Leonardo da Vinci Society Newsletter

editor: Matthew Landrus

Issue 40, May 2014

Recent and forthcoming events

The Annual General Meeting and Annual Lecture 2014

On Friday, 9 May 2013, Dr Ashok Roy, Director of Scientific Research at the National Gallery, will offer the Annual Lecture: Analysing Leonardo: New Research on his Practice of Painting. The lecture will start at 6 pm at the Kenneth Clark Lecture Theatre of the Courtauld Institute of Art (Somerset House, The Strand). Before the lecture, at 5:30 pm, the annual general meeting (open only to members) will address matters arising with the Society. The Annual Lecture will be free and open to the public.

Dr Roy provides the following initial notes about his talk: in comparison with other great painters of the European tradition, our understanding of Leonardo da Vinci’s technical practices for his easel paintings has advanced quite slowly in the 20th and 21st centuries. This is partly because of the rarity of his autograph works, their often unfinished nature, and the relative infrequency of conservation treatments of Leonardo’s paintings and, therefore, a lack of opportunity for accompanying scientific study under favourable conditions. The full-scale conservation treatments of the Virgin of the Rocks in London (at the National Gallery between 2009–11) and the Virgin and Child with St Anne (at the Musée du Louvre, carried out at Centre de Recherche et de Restauration des Musées de France [C2RMF] between 2010–12), both of which involved comprehensive technical study in support of conservation, have changed the state of this knowledge decisively. At the same time further recent studies of Leonardo’s painted work by technical experts around the world have intensified and the results of these investigations, many of which have now appeared in print, have contributed significantly to a more integrated and scientifically-grounded view of Leonardo as a practitioner. This talk will deal with recent developments and newer assessments of Leonardo’s technical procedures.

A symposium at the 24th International Congress of History of Science, Technology and Medicine

The Society arranged a symposium on “Leonardo da Vinci and the History of Science” for the International Congress of History of Science, Technology and Medicine, which was held at the University of Manchester in July 2013 (ichstm2013. com). The meeting was well attended and featured four speakers: J.V. Field, Martin Kemp, Eduardo Kickhöfel, and Matthew Landrus. Drs Field and Landrus organised and chaired the discussions. Here below are abstracts for the event and essays. For iCHSTM’s call for papers, Dr Field provided the following abstract:

Leonardo has often had an ambiguous treatment from historians. Historians of art have never dealt with anything that looks to them so ‘scientific’ and historians of science have never had to deal with diagrams that are so beguilingly beautiful. The difficulties are partly caused by the narrow specialisms of our day. In Leonardo’s time the pattern of division into recognised areas of specialised intellectual and practical work was very different. The obvious division is largely social: between university education, in Latin, and practical instruction, in the vernacular, but the borders seem to have been fairly porous (at least in Italy). Unlike university graduates, trained in the arts of the trivium and the quadrivium (the four mathematical ones often called ‘sciences’), craftsmen were expected to make direct use of practical knowledge in their workplaces. In the practical world, ‘art’ also had a specialised meaning for the trades associated with guilds; for instance the wool guild was called the Arte della Lana. These changes in the meaning of the terms ‘art’ and ‘science’ can make it difficult to use “actors’ categories” properly, but whatever terms one uses it is clear that the intellectual map was very different from what it is today and that craftsmen (among them painters and sculptors) regularly...
brought considerable ‘scientific’ knowledge to their work.
In recent years some bridges have been built across today’s disciplinary divide, and the emergence of a healthier body of literature on Leonardo offers some opportunities to historians of science to integrate him into a viable image of the natural philosophy, mathematics, medicine and technology of his time - and, of course, to assess his possible contributions to what happened next.

J.V. Field (Birkbeck) discussed ‘What the craftsmen taught the scholars about natural philosophy’. In the fifteenth century, technology (the crafts) was doing better than either natural philosophy or the sciences in producing works that still have something to say to the twenty-first century. We may contrast Brunelleschi’s dome for Florence cathedral (still standing) with contemporary theories of the motion of the Sun (which could not correctly predict dates of equinoxes). Craftsmen, whose activities were attracting increasing attention from the learned, had much to teach scholars about the power of approximate, non-rigorous methods and the usefulness of focussed observation.

