

Leonardo da Vinci Society Newsletter

Editor: Maya Corry

Issue 43, October 2016



Forthcoming event

30th Anniversary Lecture on Friday 4 November

The Failure of Pictures: From Description to Diagram in the Circle of Galileo
Professor David Freedberg, Warburg Institute

To celebrate the 30th anniversary of the launch of the Leonardo da Vinci Society, which took place in early November 1986, Professor David Freedberg, Director of the Warburg Institute, will give a special lecture entitled *The Failure of Pictures: From Description to Diagram in the Circle of Galileo*. The lecture will be held on Friday 4 November 2016, at 6pm, in the lecture theatre of the Warburg Institute, Woburn Square, London WC1.

Professor Freedberg writes: When Federico Cesi and his friends in the Accademia dei Lincei – generally regarded as the first modern scientific society – decided to make and collect drawings of everything in nature, their main points of reference were Galileo and Leonardo. But the more drawings they collected the more they realized the impossibility of ordering and systematising the multiplicity of nature. Despite the splendour of many of their drawings, most little known until recently, and the environmental attentiveness of many others, they swiftly became aware of the near-futility of their efforts. Neither the telescope nor the microscope provided them with the essential clues needed to create the order they sought, or the clear borderlines between species that the drive to more rigorous systems of taxonomy and classification required. Halfway through their efforts, Galileo subverted all traditional modes of understanding nature, and Cesi began to realise that pictures might have to yield to mathematics, and description to diagram. This lecture will retrace their journey with vivid examples, and conclude with the implications for our time.

Recent Events

The Leonardo da Vinci Society Annual Lecture 2016

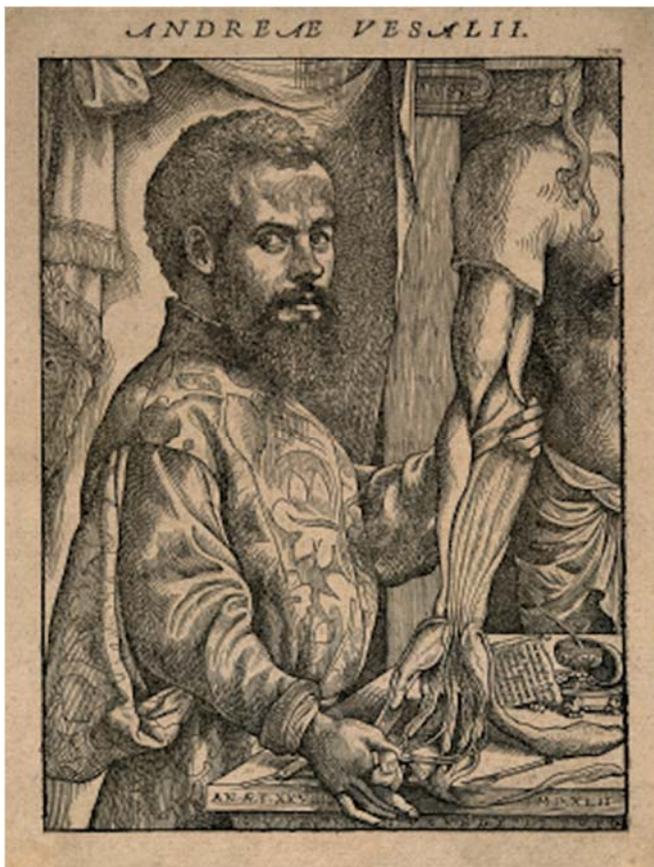
Art and Anatomy in the Fifteenth and Sixteenth Centuries
Professor Andrew Gregory, University College London

As interest in Leonardo continues to beget exhibitions, conferences and publications that probe every aspect of his thought and output, the myth that he was in some way 'independent' of his time is being slowly dismantled. Extraordinary as so many of his endeavours were, they were deeply and intimately bound up with the investigations, debates and pursuits that occupied his contemporaries. At the Society's annual lecture in May, Professor Andrew Gregory provided a lively survey of the anatomical learning and intellectual climate that shaped and informed Leonardo's approach to the human body.

Renaissance attitudes to the body cannot be comprehended by the examination of any single field of knowledge, as Professor Gregory's wide-ranging approach ably demonstrated. As an apprentice in Verrocchio's *bottega* in Florence, the young Leonardo would have made many life drawings – often of other *garzoni* from the workshop – as well as copying models, casts and designs of figures and body parts. By the time he was in Milan in the 1480s and 1490s, he had become friends with physicians and was making avid use of his increased access to books to consult medical texts. His anatomical investigations were bounded by the knowledge he inherited, along with all his peers, from classical authorities such as Galen, and the medieval scholarship of Avicenna, Mondino de' Luzzi and others. In conjunction with these influences, he was exploring the significance of contemporary theories of mathematics, perspective and geometry to the human form. The drawings Leonardo made of ideally proportioned figures (most famously, of course, the Vitruvian Man) are thus intimately connected to both his wider artistic practice and his work as an anatomist.

Having established these links, Professor Gregory turned to a more detailed consideration of the history of dissection and anatomical investigation in the early modern era. Many aspects of Galenic thought that are apparent in Leonardo's drawings and notes, and which are today recognised as incorrect, stem from the fact that the great physician was denied access to human cadavers due to the religious strictures of his time. His reliance on the bodies of Barbary apes inevitably introduced errors – some of which Leonardo probed and questioned, others of which he accepted as fact. It was not until the publication of Andreas Vesalius's magisterial and beautifully illustrated *De humani corporis fabrica* (On the Fabric of the Human Body), in 1543, that many of Galen's assumptions were disproved.

Yet the lecture refused to present a neat, narrative history of the displacement of one medical authority by another.



Rather, Professor Gregory framed his argument in more interesting terms – questioning the spiritual beliefs that underpinned and informed the work of many early modern physicians and anatomists. Just as Leonardo had been concerned to comprehend the divine harmonies that ruled the proportion and workings of the body, so in the early seventeenth century William Harvey perceived the circulation of the blood as analogous to weather cycles. This sense of the human body as a microcosmic synecdoche of the macrocosm of creation indicates that the modern-day chasm separating scientific from religious thought is a relatively recent phenomenon.

