



A technical examination of Odilon Redon's paintings from the Bonger Collection, Van Gogh Museum

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Introduction

In 1996, to put into effect the Preservation of Cultural Patrimony Act, the Dutch State acquired a collection that formed the main body of works once assembled by Andries Bonger (1861-1936). This collection comprises works by only two artists: Odilon Redon (1840-1916) and Emile Bernard (1868-1941). In total, the State acquired 22 paintings, 69 works on paper, 5 embroideries and one decorated mirror frame.¹ As part of the signed agreement, it was decided that this collection was to be kept at the Van Gogh Museum, and that fixed portions of the Bonger collection would be brought to the museum at the beginning of each year. The last consignment of works was transferred in 2004.

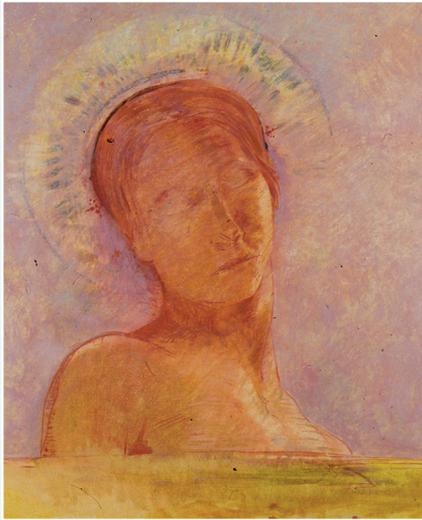


Fig. 1 Au Ciel: *Yeux clos* (1889), Van Gogh Museum, Amsterdam, S 500



Fig. 2 *Tête de femme en profil (Tête de femme pensive)* (1896), S 467



Fig. 3 *Vitrail (Piété près d'un buisson rouge)* (c. 1904), S 473

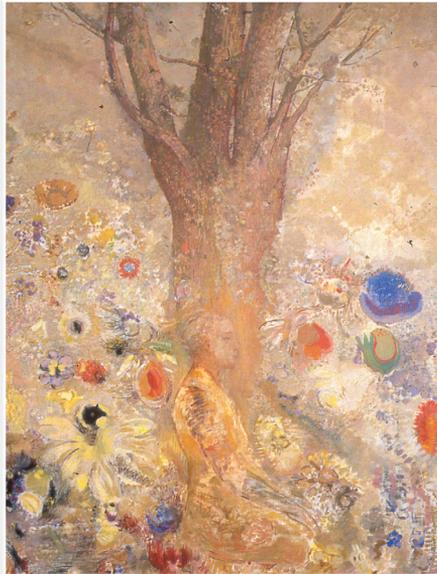


Fig. 4 *Le Bouddha (Jeunesse de Bouddha priant devant la nature)* (1904), S 465

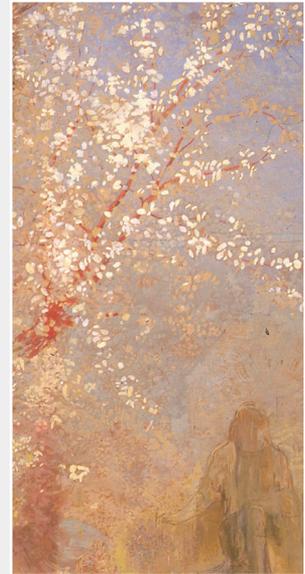


Fig. 5 *L'Arbre rouge* (c. 1905), S 464



Fig. 6 *Femme apparaissant dans un ogive (Arcade gothique, femme cueillant des fleurs)* (c. 1905), S 472

Once all of the collection had become available for examination and conservation treatment in the museum, special attention was paid to the painted works by Redon, resulting in the first focused study of the artist's painting materials and techniques. The only publication available on Redon's materials and techniques so far, which serves as a useful reference for any examination of the artist's oeuvre, focused on his graphic works and discussed his later painted works in the context of his achievements as a draughtsman.² Based on their subject matter, the Redon paintings examined³ can be divided into two separate groups: six symbolist scenes⁴ and six flower still lifes painted between c.1889 and c.1905 (figs. 1-12). All are small-size easel paintings - except for two of the symbolist paintings, *L'Arbre rouge* and *Le Bouddha*. Whereas the easel paintings belong to the type of works for which Redon became increasingly popular with a broader public after 1900, the two compositions mentioned are early examples of the large-scale decorative paintings that the artist painted for a smaller number of private collectors (detailed information on each of the paintings from the Bonger collection concerning a wide range of subjects - such as dimensions, supports, colour of priming, appearance of paint surface, observations made by x-radiography and infrared reflectography is listed in Table 1). The present study is the result of the examination of these twelve paintings by Redon from the Bonger collection. It aims to augment our knowledge of this particular part of the artist's oeuvre, based both on visual examination of the paintings themselves and on analyses of a select number of paint samples using a variety of analytical techniques, such as light microscopy and Scanning Electron Microscope Energy-Dispersive X-ray spectroscopy (SEM-EDX) on paint cross sections, Fourier Transform Infrared Analysis (FTIR), Gas Chromatography-Mass Spectrometry (GC-MS) and High Performance Liquid Chromatography (HPLC) on other samples. Results of the observations on paint cross sections, as well as the analyses of results from priming and paint samples, and detailed information on the analytical techniques, are listed in Tables 2 (Primings - Pigments and Binding Media) and 3 (Paints - Pigments and Binding Media Selected Samples). The works of the Bonger collection are especially interesting, since their condition has generally remained very good and only a few interventions have been performed on them.⁵

The artist and the patron

Odilon Redon devoted the first two decades of his career (early 1860s until around 1880) mainly to becoming an

accomplished draughtsman. Most prominent in the drawings from this period is the use of charcoal, although combinations with other black drawing materials have been found. The production of these drawings, or *noirs*, has been linked to the growing popularity of black drawing materials during the second half of the century, their acceptance in academic circles as independent works of art, and the introduction on the market of new charcoal-based drawing materials.⁶ By 1880 Redon's use of different types of charcoal, black chalk, pastel, black crayon and graphite had developed into a mature and innovative manner of applying and manipulating (including wiping, incising, stumping and erasing) these materials, which resulted in a wide range of different tones of blacks and greys in each drawing. Besides the impact of the drawing materials, the overall colour effect of the *noirs* was greatly influenced by the artist's choice of coloured papers, and by the deliberate use of resinous fixatives that would turn golden in the course of time.⁷ Contrary to what their name suggests, Redon's choice of drawing materials and techniques for his *noirs* makes quite clear that he did not consider them to be just works in black and white, but rather chromatic works.

Although graphic techniques dominate Redon's oeuvre from around 1860 to 1880, he did paint some smaller landscapes on occasion, as well as still lifes and symbolist scenes on canvas, panel and paper alike. A few pastels are also known from the early years. However, it was only during the last decade of the century that additional pigments other than carbon black pigments came to play an important role in his graphic work, and he started to work more regularly with different paint media. In fact, the growing importance of painting in his oeuvre after 1890 represents the final stage of Redon's gradual shift to colour applied in drawing materials and paint media: from the turn of the century the artist rarely worked in black. In a letter written to his friend Maurice Fabre in 1902, Redon noted that he could no longer succeed in making a black drawing as he used to, and that he had completely abandoned charcoal. Also, he considered working with new materials as a means of survival, and that his rejection of black drawing materials caused him to devote himself completely to using colour: '[...] I tried to make a charcoal drawing like in past times: impossible, it was a break with charcoal. In fact, we can only survive thanks to new materials. Since, I am wedded to colour.'⁸

This shift in interest had taken place over several years, and when Bonger started collecting the artist's works after 1892, he not only included Redon's already well

known noirs from the previous decades, but also more recent pastels and paintings. Most of the works Bonger acquired had been finished only the year before at most, and hence represent the working methods of the artist around the turn of the century.

Andries Bonger lived in Paris from 1879 to 1892, after his initial training in Holland and Germany to become an insurance expert. There he became acquainted with Theo van Gogh in 1881 and his brother, Vincent, in 1886. Theo van Gogh almost certainly introduced him to Emile Bernard at Vincent's funeral in 1890. Through Bernard, Bonger also met Odilon Redon in the same year. After his return to the Netherlands in 1892, while cultivating a successful career as a marine insurance expert, Bonger started to collect modern French art with a strong preference for the works of Redon and Bernard. His relationship with Redon especially was developed from the traditional association of artist-patron into a heartfelt friendship, to which their year-long correspondence testifies. At the time of Redon's death in 1916 Bonger had acquired almost the complete printed oeuvre as well as some 50 paintings, pastels and drawings by the artist.

Materials and technique

Supports and primings (See Tables 1 and 2)

Prior to the 1880s, the few paintings Redon made do not demonstrate a preference for a particular type of support. However, as his attention towards painting increased over the years, it seems that Redon did come to prefer specific supports and primings for certain works. For example, a striking number of the Breton beach scenes, landscapes and villages from the 1880s, were painted on cardboard and small size panels with textured grounds⁹ whereas the majority of the flower still lifes that Redon executed around the turn of the century were painted on canvas.

