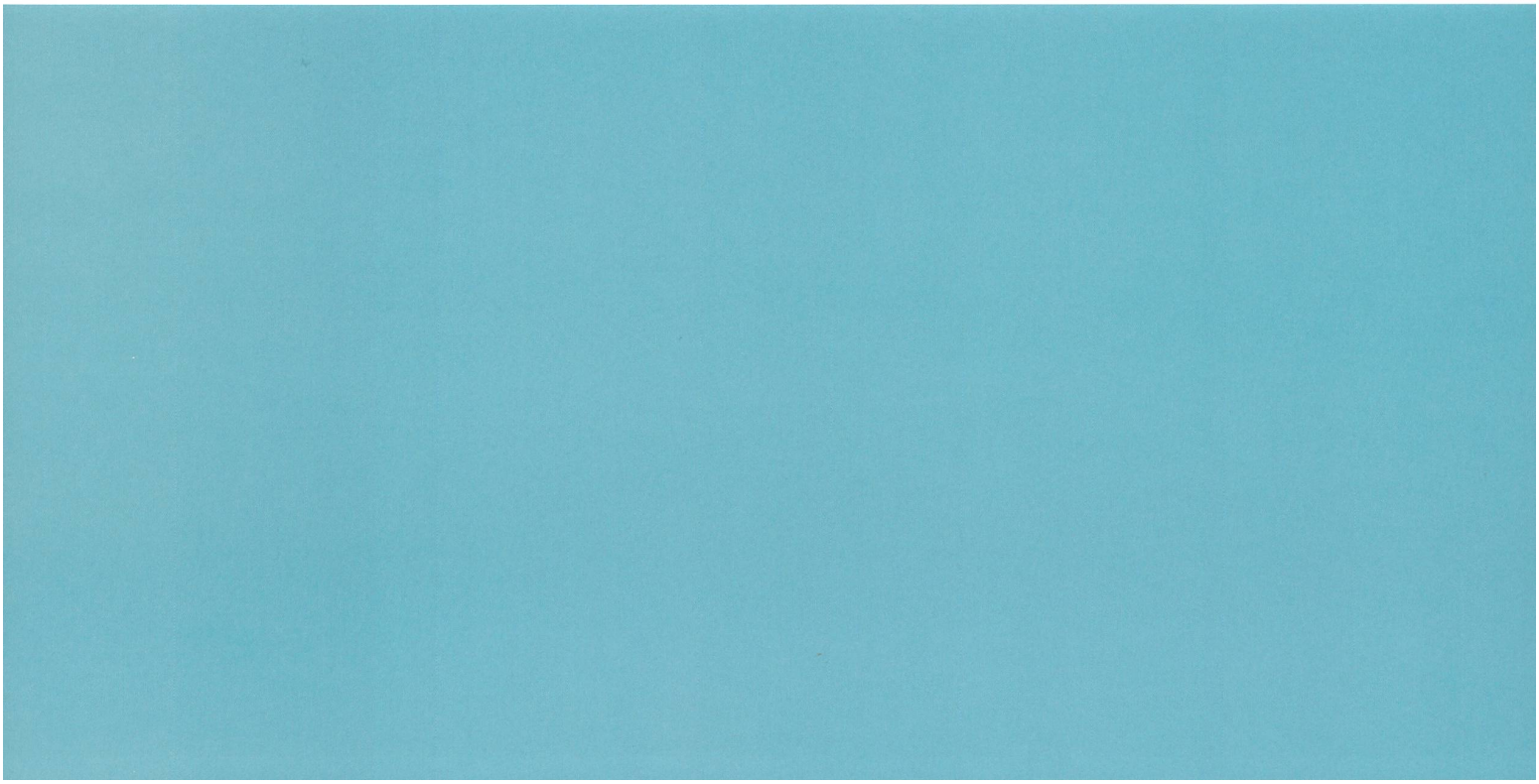


INTRODUCTION

In Italy in the late 1800s, a strong tradition of experimentation with paint formulations invented by individual artists developed. The industrial production of artists' materials began only in the second decade of the 20th century, much later than in other European countries. This paper explores the circumstances in which painters' supplies, both imported and locally produced, were made available in Italy in the late 19th and early 20th century, and how an interest in tempera painting flourished within this context. Subjects considered include artists' creation and use of their own proprietorial tempera formulas, the tradition of limited artisanal manufacture of paints and the beginning of the industrial production of tempera paints in Italy, notably at the Maimeri factory (founded in 1923, see Maimeri 1923–1924), which was to produce some of the country's most renowned paints.

19TH-CENTURY CONTEXT FOR PAINTERS' SUPPLIES AND PAINT PRODUCTION

Despite the efforts to disseminate information regarding the wider context of painting in Europe made by some Italian publishers after national unification in 1860 – such as Ulrico Hoepli in Milan, who began publishing reports summarising scientific achievements and the most advanced research being undertaken (e.g. Lepetit 1875; Erbici 1900; Ronchetti 1900; Fornari 1892; Gorini 1896; Appiani 1905; Assirelli 1992) – Italian artists remained relatively unaware of recent developments of materials for painting. For example, a work of 1874 by Gonsalvo Carelli (1818–1900), a painter and member of the art academy of Naples, shows a general lack of familiarity with newer pigments: he believed that emerald green was obtained by grinding its eponymous gemstone and he listed only Prussian blue as a modern synthetic blue pigment, as he was apparently unaware of cobalt blue and French ultramarine (Carelli 1874, p. 15).

Equally, at mid-century, the Italian chemical industry was far behind its European counterparts, as evidenced by the catalogue of the first *National Exhibition of Italian Agrarian, Industrial and Artistic Products*, which was held in Florence in 1861. The pigments and colorants presented were primarily produced on a small scale with natural raw materials. Red dyestuffs provide a typical example: the exhibition recommended expanding the cultivation of madder in Italy in order to combat the increasing dominance of foreign synthetic dyes (Ridolfi 1865). The situation remained the same in subsequent national exhibitions at the end of the 19th century (1881 in Milan, 1884 in Turin, 1892 in Palermo, 1894 in Milan, and 1898 again in Turin).

The local colourmen from whom Italian artists purchased their supplies stocked materials that they had either imported from abroad or produced in their own improvised laboratories. Their shops were often to be found near the art academies in the major Italian cities. For example, from 1847, Angelo Mattei's shop in Rome sold modern synthetic pigments (Bensi 2007, p. 74), while Luigi Calcaterra's shop in Milan carried pigments of French, English and German manufacture, which were used by painters of the Divisionist and later the Futurist schools (Scotti Tosini 2005; Gioli 2015). Here artists such as Gaetano Previati (1852–1920) and Giovanni Segantini (1858–1899) could purchase pigments made by both Lefranc and Roberson (Rava and Bensi 2009, p. 225). Moreover, Calcaterra promoted the improvement of artistic practices by printing an *Enciclopedia artistica* (*Artistic Encyclopedia*) – compiled by Maurizio Erbici in 1900, with an updated reprint in 1903 (Erbici 1900/edn 1903) – in which he reported on all the latest art materials available on the market, along with the opinions of the most authoritative experts on artists' supplies, excerpted from the most famous works of the late 19th century. Erbici included only the best-known technical texts: it is particularly interesting to note that he chose to reproduce Jehan-Georges Vibert's (1840–1902) comments on tempera painting in *La science de la peinture* of 1891 (Vibert 1891, pp. 242–247) rather than the more recent account included in the brochure on egg tempera painting that Vibert had produced six years later (Vibert 1897). This text was translated into Italian by Vittore

Grubicy de Dragon (1851–1920), who was both a painter who worked in the Divisionist style and a patron of the Divisionist movement (Grubicy de Dragon, Ben. II.2.).