Maya Corry
University of Cambridge

Review: ‘Leonardo da Vinci: The Mechanics of Genius’

An exhibition at the Science Museum, London, 10 February to 4 September 2016

In 1952, seven years after the end of WWII, the quinquenary of the birth of Leonardo da Vinci was celebrated. Among the events were two exhibitions: one in Milan, which led to the founding of the Museo Nazionale della Scienza e della Tecnologia, and one in the Royal Academy, London, held at the suggestion of colleagues from the Science Museum. The content of these two exhibitions came together in this 2016 Science Museum display and prompt a number of thoughts beyond the usual tropes such as Leonardo was a

‘Renaissance man’ or ‘universal genius’ or that he invented the helicopter, tank, et cetera.

What struck me was the sheer difference in scale between the British- and Italian-made three-dimensional models designed following, as far as was practicable, Leonardo’s drawings and descriptions. The British items, made in the era of austerity following the country’s emergence from the war, were dwarfed in comparison to their Italian counterparts. The former were centimetres across compared with the metres of the latter, suggesting a more significant investment of resource by the Italians.

What this exhibition seemed to illustrate was the respective attitudes of Britain and Italy towards culture, including science and engineering. Despite all the wartime problems experienced by the Italians, it was evidently worthwhile for them to dedicate scarce resources to a significant cultural undertaking than to other areas which might, in Britain, have been deemed more important. Judging by the current and in some cases irreversible damage being deliberately inflicted on cultural institutions in this country by the government’s austerity programme, it seems to me that very little has changed since 1952 so far as Britain’s priorities are concerned.

I somehow doubt if this was the message that the organisers of the Science Museum exhibition had intended to get across as they put it together. I would also think that the vast majority of the exhibition visitors did not take away that message, preferring the usual Leonardo tropes. All that is a pity, since it will only be by understanding and then protesting at what is happening to culture in this country, that government policies and public attitudes can be reversed; otherwise we may not be able to afford such exhibitions again.

Frank James
Royal Institution / University College London

Conference reports

Leonardo in Britain: collections and reception

Conference organised by Juliana Barone (Birkbeck, University of London) and Susanna Avery-Quash (National Gallery, London)

25-27 May 2016, London

The first thing to note about the conference is its choice of subject matter and the impressively comprehensive way it was explored. The theme itself was derived from fruitful conversations the organisers had with the late, and much missed, Romano Nanni (former director of the Biblioteca Vinciana in Vinci), who strongly supported the realisation of this conference. It followed two earlier conferences which had looked at the reception history of Leonardo in France and in Russia.

Thus far there has been sparse interest in British collections of Leonardo's art and responses to his ideas in Britain. Apart from Juliana Barone and Martin Kemp's 2010 publication *I disegni di Leonardo da Vinci e della sua cerchia. Collezioni in Gran Bretagna*, there has been little work on the topic. Consequently, a major focus of the conference was devoted to an exploration of the provenance of the master's paintings and manuscripts within the British Isles, as they passed through different hands and received different attributions, from the fifteenth century up to the present day.



The inaugural keynote lecture by Professor Martin Kemp, on the 25th of May, introduced these themes in a most lively way, as though he were an undercover detective! Kemp explored the vexed history of the *Madonna of the Yarnwinder*, which is known in several versions. One of these, owned by the Duke of Buccleuch and now in the National Gallery of Scotland, had long been attributed to the workshop. But through employing the most up to date scientific techniques and comparing the painting to the version held in New York, Kemp convincingly argued that it was likely that Leonardo had worked on both paintings side-by-side, such that neither was an 'original' or a 'copy'.

The second day of the conference was hosted at the National Gallery and focused on the collecting of Leonardo in Britain. The morning's papers investigated drawings collections and discussed some of the most important early English collectors of Leonardo and his school. The afternoon turned to some key works by Leonardo, or related to the master. The day concluded with papers addressing the fundamental issues of the seventeenth-century perception of Leonardo in England and a discussion of what Victorian directors of the National Gallery thought of Leonardo and the Lombard School.

The first paper by **Martin Clayton** introduced the early reception of Leonardo's drawings in Britain, in particular the anatomical studies, the ones that Vasari had seen at Francesco Melzi's workshop in Milan. Clayton explored the provenance of the considerable group of 555 autograph drawings held at Windsor Castle. Passing from Pompeo Leoni to the Earl of Arundel, they entered the Royal Collection in 1690. Nevertheless, these original sheets were forgotten about over time and began to be studied only at the end of the nineteenth century, around the time of the publication of Leonardo's *Notebooks*.

Jacqueline Thalmann explored the reasons why General John Guise (1682-1765) acquired a number of Leonardo's drawings and paintings for his collection, which he later left to Christ Church, Oxford. His collecting took place in the years immediately succeeding the publication of the *Trattato della pittura* (made in Paris in 1651), and in parallel to Newton's discoveries. The cultural background of the then current debates on electricity reflected a new kind of interest in Leonardo's genius, which shaped Guise's attitude to his collection.

The collection of Leonardo's drawings held in the British Museum has a more recent history, as explored by **Hugo Chapman** and **Sarah Vowles**. The provenance of the British Museum drawings is not uniform, even if the majority come from the celebrated collection of Sir Thomas Lawrence. The study of their various provenances allows a richer understanding of the extent of the infatuation with Leonardo's drawings in Britain from the second half of the nineteenth century, as well as the range of works thought to be by him.

Leonardo's drawings at the British Museum and Windsor Castle have been closely studied over many years by **Carmen Bambach**. Here, she turned her attention to the process adopted by Leonardo for the composition of the *Burlington Cartoon*. Bambach asserted that in order to get from the cartoon, exhibited at the Annunziata in Florence, to the Louvre *St. Anne* painting, Leonardo could have reversed the composition from the right to the left, working on the two versions at the same time. This convincingly supports a dating of the Burlington cartoon to 1507.

Larry Keith and **Caroline Campbell** devoted their paper to a rich exploration of the conservation history of the London *Virgin of the Rocks* (especially the restoration by Ruhman in 1949), as well as the painting's provenance, as it passed from William Petty to John Howard, Earl of Suffolk, who later sold it to the National Gallery.