Martin Kemp (University of Oxford) discussed ‘Science and the Codex Leicester’, addressing the state of Leonardo’s research on natural science around 1508-12, with particular interest in the Codex Leicester and his studies of water, hydrology, astronomy, cosmology, fossils, geology, and more generally, the “body” of the earth.

Matthew Landrus (University of Oxford) spoke on ‘Leonardo and the art of engineering’. Traditional academic assessments of preliminary or unconstructed mechanical engineering projects often address the authors’ intuitive approaches to this ‘paper engineering’. Estimates for machine studies, compared with detailed calculations for practical engineering projects, were often rooted in similar systematic approaches. In both cases, structural intuitions and measured calculations often extended from standard assessments of proportional geometry. Standard systematic methods helped with updates to projects, from their initial stages to advanced stages. As reflections of antique engineering methods, Renaissance engineers valued these geometric standards for their supposed structural and stylistic reliability and permanence. Landrus’ discussion addressed Leonardo da Vinci’s systematic approaches to the art of engineering and the means by which he responded to similar approaches in medieval and classical antiquity. Recognized in his plans for treatises on military and mechanical engineering, this work involved research on Greek and Roman systems of proportional geometry. To address a general question with regard to his engineering drawings: for what purposes were they developed? Evidence of their development with systematic proportional methods provides part of the answer.

Eduardo Kickhöfel (Universidade Federal de São Paulo) addressed ‘The place of Leonardo da Vinci in the history of natural philosophy’. He discussed the way in which the Renaissance was a period dominated by Aristotelian philosophy. Varchi, in the preface of the second of his “Two lessons on painting and sculpture”, says that science is “nothing more than the knowledge of the universal things, necessary and consequently eternal, obtained by demonstration”, and art is “the disposition to make involving a true course of reasoning”, following the definitions of Nicomachean Ethics. Toletus, in his Commentary on Aristotle’s Physics, divides philosophy into speculative, practical and productive, following the beginning of the sixth book of Metaphysics. However, instead of the higher value given to the vita contemplativa in Antiquity still present in the Middle Ages, Renaissance men like Salutati and Manetti gave new values to the vita activa, and craftsmen-writers like Alberti, Ghiberti and Martini aimed to elevate the value of their knowledge and their own social status. Different from the unlettered craftsmen, the craftsman imagined by them was a sort of lettered man who could work from the knowledge of principles and was able to speak about them. However, the definitions and the organizations of knowledge of the ancient texts were well established and clear. Leonardo da Vinci tried to surpass them and tried to identify art and science. After his education in Verrocchio’s atelier, in Milan Leonardo began to study matters like optics, physics and anatomy. In the case of anatomy, Leonardo took a very distinctive path, separating himself progressively from the craftsmen and the physicians. Without the prejudices of the university professors, he did dissections, and for him the painter-anatomist had to know “the good draughtsmanship”, “the knowledge of perspective”, “the methods of geometrical demon-
stration and the method of calculation of the forces and power of the muscles”. Using his art of drawing, his experience of dissection and his knowledge of mechanics, he could recreate the human figure “without seeing the living [and] without error”. However, the definitions and the organizations of knowledge did not permit the synthesis Leonardo da Vinci was proposing. He did not have disciples as an anatomist. It is argued here that Leonardo da Vinci’s anatomical studies are products of an active view of life, but still facing the limits of the Aristotelian philosophy present in the Renaissance. Natural philosophy, part of the speculative branch of philosophy, could be aided by the arts, but not directly elaborated by them.