Most fine artists, such as the painters of the Lombard Divisionist school and the Tuscan Macchiaioli, relied on imported artists' paints, while decorators and craftsmen bought powdered pigments that they then blended with appropriate media, following centuries-old workshop traditions (see also the contributions by Perusini and Perusini, and Reinkowski-Häfner, 'From wall to canvas', in this volume).

TEMPERA PAINTS DEVELOPED BY LAURENTI

As documented by the painter Antonio Mancini (1852–1930), from 1880 the well-known firm of Antonio Laezza (1820–1903) sold colours and prepared canvases in Naples until they were destroyed during the Second World War (Bensi 2007, p. 75). After 1900, Laezza also sold tempera paints. These were supplied by Cesare Laurenti (1834–1936), an Emilian painter active in Venice, who in 1902 had invented a tempera technique complete with accompanying recipes for paints (Torresi 1991). After training at the academies of Florence and Naples, Laurenti had moved to Venice, where he participated in every *Biennale* exhibition from 1895 to 1909. Apart from the formative aspects of his education, he had also been influenced by travel abroad, most importantly to Munich where he was impressed by the work of Max Klinger (1857–1920) and Arnold Böcklin (1827–1901). The experimental climate that flourished in Munich during the final decades of the 19th century had a profound effect on Laurenti; under its influence his painting turned towards the Symbolist school, as the creative potential of the tempera technique was being actively explored by the Symbolist painters working in Venice.

Letters from August 1909, preserved in Laurenti's archive, testify to his contacts with the small chemical factory Giorgi of Rovigo, with which he worked to produce a line of ready-to-use artists' colours. The collaboration was primarily concerned with the preparation of the *Tempera Laurenti* paints. As is indicated in a letter of 15 February 1905 (Beltrami 2010, p. 19), these tempera paints were fabricated from materials purchased from trusted retailers, and contained different binders, formulated respectively for easel and mural painting (Laurenti 1990, pp. 22–23). Laurenti's recipes were collected and published by his niece after his death but they do not relate the composition of his tempera paints in an accurate fashion. However, Laurenti describes the main components of the tempera separately: animal-skin glue and gum arabic.

The animal glue preferred by Laurenti was in his opinion the best glue then available: that made by Totin (Laurenti 1990, p. 80). Totin glue was a type of patented, dried rabbit-skin glue, industrially produced in Montreuil-sous-Bois near Paris by the company Totin Frères (Robbins and Stonor 2012, p. 91; Perego 2005, p. 213). Laurenti describes it as:

> The best glue for use in tempera painting is without doubt '*Totinz*' [*sic* for Totin] which corresponds precisely to a glue of parchment clippings and glove leather, as was used in the past, and therefore it should be preferred to all other modern glues, even those commercially available. [Its] only drawback is its lack of transparency, but I have remedied this by filtering the glue near the stove to ensure greater fluidity between the pieces of [filter] paper, and in this way I get a highly transparent glue (Laurenti 1990, p. 80).[1]

This animal glue was reserved for painting on canvas with white and light-toned pigments, while for darker shades Laurenti recommended a 'solution of gum arabic together with a solution of linseed gel [Laurenti writes '*gelatina*'] boiled in water and filtered. I think better still, dissolve the gum arabic in said gelatinous [Laurenti writes '*gelatinosa*'] solution of linseed' (Laurenti 1990, p. 81).[2]

Laurenti favoured aqueous binders for many different uses. He also employed gum arabic as the primary ingredient for the production of his watercolour paints, where

he combined it with honey and glycerine (Laurenti 1990, p. 83). In contrast, for mural painting he used a more resistant formulation, a casein tempera produced after the recipe contained in the well-known work on restoration by Giovanni Secco Suardo (1789–1873) (Secco Suardo 1894/edn 1993), which Laurenti employed in the mural decoration of the Hotel Sturgeon in Padua, now preserved in fragments at the Civic Museum (Rubaltelli 1991; Beltrami 2010, p. 20).

Like many other Italian colleagues, Laurenti wanted to achieve rich effects in the body colours and transparency of his paints and used several formulations for glazes based on a resin binder with an addition of copal, mastic and turpentine. These experimental recipes were derived from French texts (Tingry 1803; Riffault *et al.* 1862) printed in the popular French series, *Manuels Roret* (Laurenti 1990, pp. 82–83). Laurenti's layering system – which employed aqueous paints and resin glazes – is similar to that promoted by Alfons von Pereira-Arnstein from 1891 (see the contribution by Beltinger, in this volume).

TEMPERA AS USED BY DE MARIA, MICHETTI, DI VOLO AND OTHERS

The passion for technical experimentation demonstrated by Laurenti in Venice was shared by the painter Mario de Maria (1852–1924). In 1893 de Maria showed a landscape he had created with the commercially available Pereira tempera paint at an exhibition on painting technology in Munich (*Ausstellung für Maltechnik*: Munich 1893, p. 70; see also the contributions by Beltinger and by Kinseher, in this volume), but mostly he seems to have mixed his own tempera formulations. Unlike those of Laurenti, de Maria's temperas were entirely the result of a rigorous, individual preparation of a recipe that he jealously guarded and shared only with his son Astolfo (Mazzanti 2007, p. 84). De Maria's recipe is summarily described in a letter written in 1912 by the painter to the art critic Ugo Ojetti (1871–1946). The latter was preparing an Italian edition of Charles Moreau-Vauthier's (1857–1924) recent book (Moreau-Vauthier 1912) and in that context asked the painter for information on his tempera technique. De Maria described his paint, composed of a 'glue mixture of vegetable and animal glues and various resins'. The concoction was not only employed as a binding medium: once the paint had dried, it was also used to coat the surface in order to make it 'tough and durable'. Finally, de Maria noted, 'once the painting is finished, I then impregnate the whole with molten amber' (Mazzanti 2007, p. 227).[3]

Another artist known to have mixed his own tempera was Francesco Paolo Michetti (1851–1929). At the *First International Art Exhibition of the City of Venice* (*Biennale di Venezia*), the first prize was awarded to Michetti's *La figlia di Jorio* (*The Daughter of Jorio*) of 1894,[4] a large work on canvas created with his own tempera formulation. Except for the fact that it contained glycerine, the composition of his tempera remains unknown.

In addition to mixing their own paints, in the early decades of the 1900s, Italian painters who wanted to work with tempera could also purchase ready-made products from a variety of suppliers. An example of the transformation of craft knowledge into an industrial product is the egg-based tempera paint that was developed by Eligio Di Volo (1880–1964), a teacher at the Academy of Fine Arts in Florence. In 1915 he opened a company in Florence. Today, the company, Divolo, is still actively producing tempera and oil paints as well as powder pigments (Rinaldi and Falcucci 2012).

A summary account of many Italian experiments is found in the recipe book compiled in 1910 by the Neapolitan painter Raffaele Armando Califano Mundo (1857–1930), in which the author sought to make his Italian colleagues aware of the many types of tempera paints that were marketed throughout Europe, such as the Pereira tempera, which was manufactured by Müller & Co. of Stuttgart (see the contribution by Beltinger, in this volume), as well as three types of tempera produced by the Schoenfeld firm in Düsseldorf: Lechner, De Pidoll and Schoenfeld (see the contribution by Pohlmann *et al.*, in this volume). In particular, he recommended Schoenfeld

tempera paints, of which he noted: '[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 ground' (Califano Mundo 1910, p. 47; see also the contribution by Travaglio, in this volume).[5]

A brochure listing the company's wares specially produced for the Italian market in 1889 (Schoenfeld 1889) is the earliest known record of the German manufacturer Franz Schoenfeld's own tempera brand.