Another paper focusing on problems of dating and attribution was presented by **Pietro C. Marani**. It dealt with the copy of the *Last Supper* owned by the Royal Academy, London (on display in Magdalen College, Oxford). Attributed over the centuries to Leonardo's workshop – Marco d'Oggiono or Giampietrino (by J.P. Richter) – or to Leonardo himself (by John Ruskin), this painting is convincingly attributed by Marani mainly to the hand of Boltraffio, in collaboration with Marco d'Oggiono and Giampietrino. His arguments rest on a

number of bases, including the unpublished scientific analysis of the *Last Supper* copy made during its restoration in 1980 (Brambilla) and observations concerning the Strasbourg drawings, which have links to Boltraffio.

Confused and erroneous attributions to Leonardo or to his followers (especially Luini) have been a vexed issue since the seventeenth century. **Margaret Dalivalle** considered the interrelated history of the royal collections in this period, and that of the Earl of Arundel. The latter was expatriated to Amsterdam, and part of it bought by Abraham van der Doort. The history of the *Salvator Mundi* is bound up in these movements.

In the nineteenth century, Sir Charles Eastlake, first director of the National Gallery, London, was convinced that the schools of the great masters were worthy of interest and necessary to fully understand the relationship between esteemed masters and their contemporaries. This belief informed the purchase of several paintings, including those by artists associated with Leonardo. As **Susanna Avery-Quash** and **Silvia Davoli** explained, Eastlake's views were shaped by an international *intelligentsia* of scholars including Giuseppe Molteni and G. Cavalcaselle in Italy and led to much weighty scholarship being published for the first time in English, not least by H. Horne, specialist writers like John Ruskin and Walter Pater, and the collector Herbert Cook. Not only this, but Lady Eastlake was herself an accomplished, if overlooked, authority on Italian art.

At the Warburg Institute the focus of the third day of the conference was on the reception of and historiographical approaches to Leonardo's writings. The speakers looked at some of Leonardo's scientific manuscripts and their impact on British science, as well as at his 'Treatise on Painting', its ownership by key British collectors and place in British art theory. Consideration was also given to Leonardo's influence on the Royal Academy's teaching programme and landscape painting. Finally, Leonardo was considered through the eyes of twentieth-century art historians, and work of the first translators into English of his manuscripts.

J.V. Field considered the apparent lack of influence of Leonardo's anatomical work in early seventeenth-century England. Girolamo Cardano (1501 -1576) regretted that one of Leonardo's beautiful drawings had no explanatory text, which would have made it useful. There is no evidence that any medical writer of the time took account of Leonardo's observations.

By contrast, **Domenico Laurenza** explored the ways in which Leonardo's work circulated in scientific circles in the period known as the 'Scientific Revolution'. In particular, Leonardo's notions about geology arrived in England via a copy of the *Codex Leicester*, made in Florence for the Earl of Leicester, at the request of the collector T. Cook. Its publication in English in 1717 resulted in echoes of Leonardo's observations on the earth resounding in numerous writings on the solar system, such as those by J.T. Desaguliers and J. Senex.

The diffusion of the *Treatise on Painting* in its English edition (by the same J. Senex in 1721) resulted in growing interest in Leonardo's ideas on painting in the British *milieu* at the beginning of the eighteenth century. **Juliana Barone** explored three manuscript copies of the *Trattato* owned by important personages: the artist Thomas Patch (MS Riccardianus 2275, with Stefano della Bella's drawings), the British Consul in Venice, Joseph Smith (MS 284, British Library), and the collector and antiquarian Maurice Johnson (MS Johnson, Courtauld Institute). These were considered in the context of the British reception of Leonardo's theoretical ideas on painting and drawings of the human figure.

In the Royal Academy of Arts in the eighteenth century, artists began to study Newton's ideas on light and colour, and to be interested by the empiricist philosophy of Locke. The tension between an ideal approach to art theory and empiricist thought led to Leonardo's theory on painting being misunderstood. **Harry Mount** traced the growing interest in Leonardo that led to a new translation of the *Trattato* in 1802 (by John Francis Rigaud). This was made possible by the Academicians' interest in Leonardo's observations on science and art, anatomy, the motions of the mind, and his natural philosophy.

Charles Saumarez Smith went on to consider attitudes to Leonardo's works in the late eighteenth century at the Royal Academy of Arts in London. Joshua Reynolds, the first President of the Royal Academy, tried to spread Leonardo's ideas on painting via his presidential Discourses to students, and purchased the *Burlington Cartoon* for the Antique School at Old Somerset House. However, a real interest in Leonardo developed only later, as shown by the expensive acquisition of the *Last Supper* copy in 1821, under the influence of Fuseli.

Francesco Galluzzi explored an unexpected channel by which Leonardo's thought, particularly his conception of landscape, was developed and disseminated, notably in the work of Alexander Cozens (1717 - 1786). Cozens was a friend of the famous picture collector William Thomas Beckford, and together they succeeded in associating Leonardo's work with the occult. This association persisted for over a century, into the time of Aleister Crowley.

The last panel of the conference dealt with twentieth-century responses to Leonardo's works. **Francesca Fiorani** considered Kenneth Clark's writings on Leonardo. Clark was deeply influenced by the views of Paul Valéry and, for this reason, clashed with Bernard Berenson, as attested by their correspondence.

Alessandro Nova argued that John Shearman was principally influenced by the pure-visibility theory of H. Wölfflin. In his PhD thesis, Shearman returned to the perception of colours in Leonardo's painting, as seen by his contemporaries, in terms of 'chromatic lack of unity' and 'tonal unity'. This last discovery represented a turning point in Renaissance colour technique.

Claire Farago compared the choices made by J.P. Richter and Edward McCurdy, the two most important early twentieth-century editors of Leonardo's autograph notes, at a time

when they were just becoming available in published transcriptions and facsimiles. Richter rearranged Leonardo's writings under a diverse group of topic headings of his own choosing, while McCurdy took a different approach by focusing on the 'unity' of Leonardo's thought.

The day concluded with a viewing and discussion of selected drawings by Leonardo and his school for speakers, chairs and guests in the Prints and Drawings Department of the British Museum. The conference brought to light much new and cutting-edge research about Leonardo and the reception of his art and ideas in Britain over the centuries and provided an important forum for debate and thoughts on further projects relating to Leonardo in particular, and to cultural and intellectual interchanges more generally.