Conference Proceedings: Lives of Leonardo


In 2013, Thomas Frangenberg and Rodney Palmer published the proceedings of the 2006 Society conference on the ‘Lives of Leonardo’, held at the Warburg Institute on 15 September 2006. Organised by Dr Palmer (on behalf of the Society), the conference explored “the biographical, fictional and psychological approaches to Leonardo”, as he noted in the conference programme, and as he now describes in the book: “What light do these different narratives shed on Leonardo himself, and on the cultures in which they were written? Why has Leonardo’s life story attracted so much attention? How did anecdotes about Leonardo affect Leonardesque art theory? When and why were myths of Leonardo created, and in what ways have they biased responses to his art?” All speakers at the meeting, with the addition of David Ekserdjian, contribute the following essays to the book, introduced by Dr Frangenberg:

- Charles Hope, ‘The Biography of Leonardo in Vasari’s _Vite_’
- Paul Taylor, ‘Leonardo in the Low Countries’
- Juliana Barone, ‘The “official” _Vita_ of Leonardo: Raphael Trichet Du Fresne’s biography in the _Trattato della pittura_’
- Giovanna Perini, ‘Leonardo and his Eighteenth-Century Italian biographies’
- Thomas Frangenberg, ‘Between Translation and Fabrication: Leonardo in German-Speaking Countries before 1800’
- Rodney Palmer, ‘Leonardo’s Nonconformist Choices and his Legendary Death, from Vasari to 1869’
- Michela Passini, ‘A fin-de-siècle Leonardo between History and Fiction: Gabriel Séailles and his “Psychological Biography” of Leonardo (1892)’
- Julia Friedman, ‘Three Faces of Leonardo da Vinci in Fin-de-Siècle Russia’
- Bradley Collins, ‘Freud’s Leonardo. Its Cultural Moment and Legacy’
- David Ekserdjian, ‘Renato Castellani: Leonardo (1971)’
- Martin Kemp, ‘Do Biographies (and Portraits) Matter?’

The book may be purchased at the School of Advanced Study - [http://events.sas.ac.uk/support-research/publications/994](http://events.sas.ac.uk/support-research/publications/994) - where it is the twenty-second publication of the Warburg Institute Colloquia. A book review would be most welcome in the present Newsletter, and readers are invited to email the editor with this or other submissions.

Special project: 30-Second Leonardo da Vinci


In December 2012, members of the Society were approached for contributions to the 30-Second book series, which in February 2014 resulted in the _30-Second Leonardo da Vinci_. Because of the interdisciplinary and often profound nature of Leonardo’s work, summarizing his contributions into essential components is an interesting task, particularly for Leonardo specialists. Society members wrote most of this book, and a portion of the authors’ fees was donated to the Society. The book is designed to help readers understand Leonardo in a series of relatively brief readings and images, divided into seven sections:
painting and sculpture, geometry, mechanics, civil engineering, military engineering, nature, and anatomy and anatomical studies. As Martin Kemp notes in the foreword: “Leonardo roundly criticized the ‘abbreviators’ – those who try to take shortcuts to knowledge. This book is necessarily about abbreviation. We have, in the face of the daunting range of delightful and often exceedingly difficult material in his surviving legacy, to effect some kind of summary and synthesis.” The 30-Second Leonardo Vinci provides this useful synthesis for new and experienced students of Leonardo.

**Francis Wells, The Heart of Leonardo, Foreword by HRH Prince Charles, The Prince of Wales, Foreward by Martin Kemp, Heidelberg: Springer, 2013, £100**

In June, Francis Wells was honoured at The Queen's Gallery, Buckingham Palace, with a reception for his new book, *The Heart of Leonardo*, a magnificent, ground breaking assessment of Leonardo’s research on the anatomy and function of the heart. Martin Kemp, Martin Clayton, and Francis Wells offered presentations. As a cardiothoracic surgeon at Papworth Hospital, Cambridge, Mr Wells offers the most informative and thorough comparisons of the heart with Leonardo’s observations, discussions, and illustrations, explaining in some cases Leonardo’s accuracy. The book is a culmination of Mr Wells’ research at different stages since the early 1990s, and especially since 2002, when he restarted part of this project in Oxford and Windsor. For the Society, he delivered the 2006 Annual Lecture on “The Mathematical Heart: Why we should take Leonardo da Vinci seriously in the 21st Century.” Portions of that discussion on interior structures of the heart reappear in the very interesting fourth chapter of the recent book, where Wells explains and illustrates Leonardo’s notes alongside modern images and explanations. This is the first monograph to reproduce all of Leonardo’s drawings of the heart and circulation with relevant contemporary English translations of his texts. Those transcriptions and translations are by Carlo Pedretti and Kenneth Keele (founder of the Society). As Prince Charles notes in his foreword, “it is common to speak of a ‘meeting of the minds’ across the ages; but rarely can the work of a scientist of centuries past been shown to be so relevant to contemporary concerns.”