MUZII TEMPERA, A PRODUCT OF ITALIAN ORIGIN

Alongside the famous tempera paints produced by Schoenfeld, the Muzii temperas of the French manufacturer Lefranc were also available in Italy. Known in France as *Couleurs Muzii – Tempera brillante* (Muzii paints – brilliant tempera), and in Italy as *Tempere Muzii*, they represent a particularly significant case of the transfer of craft knowledge into an industrial product. They had been developed by the Italian artist Alfonso Muzii (1856–1946), who was born in Pescara and who trained in the academies of Florence and Naples before emigrating to Argentina for about a decade. He finally returned to Europe where he resided variously in Genoa, Milan and Paris. While living in Paris in the early 1900s, Muzii came into contact with the firm Lefranc, which in 1905 began to produce and market the tempera paints that he had developed (Muzii 1905).

Muzii tempera paints were allegedly based on an egg tempera binder; they were quick drying and highly opaque (Scotti 1986, p. 474). Research in the Lefranc archives has not revealed any further information regarding their composition (Roualt 1993) and relatively little is known of their use: however, there is evidence that they were employed by the Divisionist painters Giuseppe Pellizza da Volpedo (1868–1907) (Scotti 1986, p. 474), Emilio Longoni (1859–1932) and Grubicy de Dragon (Marchese 2015, p. 56).

BÖCKLIN'S TEMPERA IN FLORENCE

Next to the industrially produced paints, a more limited production of a tempera formulation was that developed by Arnold Böcklin, which was sold from the late 1890s in a pharmacy in Florence owned by the English chemist Henry Roberts (Urban 1939, p. 67; Holenweg 1980, p. 35). It is not known why Böcklin, who used a number of different tempera binders during his last years in Florence (1893–1901), requested that Roberts manufacture one of his formulations as he is not believed to have encountered any difficulties in mixing his paints. According to the Munich painter and scholar in the field of painting technology Ernst Berger (1857–1919), the binder that was on sale in the English pharmacy was composed of gum arabic and copaiba balsam (Berger 1906d, p. 138). However, the German artist Hermann Urban (1866–1946), who purchased this binder in 1902, assumed that it contained cherry gum, not gum arabic ('*Kirschharzkopaiva-Temperaemulsion*') (Urban 1939, p. 67). It is possible that Urban's experiments with Böcklin's tempera influenced the development of his own gum-resin formulations.[6]

TEMPERA FOR THE RESTORATION AND COPYING OF MEDIEVAL PAINTINGS

Many Italian painters of the late 19th and early 20th century also worked occasionally as restorers – as did Laurenti, for example, at the end of his career – and developed a specific interest in the recovery of medieval and Renaissance painting techniques. Factory-made, ready-to-use tempera paints were not their first choice for restoration work – generally, they preferred to buy the dry powered pigments offered by many manufacturers and then mix them with binders of their own

preparation. The main medieval painting technique was recognised as egg tempera; however, it was thought that from the 15th century, the masterpieces of Italian painting had been made with the so-called '*tempera grassa*', a fatty emulsion obtained by mixing a siccative oil and an aqueous binder (egg, gum, glue, casein).

In his manual on restoration, Secco Suardo confirmed that the practice of hand grinding tempera paints was commonly employed in his time and describes six types of tempera binders used for painting and for retouching: 1) parchment glue and honey; 2) parchment glue and milk; 3) whole egg and milk; 4) whole egg and fig sap; 5) whole egg, milk and white wine; 6) egg yolk (Secco Suardo 1894/edn 1993, pp. 520–521). Similarly the formulations of landscape painter Antonio Fontanesi (1818–1882) bear witness to this practice, which was probably also occasionally employed by Carlo Carrà (1881–1966) as reported by Maria Bazzi (1976, p. 176). Bazzi also cites the particular composition of a tempera based on starch glue and gum arabic used by Ottaviano Giovanni Rapetti (1849–1931) (Bazzi 1976, p. 185).

GIORGIO DE CHIRICO'S *TEMPERA GRASSA*

The revival of the tempera technique in Italy lasted from the late 19th century (the beginning of the tempera debates in Munich) until c. 1940. There were two main reasons for this interest: on the one hand the tempera medium was seen as a technical paradigm of Italian Renaissance art, which symbolised the artistic identity of the nation; on the other hand, certain contemporary artistic movements were embracing a 'return to the craft' ('*ritorno al mestiere*'), a component of their rejection of modern post-industrialisation by means of the rediscovery of 'primitive' art in all its aspects, both stylistic-formal and technical-expressive. Thus, in Italy, tempera painting was a particularly Italian expression of a tendency that had appeared in varied guises throughout Europe.

The main protagonist and theoretician of the 'return to the craft' in Italy was the painter Giorgio de Chirico (1888–1978), who engaged in ongoing experimentation with tempera painting as described in his *Piccolo trattato di tecnica pittorica* (*Little Treatise on Painting Technique*) of 1928, which was built upon an earlier work, a text entitled *Pro tempera oratio* (*Plea for Tempera*) of 1920 (de Chirico c. 1920/edn 2006; Vacanti 2006).

Although the theoretical ideas of de Chirico had a large circulation and were shared by many artists, such as the Italian painter Gino Severini (1883–1966) and the French painters of the Nabis group Maurice Denis (1870–1943) and Paul Serusier (1864–1927), the influence of his technical experimentation was restricted. Equally, the diffusion of his text was limited: printed in 1928 in only 350 copies, the first translation was into Czech (1931). Although French and English translations were also planned, they were never realised in his lifetime (Vacanti 2014, p. 57). In his work of 1928, de Chirico described two types of *tempera grassa* that he had developed: one contained whole egg, boiled linseed oil, Venice turpentine, Marseille soap and white vinegar; the other, egg yolk, poppy seed oil, turpentine or petroleum, glycerine, white vinegar and water (de Chirico 1928/edn 2001a, pp. 36–42).

In the 1920s and 1930s his instructions for painting with *tempera grassa* influenced the painting technique of Aligi Sassu (1912–2000), Gianfilippo Usellini (1903–1971), Corrado Cagli (1910–1976) and Afro Basaldella (1912–1976) (Vacanti 2014, p. 60). The Surrealist painters however, with whom de Chirico had severed relations in 1919, and in particular André Breton (1896–1966), mocked his interest in technical matters. In their judgement, his artistic talent had been exhausted after his early metaphysical paintings. His subsequent artistic output inspired by a return to craft was deemed retrograde and reactionary – an opinion which was shared by many up to the 1970s, when in the context of postmodernism, de Chirico paintings were reinterpreted as early examples of this school of thought for their critique of modernity (Viva 2012, pp. 166–167).

The recipes published by de Chirico were not merely compilations of early Italian documentary sources for

tempera painting, such as the texts by Cennino Cennini, Giorgio Vasari, Neri di Bicci and Michelangelo Biondo (see Cennini c. 1390/edn 1859; Vasari 1550, 1568/edn 1906; Bicci 1453–1475/edn 1976; Biondo 1549) – the instructions de Chirico had received at the Munich Academy are also evident in his writings on tempera, as are his conversations with the Russian painter Nicola Lochov (1872–1948) then based in Florence (Rinaldi 2011–2013). Lochov was a famous copyist (and restorer) of Italian primitives whose skill in working in tempera was greatly admired by the art historian Edward Waldo Forbes (1873–1969) when he stayed in Florence with Daniel Varney Thompson Jr. (renowned for his English translation of Cennino Cennini's treatise). In 1920 Forbes bought copies of Italian Renaissance works (one a painting, the other a fresco) by Lochov for the Fogg Art Museum, which he appreciated as embodiments of the Russian painter's deep knowledge of 'technical processes' (Forbes 1920–1921, p. 2).

