

Leonardo da Vinci
and *The Virgin
of the Rocks*

Leonardo da Vinci
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*One Painter, Two Virgins,
Twenty-Five Years*

By

Katy Blatt

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For Granny,
who held my hand in front of *The Virgin of the Rocks* at the National
Gallery when I was five.

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FOREWORD AND ACKNOWLEDGEMENTS

To choose to write about one of the most famous figures in the history of western art is ambitious and perhaps even a little foolhardy. This book cannot but reformulate information from over two centuries of study on Leonardo, and for this reason I am indebted to countless authors, many of whom I warmly credit in the bibliography. Even before Leonardo's notebooks started to be published over a century ago, his life and work were a topic of fascination both in scholarly circles and in the public domain. As Richard Turner¹ has pointed out, Leonardo has been systematically re-imagined since his death, with each successive author reinterpreting the evidence in ways culturally relevant to themselves. The myth or aura surrounding Leonardo has itself become part of our cultural inheritance. In this book I hope to show how Leonardo and his work are relevant today. As much as at any other point in history *The Virgin of the Rocks* is an important part of our cultural heritage, and learning about it should be accessible to all who wish to enjoy it.

At a time when art and its histories—indeed many forms of visual, physical, tactile and sensual learning—are increasingly threatened by the shallower high-speed processing encouraged by today's technology and by the government's often limiting education strategies, it seems more important than ever to facilitate a process of "slow looking": a deep and meaningful contemplation of our world. This is central to the discipline of Art History, and by focusing on a single painting commission I have tried to model this approach. By spending time with Leonardo's painting of the *Virgin of the Rocks* in the National Gallery, looking at it for a period of an hour or more, coming back to it repeatedly, and by learning about the philosophy and politics surrounding this painting at the time it was created, it begins to breath with a life of its own.

I started writing this book with several questions in mind: why did Leonardo make two versions of *The Virgin of the Rocks* and, since the second is a copy, why do they look so different? By comparing the two paintings and exploring Leonardo's experiences during the intervening years between his completion of the first and second version, I hope to have gone some way towards answering these questions. In accordance

with most recent scholarship I have taken the London, National Gallery, version to be the later and more mature of the two.²

Part 1 of this book is intended as an introduction to the commission of the *Virgin of the Rocks* and focuses on the first version, now in the Louvre, Paris, but painted in Milan in c.1483. Chapter 1 describes the painting in terms of Leonardo's revolutionary style and technique. Chapter 2 goes back in time, to Leonardo's training in Renaissance Florence. By exploring the socio-political and artistic context in that city, the roots of Leonardo's astonishing technical skill are established. It also explains the frustration that led to his departure from Florence to seek his fortune in Milan. Chapter 3 sets the scene in Milan under the rule of the warlord Ludovico Sforza, a stark contrast to republican Florence. It introduces the patrons of *The Virgin of the Rocks*, the Confraternity of the Immaculate Conception, and explains the dominant Christian iconography of the painting. The section ends with the mysterious disappearance of the first *Virgin of the Rocks*.

Part 2 introduces the second National Gallery painting, picking out the differences from the first version in terms of composition and style (Chapter 4). Having set up the two paintings as contrasting, I then return to the events of the intervening years thematically in order to assess the reasons for the changes. These include Leonardo's personal development as the master of his own workshop in Milan (Chapter 5), his scientific and anatomical research (Chapter 6), and his philosophical and intellectual developments during this period (Chapter 7).

Part 3 continues the story, focusing on the growing political unrest in Milan, which forced Leonardo to flee in 1499, leaving the second painting unfinished (Chapter 8). I consider Leonardo's vastly elevated social status, evident during his next few years of travel through Venice, Florence and the Papal states as a military engineer. Finally, the chapter looks at the patronage of the French, now governing Milan, which attracted Leonardo back to that city, resulting in the long-awaited completion of the second *Virgin of the Rocks* (Chapter 9). In the two-part post-script I consider how *The Virgin of the Rocks* facilitated Leonardo's vast increase in status during his lifetime, as well as his reception after his death and in the twenty-first century.

