The largest ever exhibition of Leonardo da Vinci’s studies of the human body will be shown at The Queen’s Gallery, Buckingham Palace in 2012. Leonardo has long been recognised as one of the great artists of the Renaissance, but he was also a pioneer in the understanding of human anatomy. He intended to publish his ground-breaking work in a treatise on anatomy, and had he done so his discoveries would have transformed European knowledge of the subject. But on Leonardo’s death in 1519 the drawings remained a mass of undigested material among his private papers and they were effectively lost to the world for almost 400 years.

Leonardo’s desire to be ‘true to nature’ in his painting led him to research the appearance of the physical world in all its aspects, including the principal subject-matter of the Renaissance – the human body. Through his anatomical studies Leonardo tested contemporary theories of ideal proportion and sought greater knowledge of human life – conception and growth, the senses, memory and fantasy, even the soul itself. Working in hospitals and medical schools, he undertook dissections to investigate the bones, muscles, vessels and organs. His skill at dissection, his insights as an architect and engineer, and his astonishing artistic ability enabled him to portray three-dimensional structure with unparalleled clarity.

Many of Leonardo’s earliest anatomical drawings were based on the received wisdom of medieval treatises, and, as human material for dissection was hard to come by, he had to work on the bodies of animals. One of Leonardo’s most impressive early studies is of a dissected foot of a bear (c.1485-8), the only large quadruped that walks on the soles of its feet. Another early drawing (c.1488-90), at first glance showing the nerve pathways in the arm of a man, seems to have been based on dissections of monkeys and dogs.

In 1489 Leonardo produced a series of exquisitely detailed studies of a human skull. In one drawing, he has sliced the skull vertically and the right half frontally, juxtaposing the two pieces to capture the position of the facial cavities in relation to the skull’s surface features. Leonardo’s concern with proportion reflects the Renaissance preoccupation with the ideal human body as an expression of universal harmony.

Before beginning work on his great mural of the Battle of Anghiari in the Palazzo Vecchio, Florence, Leonardo started to survey the external features of the human form in an almost architectural manner, and he soon delved below the surface to investigate the forms of the muscles and their attachment to the bones. By the beginning of the 16th century he had sufficient
reputation to be permitted to work on human corpses, usually the bodies of executed criminals or those who had no relatives to claim them for burial. In the winter of 1508-9 Leonardo conducted an autopsy of an old man, recording in his notebooks: *This old man, a few hours before his death, told me that he was over a hundred years old, and that he felt nothing wrong with his body other than weakness.* Leonardo then goes on to provide the first clear description of coronary vascular occlusion and arteriosclerosis in the history of medicine.

Two years later Leonardo apparently carried out approximately 20 autopsies in the medical school of the University of Pavia in collaboration with the professor of anatomy, Marcantonio della Torre. His studies are recorded in the ‘Anatomical Manuscript A’, in which Leonardo illustrates every bone in the human body except those of the skull (including the most complete representation of a skeleton in the whole of Leonardo’s surviving work), and many of the major muscle groups. On this series of 18 sheets, the artist crammed over 240 individual drawings of astounding clarity and notes running to more than 13,000 words in his distinctive mirror-writing. This was not an attempt to keep his researches secret, as has been claimed, but probably a simple childhood trick that became a habit.

In Manuscript A, Leonardo adopted a range of illustrative techniques to make his drawings as clear as possible. From architecture, he took the principles of elevation, plan and section to convey spatial information; from engineering he took the device of the ‘exploded view’, pulling apart elements to show their articular surfaces and how they connect. He saw some structures as composed of distinct layers – for example, the palm of a hand is built up in six separate drawings.

Towards the end of his career, Leonardo concentrated his studies on the process of reproduction, one of the subjects that he wished to cover in his anatomical treatise. This study of embryology resulted in some of the artist’s most beautiful anatomical drawings. In the most famous of these, from c.1510-13, Leonardo depicts an opened uterus with a baby in the breech position. This delicate and moving red chalk study was in fact based on the dissection of a gravid cow, as Leonardo believed the reproductive structures to be the same in all mammals.

Leonardo’s last and greatest anatomical campaign was an investigation of the heart. Working with the hearts of oxen, he precisely recorded the form of the chambers, valves and coronary vessels, and made models to analyse blood flow and demonstrate from hydrodynamic principles why the valves and chambers are formed as they are. He came very close to discovering the circulation of the blood, a century before William Harvey, and some of his observations are being confirmed only now by computer modelling and advanced scanning techniques.

Soon after these last drawings were made, Leonardo’s anatomical researches ceased for unknown reasons. The treatise that he had been planning for decades was never written, and his drawings remained unpublished in his studio at his death. These papers were pasted into albums by his successors, and one of these albums, containing all of Leonardo’s surviving anatomical studies, arrived in England in the 17th century. This album was probably acquired by Charles II, and Leonardo’s anatomical drawings have been in the Royal Collection since at least 1690.

Tickets and visitor information: www.royalcollection.org.uk or +44 (0)20 7766 7301.
For further information and photographs, please contact the Royal Collection Press Office, +44 (0)20 7839 1377, press@royalcollection.org.uk. A selection of images is also available from www.picselect.com.

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