FORTUNY TEMPERA

In the 1930s, both restorers and painters were interested in tempera which enabled the successful introduction of the *Tempere Fortuny* (Fortuny tempera) paints that were developed by the famous Spanish artist, Mariano Fortuny y Madrazo (1871–1949), then resident in Venice, and patented on 18 May 1933. His line of paints encompassed a range of 44 different colours (Rinaldi 2013). Fortuny entrusted the marketing of his products to the company Crespi in Milan. Although the nature of the binder that his paints employed was kept strictly secret, they became extremely popular locally, both among the artists of the Brera Academy and with restorers. One of these was the most famous Italian restorer of the first half of the 20th century, Mauro Pellicioli (1887–1974), who systematically restored the paintings in the Brera Picture Gallery and whose studio was located in the adjacent street.

In 1937, Pellicioli met Fortuny when both were engaged to work on an exhibition of the paintings of Jacopo Tintoretto in Venice at the Ca' Pesaro. On this occasion Fortuny was responsible (after Pellicioli had finished his restoration of the paintings) for the lighting of the exhibition, an assignment that he obtained in part due to the popularity of his work in theatre scenography as well as his considerable reputation as an innovator in the areas of fashion and design. Pellicioli and Fortuny collaborated again during the restoration campaign started in 1946 for the reopening of the Venetian Galleries. While Fortuny designed the settings for the display of the many tempera paintings of the 14th and 15th centuries that Pellicioli had restored, in his interventions, the restorer tested tempera paints produced by both Fortuny and the Maimeri factory (see below) for the retouching of the Italian masterpieces (Rinaldi 2014). The comparison between a list of the pigments compiled by Pellicioli in 1945 (Fig. 1) and Maimeri's historical catalogues confirms the use of that company's *tempera grassa* products.

MAIMERI AND THE PRODUCTION OF TEMPERA PAINTS

The establishment by Carlo Ferrario in 1919 of the first Italian factory to produce fine art materials (Ferrario 1930) was followed by the foundation of the Maimeri company only a few years later, in 1923. It was set up by the painter Gianni Maimeri (1884–1951) (Fig. 2) and his brother Carlo (1886–1957), an industrial chemist who had studied at the University of Zurich (Maimeri c. 1930/edn 2010). The recent research on the earlier history of the Maimeri factory has brought to light much new information (Migliavacca 2010). The collaboration on the industrial production of artists' colours between Gianni and Carlo Maimeri began in 1923, but the first real industrial production and distribution of trial sample sets to some artists only started at the beginning of 1924, in Milan.

From the documentation generously made available for this study by the Maimeri Foundation, it appears that the company had begun production of tempera paints by the end of the 1920s, but at present little is known of the products it offered. We know that in a letter of 15

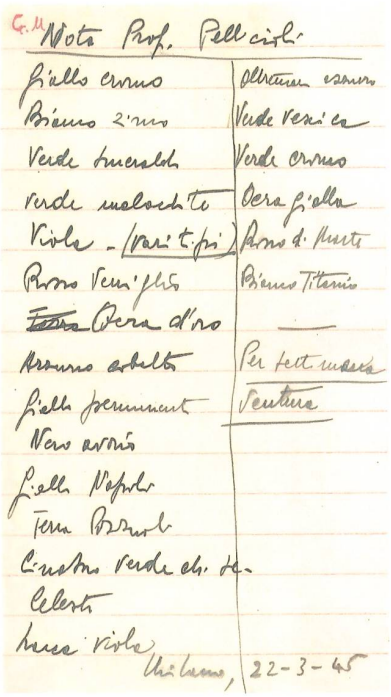


Fig. 1 List of pigments compiled by Mauro Pellicioli in 1945, Milan, Maimeri Archive, 5–13.7. The comparison between this list and historical catalogues of the company Maimeri confirms Pellicioli's use of Maimeri's '*tempera grassa*' products: '*Nota Prof. Pellicioli / Giallo cromo / Bianco zinco / Verde smeraldo / Verde malachite / Viola (vari tipi) / Rosso Vermiglio / Ocra d'oro / Azzurro cobalto / Giallo permanente / Nero avorio / Gallo Napoli / Terra Pozzuoli / Cinabro verde ch[iaro] sc[uro] / Celeste / Lacca viola / Oltremare azzurro / Verde vescica / Verde cromo / Ocra gialla / Rosso di Marte / Bianco Titanio – Per settimana / ventura / Milano, 22-3-45*'. ('Note Prof. Pellicioli / Chrome yellow / Zinc white / Emerald green / Malachite green / Violet (various types) / Vermilion red / Golden ochre / Cobalt blue / Permanent yellow / Ivory black / Naples yellow / Terra Pozzuoli / Cinnabar green light [and] dark / Cerulean blue / Violet lake / Ultramarine blue / Sap green / Chrome green / Yellow ochre / Mars red / Titanium white - For next week / Milan, 22-3-45'.)

Fig. 2 Gianni Maimeri, *Self Portrait*, c. 1930, oil on cardboard, 50 x 40 cm, Maimeri Archive, Milan, inv. no. 1292.

Fig. 3 Notebooks in the Maimeri Archives, Milan.

January 1935 written by Sante Faccini (partner and distributor for the Maimeri brothers) to Gianni Maimeri, Faccini announced the impending visit of Fortuny y Madrazo, who wanted to learn more about the industrial production of pigments. Faccini indicated that if the Spanish painter had come only 'to chat about the types of colour', he could be well received, but the production system and the laboratory 'should be held behind closed doors' (Faccini 1935).

The economic and financial instability that followed the onset of the Second World War limited the establishment of a true mass production. Although he was already suffering from the disease that was to eventually claim his life, in 1946–1947, soon after the end of the war, Gianni Maimeri reorganised the factory, partly to facilitate the takeover of the business by his son Leone Maimeri (b. 1926), who became the new general manager in 1951. During this time, extensive records were kept: the production formulas and descriptions of experiments and of discarded attempts by Maimeri researchers were recorded in a series of ordered notebooks (Fig. 3). These documents require more research and some verification, especially concerning the use of new anionic surfactants

Fig. 4 Gianni Maimeri, *Still Life with Flowers and Fruit*, 1951, tempera on wool applied to Masonite, 131 x 56 cm, Maimeri Archive, Milan, inv. no. 867.

that had been invented before the Second World War, but which only became widely available in Italy once the conflict had ended. These included sorbitan monopalmitate and similar anionic surfactant compounds, which were marketed under various names such as 'Tween', 'Span', etc. After the war, their availability resulted in their gradual introduction into Italian artists' paints.

Gianni Maimeri tested his tempera formulations in his paintings (Fig. 4) and discussed the results in a note in his unfinished text *Trattato della pittura* (*Treatise on Painting*), which he composed at the beginning of the 1930s but left unfinished (Maimeri c. 1930/edn 2010). Guidelines for the production of paint are described on some folios of the treatise (13r–16v). However, the text is intended for professional artists and for the growing number of amateur painters, not as an accurate record of the industrial products produced by the firm. After a brief historical synthesis, Gianni Maimeri stated:

> Our technicians, however, very quickly gave up the attempt to stabilise a paint made with egg and render it subject to preservation, and they also set aside other irrational tinkering based on albumen, resin soaps, casein and other [things]. [...] They turned their attention instead to the natural process [*sic*] of egg. They studied its essential components with a view to their adhesive and emulsifying power and became convinced that it was possible to replicate the mixture synthetically by an analogous process, in which the ratios of the essential components of egg relating to emulsions would be scrupulously observed [...] And so all the sulphuric components were discarded, along with many elements of value for other applications but that slowed down the chemical process of interest to us. As far as the remaining ingredients are concerned, which were found to be indispensable to and characteristic of the emulsifying process, we attempted to use the synthetically pure product, or at least to replace it with closely analogous ingredients. And so we came up with a synthetic reconstruction of the inherent and constitutive component of the egg itself. Drawing on the experience of the practices of many of our predecessors, we then added, with due precautions, those resins which it seems they also added in the past, which have definitely given decisive evidence of beneficial effects in modern gouaches. As the final, very useful result, we were able to eliminate both ineffectual vinegar and other disinfectants, made redundant by the completely sterile formula anticipated (Maimeri c. 1930/edn 2010, pp. 46–47).[7]

Another source for tempera paint formulations, more detailed in terms of chemical components, is a laboratory notebook written between November 1949 and 1951 (see the appendix). The notebook summarises some failed attempts as well as some successful formulations, including one approved for the production of an oil-tempera binder (sold in tubes) that could be emulsified and that was soluble in water; it was composed of linseed oil, mastic resin, Tween, triethanolamine, dry albumin and water.