Anna Sconza
Sorbonne University, Paris

The Flow of Ideas: Leonardo and Water

International conference of the Center for Medieval and Renaissance Studies, University of California, Los Angeles, organised by Constance Moffatt (Pierce College) and Sara Tagliagamba (École Pratique des Hautes Études, Sorbonne).

20-21 May 2016, Los Angeles

The Center for Medieval and Renaissance Studies (CMRS) at UCLA hosted a conference addressing Leonardo's sustained interest in water. References to water abound in Leonardo's notebooks, where he scrutinised its force, dynamism and beauty. Leonardo sought to understand the movement of water and harness its power in his hydraulic inventions. He experimented with its dynamic currents and investigated its eroding forces. He related water to the movement of blood in the body and, more specifically, the vortices of swirling blood in the heart. And perhaps most famously, he explored its infinite beauty in his so-called Deluge drawings. Leonardo's investigations of water seem tireless and his lifelong preoccupation with the subject has been well studied. However, the conference organizers, Constance Moffatt and Sara Tagliagamba, sought to draw attention to new approaches to this well-trodden area of Leonardo scholarship. They succeeded in bringing together an impressive interdisciplinary group of speakers to shed new light on the subject. Even when methodological approaches differed vastly, the conference exposed many themes deserving of further exploration and the necessity of art historians to work across disciplinary boundaries with scholars from the history of science, engineering, robotics, literature, and medicine.

The conference opened with a thorough historiographic summary of the scholarship on Leonardo and water. It continued with an investigation of Leonardo's studies of the movement of water in rivers and a fascinating discussion of his elegant staging of hydraulic experiments. A pragmatic reconstruction

of the 'bottini' that worked Leonardo's hydraulic clock provided insight into the sheer complexity of Leonardo's designs. And a detailed analysis of his studies of water's viscosity revealed the subtle effects in his drawings, while a discussion of the drawing of a pavilion surrounded by water in Manuscript B brought together new insights into its relationship to the painted arbor in the *Sala delle Asse*. Presentations from practitioners in the modern medical field supplied detailed analyses confirming the accuracy of Leonardo's study of the flow of blood through the heart, as well as the circulatory system. A look at Leonardo's designs for Milan's waterways reintroduced the idea of invention. The conference concluded with talks addressing Leonardo's philosophical and literary learning – both ancient and early modern – and their relation to his study of water.

A presentation on UCLA's Elmer Belt Library of Vinciana highlighted the rich tradition of Leonardo studies at UCLA, extending back to formative figures such as Elmer Belt, Kate Steinitz and, of course, Carlo Pedretti. Conference participants were treated to a number of shared anecdotes from the audience, which further enlivened the discussion. The paper was complemented by the exhibition 'Master of Water: The Flow of Water through Leonardo's Notebooks' in the UCLA Library Special Collections. Finally, the program included the much-welcomed addition of a paper presented by the distinguished scholar Irving Lavin of the Institute for Advanced Study, Princeton, New Jersey. Professor Lavin's paper, 'Leonardo's Watery Chaos', built on his long-standing interest in the Deluge drawings and convincingly suggested that they represent a sort of visualisation of the complete disruption of natural order. As such, the drawings stand apart from Leonardo's other studies of water, and according to Lavin relate to the combined ideas of force and symmetry and ultimately to order and chaos.

The conference organisers intend to publish the proceedings as part of the series, *Leonardo Studies* (Brill). A more extended summary of the papers is provided in the following abstracts:

Damiano Iacobone (Architectural History, Politecnico di Milano)

Leonardo and Water: A Short Historiography

This paper outlined scholarly studies referring to Leonardo's hydraulic knowledge, dating from the second half of nineteenth century to the mid-twentieth century. Beginning with the transmission of the main sources related to hydraulics (the Arconati manuscript, Codex Leicester and the manuscripts of the Institut de France), this paper analysed the critical and philological essays of Venturi (1797), Richter (1883), Calvi (1909), Duhem (1906-13), Beltrami (1902; 1919), Carusi and Favaro (1923), while also presenting a comparison between the themes analysed in Leonardo's manuscripts and those of the essays. Unpublished materials referred to the exhibition held in Milan in 1939 and others through the 1950s, when scholars started to delve deeper into the relationship between art and science in Leonardo's studies (Clark and Heydenreich, 1952), and the contribution of Brizio and Pedretti.

Paolo Cavagnero and Roberto Revelli (Engineering, Politecnico di Torino)

'For not making this science useless': Learning From Nature to Harness the Power of Water Flow

'When you gather the science of water movements, remember to put under every proposition its benefits, for not making this science useless.' Drawing on this note from Manuscript F (f. 2v), the authors highlight three keywords: benefits (which recalls the principle of usefulness which underlies engineering practice); water movement (this is quite different from simply dealing with 'water'); science (the combination of notions coming from the observation of natural phenomena, ideal or actual experiments as well as medieval and Renaissance natural philosophy, which together distinguish Leonardo's knowledge). Looking at these keywords, which characterise Leonardo's approaches to water science, this paper attempts to clarify the meaning of this quote using Leonardo's own drawings and words on flowing water. As hydraulic engineers and hydrologists the authors focus, among the many possibilities, on streams and rivers, highlighting the utility of water engineering that emerged from Leonardo's vision. This examination of Leonardo's notes started from a description of the geomorphological processes that impact river courses and extend to his investigations of the interactions among obstacles, water streams and riverbanks. The paper concludes with remarks regarding Leonardo's learning from nature how to harness the power of water flow to improve the design of the piers of bridges, the diversion of river courses, and the protection of riverbanks.