The thematic approach of this book allows new links to be made between the two paintings and their contexts and offers subtle insights into their specific cultural meaning. This single commission becomes a focal point from which to explore diverse subjects: from politics, philosophy and

science, to religious and theological concerns, psychology and personal relationships, workshop environments and artistic practices. This process of exploration is intended to highlight the multi-layered complexity of Leonardo's work, his identity, and the rich iconology³ embedded in the *Virgin of the Rocks*.

The notion of studying an art object from a range of inter-disciplinary perspectives is central to Art History—we need only remember Ernst Gombrich's interest in the psychology of perception to make this tradition clear⁴—and for students, this link-making between subjects and forms of experience promotes an unusual intellectual versatility. A thematic approach is at the heart of the new Edexcel A-level Art History syllabus, as well as the International Baccalaureate (IB) and the Cambridge Pre-U. Indeed, this book is organised so as to deal directly with core themes within these courses, such as historical context, patronage, form and style, and materials and techniques, so it may be used as a textbook (see “Note to Teachers and Students”).

It is often possible to engage with art works on an emotional level, but those new to Art History may lack the language to describe, and therefore to critically analyse, what they see. This is no wonder since, despite living in an image-saturated world, visual literacy is rarely a core part of a child's learning at school; indeed in 2017 we narrowly avoided losing the A-level in Art History all together. This book celebrates the revival and continuance of Art History education in schools and Chapters 1 and 4, in particular, are intended to guide the reader through a thorough process of visual analysis by modelling the use of a “tool kit” or checklist of formal components, such as composition, light, tone, space, colour and form. This is an approach first published comprehensively in Penny Huntsman's *Thinking about Art* (London: Wiley, 2015).⁵ With these elements in mind it should be possible for readers to go on to examine other art works irrespective of historical context or style, and ultimately to engage more critically with the messages embedded in visual culture day-to-day.

For introducing me to this approach I am indebted to Caroline Osborne, Head of History of Art at Godolphin and Latymer School in London. Her deep and far-reaching knowledge of Art History has been invaluable to me. My sincere thanks go to James Belassie, Elaine Miles, Annie Liggins, Eddy Myres, Edith Poor, Thelma Robinson, Dr. Noah Charney, Julian Bell, Dr. Jenny Stevens, Prof. Jean Michel Massing, Dr. Diana Presciutti and Prof. Martin Kemp for their expert advice as well as their kind words of encouragement. I would also like to thank my wonderful and ever-supportive family.

NOTE TO TEACHERS AND STUDENTS

This book was written with students and teachers in mind, and I very much hope that it may be useful. The book is structured like a tapestry and draws on the threads of key themes repeatedly, so, although it can be “dipped into”, it is advisable to read the entire text to get a full overview of any given strand. Below I have outlined how the book is relevant for different courses currently being taught in Art History.

CAMBRIDGE PRE-U

Paper 2, Historical Topic 4: “Man, the measure of all things: the Italian Renaissance, c. 1400 to c. 1600”, Topic 4.5, “The High Renaissance in Rome, Florence and Milan”. This topic directs teachers and student to research Leonardo’s work in Florence and Milan, specifically naming his *Virgin of the Rocks* (both the Louvre and the London versions) as well as other works mentioned in this book: *Adoration of the Magi*; *Portrait of a Lady with an Ermine*; *Mona Lisa*; *The Last Supper*; and the preparatory drawings for *The Battle of Anghiari*. This book deals with key themes that must be considered by students, including: technical and stylistic developments, historical, political, and intellectual contexts, patronage and artistic status.

EDEXCEL–A Level

Paper 1: “Nature in art and architecture”. Within the new Edexcel syllabus, the *Virgin of the Rocks* can be used as a case study work for this thematic paper as an example of the religious symbolism of landscape and plants in Renaissance Italy, the symbolism of the elements, as well as illustrating the contemporary view of wo/man as a microcosm of the natural world, thus relating directly to the scope of works for this exam.

Paper 1: “Identities in art and architecture”. *The Virgin of the Rocks* can also be used as a case study work for this thematic paper, since it reflects not only Leonardo’s artistic and psychological development, but also issues of regional and national identity. Seen at the time as a product of the high culture of the Florentine Renaissance, then the Milanese, the two paintings, now at the Louvre in Paris and the National Gallery in

London, are today seen as part of French and British cultural identity.