From a strictly technical point of view, problems now noted in historical paintings known to have been made with Maimeri tempera paints may be due to an excess of surfactants used in the original formulations (Tween, Span and fatty acids with triethanolamine). Due to an excess of such components in the paint film, in time, the paintings may have become particularly susceptible to changes in atmospheric conditions, especially to fluctuations in humidity. As already mentioned, anionic surfactants were introduced in Italy only after the Second World War, and their use required adjustments that are difficult to imagine today.

CONCLUSION

The fact that Italy lagged behind the rest of Europe in the industrial production of painters' materials encouraged the development of varying local traditions and generated a system of heterogeneous practices. However, the research to date reveals that at the same time, in the industrial context of the post-war period, much attention was paid to attempting to recover what was thought to be the oldest technical tradition of Italian painting: tempera. This development, which followed a mid-19th-century interest in tempera paints, resulted in the production of a wide range of innovative tempera paint formulas. The research in the Maimeri Archives is ongoing as is the recognition of the importance of historical painters' formulas for tempera in the history of Italian art.

APPENDIX: EXCERPTS FROM *NOTEBOOK ON TEMPERA PAINTS* (1949–1951) BY GIANNI MAIMERI, MILAN, FONDAZIONE MAIMERI

As in many writings by Gianni Maimeri, the first draft of the text (on the first 10 folios of the notebook, the others are blank) is followed by later annotations (entitled 'Part B', at the back of the notebook, with new numbered folios). The recipes at the beginning of the notebook are numbered sequentially beginning from 39, thus continuing the sequential numbering of recipes in previous notebooks on oil painting written by Maimeri. Most of the writing in Part B dates from 1950, while the additions are of various dates, continuing up to 10 days before his death in 1951. Many other recipes in this collection were added during the same period by his son, Leone Maimeri; they address the same subjects.

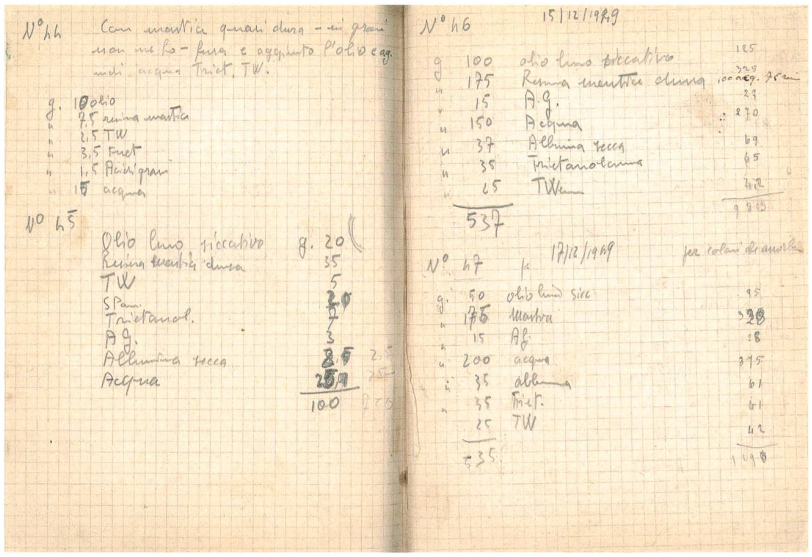
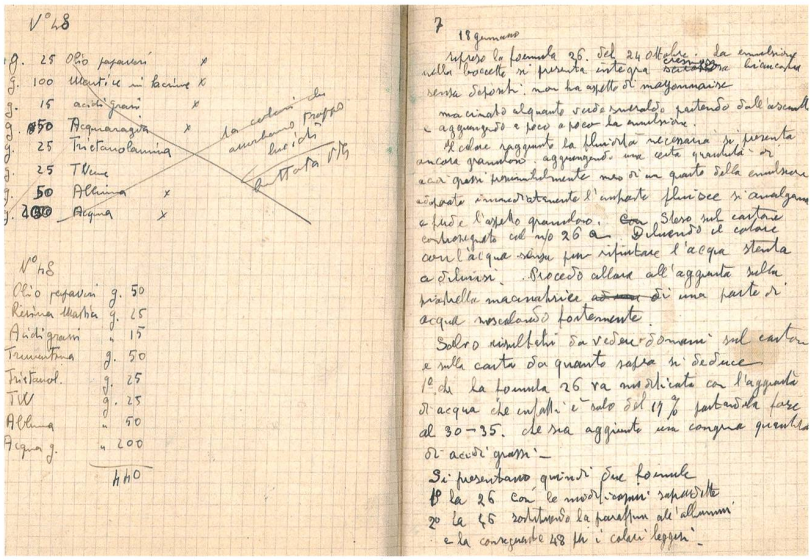
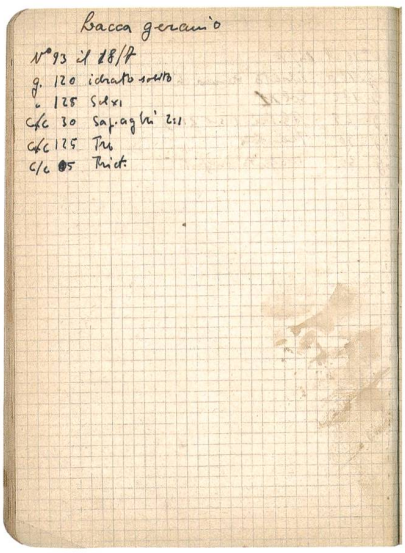


Fig. 5 Maimeri Laboratory Notebook on *Tempera Grassa*, Maimeri Archive, Milan, Part A, folios 3v and 5r (folio 4 is missing).

Fig. 6 Maimeri Laboratory Notebook (as Fig. 5), Part A, folios 5v and 6r.

Fig. 7 Maimeri Laboratory Notebook (as Fig. 5), Part B, folio 20v.