Leslie Geddes (Art History, Tulane University)

Leonardo on Experiments

This paper investigated the ways in which Leonardo da Vinci thought about experiments, chiefly those concerning water. That is, it interrogates how he strove to expose some aspect of nature that would otherwise be difficult to perceive or study. Leonardo boiled water, placed obstacles in watercourses, and documented transient natural phenomena. Better to discern river currents, he records employing tactics such as tossing sticks into streams. In the Codex Leicester and in Manuscript F he suggests putting millet seeds in boiling water within a glass tank to afford a sectional view of water's movement. By specifying that the experiment be observed at eye-level with the vessel, he puts the viewer before a kind of window. He thereby devised the experiments to afford optimal visual access. A lengthy passage in the Codex Urbina describes how water plays tricks on the eye. In noting the optical distortions, he has recourse once again to an experiment, this time with mirrors with curved surfaces. In this context the effects of water flow are less about movement than about the resulting changes in our visual perception. The experiments Leonardo poses are written, suggesting the ease of verbal articulation for these procedures, while at the same time he adamantly foregrounds the role of vision. These passages reveal how he addressed challenges pertaining to the limits of vision and consequently how one renders what one sees and knows.

Victoria Steele (Curator of Humanities Centers, Programs, and Collections, UCLA)

A Brief History of the Elmer Belt Library of Vinciana at UCLA

The most extensive research collection on Leonardo da Vinci in the United States, the Elmer Belt Library of Vinciana, was dedicated in 1966 upon completion of an elegant suite of rooms for it in UCLA's Dickson Art Center. The collection's founder and donor was Dr. Elmer Belt, who was not only one of the great collectors of his day, but also a highly respected urologist and passionate advocate of public health. In addition, he was the first person in the United States to perform sex-change operations. Two eminent figures presided over the collection in its early years and beyond. One was Kate Steinitz. Dr. Belt's first librarian. Steinitz was originally an artist at the heart of the avant-garde art scene in pre-WWII Germany. Ending up in Los Angeles after fleeing the Nazis, she transformed herself into a Leonardo scholar after being hired by Dr. Belt. The other key figure was Carlo Pedretti, the eminent Leonardo scholar, who was brought to Los Angeles by Elmer Belt and subsequently joined the Art History Department at UCLA. Professor Pedretti held seminars in the Belt Library for several decades until his retirement in the mid-1990s. In 2002, 36 years after its dedication, the Belt Library lost its quarters, owing to the transformation of the Dickson Art Center into the Broad Art Center. However, the collection remains intact and accessible. The rare books and facsimiles are served by UCLA's Library Special Collections, while non-rare materials may be accessed from the Southern Regional Library Facility located on the UCLA campus.

Mark Rosheim (Robotics, Ross-Hime Designs)

The Bell Ringer: Leonardo's Digital Hydraulic Clock

Leonardo's bell ringing *jacquemart* (c. 1510) represents the last and most highly developed of his automata. Leonardo's project of a hydraulic clock that rang the hours relates to earlier renditions of hydraulic devices, fountains and water clocks. Leonardo arranged 24 sophisticated interconnected 'bottini' in a modified spiral boustrophedon pattern. These *bottini* anticipate modern computer AND gates and Leonardo's design appears to be the first computer register. These *bottini* featured two floats and a valve assembly, functioning not unlike a modern flush toilet. The exception being an ingenious, compacted float/trigger mechanism that released the lower valve actuation float when the water level reached the upper float level. Once actuated the valve would dump its unique reservoir, causing a tip bucket to activate the figure. Leonardo's anthropomorphic *Bell Ringer* figure was designed to ring the hour on the hour by striking its bell: at one o'clock the ringer would strike once, at two o'clock two times, and so on. Although engineering details are lacking, the speaker has continued his unpublished research and has developed a theory/design of operation. One aspect that is clear is that, with this design, Leonardo anticipated basic digital computer logic elements.

Sara Tagliagambe (Art History, Sorbonne, Politecnico di Milano)

The Viscosity of Water

Realising that mathematics was inadequate for describing the movement and transformation of flowing water and also that geometry was too rudimentary for describing complex flow phenomena, Leonardo chose his exceptional facility of drawing to document his observations, realising that sketches could be both strikingly beautiful and also play the role of mathematical diagrams. His drawings of turbulent flow patterns are not realistic representations of single instances of observation, but are syntheses of many observations in the form of theoretical models. Leonardo sketched the formation of a broad range of turbulent structures of various sizes. As we can clearly see in his drawings, the region of turbulence can be divided into two parts: a 'frozen' regime with different types of vortices and a regime drawn in lighter chalk, in which the turbulent kinetic energy falls down through vortices of smaller and smaller scales until it dissipates in the water's *viscosity*. So *viscosity* is working when Leonardo drew bluff body flows around objects (calling to mind the analogy between water and air) as well as when he drew water falling upon water in a calm pool. It follows that wider and more resistant vortices are those formed by the water falling into other water (where it weighs less), while more tightly curled but more ephemeral vortices (the ones in the centre of the drawing) are those formed on the surface, where the water, surrounded by air, weighs more and it extinguishes earlier its *impetus* or *motus*. The logical conclusion is that *viscosity* for Leonardo has the function of dissipating the energy released in the turbulent motions and returns the water to the property of the *colleganza*. The turbulent flow thus is determined by an energy that breaks the *colleganza* and decreases the viscosity. Fluids have always fascinated scientists and their study goes back at least to the ancient Greeks. Leonardo was the first scientist to formulate excellent observations on how fluids flow. Many of his theories were highly accurate and his mechanics formed the basis for describing fluid flows. In 1687, in *Principia Mathematica*, Isaac Newton experimented with the viscosity of different fluids. Daniel Bernoulli established the principle of the energy conservation in a laminar inviscid flow (known, in fact, as Leonardo's law) in his *Hydrodynamica* (edited in 1738). Euler, Lagrange, Laplace and other mathematicians treated the mathematics of the governing equations in the late eighteenth century. By including *viscosity*, the governing equations were put in their final form by Charles-Louis Navier (1822) and by George Gabriel Stokes (1842) in the Navier-Stokes equation. It follows that Leonardo has been the basis for a vast body of research since then, revealing him – once again – to be a great observer of nature with a true scientist's mind.