The works examined as part of this study were all painted on fabric supports, except for two of the symbolist scenes, *Au ciel: Yeux clos* (1889) and *Tête de femme* (1896). These paintings, the oldest (meaning with the earliest date of execution) in the Bonger collection examined, were executed on primed wove, orange-coloured and coarse paper, or on poor quality cardboard respectively. Neither cardboard nor paper were chosen by Redon as support for his painted works after the early 1890s however, whereas paper remained his almost exclusive support material for his pastels.

The canvases (probably linen) used for the symbolist

compositions and *Fleurs dans une coupe* seem to originate from the same type of regular and tightly woven good quality fabrics; the supports of the two large decorative scenes, *L'Arbre rouge* (c. 1905) and *Le Bouddha* (c. 1904), were also very similar.¹⁰ The pre-stretched, commercially primed canvases Redon used for the other still lifes show a wider range of fabrics that vary considerably in weight, thread count and quality.

All supports have remained in good condition. The support of one of the two large decorative scenes, *L'Arbre rouge*, shows a darkening of the unprimed fabric on the front where it was deliberately left exposed during the painting process – thereby changing the total colour effect of the painting over the course of time.¹¹

Both unprimed and primed canvases are present in the Bonger collection, the primings being either commercially manufactured or made by the artist. Redon applied a bright white, even, thin and very matt priming for *Le Bouddha*, shown by analyses to contain chalk with possibly animal glue as its binding medium. A distinctly different type of artist-prepared priming was found on *Vitrail* (c. 1904). This latter type is opaque, often applied locally and with a colour that varies from a cool light grey to a warmer beige-grey. Its most distinct feature is a very porous and uneven texture; the countless holes in the paint surface typical for paints or priming with an aqueous binding medium (figs. 13a-b). A sample taken from the priming of *Vitrail* showed it to contain chalk, zinc white, umber, bone black and yellow ochre, and as its vehicle a protein-based medium, possibly animal glue. The low amounts of oil identified in this ground layer may be explained by oil absorbed from the oil paint applied on the priming. In at least one other case, *Fleurs dans une coupe* (c. 1905), it seems that the opacity of the priming was used to cover up (albeit partially) a rejected composition that had been painted directly on to the canvas.¹²

It is not known if Redon learnt about this particular type of priming through his own experimentation. The introduction of it in his oeuvre most certainly ran parallel with the artist's use of aqueous media for larger decorative works, which will be discussed below. Such a priming would combine quick drying properties and an ability to absorb any excess oil medium helping to create a matt surface resembling pastel. In the examples examined, the paint layers on top were thick enough to cover the irregular texture of the priming.

Most of the cross sections taken from the commercially manufactured primings found on other examples in the



Fig. 7 *Coquelicots et anémones* (1900), S 484



Fig. 8 *Vision (Fleurs dans une vase de Marie Botkin)* (1900), S 470

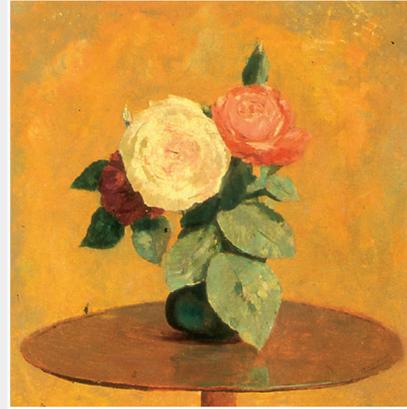


Fig. 9 *Roses dans une vase sur guéridon* (1901), S 468



Fig. 10 *Le lilas blanc* (c. 1902), S 469



Fig. 11 *Fleurs dans une coupe* (c. 1905), S 471



Fig. 12 *Vase de fleurs sur fond bleu* (c. 1905), S 474

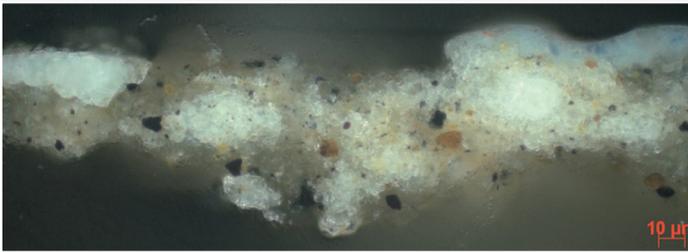


Fig. 13 b Cross section of priming of Vitrail

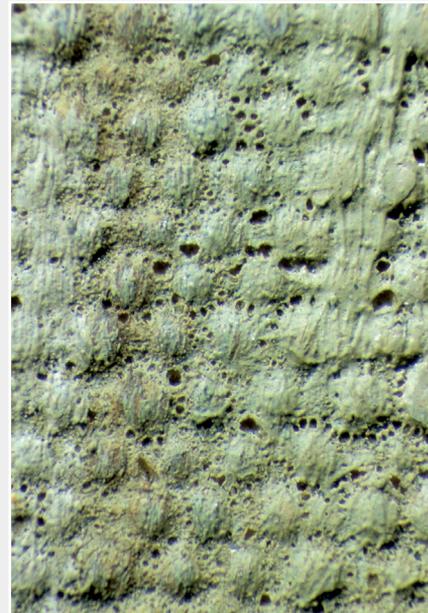


Fig. 13 a Holes in the self-made priming of Vitrail



Fig. 14 Stamp of the shop of René Beauboeuf, Paris, at the backside of Vase de fleurs sur fond bleu

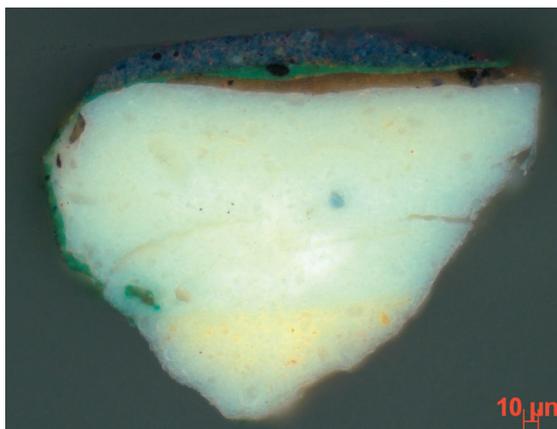
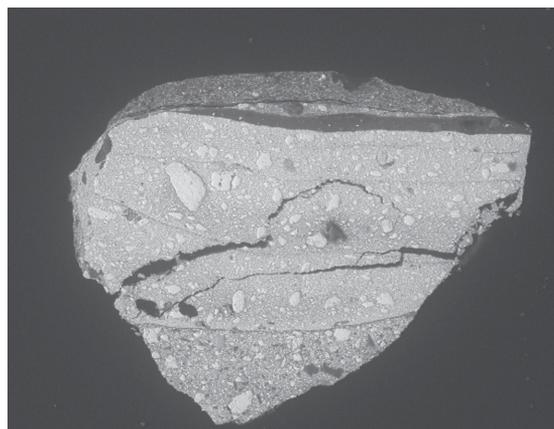


Fig. 15 a Cross section of Vase de fleurs sur fond bleu - bright field image

Fig. 15 b Idem - backscattered image (SEM-EDX)



collection show multi-layer systems, that contain different mixtures of mainly lead white, partially mixed with zinc white, chalk, gypsum or barium sulphate as well as small amounts of yellow ochre, iron oxide, umber or bone black that give the primings a certain off-white hue. For *Vase de fleurs sur fond bleu* (painted c. 1905 on a pre-stretched standard size nr. 8 *paysage bas* canvas from the shop of René Beauboeuf, Paris. fig. 14), there is a sequence of four priming layers, starting with a very matt, dull orange coloured thin layer that contains lead white, chalk or gypsum, barium sulphate and yellowish iron oxide, followed by three thicker priming layers with lead white in drying oil as their main component.¹³ The cross sections show that its priming layers are quite homogenous in composition, and that they must have been applied with sufficient drying time in between. The surface of the last priming layer of this painting is very smooth (figs. 15a-b). In contrast, the small flower still life, *Coquelicots et anémones* (painted c. 1900 on a standard size nr. 4 *portrait* canvas, now wax-resin lined) also has a commercial priming but with a different composition and manner of application: the priming layers of this work contain lead white, some barium sulphate

and yellow iron oxides in a drying oil medium which have obviously been applied wet-in-wet. None of the commercial primings Redon used had been pre-sanded or otherwise treated to make them more absorbent for painting.