**Special Report**

**Romano Nanni (1952 – 2014)**

On 14 February, Romano Nanni passed away in Empoli, after a long illness. He was an exceptional scholar and gentleman. Since 1994, he had been director of the Biblioteca Leonardiana, and thereby sponsored, wrote and assisted major developments in Leonardo scholarship, not to mention extensive Renaissance through modern studies in the history of art, science and technology. He was also director of the Museo Leonardiano in Vinci and the Leonardo Casa Natale in Anchiano. His long list of books and articles include his most recent monograph, *Leonardo and the ‘artes mechanicae’* (Skira 2013), in Italian and English. The book addresses Leonardo’s approaches to the *mechanical arts*, within the context of this tradition, from Piero della Francesca to the early Galileo Galilei. Especially at issue are the ways in which Leonardo understood and contributes to our knowledge of the technicians of his time, and to the practice of geometry. The book may be obtained here: www.bibliotecaleonardiana.it. Also published last year was a substantial volume he edited with Maurizio Torrini: *Leonardo ‘1952’ e la cultura dell’Europa nel dopoguerra* (Olschki 2013). This project, with twenty-three leading Leonardo specialists at a conference in Florence and Vinci in 2009, is one of many important collaborative initiatives arranged by Nanni over the years. With Maria Chiara Monaco in 2007 he produced another significant contribution: *Leda: Storia di un mito dalle origini a Leonardo*, (Zeta Scorpii Editore). On 12 April 2014, the LIV Lettura Vinciana that he was scheduled to deliver – on his 20th anniversary as Director of the Bibli-
The Leonardo da Vinci Society

Leonardesque News

Oxford Bibliographies: Leonardo da Vinci

In September, Oxford Bibliographies (oxfordbibliographies.com), posted a substantial annotated bibliography of 250 resources, written by Claire Farago and Matthew Landrus. It is designed to offer researchers a quick, thorough, and up-to-date assessment of the essential Leonardo scholarship in the broad range of his interests, and in the depth of his work and its context and reception This was an interesting and difficult task for the writers, who carefully organised the sections and necessarily limited each section to a maximum of eight entries. There are over 30,000 articles, books, and catalogues on Leonardo, on which specialized bibliographies can be most helpful. The best exhaustive annotated Leonardo bibliography, is at the Biblioteca Leonardiana: www.catalogo.bibliotecaleonardiana.it. There are plans to periodically update the Oxford bibliography, which is in the following order:

GENERAL OVERVIEWS: Encyclopaedia entries; Cultural Context; Documentation of His Life; Biographies; Catalogue Raisonnés; Monographs; Criticism and Interpretation; Collections of Essays; Leonardo’s Artistic Legacy

BIBLIOGRAPHIES: Scholarly Journals and Serial Publications

WRITINGS: Primary Sources; Reference Works; Current editions and translations (Manuscripts A – M; The Forster Codices; Codex Arundel; Madrid Codices; Codex Atlanticus; Codex on the Flight of Birds; Codex Leicester; Codex Trivulzianus; Windsor Folios); Treatise on Painting (Editions and Translations; Reference Works); Modern Anthologies

DRAWINGS: Overviews; Facsimiles and Catalogues of Permanent Collections (Windsor Folios; Other Permanent Collection Catalogues)

CONSERVATION STUDIES

PAINTINGS: INDIVIDUAL PROJECTS: Adoration of the Magi; Battle of Anghiari; Lady with an Ermine; The Last Supper; Mona Lisa; Virgin of the Rocks; Other

SCULPTURE

ARCHITECTURE

MUSIC

SCIENCE AND TECHNOLOGY: Perspective, Optics, and Painting; Anatomy and the Human Body; Arithmetic, Geometry, Physical Sciences, Engineering, and Technology (Overviews; Physical Sciences; Engineering; Technology)