Jill Pederson (Art History, Arcadia University)

Of Lake and Labyrinths: Leonardo and the Gardens at the Castello Sforzesco

This paper considered Leonardo's explorations of water as they relate to his architectural designs by examining the well-known drawing in Manuscript B (f. 12r) of a plan and perspectival section of what Leonardo described as a 'pavilion of the garden of the Duchess of Milan'. The drawing includes a cross-section of an elegant domed centralized building, while at right we find a plan consisting of a ring surrounding

a central octagon containing eight square compartments. At the centre of the ring, Leonardo has included the word 'aqua'. Leonardo's description of the pavilion 'in the middle of the Duke's maze' led Carlo Pedretti (1977) to connect the drawing to the Florentine humanist Giovanni Ridolfi's 1480 description of the gardens and hunting grounds surrounding the Castello Sforzesco in Milan. The pavilion provided a space of retreat and enclosure that was echoed in Leonardo's designs for the nearby *Sala delle Asse* in the interior of the castle. Recent technological findings on the original appearance of the *Sala*, based on previously unknown under-drawings, help to connect the room with a more overall concept of nature prevalent in Leonardo's cultural ambit. For instance, themes of poetic representations of nature serve to illustrate Leonardo's engagement with the pastoral ideal and visualisations of the *locus amoenus*. As these areas played a critical role in the conception of the arboreal imagery, this paper argues that the *Sala delle Asse* may be understood as a sort of intermediary space between the cultivated and the wild, and by extension the rational and the fantastical.

Francis Wells (Heart Surgeon, Papworth Hospital, University of Cambridge)

'With what words will you describe this heart so as not to fill a book?' Vortices, Fluid Drag and Linear Flow Modeling

The anatomical studies of Leonardo represent a huge amount of detailed and painstaking work carried out throughout much of his life but never published as a finished corpus, despite Leonardo expressing the desire to do so. The musculo-skeletal studies speak for themselves in their quality and depth of understanding, unequalled until the publication of Vesalius's *The Fabric of the Human Body* more than thirty years after Leonardo's death. However, less detailed attention has been paid to Leonardo's functional (physiological) studies. True, much has been written about discrete parts of the cardiac anatomy, in particular the closing mechanism of the aortopulmonary valves, but his detailed dissection work on the anatomy of the heart has to some extent been neglected. We have been able to use ultra-modern magnetic resonance imaging to demonstrate the vortices in the sinuses of the aortic root that Leonardo so accurately described as being necessary for normal function. It is in this work, carried out in the last few years of his life, that the profundity of Leonardo's powers of observation can be clearly discerned. Working with no definite known support and certainly no prior knowledge, his drawings of the dissected ox heart are exquisite in their detail and accuracy. Accepting Leonardo's accuracy of detail in the musculo-skeletal drawings, it seemed a logical next step to attempt to reproduce these dissections. To that end, the author obtained fresh specimens of ox heart and lungs 'en bloc' from a local abattoir, much as Leonardo must have done, and reproduced his dissections. The results were astonishing. To the last detail his representations were accurate and beautifully rendered. As a practicing cardiac surgeon, the author found detail that spoke to him of structural knowledge that we are only able to realise the importance of today.

Olga Corti (Surgeon, Independent Scholar, Florence)
Flowing Through the Veins, Running Between Banks: Blood and Water

The discovery of blood circulation has a long and troubled history, with many obstacles and even setbacks, due to long-standing prohibitions of dissections of the human body. The organisation of the circulatory system in its true structure and function is attributed to William Harvey, who in 1628 published his famous *Exercitatio Anatomica De Motu Cordis et Sanguinis* in which he reported his experiments demonstrating cardio-circulatory function. Confirmation of Harvey's discoveries on circulation happened 33 years later, in 1661, when Marcello Malpighi revealed capillaries under a microscope. While adhering to the Galenic theory of circulation, Leonardo made extraordinary discoveries and had brilliant intuitions. His *Research on the Functions of Body Parts* made him the inspiration of the glorious Italian school of physiological anatomy in which Harvey trained. In order to understand Leonardo's studies of circulation, it is appropriate to describe briefly the circulatory system as we know it now. He often seems to get closer to that understanding through certain correlations he makes between the movement of the blood mass and that of other fluids like the cycle of water in nature or in plants. But then Leonardo ceases his study, almost as if something held him back. He clearly expressed the concept of circulation: the discovery was almost his. But he remained on the threshold, even if he had come so close when studying plant and animal physiology.

Claudio Giorgione (Curator, Museo Nazionale Scienza e Tecnologia Leonardo da Vinci, Milano)
Leonardo da Vinci and Waterways in Lombardy: Observations, Surveys and Proposals

In Leonardo's letter written to the Duke of Milan Ludovico Sforza at the beginning of his first Milanese stay, he stated that he knew how 'to conduct water from one location to another', but only in the following years did he begin investigating the general characteristics of water with organic hydraulic studies. For Leonardo, the vivacity of the Lombard school of hydraulics was a source of study and knowledge, constituting an extremely important educational experience during his Milanese years. He studied not only large rivers like the Adda and Ticino, but also smaller watercourses, like the Nirone. Above all, it was the 'Navigli' – the city's artificial canals – that attracted his attention: from the Naviglio Grande, a masterpiece of medieval engineering, to the Naviglio Martesana, which was about to be completed. His studies of waterways and hydraulic engineering artifacts range from investigations of existing technologies to improvement proposals that date back to his first and second Milanese periods when, between 1509 and 1511, Leonardo was several times a guest at the villa of his pupil Francesco Melzi, located on the river at Vaprio d'Adda. Here, he observed the impetuous flowing of the Adda and the calm waters of Naviglio Martesana and studied a proposal for constructing a canal navigable from Lake Como to the Adda. Leonardo's drawings of the Adda valley (now at Windsor Castle and in the Codex Atlanticus), are characterised by a developed consciousness of the union between water, nature, and the work of man.

Irving Lavin (Art History, Institute for Advanced Study, Princeton)

Leonardo's Watery Chaos

The author's purpose in this paper is to discern in Leonardo's studies of water a coherent and progressive development through a comprehension of the function of forces in the absence of friction to the creation/end of the world in chaos.