A distinction can be made between the works painted on commercially prepared canvases, chosen for the flower still lifes, and the self-made primings that Redon seems to have preferred for the more imaginative symbolist scenes. For most of the examples in the Bonger collection the artist chose commercially primed, pre-stretched canvases for the flower still lifes, a type of work that had met with such a favourable response from both critics and collectors after the turn of the century. These could be bought ready-made at any of the colourmen in Paris.¹⁴ Finally it should be noted that Redon's preference for a particular type of priming seems to have been directed first and foremost by a need for smooth or textured surfaces, rather than by colour. In all the paintings examined the artist effectively covered both commercial and self-made primings with opaque paints, so that their colours were not used in the final colour

scheme of the compositions, with the exception of the white priming present on *Le Bouddha*.

Binding media and matt surfaces (See Tables 1 and 3)

• Distemper

In his painted works Redon looked for ways to achieve matt surface effects similar to those created in his noirs and pastels. With the exception of the paintings made in the earliest years of his career, it is clear that he came to prefer unvarnished paint surfaces, in particular after 1890. This is well illustrated by some works that have never been treated before: *Vitrail*, *Vision* and *Fleurs dans une coupe*, as well as the two large decorative paintings *Le Bouddha* and *L'Arbre rouge* still have their matt, unvarnished surfaces. This contrasts with the lined works, which have a more saturated surface – in spite of recent restoration treatments. In a letter to Bonger, Redon stated his preference for glazing certain high key paintings (*peinture claire*), in spite of what he felt was a negative response to it from Parisian art dealers:

‘Furthermore, I also believe that the use of glass for my paintings, is good, observe this well. In Paris, people have reacted against this practice, I believe that this refusal originates mainly from the art dealer. I persist to feel that glazing flatters bright painting, the kind that aims at a rather spiritual impression.’¹⁵ The *Fleurs dans une coupe* may very well be one of such paintings, as it was glazed in its original frame when it came to the museum in 2000; no surface dirt or grime was found imbedded in the matt, lean oil paint surface. A further letter, mentioning different aqueous binding media, such as distemper (animal glue, also known as *peinture à la colle*), gouache and a material called ‘aoline’, provides evidence for the artist’s interest in matt paint surfaces.¹⁶

At the end of the century Redon had become familiar with the technique of distemper under the influence of a younger generation of avant-garde artists such as Édouard Vuillard, Pierre Bonnard and Maurice Denis. These artists, known as the Nabis, were very skilled in using distemper for their large-scale panels and folding screens, and the aesthetics of this matt paint were considered very suitable to imitate traditional wall paintings. Also, distemper paints were thought to be stable and to offer some important advantages to oils, such as quick drying times and the ability to keep their colour in the course of time and not turn yellow.¹⁷

Analyses of paint samples taken from the Bonger paintings have shown that Redon used drying oils for his smaller easel paintings and that animal glue was present in his self-made primings (as explained above) as well as

in the paint of the larger decorative painting *L'Arbre rouge*. The areas painted with distemper in Redon’s paintings can be typified by a very matt, almost powdery surface, countless round holes and a porous character. The pastel-like texture lacks the characteristic saturation of oil paints. These phenomena were observed both in *L'Arbre rouge* and *Le Bouddha*, however. Rather puzzlingly, no evidence of a proteinaceous binder such as animal glue was found in the latter. It is not clear whether analyses were anomalously done on occasional oil brush strokes or if in fact in this case Redon achieved a comparable matt, dry effect using oil paint or an emulsion paint on the very absorbent chalk/glue priming.

Both paintings, however, reveal the speed and dexterity that distemper as a medium requires; only useable when liquid and warm, the animal glue mixed with dry pigments needs to be applied quickly before the glue cools, the water swiftly evaporates and the paint turns to a gelatinous state. Once applied, distemper brushstrokes are not easily modified, in marked contrast to those consisting of slower drying oil paints where wet-in-wet working is possible. With distemper, changes are generally made by overpainting with a new distemper layer.¹⁸ Such technical restrictions combined with the apparent absence of preparatory sketches or underdrawings for *L'Arbre rouge* show how well Redon had managed to master this material.

In a letter to Bonger, dated 18 December 1905, the artist summed up his proficiency, the appeal of working with this particular medium and the positive effects of its ageing: ‘...It [distemper] demands, according to me, complete spontaneity of improvisation and of the first design. In this case it results in a remarkable material...; I found it [a distemper screen Redon had painted earlier] softened and perhaps more harmonious; time adds to it something which completes these plain substances, more than oils do.’¹⁹

Although some *pentimenti* were found in the lower half of *L'Arbre rouge*, and the base of the red tree and the kneeling enigmatic figure at the right were covered by larger areas of beige colour and light petals, Redon remained faithful to the initial idea he must have had when he started to paint.²⁰ The existence of a well formed idea and a confidence in achieving certain effects is shown for example in the sequence of paint layers present in the light blue sky area: large areas of monochrome light blue were applied first, leaving exposed certain parts of the canvas where, only in a later phase, the larger red tree branches and white and pink petals were to be painted. Another sign of the rapidity with which hot glue and dry pigments were mixed shortly

before applying to the canvas, is the existence of many large chunks of pigment particles stuck in the paint surface as a result of their insufficient dispersion in the paint medium (figs. 16a-b). This is clearly visible in the white and pink petals especially (shown by HPLC-analyses to consist of Kopp's purpurin; see Table 3, note 4), as well as in beige areas in the lower half of the composition, where large accumulations of bright yellow pigment particles are visible. It is reasonable to assume that Redon did not prepare his colours in advance by mixing them in separate containers with heated glue, but rather dipped his brush with medium in mounds of dry pigment before mixing them and applying them onto the canvas, as a passage in a letter to Bonger suggests.²¹ Although the subject matter and genre of *Le Bouddha* closely resemble those of *L'Arbre rouge*, the former shows some distinct differences in technique and materials. This includes the very thin, white, artist-applied priming - parts of which were left uncovered by paint -, which was mentioned above. In the areas left exposed, thin outlines of a preparatory drawing (probably made with black chalk) can be seen in some of the flowers. No major changes in composition of *Le Bouddha* were found, except for two smaller tree branches that Redon over-painted at a later stage. The figure of the young Buddha was swiftly drawn with thin red-brown outlines. His dress was then roughly indicated with golden tones, set off with black and greyish brushstrokes, leaving parts of the priming uncovered. To the right and left of the seated figure he painted multiple flower-like objects that seem to float in the air. Some of these were executed in soft greys, pinks and yellows that match the colours used for the kneeling figure and the tree. More prominent are the unusual forms executed in bold contrasting colours: red and green, blue and red, purple and green-blue (fig. 17). None of the floral forms can be identified and the bright coloured ones especially seem to have been inspired by microscopic observation of vegetal and animal marine life.²² Some colours used in *Le Bouddha*, such as pale yellows, light greys and dark pinks, show the typical surface effects of distemper described above, but analyses of paint samples performed so far could not confirm the presence of distemper as a binding medium, nor of a tempera-like medium. However, the light pink impastoed highlights that were added in the tree at the final stage of the painting process show a softly saturated surface that is usually associated with oil paints and it is clearly distinguishable from the very matt, porous texture of other parts of the composition. Clearly, Redon did not hesitate to use different media to achieve his pictorial goals.

- Oil (tables 2 and 3)

All other paintings present in the Bonger collection were painted with paints of a large variety of pigments ground in drying oils, probably linseed oil. As with the distemper paintings Redon wanted his oil paintings to be left unvarnished and have matt surfaces. Whether this was achieved by adding a matting agent to the paints or by extracting oil from them by absorption of the medium on paper and diluting these with turpentine (known as *peinture à l'essence*)²³, is still unclear. The analyses of paint samples of Redon's paintings available so far do not demonstrate the use of a matting agent (such as beeswax). One of Redon's oil paintings, *Au Ciel: Yeux clos*, shows the matt surfaces, high key colour schemes and use of transparent, watercolour-like paint layers usually indicative of *essence* painting (fig. 18). It is tempting to suggest that the artist was familiar with this particular technique.

- Paint defects

Observation under magnification has demonstrated that in some of the paint surfaces, limited to certain colours, small crater-like holes have formed, as well as globular, waxy forms protruding from underneath paint layers. Such paint film defects, discussed elsewhere in several technical studies, are now labelled 'protrusions' or 'aggregates'.²⁴ Very similar crater-like defects with typical raised soft edges have now also been found on one of the lined still lifes, *Coquelicots et anémones*, as well as in the unlined *Femme apparaissant dans un ogive*. Waxy, semi-transparent material protruding from underlying layers was found on parts of the unlined *Fleurs dans une coupe* (fig. 19) and *Vase de fleurs sur fond bleu*. It is yet unclear if the defects on these different paintings are related to the same cause and if the protruding materials found on the paintings mentioned are related to the formation of metal soaps. There seems to be no link to a specific type of priming; the defects occur on both commercially manufactured oil-based primings and even on one of the paintings with a porous self-made priming. The presence of poor quality lead or zinc white in both types of primings and in paint layers on top of them may have played a role, as well as the unstable environment of private homes these works were kept in. It is striking that these defects can be linked to limited areas where certain colours have been used. FTIR-analysis of waxy material, taken from an underlying layer of the black vase in *Fleurs dans une coupe*, proved to contain zinc carboxylate (see Table 3). The paint layers from which the protrusions and crater-like holes are likely to have been formed will be subject of further research.