ORIGINAL ITALIAN	TRANSLATION
Lato A *(c. 1v.)*[8]	*Part A* *(folio 1v.)*
N° 39 uovo rosso e albume	N° 39 egg yolk and albumen
N° 40 1/3 uovo rosso 1/3 mastice 1/3 acqua acidulata acido acetico gocce Tw[een][9]	N° 40 1/3 egg yolk 1/3 mastic 1/3 acidulated water acetic acid drops Tween
(c. 2r.)[10]	*(folio 2r.)*
N°1 24/11 [1949] fa schiuma - non si divide g 10 olio g 10 acqua g 2 Tween	N°1 24/11 [1949] produces foam - doesn't separate g 10 oil g 10 water g 2 Tween
N° 2 si divide reazione nettamente alcalina a questa soluzione provo ad aggiungere 1 grammo di acidi oleici g 10 olio g 10 acqua g 10 trietanolamina	N°2 separates, strongly alkaline reaction. I try to add 1 gram of oleic acid to this solution g 10 oil g 10 water g 10 triethanolamine
Prova di ricostruzione di uovo = al[bume]	Attempt at reconstruction of egg = albumen
g 54 Bianco d'uovo " 54 Acqua montato bianco uovo a neve	g 54 Egg white g 54 Water Egg white whipped to stiff peaks
N° 41 PH 6–7 neutro g 15 al[bume] " 21 flatt[ing][11] " 8 tw[een] " 2 fiele " 54 acqua	N° 41 pH 6–7 neutral g 15 albumen g 21 flatting g 8 tween g 2 gall g 54 water
6 gocce Idrato soda al 30%	6 drops sodium hydroxide at 30%
(c. 2v.)[12]	*(folio 2v.)*
Usata albumina sbattuta e diluita al 50% aggiunto prima il tw[een] poi la flatting e l'acqua sbattuta. Il liquido si presenta lattiginoso poco schiumoso. Tende a separare. A parte aggiunto I[a] provetta trietanolamina 2 " span[13] 3 " eccesso tw[een] 4 " più idrato soda.	Albumen beaten and diluted to 50% used tween added first then flatting and water beaten. The liquid looks milky, a little foamy. It has a tendency to separate. Added separately 1st test tube triethanolamine 2nd test tube span 3rd test tube excess tween 4th test tube sodium hydroxide.

A parte preparato colore oltremare (41) a parte aggiunto al colore gocce idrato soda.

N°42 29/11 [1949]
23 Albumina
25 Olio (di cui 1/5 siccativo)
10 Damar
12 Tw[een]
2 Fiele bue
30 Acqua
Fatti grammi 200. La soluzione è ancora molto liquida. In una provetta aggiunto a un po' del N°42 albumina, tw[een] e alcune gocce idrato soda.

(c. 3r.: omissis)

(c. 3v.) (see Fig. 5)

N° 44
Con mastice quasi dura – in grani non ne ho – fusa e aggiunto olio e a[cidi] g[rassi] indi acqua, Triet[anolamina], Tw[een]
g 10 olio
" 7,5 Resina mastice
" 2,5 Tw[een]
" 3,5 Triet[anolamina]
" 1,5 Acidi grassi
" 15 Acqua

N° 45

Resina mastice dura	"	35,0
Tw[een]	"	5,0
Span	"	20,0
Trietanol[amina]	"	7,0
A[cidi] g[rassi]	"	3,0
Albumina secca	"	2,5
Acqua	"	25,0

100.0 *(sic)*

(c. 4: mancante)

(c. 5r) (see Fig. 5)

N°46 15/12/1949

g 100 Olio lino siccativo	185
" 175 Resina mastice dura (100 acq. 75 resina)	325
" 15 A[cidi] g[rassi]	27
" 150 Acqua	270
" 37 Albumina secca	69
" 35 Trietalonamina	65
" 25 Tween	42
" 537	983

Ultramarine pigment prepared separately (41)
drops of sodium hydroxide added to pigment separately.

N°42 29/11 [1949]
23 Albumen
25 Oil (of which 1/5 drying)
10 Dammar
12 Tween
2 Ox gall
30 Water
200 g prepared. The solution is still very liquid. Albumen, tween and a few drops of sodium hydroxide added to a bit of N°42 in a test tube.

(folio 3r. has not been included in this transcription)

(folio 3v.) (see Fig. 5)

N° 44
With mastic that is almost hard – I don't have it in granules – melted and oil added and fatty acids, then water, Triethanolamine, Tween
g 10 oil
g 7.5 Mastic resin
g 2.5 Tween
g 3.5 Triethanolamine
g 1.5 Fatty acids
g 15 Water

N°45

Hard mastic resin	"	35.0
Tw[een]	"	5.0
Span	"	20.0
Triethanolamine	"	7.0
Fatty acids	"	3.0
Dry albumen	"	2.5
Water	"	25.0

100.0 *(sic)*

(folio 4: missing)

(folio 5r) (see Fig. 5)

N°46 15/12/1949

g 100 Drying linseed oil	185
g 175 Hard mastic resin (100 water 75 resin)	325
g 15 Fatty acids	27
g 150 Water	270
g 37 Dry albumen	69
g 35 Triethanolamine	65
g 25 Tween	42
g 537	983

N° 47 17/12/1949
per colori che assorbono

g	50 Olio lino sicc[ativo]	95
"	175 Mastice	328
"	15 A[cidi] g[rassi]	28
"	200 Acqua	375
"	35 Albumina	61
"	35 Triet[anolamina]	61
"	25 Tw[een]	42
"	535	1090 *(sic)*

(c. 5v.)[14] *(see* Fig. 6)

[N° 48
g 25 Olio papaveri
g 100 Mastice in lacrime
g 15 Acidi grassi
g 50 Acquaragia
g 25 Trietanolamina
g 25 Tween
g 50 Albumina
g 200 Acqua]

1ª colori che
assorbono troppo
lucidi
buttata via

N° 48

Olio papaveri	g 50
Resina mastice	g 25
Acidi grassi	" 15
Trementina	g 50
Trietanol[amina]	g 25
Tween	g 25
Albumina	" 50
Acqua	" 200
	440

(c. 6r.)[15] *(see* Fig. 6)

XIV
7
18 gennaio [1950]
ripreso la formula 26 del 24 ottobre. La emulsione nella boccetta si presenta integra sciropposa cremosa biancastra senza depositi: non ha aspetto di mayonnaise. Macinato alquanto verde smeraldo partendo dall'asciutto e aggiungendo a poco a poco la emulsione. Il colore raggiunta la fluidità necessaria si presenta ancora granuloso. Aggiungendo una certa quantità di acidi grassi presumibilmente meno di un quarto della emulsione adoperata immediatamente l'impasto fluisce si amalgama e perde l'aspetto granuloso. Steso sul cartone

N° 47 17/12/ 1949
for absorbent pigments

g	50 Drying linseed oil	95
g	175 Mastic	328
g	15 Fatty acids	28
g	200 Water	375
g	35 Albumen	61
g	35 Triethanolamine	61
g	25 Tween	42
g	535	1090 *(sic)*

(folio 5v.) (see Fig. 6)

[N° 48
g 25 Poppy oil
g 100 Mastic resin in tear drops
g 15 Fatty acids
g 50 White spirit
g 25 Triethanolamine
g 25 Tween
g 50 Albumen
g 200 Water]

first, absorbent pigments
too
shiny
[mixture] thrown out

N° 48

Poppy oil	g 50
Mastic resin	g 25
Fatty acids	g 15
Turpentine	g 50
Triethanolamine	g 25
Tween	g 25
Albumen	g 50
Water	g 200
	440

(folio 6r.) (see Fig. 6)

XIV
7
18 January [1950]
took up formula 26 of 24th October again. The emulsion in the phial appears intact syrupy creamy whitish with no deposits: does not look like mayonnaise. Ground a bit, starting with it dry and gradually adding the emulsion, emerald green. With the required fluidity attained, the colour still appears granular. Adding a certain amount of fatty acids, probably less than a quarter of the emulsion put to use immediately the mixture flows blends and loses the granular appearance. Applied on cardboard marked with No. 26a. Diluting the colour with water with

contrassegnato col n° 26 a. Diluendo il colore con l'acqua senza prima rifiutare l'acqua stenta a diluirsi. Procedo allora all'aggiunta sulla piastrella macinatrice di una parte di acqua mescolando fortemente. Salvo risultati da vedere domani sul cartone e sulla carta da quanto sopra si deduce 1° che la formula 26 va modificata con l'aggiunta di acqua che infatti è solo del 17% portandola forse al 30-35% . Che sia aggiunta una congrua quantità di acidi grassi. / Si presentano quindi le due formule: 1° la 26 si presenta con le modificazioni sopradette
2° la 46 sostituendo la paraffina all'albumina e la conseguente 48 per i colori leggeri.