EXHIBITION CATALOGUES

‘Leonardo and the history of the earth: from fossils to the Mona Lisa’

Review of the Rowe Lecture by Martin Kemp, Magdalen College, Oxford, 18 October 2013

Juliana Barone writes: Martin Kemp initiated his stimulating lecture by juxtaposing an image of the Mona Lisa with a sheet from the Codex Leicester. A manuscript draft in the most advanced state of any surviving treatise by Leonardo that has reached us, the Codex is primarily about Leonar-
do’s dynamic view of the body of the earth. Composed around 1508-10 from earlier notes, several of its passages overlap in time with his painting of the *Mona Lisa*. The connection between Leonardo’s ideas on painting and nature were initially addressed by Kemp in relation to the issue of light. Leonardo’s discussions in the Codex Leicester about the new moon were shown to have more to do with his studies of reflected light than with astronomy. The *lumen cinerum*, that is, the glimmer visible in the shaded portion of the moon, is produced by sunlight reflected from the seas of the earth onto the surface of the moon. It thus relates to Leonardo’s ideas on percussion and painting, to his studies of reflected light and rebound. An example of such studies is seen, for instance, in his London version of the *Virgin of the Rocks*, in the palm of the Virgin and in the angel’s chin.

The next topic addressed in Kemp’s lecture was water. Most of the sheets in the Codex Leicester are about water in the body of the earth, the studies ranging from direct observation to experiments and constructed models. Leonardo insists on the importance of experience, and as he expresses his views the sheets are covered with numerous *propositioni*. The way he uses and fills up the paper is unique and the archaeological exercise of mapping how his thought moves through the page affects our reading of his argument. The examination of water studies in the Codex Leicester led to a vibrant succession of maps by Leonardo, from detailed studies for the diversion of the Arno to apparently freer sketches. An example of such studies is seen, for instance, in his London version of the *Virgin of the Rocks*, in the palm of the Virgin and in the angel’s chin.

Kemp argues that in the *Mona Lisa*, the two-level background (the upper above its natural position) reflects what Leonardo had learned about high and low places in Tuscan landscape. Kemp’s reading of the *Mona Lisa* via the Codex Leicester addressed key issues of Leonardo’s scientific investigations and their relationships with his painting of the portrait. The lecture concluded with a quote from Walter Pater’s powerful view of the *Mona Lisa*: ‘She is older than the rocks among which she sits; like the vampire, she has been dead many times, and learned the secrets of the grave... The fancy of perpetual life, sweeping together ten thousand experiences, is an old one; and modern philosophy has conceived the idea of humanity as wrought upon by, and summing up in itself, all modes of thought and life. Certainly Lady Lisa might stand as the embodiment of the old fancy, the symbol of the modern idea.’

**The Renaissance Society of America Annual Meeting, San Diego, 4-6 April 2013**

Four sessions at the 2013 RSA Meeting offered new assessments of Leonardo studies, the abstracts of which are available in the conference program, here: www.rsa.org/?page=Pastmeetings
Leonardo Studies in Honour of Carlo Pedretti

Constance Moffatt (Pierce College) organised three sessions in honour of Carlo Pedretti that took place on 4 April. A list of the speakers and their subjects:


Francesca Fiorani (University of Virginia): ‘Leonardo’s Early Scientific Inquiries’

Joanna Woods-Marsden (University of California, Los Angeles): ‘Leonardo’s Portrait of Mona Lisa’

Rolando Bellini (Accademia di Brera): ‘Leonardo and Milan: From an Epistemic Inquiry of Water to Holistic Representation’


Leslie A. Geddes (Princeton University): ‘Leonardo’s Mobile Bridges’


Constance Joan Moffatt (Pierce College): ‘Leonardo’s Topographic Studies’

Robert J. Williams (University of California, Santa Barbara): ‘The Discursivity of the Devotional Image in Leonardo and Raphael’

New Perspectives on the Leonardschi

Maya Corry (University of Oxford) and Jill Pederson (Arcadia University) organised a session on the followers of Leonardo, the papers for which were:


Maya Corry (University of Oxford): ‘The “Repulsive Effusion of an Aging Homosexual”? The Role of Beauty in Leonardschi Religious Works’

Ricardo de Mambro-Santos (Willamette University): ‘In the Name of the Baptist: Leonardo, Pedro Fernández de Mucia, and the Amadeits’

Giancarla Periti (University of Toronto): ‘“Delicatissimo e vago”: The Art of Bernardino Luini in Renaissance Milan’

Leonardo da Vinci and Optics, Edited by Francesca Fiorani and Alessandro Nova, Kunsthistorisches Institut in Florenz - Max-Planck-Institut, Studi e Ricerche 10, Venice: Marsilio, 2013

This substantial selection of fourteen essays includes seven of the ten presentations in a May 2011 conference at the Kunsthistorisches Institut in Florenz - Max-Planck-Institut, which was co-sponsored by the McIntire Department of Art, University of Virginia. A copy of the program is here: http://www.khi.fi.it/pdf/c20110526.pdf. As with the Studi e Ricerche 7 on Leonardo da Vinci’s Anatomical World (ed. Alessandro Nova and Domenico Laurenza, with ten essays), the 10th Studi e Ricerche contribution offers a state-of-the research study of optics and associated topics, with Leonardo specialists. An important nexus for science and art, optics for Leonardo extended to research and discourses on painting, ancient rhetoric, opthalmology, geometry, and philosophy. The book’s essays address these issues, expanding on the subject of painting practice with the help of modern technical analyses. The authors therefore include conservators, restorers, philosophers, and historians of art and science. The essays:

Francesca Fiorani and Alessandro Nova: ‘Introduction’

David Summers: ‘Chiaroscuro or the rhetoric of realism’

Elizabeth Walmsley: ‘Technical images and painting technique in Leonardo’s portrait of Ginevra de’ Benci’

Janis Bell: ‘Leonardo’s prospettiva delleombre - Another branch of non-linear perspective’

Fabio Frosini: ‘“Come calamita il ferro” - Leonardo da Vinci dalla magia alla prospettiva (1487-1492)’

Frank Fehrenbach: ‘Il fratello del nulla - Il “punto” nell’ottica di Leonardo’

Cinzia Pasquali: ‘Leonardo’s painting technique in the Virgin and Child with St. Anne’

Pietro Marani: ‘Il primate dell’occhio e della pittura - I ritratti milanesi di Leonardo e il Paragone delle arti’

Romano Nanni: ‘Luce e ritratto nel Trattato della pittura di Leonardo da Vinci’

Roberto Belucci, L’“underdrawing” dell’Annunziazione e la prospettiva di Leonardo

Francesca Fiorani: ‘Leonardo’s optics in the 1470s’
Dominique Raymond: ‘Leonardo, optics and ophthalmology’

Frank Zöllner: ‘The measure of sight, the measure of darkness - Leonardo da Vinci and the history of blurriness’

Cecilia Frosinini: ‘L’Adoraizione dei Magi di Leonardo da Vinci e le prime indagini diagnostiche presso l’Optificio delle Pietre Dure - Oltre il visibile’


Zecchini offers here the most appropriate analysis and attribution of a painting - Head of Christ - to Gian Giacomo Caprotti, known as Salaì (Leonardo’s student, the ‘little devil’). This, as it happens, is the only painting to be reasonably attributed to Salaì, and it deserves further review. Bernardo Caprotti purchased the painting at a Sotheby’s auction in New York in 2007, with the help of advice from Maurizio Zecchini. Using historical, state-of-the-research, and stylistic, scientific, chemical, multi-layered, reflectographic, thermal, tomographic, radiographic, and ultraviolet evidence, Zecchini provides a compelling case for the authenticity of the painting and it recently discovered original gold leaf inscription under layers of paint and varnish: FE • SALAI • 1511 • DINO. The first recorded owner of the painting is Count Johann Rudolf Czernin, who purchased it in 1830 (pp.16-19). The Czernin Gallery in Vienna had the painting in 1920. Wilhelm Suida published a photograph of it in that year, noting the Christuskopf was not likely by A. Pacchetti, as per the visible signature at that time – A. PACCHIETI • FE • 1511 – though was instead possibly by a student of Leonardo’s with skills similar to those of Boltraffio or Salaì. Suida’s notes are on “A. Pacchetti”, in “Leonardo da Vinci und seine Schule in Mailand, II,” in Monatshefte für Kunstwissenschaft, 1920, Abhandlungen, Band I, pp. 48-49, Tafel 10, Abb. 14. (http://archive.org/stream/monatsheftefrk13leipuoft/monatsheftefrk13leipuoft_djvu.txt)