INTERNATIONAL BACCALAUREATE (IB)–Diploma

Paper 1: “Art of the Renaissance”. For this module of the IB course, the National Gallery *Virgin of the Rocks* is a key work, and this book contains all the information needed to answer the short Paper 1 exam question relating to this painting, including: materials and techniques, stylistic and formal analysis, discussion of the work’s meaning within its original context in terms of its symbolism, historical and philosophical context, function and patronage.

Paper 2: “Art of the Renaissance”. The *Virgin of the Rocks* is also an excellent case study that may be used in the longer essay responses for Paper 2, and this book deals with all five thematic areas questioned in this exam, including: A. Style and formal qualities; B. Iconography and meaning; C. Historical context and function; D. Artistic production and patronage; E. Techniques and materials.

Guided Coursework Project. If the “Art of the Renaissance” is not part of the taught course, this book may be used as a key text for the Guided Coursework Project as it deals with the requisite cross-cultural influences on art, including the adoption of Classical influences by Italian Renaissance artists and the adoption of Florentine culture in Milan.

INTRODUCTION

It is midnight. The date is 1508. You are kneeling in the Chapel of the Immaculate Conception in the Church of San Francesco Grande in Milan. A single candle throws a foggy disk of light into the air. As your eyes accustom to the gloaming something extraordinary unfolds.

Shadows ripple across stone. Light spots dart. And the far wall of the chapel seems to shift, opening out into what looks like an antechamber, a room within a room, a cavernous space. From an inky bed, boulders—gnarled, lichen-covered—jut out and up, to right and left, monolithic, primordial. In the distance a dazzling aquamarine river winds between toothy mountains. And, in the centre of this eerie subterrane a human figure slides into focus: first a face, then a hand stretches out towards you.

A beautiful creature kneels before you. She is heavenly. Her skin is porcelain-white, spotless, pure. Her delicate shoulders are draped with soft silk, blue and gold, like the sea and the sun. The folds of her dress cling to her hips and crisply encircle her waist. She is so close that you can almost see her chest rise and fall, and her curls flutter in the breeze. Two infants perch beneath her cloak, and an angel, with the wings of a swan, leans in.

This might sound fantastical. But in 1508, when Leonardo da Vinci put the finishing touches to his second painting of *The Virgin of the Rocks*, (Fig. 2) those who looked upon it must have felt they were experiencing a vision. It is hard to understand nowadays the sheer amazement, the intensity of experience, that this painting would have evoked when it was first seen in that chapel in the Church of San Francesco Grande in Milan. Using a uniquely experimental oil technique, as well as scientific observation of the human body, Leonardo had succeeded in creating the illusion of striking three-dimensionality and a psychologically convincing world in paint.

In terms of subject matter too, Leonardo's work was unprecedented. When he set out to paint his *Virgin of the Rocks*, the Catholic theology of the Immaculate Conception of Mary had never before been visualized; the Virgin had rarely appeared in a cave setting. In many ways this was a

record-breaking, world-changing work. It profoundly influenced Raphael and Michelangelo, and it was central to the advent of the High Renaissance style in Italy. There are fewer than twenty surviving paintings by Leonardo. This is one of his largest at around two metres in height, and one of the most famous in the world.

To this day intrigue surrounds the commission of *The Virgin of the Rocks*. In c.1482 the young Leonardo emigrated from Florence to Milan and agreed to paint the original version (Fig. 1), now in the Louvre in Paris, within a year of his arrival. It was commissioned by a brotherhood of wealthy Milanese attached to the Church of San Francesco Grande, known as the Confraternity of the Immaculate Conception. The painting propelled him to fame in the humanist court of the warlord, Ludovico Sforza. But unlucky circumstance and financial disputes between the artist and patrons meant that, sometime around 1490, the painting was mysteriously lost, and the Confraternity were left without their promised altarpiece. Leonardo continued to live and work in Milan, yet another eighteen years passed before he would honour his commitment to the Confraternity by completing a second version of the lost work.