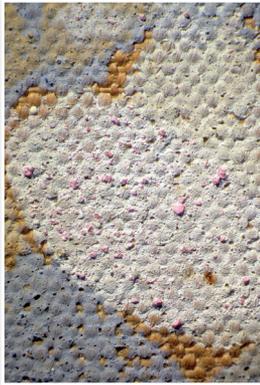


Fig. 16a Large chunks of pink pigment imbedded in the surface of *L'Arbre rouge*

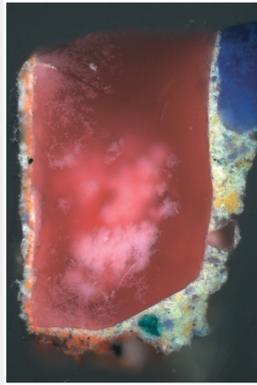


Fig. 16b Cross section of *L'Arbre rouge* showing agglomerate of Kopp's purpurine



Fig. 17 Green-red figure in foreground of *Le Bouddha*



Fig. 18 Transparent, watercolour-like paint layers in *Au Ciel: Yeux clos*

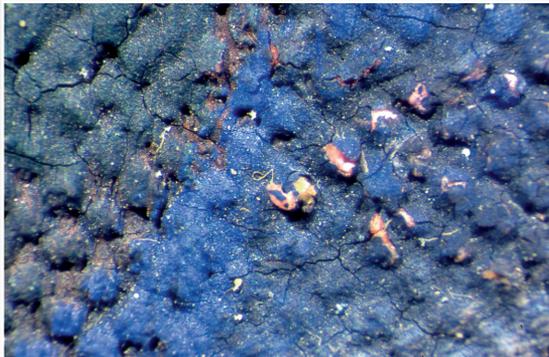


Fig. 19 'Protrusions' present in *black-blue vase of Fleurs dans une coupe*

Fig. 20 Stretching borders of *Fleurs dans une coupe* showing lines belonging to an unidentified composition



Painting techniques

• Form

In none of the works examined did Redon use realistic passages of light and shadow, nor did he work with opaque and transparent colours to suggest volumes and atmospheric effects as traditional contemporary practice still dictated. Instead, larger areas such as leaves, vases and backgrounds were painted showing only subtle tonal transitions, and highlights were rarely applied. The backgrounds in particular were often blocked in by blending colours wet-in-wet, resulting in indistinct, halo-like forms. The opacity and graphic effects of distemper paints were used to full effect in large parts of

the *L'Arbre rouge* and *Le Bouddha*, however the other symbolist compositions and flower still lifes, executed in oils, also show the same lack of depth and natural atmospheric effects. In those flower still lifes, seemingly based on actual bouquets, the light direction is unclear, and the vases appear to float against the background, on or just above a table top. In some cases *pentimenti* along the edges of the bouquets show how smaller changes were made to the composition in the final stage of painting the background by covering individual stems and flowers.

As can be expected from an artist who had devoted so many years to perfecting his drawing skills, elements of the latter appear also in his painted work. The most

obvious example of this phenomenon is *Au Ciel: Yeux clos*, which was executed on paper. Large parts of the composition, including the background, foreground and flesh tones of the figure are composed of thin washes of diluted, loosely applied paint. In stark contrast, both dark red contours and hatched shadows of the figure were drawn with a thin brush. The figures in other symbolist scenes such as *L'Arbre rouge*, *Le Bouddha*, *Vitrail* and *Femme apparaissant dans un ogive* (c. 1905) were painted in similar fashion consisting of little more than fine outlines, drawn with thin brushes.

After comparing the paint surfaces on both primed and unprimed supports used by Redon, it seems fair to conclude that the artist did not seek to use the texture of either the unprimed canvas support, nor the smoothness of the commercially primed ones. It is striking to notice Redon's tendency to reduce the dimensions of an already painted support at some point during the painting process, thereby changing the composition to some (varying) extent. In some cases, Redon continued to work on a canvas after re-stretching it. In several paintings, such as *Le lilas blanc* (c. 1902), *Roses dans une vase sur guéridon* (1901), *Vitrail* and *Le Bouddha*, the paint layers continue onto the present tacking edges. The *Roses* still life is the only painting examined from which we know its original size before the artist decided to cut it down. In a letter written to Bonger, Redon mentioned it as a 'toile 8 coupée', the number referring to the standard size pre-stretched fabric support (46 x 38 cm) available at artist's materials shops.²⁵

Some canvases were used more than once, showing different possibly unfinished compositions beneath the present one. For example, the tacking edges of *Fleurs dans une coupe* as well as small openings in surface paint layers, show different red, blue, ochre-coloured lines of an unidentified composition painted directly onto the canvas (fig. 20). The canvas must have been larger when these were painted, but for some unknown reason Redon decided to reduce the fabric and paint the present composition. Two rows of pinholes found along the present bottom edge of this painting (with paint from the flower still life flowing into them) suggest that the support had been mounted onto another working frame or even a rigid support before it was mounted on the current stretcher. Paint from the present composition has flowed over the edges of these holes. One may conclude that Redon often regarded the size of a support as just a starting point, after which it could be cut, changed and re-stretched and the paint surface

reworked according to new insight. Comparison of the tacking margins and the front of *Vitrail* for example shows that Redon finished the sky and the sea-like area on the foreground after restretching the canvas on its present stretching frame.

Next to these changes in size, the motifs themselves were also subject to variations during the painting process, the symbolist scenes more so than the flower still lifes. Whereas the flower still lifes examined disclose a more straightforward succession of different sessions performed to complete them, with only minor pentimenti in parts of the bouquets or vases, the symbolist paintings show a much more gradual development of an initial idea into its final form. The 'un-academic' sequence of layers, the application of patches of closely resembling hues, slowly filling in the entire surface with parallel hatch-like brushstrokes or blending adjoining passages with repetitive, almost circular brushstrokes, confirm Redon's tendency to develop his initial concept during the painting process until a satisfactory result was achieved.²⁶

• Colour

As described above, the colour schemes of most paintings examined do not show any deliberate use of the unprimed support or of a priming. There are exceptions however, including *L'Arbre rouge*, where the colour and texture of the fabric support in the tree and sky areas were left visible, and *Le Bouddha*, where the white priming is left showing in large parts of the lower half of the composition. A more subtle but evident impact from the priming is seen with the warm cream coloured priming on *Au Ciel: Yeux clos* and the light commercial priming of *Vision*, which evidently influence the all over colour effects. All other paintings, primed or unprimed, were covered with opaque colours. Although most layers remained rather thin, their hiding power was enhanced by mixing the paints with zinc and/or lead white. Examination of the paint layers indicate that for his oil paintings Redon used tube colours, all of which were readily available at the time. A wide range of pigments was found in his paintings, with combinations of both traditional ones such as lead white, earth colours, carbon and bone black, and pigments that had become available only in the second half of the nineteenth century such as cobalt violet light (cobalt arsenate) and dark (cobalt phosphate), Kopp's purpurine and zinc chromate (see Table 3). Most of the layers examined show complex mixtures of these different kinds of pigments, virtually none of them are composed of just one pigment. Redon

clearly prepared these mixtures on his palette; the complexity of the mixtures found in the cross sections must have been a deliberate attempt to achieve a certain desired hue. This is found to be true for both underlying and top layers. Although tube paints were often composed of mixtures of pigments, the paints studied here proved to be much more complex mixtures. Most of the backgrounds of the still lifes were composed of soft blue greys, yellows and pinks, with nuances of mauve, ochre and orange. These tones were blended on the surface when still wet, creating smooth areas with no distinct features. The vases, with clear outlines, were composed of various shades of bright and dark greens, blues, blacks and browns. In contrast to this, the individual flowers (though not examined by means of microscopy) generally show the use of bolder colours in which one pigment seems to be dominant (for example, bright red for poppies, yellow for daffodils and white for marigolds), with smaller amounts of other pigments for the shadows of petals.

The pigment mixtures analysed from *L'Arbre rouge* and *Le Bouddha*, the former painted exclusively, the latter probably in parts, with dry pigments and distemper, also include different amounts of chalk and barium sulphate. This last pigment was not used as a substrate for organic red lake, but may have been included (as well as chalk) for its filling properties.

Conclusion

The technical examination of 12 paintings by Odilon Redon in the Bongor collection (all painted between c. 1889 and c. 1905) provided new insights into Redon's painted oeuvre after 1890.