Mostre sul Codice Atlantico di Leonardo, at the Biblioteca Ambrosiana

From 10 September through 8 December 2013, The Ambrosiana Library and Picture Gallery hosted the seventeenth exhibition in the series devoted to the Codex Atlanticus. Pietro Marani curates this series, which is expected to run until at least 2015, with catalogues published by DeAgostini (Milan). Matthew Landrus curated the exhibition, 17 - Strumenti e meccanismi. Leonardo e l’arte dell’ingegneria (Instruments and Mechanisms: Leonardo and the Art of Engineering: Drawings by Leonardo from the Codex Atlanticus). Addressing Leonardo’s engineering methods, the exhibition and accompanying book have provided evidence about working components of forty-four engineering designs in the Codex Atlanticus, in some cases offering the first explanations of their uses and functions.

At the start Leonardo’s working process he apparently considered the necessary instruments and mechanisms, the way to apply a design and how it would function. He studied the essential means by which his subject functioned and the necessary tools for its operation, construction, and illustration. The key to his process, particularly with regard to understanding and making an invention, was his preparation for it, his technical scholarship. As his engineering studies developed in the 1470s, starting at the Verrocchio workshop, he collected ideas and information about tools and mechanisms on sheets of paper, and in notebooks. This process would lead to his series of mechanism presentation drawings around 1480, at a time when he thought about engineering commissions in Florence and Milan. Thereafter he produced other clever and inventive engineering solutions, compiling treatises on instruments and mechanisms. In volumes that are now entitled the Codex Atlanticus there are impressive and thorough assessments of these engineering solutions, and they address Leonardo’s rationale throughout his career for collecting more drawings on engineering than on painting. Still, there are few modern publications on his instruments and mechanisms, especially by comparison with publications on his paintings. It is with Pietro Marani’s comprehensive Codex Atlanticus exhibition project that we have some of the first reliable explanations of many of these drawings. Adding to what we know about the social history of them, the present exhibition not only explains Leonardo’s fascination with instruments and mechanisms, though especially how they worked, what he said about them, how he thought they could be improved, how he could invent new devices, and especially his methods for studying them and presenting them to a learned engineering audience. This exhibition
provides for many of the drawings the first explanations of their specific design components, and of Leonardo’s thinking and descriptive writing processes. For the collection as a whole, these new assessments provide new evidence of the specific trajectory of his engineering career, from that of an exceptional student to that of famous engineer.

The elements of mechanics were for Leonardo necessary for natural movements and for the natural essence of something. To identify the authenticity of his work one has to look for his application of this inner life to the subject, his signature expression of the mechanics and necessity of Nature. His approaches to instruments and mechanisms are keys to understanding his motivations and his brilliance. It was therefore the focus of the seventeenth Ambrosiana Codex Atlanticus exhibition to address Leonardo’s consistent interests in how things worked and how they would be explained, as these issues are informative of the qualities and capabilities that have earned him due recognition as a genius.

