Leonardo da Vinci: The Mechanics of Man

The Queen’s Gallery, Palace of Holyroodhouse  
2 August – 10 November 2013

An exhibition that sheds new light on Leonardo da Vinci’s anatomical work opens at The Queen’s Gallery, Palace of Holyroodhouse, in August. Long renowned as one of the finest artists of the Renaissance, Leonardo was also one of the greatest anatomists the world has ever seen. Almost 500 years after his death, Leonardo da Vinci: The Mechanics of Man, part of the Edinburgh International Festival, uses 21st-century technology to explore the modern relevance of Leonardo’s anatomical research. Thirty sheets of his groundbreaking investigations into the workings of the human body will go on display alongside images prepared using the latest medical technology. The juxtaposition shows how far-sighted Leonardo’s work was, and how relevant he remains for anatomists today.

The artist began researching the human body to ensure that his paintings were as ‘true to nature’ as possible, but he soon conceived the idea of writing an illustrated treatise on anatomy. This led him to dissect more than 30 corpses in hospitals and medical schools, filling hundreds of pages of his notebooks with detailed sketches, the like of which had never been seen before. His discoveries could have transformed European knowledge of anatomy. But on Leonardo’s death in 1519, his anatomical studies remained among his personal papers, and they were lost to the world for hundreds of years. Had they been published at the time, they would undoubtedly have been the most influential work on the human body ever produced.

Leonardo’s finest work dates from the winter of 1510-11, when he dissected some 20 corpses at the medical school of the University of Pavia in collaboration with the professor of anatomy, Marcantonio della Torre. On the 18 sheets of what is now known as Leonardo’s ‘Anatomical Manuscript A’, the artist crammed more than 240 individual drawings and notes running to more than 13,000 words in his distinctive mirror-writing. (This simple childhood trick had become a habit of the artist and was not an attempt to keep his researches secret, as has been claimed). Anatomical Manuscript A, which will form the centrepiece of the exhibition, has never before been displayed in its entirety in the UK.
Almost every bone in the human body and many of the major muscle groups are illustrated in Anatomical Manuscript A, requiring Leonardo to convey a huge amount of three-dimensional information in static, two-dimensional drawings. The range of graphic techniques that he developed to meet this challenge foreshadows modern medical imaging to an astonishing degree. Leonardo often used skills that he had acquired through other work to achieve his goals. From architecture, he employed the principles of elevation, plan and section. From engineering, he took the ‘exploded view’ to portray structure and movement, pulling elements apart to show how they fit together. Leonardo’s drawings will be displayed alongside CT and MRI scans, computer simulations and 3D film of the body, to demonstrate how close he came to 21st-century medical thinking.

In one masterful sheet, Leonardo demonstrates the layered structure of the hand through four dissections. He begins with the bones, adds the deep muscles of the palm, and then applies the first and second layers of tendons. Anatomists today use exactly the same sequence of images when trying to understand the hand. Displayed alongside Leonardo’s work will be an animated computer simulation that replicates the artist’s layering technique. A film of a dissected hand in high-definition 3D will also allow exhibition visitors to appreciate the subtlety of the intricate structure.

Leonardo also recorded the muscles of the shoulder and arm in eight different views, rotating the body through 180 degrees. These drawings will be juxtaposed with a modern animation capturing the same sequence. Similarly, a 3D film of a dissected shoulder will demonstrate the incredible accuracy of Leonardo’s many drawings of the bones, muscles, nerves and tendons of the shoulder joint, seen from every angle and in every position. This area of the body has a complex range of motion, and Leonardo’s attempts to capture it in two-dimensional drawings are shown to be centuries ahead of his time.

Other exhibition highlights include the first accurate depiction of the spine in history (1510); Leonardo’s notes from his post-mortem dissection of a 100-year-old man (conducted c.1508), in which he gives the first accurate descriptions of cirrhosis of the liver and narrowing of the arteries in the history of medicine; and the iconic and beautiful study of a child in the womb (c.1511), displayed alongside a 3D ultrasound scan of a foetus. Although Leonardo’s drawing was ultimately based on the dissection of a pregnant cow, it becomes clear that his intuitions about the posture of the child in the uterus were correct.

Leonardo’s last and greatest anatomical campaign was an investigation of the heart. Dissecting the hearts of oxen, he recorded the form of the chambers, valves and coronary vessels. He made a glass model of the aortic valve to study the flow of blood, but it was not until the 1980s that the pulsing image of a real-time MRI scan allowed anatomists to confirm that Leonardo’s description of the heart’s action had been almost entirely correct. Leonardo thus came very close to discovering the circulation of the blood, a century before William Harvey – but it was with the heart that his anatomical investigations came to an end.

All of Leonardo’s surviving anatomical studies arrived in England in the 17th century, bound into a single album as part of a cache of almost 600 drawings by the artist. The album was probably acquired later that century by Charles II and has been in the Royal Collection since at least 1690. The binding, now empty, will also be displayed in the exhibition.

Exhibition curator Martin Clayton, said, ‘Royal Collection Trust’s association with the Edinburgh International Festival, in a year when its programme focuses on the theme of technology, has prompted us to examine the modern relevance of Leonardo’s astonishing
Director of the Royal Collection, Jonathan Marsden, said, ‘Since the opening of The Queen’s Gallery at the Palace of Holyroodhouse in 2002, our exhibition programmes have become an established part of Edinburgh’s artistic life. This new partnership with Edinburgh International Festival is the obvious next step. We are delighted to be taking part and hope it will provide us with a further opportunity to attract the attention of anyone who may not have visited The Queen’s Gallery before.’

Director of the Edinburgh International Festival, Jonathan Mills, said, ‘The Festival is delighted to be working with Royal Collection Trust on this special exhibition. In a year when the Edinburgh International Festival is focusing on the myriad of ways in which technology seizes and shifts the imaginations of artists, there is no better example of that than the genius of Leonardo da Vinci and his sophisticated and poetic understanding of the human condition.’

The exhibition Leonardo da Vinci: The Mechanics of Man is at The Queen’s Gallery, Palace of Holyroodhouse, 2 August – 10 November 2013, and is part of the Edinburgh International Festival. The exhibition will be open late throughout August, until 20:00 on Wednesdays, Fridays and Saturdays.

A lecture and workshop series in collaboration with Wellcome Collection accompanies the exhibition. For more information please visit www.royalcollection.org.uk.

Tickets and visitor information: www.royalcollection.org.uk, T. +44 (0)131 556 5100.

A selection of images is available from www.picselect.com. For further information and photographs, please contact the Royal Collection Trust Press Office, +44 (0)20 7839 1377, press@royalcollection.org.uk.

The award-winning Leonardo da Vinci: Anatomy iPad app is available from the iTunes App Store. The app brings to life all 268 of Leonardo’s anatomical drawings in the Royal Collection and reverses and translates the thousands of notes made by the artist in his distinctive mirror-writing.

Notes to Editors

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Admission to The Queen’s Gallery, Palace of Holyroodhouse is managed by The Royal Collection Trust, a registered charity in England and Wales (1016972) and in Scotland (SCO39772).