Certain elements found in the artist's drawing techniques can be found in his paintings discussed above, the most notable of which are the thinly applied, water-colour-like paints, their matt finish traditionally associated with pastels, the high key colour schemes and the use of finely drawn lines. Examples of these are *Au Ciel: Yeux Clos*, *Vitrail*, *Fleurs dans une coupe* and *Vision*, which still show a matt finish traditionally associated with pastels. These matt surfaces were achieved by a combination of techniques and materials, either by extracting medium from the tube paints, by diluting his paints with turpentine, by using an absorbing (self-made) priming, or by using a combination of these techniques. Also, the animal glue based paints applied in the large decorative symbolist paintings (although the presence of this type of medium was not confirmed by analysis for *Le Bouddha*) are characterised by their matt, almost powdery appearance. None of the paintings examined show the use of impastoed brushstrokes or otherwise textured paint surfaces. Thicker paints only occur in the shape of small highlights or dot-like accents added at the final stage of the painting process.

The formation of 'protrusions' in some of his oil paintings is not yet understood and needs to be examined further.

It was noticed that Redon had a tendency to reuse canvases for a new composition or change the size of a support during the painting process. In most of these cases, the artist developed his pictorial idea further until the end of the final stage, as he continued to make subtle yet important changes in the composition or colour schemes after re-stretching. As Redon wrote on the results of this search: 'every work is but the incidence of a long quest.'²⁷

Table 1 Redon Paintings Bonger Collection - General Technical Information

Title, dimensions, date, inv. no., W no.¹	Support²	Priming, C/S³	Appearance of paint surface	X-ray⁴	IRR⁵	Other related works by Redon
Au Ciel: Yeux clos, 45 x 35. Signed I.L., 1889. S 500 N/1996, W 475	Dull orange coloured wove paper. Black lines were drawn with a ruler on three sides to mark the size of the matting after painting. Label provider original matting on backside backing board.⁶	Cream coloured priming, probably C.	Varnished. Most colours consist of diluted paints (see text); very thin paint layers.	-	No underdrawing detected.	First version of this theme. Other versions on paper, cardboard or canvas, W 468-478.
Tête de femme en profil (Tête de femme pensive), 27.7 x 25.5. Signed I.L., 1896. S 467 N/1996, W 237	Dark grey coarse cardboard [c. 0.5 cm thick].⁷ Top, bottom and right side have been cut after painting.	Unprimed	Unvarnished after varnish removal 1999-2000. Opaque colours, thickly applied.	No particular features	Underdrawing (pencil?) of contours face and body, eyes, halo around head, hatchings along contour head, diagonal cross lines through whole composition.	Size almost identical to Profil, W 259 [1989 Christie's New York]. Except for one, all 'profils droits' were made in pastel, crayon, charcoal and/or watercolour on paper.
Vitraill (Piété près d'un buisson rouge), 73.5 x 50.5. Signed I.L., c. 1904. S 473 N/1996, W 647	Canvas (unlined). Standard size⁸ nr. 20 marine haute. Thread count: 12.4 x 18.1. Stamp on stretcher.⁹	Greyish priming, S.	Composition expands on right side, cut during painting process. Painting finished after present stretching.¹⁰ Traces use palette knife. Very matt surface, the porous priming visible in very small areas. Unvarnished.	-	No underdrawing detected.	Priming closely resembles that of Panneau décoratif [RM Twenthe, Enschede].
Le Bouddha (Jeunesse de Bouddha priant devant la nature), 159.6 x 120.5. Signed I.L., c. 1904. S 465 N/1996, W 681	Canvas (unlined). Thread count: 16.0 x 13.0.	White, matt priming, S.¹²	Very porous and matt surface. Some paint strokes more glossy. Composition expands on top stretching border. Priming left visible in many areas of bottom half of the painting. Unvarnished.	-	-	Frame identical to L'Arbre rouge, this consists of four pieces of uncoated walnut wood, screwed on every side of the stretcher, "un cache clous noyer naturel".¹³ The frame is very simple and flat, it was designed also to hang the painting as close to the wall as possible. This type of frame was preferred by Redon for his larger decorative works.¹⁴
L'Arbre rouge, 174 x 89.5. Signed I.L., c. 1905. S 464 N/1996, W 680	Canvas (unlined). Thread count: 14.0 x 17.0.	Unprimed	Very porous and matt surface. Unprimed support left visible mostly in tree and sky area. Unvarnished.	-	-	Support, paint surface and frame closely resemble those of Panneau décoratif [see above].¹
Femme apparaissant dans un ogive (Arcade gothique, femme cueillant des fleurs), 43.5 x 61. Signed I.L. and Lr. [partially on stretching border], c. 1905. S 472 N/1996, W 352	Canvas (unlined). Standard size nr. 12 paysage basse. Thread count: 16.6 x 13.0. Top and right stretching borders cut after painting.	Unprimed	Traces use palette knife. Probably begun as two different compositions, to be separated later. Protrusions¹⁵ beige right foreground. Unvarnished after varnish removal 1999-2000.	-	No underdrawing detected.	Profile at the right side closely resembles that of Redon's drawings of his son Art, especially W nr. 32 [Musée des Beaux-Arts, Dijon], W nr. 36 [Musée du Louvre, Paris]. Frame smaller version of the ones of L'Arbre rouge, Le Bouddha and Panneau décoratif.
Coquelicots et anémones, 32.5 x 24.5. Signed I.L., 1900. S 484 N/1996, W 1616	Canvas (lined). Standard size nr. 4 portrait. Thread count: 15.3 x 14.7.	Whitish priming, C.	Protrusions. Surface consists of thickly applied, opaque colours. Unvarnished after varnish removal 2003.	A composition of earlier painting, unidentified	No underdrawing detected.	-
Vision (Fleurs dans une vase de Marie Botkin), 73.0 x 60.0. Signed Lr., 1900. S 470 N/1996, W 1531	Canvas (unlined). Standard size nr. 20 portrait. Thread count: 13.0 x 12.0.	Whitish priming, C.	Matt paint surface. Colours retained their saturation. Unvarnished, but for part of the vase. Uncertain is this is original or not.	-	No underdrawing detected.	Size canvas also used for Vase de fleurs, W 1522 [c. 1905, Cleveland Museum of Art; Une vase de fleurs, genets jaunes, pivoines W 1526 [acquired by Bonger in 1902, now private collection]. Frame of this still life and Vision identical to that of Fleurs dans une vase bleu, W 1613 [private collection], as shown on contemporary photographs. This Botkin vase was also used for W 1526-1536.
Roses dans une vase sur guéridon, 39.7 x 37. Signed I.L. [on table top], 1901. S 468 N/1996, W 1605	Canvas (lined). Cut during painting process along bottom edge. Original size 46 x 38, a standard size nr. 8 portrait.¹⁶ Thread count: 12.8 x 15.3.	Whitish priming, C.	Painted almost completely with opaque colours. Only example in collection of 'realist' rendering of volumes, light and shadows. Unvarnished after varnish removal 2003.	No particular features.	Underdrawing [probably pencil] detected of contours of white and red roses and leaves. Lines in heart of white rose partially visible in normal light.	Guéridon also used for Fleurs, W 1604 [Musée d'Orsay, Paris], that has remained its standard size: 46 x 38 cm.
Le lilas blanc, 17.3 x 30.4. Signed Lr., c. 1902. S 469 N/1996, W 1354	Canvas (lined). Stamp on stretcher 'J. Boyer'. Originally canvas larger on two sides, support used for other composition(s). Thread count: 11.9 x 12.8.	Whitish priming, C.	Painted completely with opaque colours, to cover underlying composition(s?). Unvarnished after varnish removal 2002.	Underlying composition not visible.	No underdrawing detected.	-
Fleurs dans une coupe (La coupe noire), 46.3 x 61.2. Signed I.L., c. 1905. S 471 N/1996, W 1628	Canvas (unlined). Standard size nr. 12 paysage haute. Stamp on stretcher. Holes along bottom edge from previous stretching when support was used for another composition. Thread count: 16.5 x 14.3.	Greyish priming, S.	Very matt paint surface. Protrusions in various parts. Parts of underlying composition painted directly on canvas visible on tacking edges and under the present composition. Unvarnished.	Underlying compositions not visible.	No underdrawing detected.	Size canvas also used for Vase de fleurs, W 1428 [1982 Christie's New York]; Fleurs dans un vase, W 1429 [Phoenix Art Museum, Phoenix]. Cup also used for S 1625-1627.
Vase de fleurs sur fond bleu, 46.3 x 32.2. Signed I.L., c. 1905 S 474 N/1996, W 1475	Canvas (unlined). Standard size nr. 8 paysage basse. Stamp backside canvas.¹⁸ Thread count: 25.0 x 25.6.	Whitish priming, C.	Painted almost completely with opaque colours. Protrusions in various colours. Varnished.¹⁹	No particular feature.	No underdrawing detected.	Vase also used for W 1470-1484.

¹ All sizes in cm. None of the paintings examined were dated by the artist. The dates mentioned are based on: Fred Leeman, *The collection of Andries Bongers*, n.d. [Typescript Van Gogh Museum].