Domenico Laurenza (History of Science, Istituto di Storia della Scienza, Museo Galileo, Florence)

Out of the Water: The Birth of Man and Earth. Leonardo Between Aristotle and Kircher

At the same time as the famous series of embryological drawings showing how the human body is born out of the fetal waters (c. 1509-16), a number of Leonardo's studies were devoted to the body of the earth and to the original emergence of mountains and dry land out of the sea (c. 1506-11). A comparative study of his embryological and geological studies demonstrates how, in this case, within the general analogy between the macrocosm and the microcosm, it was anatomy that furnished a model for geology. Leonardo's studies of the history of the generation of man influenced his contemporary reconstruction of the history of the earth's generation. Aristotle's eternalist and anti-historical cosmology and Kircher's later historical and biblical geological conception are also considered in order to provide focus the originality of Leonardo's theory of the earth.

Beth Stewart (Art History, Mercer University)

Interesting Weather Ahead: Thoughts on Leonardo's 'Deluge' Drawings

These drawings remain mysterious and an object of much speculation. A sampling of responses to them from various scholars suggests there are multiple influences and experiences that inspired Leonardo to produce them, including his study of what was for his time and lot in life a large number of books. In particular, ancient sources read by Leonardo, including Aristotle, Epicurus (Diogenes Laertius), Lucretius, Ovid, and Seneca, offer comparisons with the many written descriptions of violent weather and destruction in several of Leonardo's notebooks, and in the imagery of the drawings. These are particularly pertinent when he identifies the cataclysm as the end of the world or of all nature. Leonardo plays with variations that reflect ideas from all of these writers but his general lack of specific narrative (no mention of Noah or Deucalion), his lack of concern with God's providence, his insistence on the natural causes of meteorological destruction rather than punishment from an angry god, and his belief that total destruction is inherent in the nature of things makes Lucretius' *De rerum natura* the closest ancient parallel to Leonardo.

Jill Pederson
Arcadia University

Renaissance Society of America conference

31 March –2 April, Boston

This year's RSA conference in Boston was once again a hugely successful event, with numerous panels running concurrently, and thousands of delegates in attendance. A number of papers were given which related to Leonardo, summaries of which appear below.

Maya Corry (University of Cambridge)

The Workshop Production of Images for Domestic Devotion

This paper explored the question of whether common workshop practices of composing, copying, replicating and memorising had spiritual dimensions. Discussion was focused on the *bottega* set up by Leonardo in Milan in the last two decades of the fifteenth century. Like the majority of artists' workshops, a substantial portion of the output of Leonardo's *bottega* was comprised of small-scale panels for domestic devotion, and the most popular of these compositions were repeated many times. This repetition was dependent on specific processes of replicating and reproducing which were central to an artist's training and practice. Leonardo believed that copying and memorising designs was at the heart of an artist's education. Analysis of extant drawings and paintings reveals that members of Leonardo's *bottega* copied entire works, and repeatedly employed designs of parts in the creation of compositions, especially those made for private devotion. These practices had religious significance that went beyond the straightforward creation of devotional images. Both theology and art theory provided intellectual justification for the harmonising of parts in the pursuit of divine perfection, and Leonardo's work was characterised by the intense pursuit of ideal forms (as was that of artists working in his sphere in Milan). Mnemonic exercises advocated by Leonardo for artists had clear parallels with commonplace contemporary advice on cultivating good spiritual practice. This paper thus argued that the creation of religious compositions in the workshop could therefore have been perceived as itself a pious exercise, and the *bottega* as a place of religious experience. An essay based on this paper will appear in a book edited by the panel organisers, Mattia Biffis and Giorgio Tagliaferro, provisionally titled *Crossroads of creation: Artistic workshops in Renaissance Italy, 1450-1650*.

Alessandra Galizzi Kroegel (Università degli Studi di Trento)

Invention and Caution: Leonardo, Zenale and the Immaculate Conception

Most scholarship by now agrees that the *Virgin of the Rocks* alludes to the much disputed doctrine of the Immaculate Conception, and that a crucial part of this allusive character is to be found in the famous rocky landscape. This interpretation finds confirmation in two altarpieces by Bernardo Zenale, which are also characterized by an imposing geological setting. The first work (now divided between three museums in Los Angeles and Milan) was commissioned in 1502 by the Confraternity of the Immaculate Conception for the Church of San Francesco in Cantù. The second (now in Denver) is datable to around 1510 and used to hang in San Francesco Grande in Milan, just a few chapels away from the one

adorned with Leonardo's *Virgin of the Rocks*. By analysing the iconography of both Zenale altarpieces in the light of contemporary devotion to the Immaculate Conception, with special reference to the Milanese Franciscans, it can be argued that Zenale managed to produce two images which were both clear and subtle, thus fulfilling his patrons' need for cautious propaganda, just as Leonardo had done with the *Virgin of the Rocks*.

Elizabeth Lisot (University of Texas at Tyler)

Butchering the Babes: Ghirlandaio's Massacre of the Innocents, Cappella Tornabuoni, Santa Maria Novella, Florence

Alhazen's problem, studied by Leonardo da Vinci in the *Codex Atlanticus* (1478-1519), attempts to calculate the angle of reflections emanating from a curved surface. The appropriation of this interpretive model for Ghirlandaio's fresco of the *Massacre of the Innocents* (1485-90) in the Cappella Tornabuoni, Santa Maria Novella, suggests historical narratives corresponding to the graphically violent scene portrayed. The iconography may reference incidents of murder, mortality and forced infant abandonment in late quattrocento Florence. Lucrezia Tornabuoni's trauma when her sons, Lorenzo and Giuliano de' Medici, were attacked during the Pazzi Conspiracy (1478) provide a foundation for the pathos encountered by mothers of varied social classes who lost children and felt powerless against patriarchal patterns of cruelty. Patronage of art and poetry served to empower women's viewpoints while promoting alternative perspectives of disenfranchised populations.

Maria Pietrogiovanna (Università degli Studi di Padova)

Not Only Copies: Variations, Suggestions, Interpretations. Joos van Cleve and the Lost Leonardo Madonna of the Cherries

The art historical exercise of retrieving lost compositions by great masters through copies or replicas by other artists has long shaped scholarship on Leonardo. One of the most complicated and mysterious stories relates to Leonardo's *Madonna of the Cherries*. This paper focused on the relationship between the composition (known in the painting by Giampietrino now in a private collection, and formerly of the Eidsel collection, Dallas) and the replicas and copies by Joos van Cleve and his workshop. Over twenty-six of these have been identified; evidently the painting found great success in northern Europe. Following recent publications on this argument, the paper focused on a hypothesis of the transmission of Leonardo's pictorial model by considering the new painting by Joos van Cleve, unknown by critics, which has recently appeared on the art market. An essay based on this paper will appear in a book edited by the panel organiser, Maddalena Bellavitis.