(c. 6v.)[16]

Preso 50% 26 + 50% acqua e pochi acidi grassi in provetta agitata.

Il giorno dopo la pittura sulla carta e sul cartone sono ancora molli. Le parti sottili sono asciutte quasi opache (leggera lucescenza sulle parti più spesse) e perfettamente insolubili.

(c. 7r.)[17]

1/3/1950 N°1
Bianco titanio
idrato g 0,050 7%
g 5 acidi grassi
Bianco di titanio " 0.250 35%
Litopone " 0,250 35%
Soluzione " 0,170 23%:

" 720

Giallo di cadmio chiaro N°2
giallo cadmio chiaro g 500 + g 5 acidi grassi
soluzione gr 195

" 695 (*sic*)

soluzione:
" 60 Tween
" 50 trietanolamina
" 15 cera
" 25 acidi grassi
" 100 Vernice quadri
" 100 olio (80 + 20 siccativo)
" 150 acqua

soluzione:
60 Tween
20 Trietalonamina
15 Cera
25 Acidi grassi

no initial rejection of the water it is not easily diluted. I then go on to add one part of water on a grinding slab, mixing energetically. Excepting results to be seen tomorrow on cardboard and paper, from the above we can deduce: 1st that formula 26 needs to be modified with the addition of water which is in fact only 17%, bringing it to perhaps 30-35%. That a proportionate quantity of fatty acids should be added. Here is a presentation, therefore, of the two formulae: 1st 26 is put forward with the abovementioned modifications
2nd 46 replacing albumen with paraffin and 48, which comes after, for light colours.

(folio 6v.)

Took 50% 26 + 50% water and a small amount of fatty acids in a test tube, shook.

The day after the painting on paper and cardboard is still wet. The thin parts are dry, almost opaque (slight gloss on the thicker parts) and completely insoluble.

(folio 7r.)

1/3/1950 N°1
Titanium white
[sodium] hydrate g 0.050 7%
g 5 fatty acids
Titanium white g 0.250 35%
Lithopone g 0.250 35%
Solution g 0.170 23%

g 720

Cadmium yellow light No 2
cadmium yellow light g 500 + g 5 fatty acids
solution g 195

" 695 (*sic*)

solution:
g 60 Tween
g 50 triethanolamine
g 15 wax
g 25 fatty acids
g 100 Picture varnish
g 100 oil (80 + 20 drying)
g 150 water

solution:
60 Tween
20 Triethalonamine
15 Wax
25 Fatty acids

100 Vernice quadri
100 Olio
70 Acqua

390

oppure

100 Tween
40 Trietanolamina
140 Cera
70 Acqua
20 Trietanolamina

[15,5 % Tween
5,4 Trietanolamina
3,7 Cera
6,4 Acidi grassi
25,5 Olio
25,5 quadri
18 Acqua]

(c. 7v.)[18]

17/3 [1950]
Soluzione:
60 Tween (25)
20 Trietanolamina
15 Cera
25 Acidi grassi
100 Vernice quadri
100 Olio (20 siccativo)
150 Acqua

470

N°3 Bianco titanio

bianco zinco S0[19]	g 300
bianco titanio	g 300
Soluzione	g 345
acqua	g 125:

1070: (No)[20]

21/3 [1950]
Soluzione:

25 Tween	5,8%
20 Trietanolamina	4,6%
15 Cera	3,5 [oppure 3,7] %
25 Acidi grassi	5,8%
100 Vernice quadri	23,0%
100 Olio papaveri (20% siccativo)	23,0%
150 Acqua	34,0%

435

100 Picture varnish
100 Oil
70 Water

390

or

100 Tween
40 Triethanolamine
140 Wax
70 Water
20 Triethanolamine

[15.5 % Tween
5.4 Triethanolamine
3.7 Wax
6.4 Fatty acids
25.5 Oil
25.5 picture [varnish]
18 Water]

(folio 7v.)

17/3 [1950]
Solution:
60 Tween (25)
20 Triethanolamine
15 Wax
25 Fatty acids
100 Picture varnish
100 Oil (20 drying)
150 Water

470

N°3 Titanium white

zinc white S0	g 300
titanium white	g 300
Solution	g 345
water	g 125:

1070: (No)

21/3 [1950]
Solution:

25 Tween	5.8%
20 Triethanolamine	4.6%
15 Wax	3.5 [or 3.7] %
25 Fatty acids	5.8%
100 Picture varnish	23.0%
100 Poppy oil (20% drying)	23.0%
150 Water	34.0%

435

Soluzione XI
250 Olio siccativo
170 Vernice mastice
170 S1
40 Acidi grassi linolenici
50 Tween

680

Sap.
100 acidi grassi linolenici
80 S 17

Lato B (Retro del taccuino con nuova numerazione delle carte)

(c. Iv. Frontespizio)

Soluzione XI

g 250 Olio siccativo
g 170 vernice mastice
g 170 SI
g 40 acidi grassi linoleici
g 50 Tween

(c.1r.)
I
Emulsioni

Olio lino A	g. 190
olio siccativo	45
cera	35
dammar	105
acquaragia	130
acidi grassi	50/30
tween	50
trietanolamina	30
acqua	300
	935 (*sic*)

II

olio lino A	55
olio siccativo	15
cera	10
dammar	30
acquaragia	40
acidi grassi	8
trietalonamina	3
acqua	75
	236

Solution XI
250 Drying oil
170 Mastic varnish
170 [...]
40 Linoleic acid
50 Tween

680

[...]
100 linoleic acid
80 S 17 [?]

Part B (Back of notebook with new page numbering)

(folio Iv. Frontispiece)

Solution XI

g 250 Drying oil
g 170 mastic varnish
g 170 SI
g 40 linoleic acid
g 50 Tween

(folio 1r.)
I
Emulsions

Linseed oil A	g. 190
drying oil	45
wax	35
dammar	105
white spirit	130
fatty acids	50/30
tween	50
triethanolamine	30
water	300
	935 (*sic*)

II

linseed oil A	55
drying oil	15
wax	10
dammar	30
white spirit	40
fatty acids	8
triethanolamine	3
water	75
	236

III
200 olio
50 olio siccativo
200 vernice mastice
130 acquaragia
120 acidi grassi linolenici
50 tween 20

750

35\40 trietanolamina[21]

(cc. 1v–15: omissis)

(c. 16r.)[22]

XXXVII
Nero avorio
N° 61 il 22/6 [1950]
carbon black g 200
soluzione X g 550
trietanolamina 40
acquaragia 400 circa
sempre gelatinoso, non si smolla mai - molta trietanolamina
buono mettere invece più tween[23]
13/9 Non si scioglie più.

(c. 16v.)[24]

XXXVIII
Lacca viola
N° 59 il 22/6 [1950]
g 200 Idrato
30 violetto Brillant[e] [oppure Brillfast][25]
30 trietanolamina
30 acidi grassi
60 trementina Duro da
[...]
sostituire idrato
con bario e [...][26]

XXXIX
N° 85 il 5/7 [1950]
g 300 silicagel
g 50 violetto Brillfast[27]
g 360 soluzione X
c/c 35 trietanolamina
c/c 75 trementina

III
200 oil
50 drying oil
200 mastic varnish
130 white spirit
120 linoleic acid
50 tween 20

750

35/40 triethanolamine

(folios 1v–15 have not been included in this transcription)

(folio 16r.)

XXXVII
Ivory black
N° 61, on 22/6 [1950]
carbon black g 200
solution X g 550
triethanolamine 40
white spirit circa 400
still gelatinous, it never liquifies - a lot of triethanolamine
good add more tween instead
13/9 It doesn't melt anymore.