² The threads of the unlined canvases were counted on the backsides of the paintings, those of the relined supports on the x-rays. The counts are noted in horizontal (h) and vertical (v) directions. For both directions, threads were counted on five different spots, chosen at random, each over a 2 cm distance, the average then divided in half.

³ C = commercially manufactured priming; S = self-made priming.

⁴ X-ray photography performed at VGM by R.T.D. b.v. (Rotterdam) between 1999 and 2003.

⁵ Infrared reflectography performed at VGM by intern B. van Velzen (for inv. nr. S 467), using a Hamamatsu camera type C2741-03 equipped with N2606-06 infrared sensitive vidicon with a spectral response from 400 to 2200nm, and a Kodak Wratten 87A filter. The C-mount of the camera was used to attach a Micro-Nikkor 1:2.8/55 lens. The camera has a horizontal centre resolution of 600 TV lines, resulting in approximately 500 effective scanning lines; by intern E. van Duijn in 2002 (for inv. nr. S 469) and by author (for all other paintings examined), using the Mega-pixel multispectral imaging system Artist (filter: Near infrared 2) designed by Art Innovation, Hengelo, the Netherlands. The camera has a CCD progressive scan image sensor, with 1360 x 1036 pixels and a C-mount wide angle lens 23 mm.

⁶ 'Encadrements et Dorure Cadres Chênes, Poiriers, etc. P. Cluzel 33 Rue Fontaine St. Georges, Paris Nettoyages et R...ement Vieilles Gravures.'

⁷ The cardboard consists of different materials (linen or cotton fibres, hairs and wood or paper fibres). Also, pieces of charcoal or graphite and possibly even tar can be seen in the board.

⁸ The standard format stretcher numbers given in the table correspond with, or are closest to the sizes of Redon's paintings. Standard format stretchers were available at retail shops during the end of the 19th century (although small variations occurred by year and/or manufacturer). The numbers mentioned here were based on the Lefranc et Cie sale catalogue, Paris 1889, illustrated in: A. Callen, *The Art of Impressionism. Painting Technique and the Making of Modernity*, New Haven/London 2000, p. 15.

⁹ 'Durand 42 avenue de Wagram Paris Couleurs fins [sic] Toiles à peindre'. On this address, Durand had a shop from 1894-95, in 1896-99 a shop on this address was known as Durand Jules. The authors would like to thank Stéphanie Bennett for providing this information.

¹⁰ Letter by Redon to Bongers, 23 May 1906: 'J'ai encore ici, pour aujourd'hui et demain, le vitrail aux deux femmes, dont le bas est à finir.' Cited by Leeman [n.d.], see note 1. When finishing the bottom part of the painting, the artist overpainted a first signature on the right side, slightly above the present horizon, and made the present one, bottom left corner.

¹¹ Painted c. 1902, the *Panneau* was acquired by Bongers in 1903. The painting (not included in the Wildenstein *catalogue raisonné*) was examined in the galleries using a stereomicroscope in 2002, with kind permission of Feroza Verberne, Head Conservation studio Rijksmuseum Twenthe. It could not be established with certainty whether the painting has a self-made, locally applied priming.

¹² A similar priming, reported to contain starch and gypsum, was also found on *Piment et citron*, 27,5 x 46,5, Haags Gemeentemuseum, The Hague. Painted in 1901, it was acquired by Bongers in 1902.

¹³ Quote from a letter by Redon to Bongers, dated 21 July, 1905, in S. Levy, *Lettres inédites d'Odilon Redon à Bongers, Jourdain, Viénes...*, Mayenne 1987, 117.

¹⁴ Letter by Redon to Bongers, dated 23 August 1905: 'C'est une création dont j'userai pour les toiles un peu grandes ou décoratives, et à cette fin d'éviter les cadres encombrants', in Levy 1987, 122.

¹⁵ See text.

¹⁶ '...toile 8 coupée...'. Cited by Leeman [n.d.], see 1.

¹⁷ 'Durand 42 avenue de Wagram Paris Couleurs fins[sic] Toiles à peindre'. See 11.

¹⁸ 'René Beauboeuf Vente et location de tableaux et dessins Rue du Marché St.- Hono...'

¹⁹ Pending the results of further research into the 'protrusions' found on the painting, it was decided not to remove the varnish.

Table 2. Redon paintings Bongers collection. Primings – Pigments and Binding Media¹

Title, inv. nr. VGM	number, colour ²	pigment composition priming layers (p) ³	binding medium ⁴
Vitrail, S 473	one layer, porous, brownish grey	p1: at least 60µm; chalk, mixed with some zinc white, umber, bone black and yellow iron oxides	possibly protein (FTIR- GCMS-p); trace of drying oil (GCMS-p)
Le Bouddha, S 465	one thin layer, whitish	p1: at least 70µm; chalk	protein (GCMS-p)
Coquelicots et anémones, S 484	two almost similar layers: whitish, applied wet-in-wet	p2: c. 80µm; lead white, little barium sulphate, trace of chalk or gypsum, very little yellow iron oxide p1: c. 80µm; lead white, little barium sulphate	linseed oil (GCMS-o)
Vision, S 470	one layer, whitish	p1: chalk with some agglomerates of zinc white and lead white	-
Roses dans une vase sur guéridon, S 468	two almost similar layers, whitish	p2: c. 40µm; lead white p1: at least 80µm; mainly lead white, mixed with some chalk	oil (FTIR)
Le lilas blanc, S 469	one layer, whitish	p1: c. 200µm; lead white mixed with chalk and a few particles of barium sulphate	oil (FTIR)
Vase de fleurs sur fond bleu, S 474	four layers; the bottom one pale orange-crème coloured, on top three almost similar layers, whitish	p2-4: c. 150µm; lead white; (g3 containing a single smalt particle) p1: at least 70µm; lead white, mixed with some chalk or gypsum, barium sulphate and transparent yellow ochre	p2-4: drying oil (FTIR); linseed oil with possible addition of other oils (GCMS-o) p1: oil; indication of starch (FTIR)

¹ All samples were taken with a scalpel using a stereomicroscope.

² Based on observations in cross section using the microscope.³ See also Table 1.

³ Particle composition determined by light microscopy on paint cross sections, performed by E. Goetz, C.M. Groen and M. de Keijzer. Samples were embedded in polyester resin (Polypol) and after wet and/or dry grinding with SiC-paper examined under a Zeiss Axioplan 2 microscope. Incident normal and UV-light (Xenon lamp and high-pressure mercury vapour lamp, respectively). Filter set 'UV H365': excitation BP 365/12, beam splitter FT 395, emission LP 397. The observations were substantiated by elemental analysis of the pigments or fillers in paint cross sections using Scanning Electron Microscope-Energy-Dispersive X-ray spectroscopy (SEM-EDX, performed by I. Joosten using a JEOL JSM 5910 LV Scanning Electron Microscope and a Noran Vantage Energy-Dispersive X-ray spectroscopy system with a Pioneer Norvar detector. Electron beam 20 kV. No Polarized light microscopy was performed.

⁴ FTIR: Fourier Transform Infrared Analysis, performed by S. de Groot at ICN (Amsterdam), on a Perkin Elmer Spectrum 1000 FTIR spectrometer combined with a Perkin Elmer Autoimage System FTIR Microscope, using a Miniature Diamond Anvil Cell with type IIa diamonds; GCMS: Gas Chromatography-Mass Spectrometry was performed by H. van Keulen at ICN on a ThermoQuest GC8000Top Voyager GCMS; analysis for oil, wax and resin (GCMS-o): Pyrolysis mode (625 °C), in situ derivatisation with 2.5 % Tetramethyl Ammonium Hydroxide (TMAH), DB5 GC column; (GCMS-p): analysis for proteins and carbohydrates, hydrolysis with trifluoroacetic acid, derivatisation with 10/1 MSTFA/TMCS. ZB50 GC column; DTMS: Direct Temperature-Resolved Mass Spectrometry Analyses were performed by K.J. van den Berg at the Shell Research Centre in Amsterdam on a JEOL SX102 sector mass spectrometer. The sample was homogenised in a mini glass mortar and made into a suspension with ethanol. Subsequently, the sample was applied on the Pt/Rh filament of a direct insertion probe. The current through the filament was ramped at a rate of 0.5 A/min for two min. to reach an end temperature of about 800 °C. Desorbed molecules were ionised (16eV) in an ionisation chamber kept at 200 °C and accelerated to 8 keV. The mass spectrometer was scanned from m/z 40-800, with a cycle time of 1 s. A JEOL MP-7000 data system was used for data acquisition and processing.