When Leonardo finally completed the second *Virgin of the Rocks* in 1508, now at the National Gallery in London, twenty-five years had passed since he had first signed the commission papers, one of the longest-standing agreements of its kind in history. During these crucial decades, Leonardo underwent the most startling artistic, intellectual and scientific development of his life. At first glance the two paintings seem very alike, yet on careful comparison the differences start to come into focus. These differences hold the key to an understanding of the life and times of one of the most famous artists and thinkers that has ever lived.

This is the story of Leonardo and his two paintings of *The Virgin of the Rocks*: one painter, two Virgins, and a twenty-five-year period of revolutionary discovery.

PART 1

**THE FIRST *VIRGIN OF THE ROCKS* C.1483-4
(LOUVRE, PARIS)**

CHAPTER ONE

EXPLODING THE LIMITS OF PAINTING

Technical and Stylistic Analysis

Those who saw Leonardo's *Virgin of the Rocks* when it was first completed in the mid 1480s would have been stunned. A parallel might be drawn with the immersive experience of 3D film today. Like James Cameron in his 2009 film *Avatar*, Leonardo had pushed visual effects to the limit.

In the battle scenes of *Avatar* arrows seem to fly into the audience and the surround sound recreates the “zing” of metal whizzing past our ears. In the forest scenes the holographic projections trick us into thinking that a web of branches meets over our heads; the sense that the drama is unfolding in our own space is confirmed by the sound of rustling leaves above and behind us. During this experience our disbelief is suspended. We tense our shoulders and hold our breath when we see objects hurtling towards us; even our heart rate increases.

This is not unlike the impact that Leonardo's *Virgin of the Rocks* must have had in its original setting. It was intended as part of a total-work-of-art: a physical, spatial, aural and tactile encounter, not just a visual one.¹ It was displayed in a side chapel of San Francesco Grande: an enclosed and darkened room, lit by candles, with cold stone walls and reverberant acoustics. The painting was a devotional aid. Members of the Confraternity of the Immaculate Conception would have come here to pray in silence, contemplating the perfection of the Mother of God and her sacrifice. Kneeling in that gloomy chamber they hoped to be transported, to experience religious clarity, to truly empathise with Mary. In this context Leonardo's painted cave would have seemed like an annexe of the real room in which they knelt. They would have felt the cold stone walls and the roughness of the wooden pews under their fingertips as an extension of Leonardo's rocky landscape. The red silk draped over the angel's shoulders might have matched the cloth of the real altar below the painting. Muffled footfalls and the drone of plainsong would have been the

eerie soundtrack. Leonardo was intentionally blurring the boundaries between the real and imaginary. Like our experience of 3D film today, the fifteenth-century audience would have been momentarily taken in by Leonardo's painted world.²

Leonardo aimed to suspend the disbelief of his audience through his "special effects", which, like Cameron's more recently, were revolutionary. On a two-dimensional surface he could create the illusion of three-dimensional space, and he could paint human figures who seemed to think and feel. In comparison, the work of contemporary Milanese artists must have looked artificial. The side panels for Leonardo's altarpiece, *An Angel in Red with a Lute* of c.1495-9 (Fig. 3) and another angel in green, are now at the National Gallery in London and were painted by Leonardo's associate, Ambrogio de Predis. Ambrogio may even have made a copy of Leonardo's Virgin to use as a template for his first angel: he borrowed the incline of the head, the sloping shoulders, the centrally-parted hair and pouting lips. But despite these similarities, his attempt at depicting the human form simply highlights Leonardo's unique naturalism. Compared to de Predis' rigid and angular figures, Leonardo's were compelling. To contemporary viewers Christ must have seemed like a real infant twisting in movement, with rolls of fat around his waist, the hollows and dimples of his arms hinting at muscle beneath the skin, each silken curl picked out by a fleck of gold, each fingernail present. Mary's hand, gently indenting the flesh of St John's shoulder, describes the softness of a real, warm body.