Around 1510, while writing about the bones, tendons and muscles of the hand on a page for his treatise on anatomy, Leonardo adds a reminder for the eventual publication of the treatise: “Make sure that the book on the elements of machines, with its practical functions, should come before the demonstration of the motion and force of man and other animals; and according to these, you will be able to prove your propositions” (Windsor Royal Library folio 19009 r). This book of formal demonstrations on the elements of machines dates to around 1493 and partially survives as a manuscript now entitled Codex Madrid I. Luca Pacioli referred to it in his 1498 De divina proportione as, “an inestimable work on local motion, percussion, weights and all the forces, that is, accidental weights, having already with great diligence finished a worthy book on painting and human movements.” Thus Leonardo had at least two presentable manuscripts by 1498, the first on painting and human movements, and the second on statics, which is the branch of mechanics that explains the forces of bodies at rest. Pacioli’s note and other comments by Leonardo indicate that this book on statics is his book on the elements of machines, which assessed more specifically the elements of mechanics. Set up in a manner inspired by popular publications in the 1480s of Euclid’s Elements of Geometry, with propositions, demonstrations, and illustrations, Leonardo wrote about principles, capabilities and inventive uses of instruments and mechanisms. The basic ‘elements’ of these devices were joints, gears, pulleys, levers, springs, screws, arbalests, hoists, bearings, pendulums, and escapements, all of which are discussed in the exhibition catalogue. These were essential for understanding and using the forces of Nature, which was governed by the proportional mathematics of the cosmos. As Leonardo notes, “mechanics is the paradise of the mechanical sciences, because with that, one comes to the fruits of mathematics” (Manuscript E folio 8 v). He had such faith in the perfect mechanical system of the Aristotelian microcosm of Nature that he would early in his career calculate similar properties for units of weights as for units of measurements, assuming that they were commensurable, and that a valid, working design would have a force that is proportional to its size. This was of course helpful for understanding the scale and geometry of a project, though not in every case the arithmetic for its physical properties and capabilities.

There are five categories of instruments and mechanisms in the catalogue, ranging from basic tools to sophisticated automata and textile machines. Item numbers 1-7 are instruments that serve as basic tools, whereas item numbers 8-20 are basic machines that often serve as tools for larger projects. Items 21-25 are mechanisms that engage with hydraulic problems and systems. The ownership and use of water was a lucrative business, one that motivated creative entrepreneurs like Leonardo. Before his return to Milan in 1508, for example, he negotiated his earlier rights to the Naviglio Grande, a canal in southwest Milan, writing to the French governor the need, “to set up my instruments and things which will most greatly please Our Most Christian King” (Codex Atlanticus folio 872 r). The fourth category of items 26-33 addresses Leonardo’s automata, his automatic devices. Although studied and developed most often for formal events, these were also part of his study of methods for perpetual motion, a popular and fascinating trend in north Italy near the turn of the sixteenth century. The final category, with items 34-44, provides an assessment of his machines for the textile industry, most likely for a project to develop automated machines for a textile factory near Milan in 1493-95. There are nonetheless projects that overlap categories, as is
typical with Leonardo’s abilities to use one device for several different projects. For example, his perpetual water pump (number 24) is both hydraulic device and automation.

One can read a technical illustration by Leonardo as one of at least three possibilities: (1) a demonstration of basic principles of mechanics, (2) a practical, buildable device that he observed or invented, or (3) a practical construction worksheet for an instrument or machine that also reveals its basic mechanical principles. But in any event, he regularly advises in his drawings that one observe at first its basic mechanical principles. He also reflected on this problem around 1510, when writing about the anatomical mechanics of the hand, implying that his book on anatomy would only be understood only after one read his book on mechanics (Windsor folio 19009 r). His instruments and mechanisms, like those of Nature would govern its biological mechanisms, governing movements of the human body, water, or air, etc., as they were all set in motion by the Aristotelian prime movement of the cosmos. Addressing this general issue with specific examples of the instruments and mechanisms, this exhibition hereby locates Leonardo within the tradition of self-educated tradesmen of his time, within a prestigious group of universal or Renaissance artist-engineers who include Piero della Francesca, Francesco di Giorgio Martini, Donato Bramante, Giuliano da Sangallo, Antonio Filarete, Leon Battista Alberti, Donatello, Andrea del Verrocchio, Niccolò di Buonaccorso, Lorenzo Ghiberti, Filippo Brunelleschi, Giovanni Fontana, Mariano Taccola, Guido da Vigevano and others. Although most of these gentlemen will not be discussed in the exhibition catalogue, they were important influences on Leonardo, who honored them by improving on their approaches. His technical demonstrations are both scholarly research projects and innovative entrepreneurial assessments.

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 webpage, which can be visited at the following address: <http://www.bbk.ac.uk/hosted/leonardo>