Table 3. Redon paintings Bonger collection. Paints – Pigments and Binding Media Selected Samples

Title, inv. nr. VGM	description sampling area	pigment composition paint layers ^a	binding medium ^a
Tête de femme en profil, S 467	brown area bottom left edge	-	carboxylates, presumably predominantly zinc carboxylate (FTIR)
Vitraïl, S 473	matt light blue sky area	1: 5-15µm light blue paint layer: zinc white, lead white, chalk, cobalt blue, one particle of cobalt violet light (cobalt arsenate)	-
	matt violet robe left figure	1: at least 60µm violet paint layer: cobalt violet light (cobalt arsenate), mixed with some particles of cadmium yellow, very few particles of zinc white, a transparent magnesium containing compound, chalk and red iron oxide particles	-
Le Bouddha, S 465	matt, porous yellow petals bottom left	2: at least 35µm yellow paint layer: lead chromate (chrome yellow) painted wet-in-wet with pink-grey paint layer 1: 40-50µm pink-grey paint layer: chalk, vermilion, bone black, lead chromate (chrome yellow), little zinc white, very little barium sulphate and synthetic ultramarine blue and organic red ^b	pale yellow paint: drying oil (GCMS-o, p)
	saturated grey brushstrokes bottom left	4: 20-70µm grey paint layer: lead white, mixed with barium sulphate, umber and very little black pigments 3: 30-70µm (pale) yellow paint layer: zinc white and lead antimonate (Naples yellow), trace of synthetic ultramarine blue 2: 10-90µm pink-grey paint layer: chalk, vermilion, bone black, lead chromate (chrome yellow), very little zinc white and barium sulphate, trace of synthetic ultramarine blue 1: 0-15µm; white paint layer: zinc white	greyish paint: drying oil (GCMS-o)
	matt, porous light blue spots bottom left	1: 0-250µm light blue paint layer: mostly lead white mixed with chalk, zinc white, cobalt blue, zinc chromate (zinc yellow), red ochre, black particles	light blue paint: drying oil (GCMS-o)
	saturated pale pink impastoed paint	-	Drying oil (GCMS-p)
L'Arbre rouge, S 464	matt, porous pale green sky area top left side	-	animal glue (HPLC-p), protein (FTIR)
	matt, porous white-pink petal top left side	-	animal glue (HPLC-p), protein (FTIR)
	transparent, brown brushstroke on lower part of red tree	2: 10-20µm brown paint layer: red ochre, quartz, barium sulphate, chalk, little zinc white, little lead white and very little bone black 1: 0-250µm greyish paint layer: Kopp's purpurine ₄ , cobalt blue, barium sulphate, lithopone, chalk, zinc white, yellow ochre, very little bone black	Brown paint: protein (FTIR) protein (FTIR)
	matt, porous blue sky area top side	-	
Femme apparaissant dans un ogive, S 4725	opaque beige circle left of standing figure	chalk, gypsum, ochre (FTIR)	oil (FTIR)
	transparent blue-green paint background behind standing figure	chalk, gypsum (FTIR)	oil (FTIR)
Coquelicots et anémones, S 484	blue-grey background bottom edge	7: 10-20µm blue paint layer: synthetic ultramarine blue, lead white, vermilion, cobalt blue, little bone black, little emerald green, little zinc yellow 6: 3-6µm orange paint layer: red and yellow ochre, little cadmium yellow, very little black pigments 5: 2-40µm white layer: lead white, little aluminium silicates, very little vermilion, very little carbon black 4: 0-4µm thin transparent layer: binding medium rich 3: 5-60µm brown paint layer: different earth pigments (yellow and red ochre, umber), vermilion, bone black, lead white, one particle of viridian 2: 5-15µm dark paint layer: binding medium rich, synthetic ultramarine blue, one big particle of emerald green, little aluminium silicates, very little lead white 1: 30-40µm brown paint layer: different earth pigments (yellow and red ochre, umber, quartz, little ilminite), little vermilion, little bone black	-
	blue background lower area right edge	6: varnish 5: 5-20µm blue paint layer: synthetic ultramarine blue, lead white, vermilion, cobalt blue, little bone black, little zinc yellow 4: 0-25µm yellowish grey paint layer: mostly zinc white, mixed with lead white, Naples yellow, cadmium yellow, synthetic ultramarine blue, zinc chromate, bone black 3: 35-65µm light blue paint layer: mostly lead white, mixed with cobalt blue, viridian, little vermilion, very little yellow and red earth pigments, very little umber. This layer possibly consists of two layers painted wet-in-wet, lower part more greenish with more vermilion and less blue particles 2: 10-40µm white paint layer: lead white 1: 0-30µm brownish-green transparent paint layer: brown and yellow ochre, synthetic ultramarine blue, little vermilion, little carbon black, very little bone black, some chalk	-
Vision, S 470	light-violet background bottom edge	3: 0-5µm transparent grey-pink layer 2: 3-20µm violet paint layer: zinc white, cobalt violet light (cobalt arsenate), little zinc chromate, little Naples yellow, very little synthetic ultramarine blue, very little cadmium yellow, trace of cobalt green and vermilion (wet-in-wet painting technique) 1: 0-12µm yellowish white paint layer: zinc whites, little cobalt violet, little zinc chromate	-
Roses dans une vase sur guéridon, S 468	yellow-orange background (top right corner)	2: semi-transparent top layer: cobalt violet dark (cobalt phosphate), zinc white, lead white, cadmium yellow, Naples yellow (wet-in-wet painting technique) 1: yellow paint layer: zinc white, lead white, Naples yellow, cadmium yellow, very little vermilion, one big particle of bone black and one aluminium silicate.	-
Le lilas blanc, S 469	brown grey paint layer bottom tacking edge	5: c. 15µm medium rich greyish layer: zinc white, ochreous material, some viridian, some carbon black, little lead white 4: c. 10µm green-grey/brown-grey paint layer: lead white, viridian, vermilion, some fine black particles, some organic red particles (bright orange fluorescence under UV-radiation) 3: 2-10µm dark binding medium rich paint layer: chalk, iron oxides, little vermilion 2: 0-10µm light pink paint layer: lead white, mixed with orange iron oxides, vermilion, some particles of viridian and some organic red particles (on Al-substrate). The calcium peak in the overall indicates the presence of chalk and/or gypsum. 1: c. 10µm brown paint layer: earth pigments, (mostly orange iron oxides and umber, some aluminium silicates and quartz), mixed with synthetic ultramarine blue, some coarse particles of viridian and some cobalt blue	-
Fleurs dans une coupe, S 471	brownish grey paint	-	drying oil, no protein (FTIR; GCMS-p)
	Protrusion ^c in shadow of black-blue vase	protruding material: slightly pinkish, opalescent, waxy mass: zinc carboxylates (FTIR). Blue paint layer attached to the protrusion consists of synthetic ultramarine blue	-
Vase de fleurs sur fond bleu, S 474	blue-grey background lower area left edge	3: 0-24µm blue paint layer: ultramarine, lead white, some vermilion, little cobalt blue, little bone black, very little cadmium yellow 2: 0-10µm bright green paint layer: chrome green (mixture of chrome yellow and Prussian blue), mixed with lead white, very little bone black 1: 0-14µm semi-transparent brown layer: very binding medium rich, little vermilion, little cobalt blue, little carbon black	-

Notes Table 3

1-2 See Table 2 for experimental details.

3 Orange fluorescence under UV-radiation. Substrate (presumably) aluminium.

4 The organic red (on an aluminium containing substrate) form remarkably large agglomerates. The presence of mainly purpurin in the HPLC-Fluorescence Chromatogram indicates the use of Kopp's purpurine. HPLC (High Performance Liquid Chromatography), performed by M. van Bommel (ICN); See M. van Bommel, M. Geldof and E. Hendriks, 'Examination of the use of organic red pigments in paintings by Vincent van Gogh (November 1885 to February 1888)', this volume of *ArtMatters* (2005), 111-137.

5 Analyses of varnish samples taken before treatment (1999-2000) showed natural resin (FTIR); mastic, some linseed oil (GCMS-o).

6 See text.

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Notes

1 At the time of Bongers's death (1936), the collection was larger than it is today. Already during the final years of the collector's life, and during the decades preceding the acquisition by the Dutch State in 1996, single objects (such as paintings by Vincent van Gogh, Cézanne and Gauguin) changed ownership either through sale or donation. Other museums, amongst others Rijksmuseum (Amsterdam), Kröller-Müller Museum (Otterlo), Rijksmuseum Twenthe (Enschede) and the Haagse Gemeentemuseum (The Hague), now own parts of the former Bongers collection. Biographical details on Bongers's life as well as references on his collection used for this article have been taken from F. Leeman, *The collection of Andries Bongers*, n.d. [typoscript Van Gogh Museum]. In 2007, the Van Gogh Museum plans to devote an exhibition to Bongers and his collection. The W-numbers in text and Tables refer to A. Wildenstein (texte Agnès Lacau St. Guily, documentation Marie-Christine Decroocq), *Odilon Redon. Catalogue raisonné de l'oeuvre peint et dessiné*, vols. I, III, (Paris, 1992-96). The S-numbers refer to the Van Gogh Museum inventory numbers.