With smoky tonal modelling—*sfumato*—Leonardo created a shift from highlight to shadow so gradual that the boundaries between solid and void became invisible to the naked eye. Unlike Ambrogio's angel, which is contained by a hard outline, the limits of Leonardo's figures are deliberately elusive. This effect requires the mind to make a "top-down" analysis of meaning: the brain has to complete parts of the image that the human eye simply cannot see.³ As a result Leonardo's figures seem literally to vibrate with life, as if they are breathing. It was because of this effect that Vasari later reported seeing the "pulse beating" in the throat of Leonardo's *Mona Lisa*,⁴ and that her eyes appear to follow you. Rather like the effect of a 3D film, where our eyes and brain trick us into believing that the characters are leaping out of the screen, Leonardo's *sfumato* forces the mind of the viewer to become more actively involved in decoding the forms within the *Virgin of the Rocks*, and therefore more invested in the scene.

Not only did Leonardo's figures seem to breathe, they also appeared to think. The hands—the tactile, sensual parts of the body—act like sign language. The outstretched hand of Mary, the pointing finger of the angel, the hands of the little boys in prayer and blessing, highlighted by soft light, seem to dance between their bodies. Not touching, but almost, they tell of a charged, meaningful communication between the figures. Their gazes are also interactive: Mary glances down at John, who focuses on Christ, who looks back at his cousin. We trace with our own eyes the circle of faces; the direction of our gaze replicates theirs in real time. Looking outward, the angel appears to welcome us into the silent conversation. Leonardo had choreographed audience participation in a way that is still psychologically gripping today.

Leonardo's ability to render subtle differences in texture was also wonderfully convincing compared to the stylized, flattened folds of fabric covering Ambrogio's angel. Mary's blue velvet cloak, finished with a necklace of golden threads, is pulled taut by a brooch at her breast. The sling of golden silk at her waist appears crumpled in stiff, three-dimensional folds. The angel's arm can be glimpsed through the transparent fabric of her sleeve, its delicacy contrasting with the heavy red roll of silk that folds down her back. The depiction of this weighty cloth is so believable that we can almost hear it tumble with a "plomp" from the ledge. A clear sheath of gauze encircles John's stomach, fragile as a cobweb. The apparent contrast between the warm, soft flesh, the dry crisp herbage, the silk, velvet and gauze, and the cold stone, emulates the raw sensuality of life.

Beyond the human forms the observed detail in Leonardo's landscape was unparalleled. The flora is rigorously accurate. A careful observer would have been able to identify the plant species by the shape and colouring of the leaves: there is a columbine to the right of the Virgin's head; a species of galium above her right hand; a cyclamen with heart-shaped leaves below the foot of Christ; and a basal rosette of primrose by his knee.⁵ Just above St John's back we see the soft fan of a fern frond, each delicate blade painted individually, caught by a sliver of light.

Finally, Leonardo's figures seem to inhabit a physical space. This is partly due to his development of *chiaroscuro*, the stark contrast between dark and light tones. The shadow appears to recede, creating the illusion of depth in the cave, while the highlighted areas seem to project towards us. Thus the illuminated faces and hands of the figures seem to burst out of the painting into our world. He also observed that, in the distance, colour

density decreases. This “atmospheric perspective”, seen in the lighter blue of the mountain peaks in the background, also helps to create a sense of depth. Leonardo went further in his attempt to create the illusion of three-dimensional space within the painting by arranging the figures in a novel pyramidal composition. Mary’s head is the apex, her knees, and those of St John and Jesus, form three corners of the base. But, truly revolutionary, was Leonardo’s implication that the viewer was seated at the fourth corner of the base of this pyramid, *beyond* the picture plane. In doing so Leonardo makes us feel included in this formation of holy figures. If recreated as a filmic projection the rock ledge would shoot out and up under our feet and Mary’s hand would reach out towards us. For Leonardo’s intended audience, kneeling in that darkened chapel, this illusionism would have contributed to an experience of total physical and spiritual immersion.