Mauro Pavesi (Università Cattolica del Sacro Cuore, Milan)

New Insights on Giovan Paolo Lomazzo's Artistic Career

Better known today as an art theorist than as an artist, Giovan Paolo Lomazzo (1538-92) was one of the most celebrated artists of Milan until 1572, when he stopped painting due to blindness. In his small *Self-Portrait* now at the Kunsthis-

toriches Museum, Vienna, Lomazzo paints himself in a totally Leonardesque profile which, in the shapes of the neck and the curly hair, recalls many Leonardo drawings at Windsor. Probably Giovan Paolo wanted to highlight his belonging to the Milanese Leonardesque tradition, as opposed to that of foreign painters, especially those from Cremona. In the Vienna *tondo* we can already admire a sort of early stage of his theory of the 'seven governors' of painting, later expounded in the *Idea*: pure Leonardesque drawing coupled with Venetian coloring, as visible in the crude, expressive brushstrokes, which show no evidence of Leonardo's *sfumato*. In his youth Lomazzo made a fresco copy of the *Last Supper* by Leonardo (1560, destroyed during WWII), and the Luinesque fresco cycle of Santa Maria Nuova in Caronno, not far from Milan. But the most important turning point of Lomazzo's career was surely his journey to Rome in 1564-65, where he admired Raphael and Michelangelo's painting, and also that of Daniele da Volterra, Salviati and Barocci. Mannerist influences, mixed with Flemish tendencies, were visible in his now lost *Lenten Feast* formerly in Sant'Agostino, Piacenza. But in his small *Agony in the Garden* in the Ambrosiana (1565), the gloomy naturalistic setting can be read again as an archaistic interpretation of Leonardo's landscape of the *Virgin of the Rocks*. In 1568, when he was made 'abbot' of the Val di Blenio Brotherhood, Lomazzo painted his second *Self-Portrait* now in the Brera Gallery. Even if the composition is somewhat Giorgionesque, what remains incontrovertible is the refined, sophisticated use of Leonardo's *sfumato*. Features of Leonardo's style, mixed with elements drawn from Michelangelo, Titian, Dürer and Bramantino, can be found in his later paintings. In his famous 'exemplum fictum', in the seventeenth chapter of *Idea*, he describes two hypothetical 'paintings of the highest perfection, such as one of Adam and one of Eve' with 'Adam drawn by Michelangelo and colored by Titian' and 'Eve drawn by Raphael and colored by Antonio da Correggio'. Even if in the Vicenza *Noli me tangere* (1568) and in the Foppa altarpiece in San Marco, Milan (1570), the landscape again shows suggestions of the *Virgin of the Rocks*, in these last works his free, fascinating 'spotted' way of painting actually prevails over Leonardo's *sfumato*, so much so that many details even seem to be unfinished.

Anthony Russell (University of Richmond, Virginia)
From Beatrice to Mona Lisa: Love and Grace in Vasari's Vite

Employing Vasari's life of Leonardo as a principal example, this paper explored the possible influence of the *Dolce Stil Novo* on Vasari's representation of ecstatic responses to exceptional works of art. The *Vite* suggest an intriguing continuity between falling in love with the beautiful and powerful beloved in the *Vita Nova*, for example, and the almost erotic fascination evoked by beautiful and powerful works of art such as the cartoon of the Virgin and St. Anne or the *Mona Lisa*. *Grazia* is one of the principal elements shared by Beatrice in Dante's poetry and by 'third period' art (as defined by Vasari), and it is the source of a unique coincidence of the aesthetic and the metaphysical that arouses wonder and love as a response.

William E. Wallace (Washington University in St. Louis)
Encountering Leonardo's Adoration of the Magi

This paper addressed some observations regarding Leonardo's unfinished altarpiece, now in the Uffizi, *The Adoration of the Magi*, resulting from repeated encounters with this familiar yet still mysterious masterpiece. In particular, the patriarchal role of Joseph, who is located at the very centre of Leonardo's complicated composition, was discussed. Joseph, who leans over a wine vat, appears to hold an ancient or medieval style bell, suggesting a sacramental and Eucharistic dimension to this otherwise seemingly secularized version of the Epiphany.

The Leonardo da Vinci Society

The Secretary and *Newsletter* Editor are very grateful for the comments and suggestions made by members. We welcome suggestions of material, such as forthcoming conferences, symposia and other events, exhibitions, publications, reviews, and so on, that would be of interest to members of the Society for inclusion in this *Newsletter* or on the website, which can be visited at the following address: <<http://www.bbk.ac.uk/hosted/leonardo>>

Officers:

President: Dr J.V. Field, Birkbeck, University of London; jv.field@hart.bbk.ac.uk

Vice-President: Emeritus Professor Francis Ames-Lewis, Birkbeck, University of London; f.ames-lewis@bbk.ac.uk

Secretary and Treasurer: Tony Mann, University of Greenwich; a.mann@gre.ac.uk

Newsletter Editor: Dr Maya Corry, Oriel College, Oxford; maya.corry@riel.ox.ac.uk

Websites: Dr Matthew Landrus, Wolfson College and Faculty of History; matthew.landrus@history.ox.ac.uk

Committee members:

Dr Susanna Avery-Quash, National Gallery
Dr Juliana Barone, Birkbeck, University of London
Dr Stephen Clucas, Birkbeck, University of London
Professor Frank A.J.L. James, Royal Institution
Centre for the History of Science and Technology
Professor Dilwyn Knox, University College, London
Dr Nick Lambert, Ravensbourne
Dr Richard Oosterhoff, Cambridge University
Dr Anna Sconza, Sorbonne University, Paris
Ms Angela Sheehan, London
Richard Talbot, Newcastle University

Please send items for publication to the *Leonardo da Vinci Society*: Maya Corry, Oriel College, Oxford, OX1 4EW; maya.corry@riel.ox.ac.uk