2 H.K. Stratis, 'Beneath the Surface: Redon's Methods and

Materials', in D.W. Druick et al., *Odilon Redon (1840-1916)*, [exh. cat., The Art Institute of Chicago, Van Gogh Museum Amsterdam, The Royal Academy of Art] (London, 1994-95), 353-377.

3 One painting from the Bongers collection, *L'Ange de Tobie* (55.5 x 46 cm, VGM inv. no. S 466) has not been examined. It is a copy of a part of Rembrandt's *Archangel Raphael leaving Tobias's family* (Musée du Louvre, Paris), painted by Redon in 1874-75. It was acquired by Bongers in 1922, six years after the artist's death. As it is too distinct (viz. academic) from the more avant-garde symbolist compositions and flower still lifes Bongers acquired during the artist's lifetime, this painting was not included in the present examination.

4 The adjective 'symbolist' is used here to define various types of imaginative compositions with mystic or idealistic connotations or themes derived from literature.

5 Of all paintings examined, three paintings have been wax-resin lined and varnished at an unknown date. When the museum took over the care of the collection in 1996, only a few of the unlined paintings were found to have consolidation problems. The only records known of previous interventions concern the two large-scale paintings, *L'Arbre rouge* and *Le Bouddha*, which have been subjects to treatments in the 1980s. Some of the paintings in the collection had discoloured varnishes, and almost all paintings showed numerous fly specks on their surfaces. Some damage found on the paintings can be related to their presence in a domestic environment during the past century or by unfortunate storage conditions during the German occupation in 1940-45, when the entire collection was kept hidden.

6 Stratis in Druick et al. 1994-95, 356-358.

7 Several remarks made by the artist confirm these findings. See Stratis in Druick et al. 1994-95, 361-363.

8 Letter from Redon to Fabre, 21 July 1902, in M.A. Leblond, *Lettres d'Odilon Redon (1878-1916)*, (Paris, 1923), 50: '... j'ai voulu faire un fusain comme autrefois: impossible, c'était une rupture avec le charbon. Au fond, nous ne nous survivons que grâce à des matières nouvelles. J'ai épousé la couleur depuis ...'

9 The texture of one type of priming, characterised by its pointed surface – caused by rolling priming material on a paper or board support – seems to have been preferred by Redon for a number of the beaches and village streets he painted during the 1880s, such as *Rochers en Bretagne*, W 1886 (Musée d'Orsay, Paris); *Rochers sur la plage*, W 1892 (The Ian Woodner Family Collection, New York); *Rochers sur la grève*, W 1897 (Musée d'Orsay, Paris); *Rue à Samois*, W 1831 (Van Gogh Museum, Amsterdam). As in the paintings from the Bongers collection, the colours of these primings do not influence the final colour scheme of the compositions. Further research into the composition of these primings should cast more light on this material.

10 Visual comparison of both fabric supports (general appearance, weave structure, irregularities, colour, etc.) suggests that they match, but the respective thread counts are slightly different (see Table 1), showing a difference of 1 thread for each direction.

11 Also, the porous paint surface attracted fine dirt particles, which added a slightly greyish sheen to the painting.

12 Transmitted light photography shows that the large *Panneau décoratif* (256 x 185.8 cm, painted c.

1902, once part of Bongers's collection, now at Rijksmuseum Twenthe, Enschede) was painted on top of an earlier composition of a large tree. The latter appears to be quite similar to *L'Arbre jaune* (249 x 185 cm, painted c. 1901, Musée d'Orsay, Paris). It could not be established if Redon covered the first composition of the Enschede painting with a self-made priming before painting the present one.

13 One of the white layers contains one particle of smalt. See fig. 14 and Table 2. It is not certain if this is a deliberate addition to the priming material to give it a cool white hue, or whether it should be considered a contamination. It is improbable that the cobalt-based pigment particle visible in the cross section was added to the priming layer for its drying properties, as the lead white that constitutes the main component of the layer would already ensure proper drying of the binding medium.

14 Although these works were very much in demand, which guaranteed him a financially more secure position, Redon was anxious not to become a victim of this success. Indeed, some of his flower still lifes created after the successful solo exhibitions of 1904 and 1906 seem less inspired.

15 Redon's letter to Bongers, dated 23 August 1905. Levy 1987, 122: 'Puis, je crois aussi que l'usage du verre pour ma peinture, est bien, observez-le. On a réagi à Paris contre cet emploi, je crois que ce refus vient surtout du marchand. Je persiste à ressentir que la vitre va bien à certaine peinture claire, celle qui vise à un effet plutôt intérieur.' Saturation of paint layers by means of a varnish would diminish the high key values of matt paintings that Redon refers to. The *effet plutôt intérieur* alludes to the appeal made on the

intellect of the spectator. Glass front protection for certain matt paintings mentioned in this quote is thus intended as an aid for introspection.

16 It is not known what the exact nature of 'aoline' is, nor do the results of paint sample analyses available so far give any clues on this point. Considering Redon's preference for matt surfaces and familiarity with aqueous media, this could be emulsion-type paint, possibly a commercially manufactured product, available around the turn of the century. Aoline is mentioned in a letter by Redon to Bonger, dated 17 January 1901 in Leblond 1923, 43, as a medium for large-scale decorative works next to distemper and oil: '[...] *grands panneaux, traits avec un peu de tout, la détrempe, l'aoline, l'huile, [...]*'. No mention was made by the artist on preparing his oil paints by either adding a matting agent or by extracting oil from paint tubes (by absorption on paper) and diluting them with oil of turpentine, which is known as *peinture à l'essence*. Perhaps 'aoline' refers to oil tube paint with a petrol-based diluent (white spirit).

17 G. Groom, 'The Emergence of a Decorative Aesthetic' in Druick et

al. 1994-95; G. Groom, 'The Use and Misuse of Distemper in the Works of Édouard Vuillard: A Curator's View', in H.K. Stratis and B. Salvesen eds., *The Broad Spectrum. Studies in the Material, Techniques and Conservation of Color on Paper*, (London, 2002), 145-150.

18 On the technique and aesthetics of distemper, see F. T. Wrubel, 'The Use and Misuse of Distemper in the Works of Édouard Vuillard: A Conservator's View', in Stratis and Salvesen 2002, 151-154.

19 Letter by Redon to Bonger, dated 18 December 1905, Leblond 1923, 69: '...; elle exige, à mon avis, toute la fraîcheur de l'improvisation et du premier jet. Elle donne en ce cas une matière précieuse... [je] l'ai trouvé adouci et peut-être plus harmonieux; le temps dépose là quelque chose qui complète ces simples substances, mieux que dans l'huile.'

20 It was precisely in these over-painted areas where several paint layers had been applied on top of each other, and tension caused paints to crack and loose adhesion to the canvas support.

21 Redon reportedly described the use of dry pigments on a large decorative painting he sold in 1910 to another private collector,

made with poorly bound 'poudre de couleur'. Proper preparation of colours by mixing and wetting them thoroughly in advance would prevent the lumpiness occurring in paint layers of *L'Arbre rouge, Le Bouddha* and other large decorative paintings. As described by Stratis in Druick et al. 1994-94, 431, note 66.

22 Contemporary exhibitions and publications on this subject seem to have inspired Redon also for some of the noirs. D.W. Druick and P. Kort Zegers in Druick et al. 1994-95, 148-49.

23 Thus, the artist was able to work with them on paper supports almost like watercolours showing matt effects. For this technique, see D. Bomford et al., *Art in the Making*. Degas, [exh. cat. National Gallery London] (London, 2004), 25-27.

24 On zinc-based protrusions see J.v.d. Weerd, M. Geldof, L. Struick van der Loeff, R.M.A. Heeren, J.J. Boon, 'Zinc Soap Aggregate Formation in *Falling Leaves (Les Alysamps)* by Vincent van Gogh', *Zeitschrift für Kunsttechnologie und Konservierung*, 17 (2003), Heft 2, 407-416.

25 Cited by Leeman [n.d.], see note 1. The same size canvas was also

used for a flower still life of similar composition and placed on the same *guéridon*, *Fleurs*, W 1604 (Musée d'Orsay, Paris). See Table 1, note xvi.

26 Preparatory drawings seem to be rare in Redon's oeuvre. Comparison with unfinished paintings from other collections, like *Profil*, W 181 (private collection) or *Tête de femme endormie*, W 442 (private collection), shows how Redon began to construct a composition by roughly covering certain parts of the surface with colours, starting in one area. Thus the painted image would expand gradually from one part of the surface until the image was complete. Only a minimum of preparatory drawing can be seen. This is very contrary to academic practice, that promoted the systematic succession of underdrawing, *ébauche* (darker and lighter passages softly blended where they were juxtaposed) and final shadows and highlights. The only underdrawing found in the paintings from the Bonger collection was found under *Roses dans une vase sur guéridon*.

27 'chaque oeuvre n'est au'une incidence de la longue recherche.'