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Interviewed just before the release of *Avatar*, the director, James Cameron, said:

“The irony with *Avatar* is that people think of it as a 3D film and that’s what the discussion is. But I think that, when they see it, the whole 3D discussion is going to go away ... That’s how it should work. All of the technology should wave its own wand and make itself disappear.”⁶

Cameron had invented new stereoscopic cameras that mimicked the way human eyes view the world in three dimensions. Each lens had a filter that removed a different part of the image as it entered the eye, giving the brain the illusion of seeing two different angles simultaneously, in turn creating the 3D effect.⁷ Cameron was successful. The result was so naturalistic that viewers reported forgetting that they were watching a film; instead they were swept up in the action. His technology was, indeed, so good that it had “made itself disappear”.

Leonardo’s revolutionary naturalism was also the result of new “technology”. His artistic process was at the cutting edge of Renaissance practice. Craftsmen of the Middle Ages had often traced or copied images from stock collections in block-books.⁸ This can still be seen in paintings from the workshop of Leonardo’s teacher, Andrea del Verrocchio (c.1435-1488). The palm tree on the right of his *Baptism of Christ* of c.1472 (Fig. 4) is a typical block-book creation. The artist, probably one of Verrocchio’s apprentices, had clearly never seen such a species with his own eyes: the tree appears rigid and stylized, almost cartoon-like, with

strange frond formations. In addition, as was usual, there are several hands at work in this painting; different apprentices or associates were given separate sections to complete, and the result is a disjointed composition. Leonardo sought to rectify both these problems.

His solution was to make a series of preliminary compositional studies. These allowed him to imagine and then rework the arrangement of figures in space as a unified group. A sheet of drawings with *Designs for an Adoration of the Christ Child* (1482-3)⁹ in the Royal Collection at Windsor dates from the same years as *The Virgin of the Rocks*. With pen and ink over metalpoint Leonardo drew Mary kneeling over her child within a semi-circular frame. He repeats the scene from four slightly different angles on the same sheet of paper. Similar to the way Cameron might experiment with camera angles, Leonardo was assessing which “shot” would best convey his story.

Once he had decided on the viewpoint and composition Leonardo started to make meticulous drawings from life. Leonardo’s study entitled *The drapery of a kneeling figure* from c.1491-4 (Fig. 5)¹⁰ depicts a figure in a very similar pose to the angel in *The Virgin of the Rocks*. Leonardo probably used a maquette for this study, wetting a rag, dipping it in plaster and then letting the folds harden over a supporting framework or armature.¹¹ The drawing illustrates the precision with which he recorded the play of light on the fabric, the shape and quality of the shadows cast by a fold, and the way a lip catches the light and appears brighter. Using the blue tinted paper as a mid-tone, directional hatching in black ink for the shadows, and building up to highlights in white chalk, his drawing took on a sense of sculptural mass. The obvious pleasure he took in working up such studies, almost as if they were finished masterpieces in their own right, suggests that Leonardo was interested in the effects of monochrome as much, if not more, than *colore*. His working method, focusing heavily on drawing and design, was later called *disegno* by the Renaissance Art Historian Giorgio Vasari (1511-1574). Gone was the reliance on the block-book. Here was a new confidence in human vision as a source of knowledge. In believing his own eyes Leonardo had begun to transform the role of the artist from a craftsman—a reproducer of stock images—to a scientific observer of nature; a thinker. The unsurpassed naturalism of his painting stemmed from this novel approach; his acute attention to observed detail.¹²

Leonardo’s detailed studies were then combined and reworked to create a *cartone*, or cartoon. A section of the cartoon for *The Virgin of the*

Rocks, depicting the *Head of the infant St John the Baptist* of c.1482-3 (Fig. 6), is held at the Louvre in Paris. It is just a small part of what would have been a full-size monochrome mock up of the painting on paper. At the National Gallery in London there is an example of a completely intact cartoon by Leonardo. *The Burlington House Cartoon* of c.1499-1500 (Fig. 7),¹³ as it is known, depicts the Virgin and Child with St Anne and John the Baptist.¹⁴ Leonardo would then have transferred this design to a primed wooden panel via a tracing process called *spolvero*. Using a needle he pricked small holes along the primary lines of the drawing. Then, reversing the paper so that the drawn lines were underneath, he used a powder puff made of sacking to brush charcoal particles through the holes and onto the panel below. When he gently removed the cartoon the dots of charcoal left on the panel could be joined up using a wetted brush. These lines would form the basis for the underdrawing on the panel, which laid out the composition for the painting.¹⁵ Unique to Leonardo was the delicacy with which he then worked up this underdrawing with the finest charcoal modelling. This allowed him to create an effect of three-dimensionality and mass in his figures in *The Virgin of the Rocks*, even before he started to use paint.¹⁶