(folio 16v.)

XXXVIII
Purple lake
N° 59 on 22/6 [1950]
g 200 [sodium] Hydrate
30 Brilliant or Brillfast violet
30 triethanolamine
30 fatty acids
60 turpentine Hard from
[...]
replace [sodium] hydrate
with barium and [...]

XXXIX
N° 85 on 5/7 [1950]
g 300 silica gel
g 50 Brillfast violet
g 360 solution X
cc [cubic centimetres] 35 triethanolamine
cc 75 turpentine

(c 17r. omissis)

(c. 17v.)[28]

XLI
Ocra gialla
N° 70 il 28/6 [1950]
g 500 amido giallo
" 200 soluzione X
c/c 11 trietanolamina
c/c 75 trementina buono

(cc 18–19; omissis)

(c. 20r.)[29]

XLVI
Lacca Wolframio
N° 91 il 14/7 [1950]
g 150 idrato sodico
g 172 soluzione XI
g 25 acidi grassi Tri[etanolamina] (Sol[uzione] 2:1)
g 90 trementina
g 30 magenta brillant[e] [oppure Brillfast][30] molybdate tungstate phosphate[31]

(c. 20v.)[32]

XLVII
Lacca geranio
N° 93 il 18/7 [1950]
g 120 Idrato sodico
g 125 soluzione XI
c/c 30 Sap. acidi grassi tri[etanolamina] (2:1)
c/c 125 trementina
c/c 5 trietanolamina

(folio 17r has not been included in this transcription)

(folio 17v.)

XLI
Yellow ochre
N° 70 on 28/6 [1950]
g 500 yellow starch
g 200 solution X
cc 11 triethanolamine
cc 75 turpentine good

(folios 18–19 have not been included in this transcription)

(folio 20r.)

XLVI
Tungsten Lake
N° 91 on 14/7 [1950]
g 150 sodium hydroxide
g 172 solution XI
g 25 fatty acids Tri[ethanolamine] (Solution 2:1)
g 90 turpentine
g 30 brilliant or Brillfast magenta phospho-tungsto-molybdic acid salt

(folio 20v.) (see Fig. 7)

XLVII
Geranium lake
N° 93 on 18/7 [1950]
g 120 Sodium hydroxide
g 125 solution XI
cc 30 [...] fatty acids tri[ethanolamine] (2:1)
cc 125 turpentine
cc 5 triethanolamine

ACKNOWLEDGEMENTS

The authors are grateful to Fondazione Maimeri for permission to publish documents and illustrations of the Maimeri family.

1 *'La migliore colla per uso della pittura a tempera è senza dubbio quella 'Totinz' [sic, per Totin] [...] la quale corrisponde appunto ad una colla di ritagli di pergamena e di pelle di guanti come era usata dagli antichi e perciò va preferita a tutte le altre colle odierne e del commercio, unico inconveniente è la mancanza di trasparenza, ma io ho rimediato ad esso filtrando la colla vicino alla stufa per imprimere maggiore scorrevolezza fra i pezzi di carta e ne ottengo una colla trasparentissima'* (Laurenti 1990, p. 80).

2 '*Soluzione di gomma arabica insieme ad una soluzione di gelatina [sic] di semi di lino bollita in acqua e filtrata. Credo meglio ancora sciogliere la gomma arabica in detta soluzione gelatinosa [sic] di semi di lino*' (Laurenti 1990, p. 81).

3 '*Terminato il quadro poi il tutto lo impregno con l'ambra liquefatta*', Mario de Maria, letter to Ugo Ojetti, 14 September, 1912 (Mazzanti 2007, p. 227).

4 Today at the Biblioteca Provinciale in Pescara.

5 '*[...] sono giudicati degni succedanei dei processi a tempera dei vecchi maestri del XV secolo. Questi colori di pimenti 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, panelli di legno, carta, avorio, metallo, stucco, calce, preparati a fondo bianco o oscuro*' (Califano Mundo 1910, p. 47).

6 The information on Hermann Urban's experiments with Böcklin's tempera medium was kindly provided by Eva Reinkowski-Häfner, Munich.

7 '*I nostri tecnici però, abbandonarono ben presto il tentativo di stabilizzare e rendere conservabille una pittura fatta con l'uovo e tralasciavano pure le altre manipolazioni irrazionali a base di albumine, saponi di resina, caseina ed altro [...] Rivolsero invece la loro attenzione al procedimento naturale dell'uovo. Ne studiarono i componenti essenziali in vista del loro potere adesivo ed emulsionante e si convinsero che era possibile rifare la preparazione sinteticamente con procedimento analogico in cui fossero scrupolosamente rispettate le proporzioni dei componenti essenziali dell uovo, interessanti le emulsioni [...] Così tutte le parti solforiche furono scartate e molti principi preziosi in altri campi ma ritardatari del processo chimico a noi interessante. Per gli elementi residui che si riscontrarono indispensabili e caratteristiche del processo emulsivo, si cercò di usare il prodotto sinteticamente puro, o quantomeno di sostituirlo con elementi di stretta analogia. Si arrivò così alla ricostruzione sintetica della parte costitutiva ed essenziale dell'uovo stesso. Valendosi poi della esperienza della pratica di molti predecessori, si aggiunsero con le dovute precauzioni quelle resine che pare che fossero aggiunte anche dagli antichi, che certamente hanno dato decisive prove di bontà nelle tempere moderne. Si potè come ultilissimo risultato, eliminare sia l'inutile aceto, sia la presenza di altri disinfettanti resi ridondanti dalla formula perfettamente asettica preconizzata*' (Maimeri c. 1930/ edn 2010, pp. 46–47).

8 The text is written in pencil (graphite/grey).

9 Although it is named in these notes, it is not certain that Maimeri used Tween since, both before and during the war, international sanctions against Italy mean that surrogate products of varying formulae were manufactured within the country. However, Tween, which was already available on the international market in the 1930s, was certainly smuggled into Italy in this period, possibly from Switzerland, where Carlo Maimeri had studied in Zurich. If he did use Tween, then it is impossible to speculate on the particular type in question; he could have used a mixture of the different Tweens available or possibly test products.

10 See note 8 above.

11 'Flatting' is a term commonly and generically used in Italy for clear varnishes that are particularly water resistant, commonly used on boats and furniture. In the 1920s these varnishes contained varying percentages of hard resins such as copal or castor oil and were usually melted and applied hot. However, it is unclear whether Maimeri is using the term here in a generic or a specific sense. The situation is complicated by the fact that before and during the war, due to international sanctions against Italy, many surrogate products with varying formulae were manufactured within Italy; even after the war, this stock continued to be used and, in addition, products based on synthetically modified organic molecules began to be imported.

12 See note 8 above.

13 Span 20, i.e. Dodecanoic acid.

14 The text is written with a pen in sepia ink.

15 See note 14 above.

16 See note 14 above.

17 See note 14 above.

18 See note 14 above.

19 S0: this indication, from an old Maimeri table of pigments, corresponds to pigment P97, while Zinc white SA corresponds to P96.

20 This word is written in pencil (graphite).

21 The text, from the beginning of the section, is written in pencil (graphite).

22 See note 14 above.

23 See note 8 above.

24 See note 14 above.

25 'Brillant' is presumably miswritten for 'Brillfast', as found in the subsequent recipe, particularly in view of the capital letter.

26 See note 8 above.

27 P64: Brillfast Violet 3165.

28 See note 14 above.

29 See note 14 above.

30 Despite the lack of a capital letter, 'brillant' was probably mistakenly written for 'Brillfast' (see note 25). However, it could also be a slip for 'brillante', in which case it should be translated 'brilliant'.

31 Brillfast Magenta.

32 See note 14 above.