Leonardo's painting technique was also radical: he was one of the first Tuscan artists to paint entirely in oil colour. First perfected in the Netherlands by Jan van Eyck (1390-1441) and his contemporaries in the early 1400s, oil paint technique had been brought to Italy in the mid 1400s by artists such as the Sicilian Antonello da Messina (1430-1479) and Ferrarese painter Cosmè Tura (c.1430-1495), when the majority of painters in Italy were still working in the traditional egg tempera.¹⁷ Even Leonardo's teacher, Andrea del Verrocchio, who experimented with oil, only used it for the final touches to his tempera work.¹⁸ Consisting of ground pigment bound in egg yolk and water, egg tempera had serious limitations: it was opaque and so dried with a rather flat, matt finish; its water base meant that it was absorbed quickly into the gesso ground and was hard to blend; and any tonal modelling had to be achieved with hatching and crosshatching. This meant that brush strokes remained visible, drawing attention to the painter's hand rather than the subject depicted.¹⁹

In *The Virgin of the Rocks*, however, Leonardo mixed his pigment with linseed oil binder to create a translucent, slow-drying medium. The light shone through the oil, reflecting off the suspended pigment particles, creating a new vibrancy and luminosity of colour, seen in the rich red of the angel's cloak. His innovative *sfumato* effect was created by gradually

building up glazes of oil, with each layer being so thin that pigment concentration and intensity of colour increased by tiny increments. By building up many such layers a new and dramatic *chiaroscuro* could be created, in turn adding to the convincing sense of depth and mass in his figures. The natural lip of the oil binder meant that brush strokes were invisible, allowing the viewer to forget about the painting process and instead become absorbed in the story unfolding before them. Because the oil binder sat proud of the surface of the panel rather than being absorbed, it was also possible for Leonardo to create the minute detail in the painting, like the wisps of hair and the fern fronds.²⁰

Like Cameron too, Leonardo was fascinated by the science of vision. He consciously sought to imitate the natural mechanisms of light, for example, as a means of creating a believable scene. Because his oil glazes were transparent, colour from the lower layers showed through the upper layers, allowing for subtle blending of colour by the eyes. Using coloured glass to explain his theory, he wrote later:

“If you wish to see readily the variety of all compound colours, take some coloured pieces of glass and look through them at all the colours of the countryside that can be seen behind them, and thus you will be able to see that all the colours of the things behind the glass appear to be mixed with the colour of that particular glass ...”²¹

In *The Virgin of the Rocks*, blue glazes show through the red of the angel’s cloak, creating purple tones in the shadow.

Leonardo’s development of what he called “aerial perspective”, seen in the mountainous background, was also the result of a scientist’s observation of nature. He wrote:

“The blueness we see in the atmosphere is not intrinsic colour, but is caused by warm vapour evaporating in minute ... atoms on which the solar rays fall rendering themselves luminous...”²²

Noticing that the higher one climbed, the lighter the sky-tone became, he deduced that this must have been because the atmosphere had become gradually thinner.

“It is clearly seen that the air which borders most closely on the plain of the earth is more dense than the other air, and to the extent that it is higher it is thinner and more transparent. Things which are tall and large, whose bases are distant from you will be little seen, because the visual axis passes through the denser air surrounding them.”²³

Leonardo translated this in a literal sense to his painting, so that pigment particles corresponded to atmospheric “atoms”. To depict the stratospheres, for example, where he believed there to be a lower concentration of these “atoms”, he mixed fewer blue pigment particles in with the oil binder, resulting in a lighter tone. Thus, the peaks of the mountains in *The Virgin of the Rocks* are a lighter shade of blue. Centuries before Cameron, Leonardo had attempted to recreate nature in art. He too had waved his “wand” and made his technology “disappear”.²⁴