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LEONARDO DA VINCI: ART AND THE MACHINE

Leonardo da Vinci was a protean figure representative of all those who love art and science with equal fervor. But Leonardo, who was more of a philosopher than an artist or scientist, was consumed by the "how" and "why" of principles and less by their application. In fact, he was so much in love with ideas and so driven by a desire to investigate that he was rarely able to complete the multitude of projects he set for himself.

Underlying Leonardo's investigation of art, science, and technology was a lifelong attempt to comprehend a set of universal principles that he believed governed all things. His love for observing the details of nature led to his study of dynamics as he concerned himself with the motion of bodies in space, how that motion can be affected, and, most importantly, how motions of different phenomena are analogous. The manner in which a vortex operates, for instance, is similar for a thunderous storm as it is for the movement of blood within the heart; the appearance of that motion is revealed in a woman's braided hair or in the way a plant gradually assumes its form.

Leonardo declared that motion is the cause of all life and that the physiology of any organism or the mechanics of any machine are simply a continuous chain of similar events. Motion, for Leonardo, is a persistent and dominant force in nature. He believed, however, that it was not sufficient to merely express the laws of nature in abstract formulae, but to represent them in their concrete operation and appearance.

The models presented in Leonardo da Vinci: Art and the Machine are illustrations of a few of the mechanical principles that Leonardo investigated over several years and represent a facet of one of his main pursuits: general technology. The manuscript containing the drawings and notations from which the models were fabricated is known to us as the Madrid Codex. This document was included in an 1830 inventory of the holdings of the Biblioteca Nacional in Madrid, but formal searches begun in 1898 to determine the exact location of the codex proved unsuccessful. Then, in 1967, Dr. Jules Piccus, a specialist in early Spanish literature from the University of Massachusetts Amherst, accidentally came across the codex while conducting research on medieval ballads in the Biblioteca Nacional. According to the da Vinci scholar Ladislao Reti, the manuscript traveled from Italy to Spain with the 16th century sculptor Pompeo Leoni who, coming into possession of most of Leonardo's manuscripts and drawings in 1570, intended to give it to Philip II. For some reason, Leoni did not do so, and by the middle of the 17th century it was in the hands of Juan de Espina, a famous art collector, who left his collection to Philip IV. The codex was transferred from the Royal Palace to the Biblioteca Nacional sometime before 1830, but for unknown reasons became temporarily misplaced by the end of that century.

There are actually two volumes that make up the manuscript: In Codex I Leonardo attempted to outline a treatise of practical kinematic, where mechanical principles and basic movements are examined rather than complete working machines. Leonardo's aim is the systematic analysis of conditions and constructive details that could lead towards the rational assembly of useful machines. He is particularly concerned with problems related to friction that arise in both gear wheel trains and bearings. About half of the book contains mechanical devices drawn with great care; the second half has more the character of a notebook dealing with different matters, mostly statics and dynamics.

Codex II includes unexpected revelations on a number of little-known facts in Leonardo's life: records on books and personal belongings, many notes on painting and the science of perception, beautiful multi-colored maps and sketches pertaining to the projects for the diversion of the Arno River in the war against Pisa, plans for elaborate military fortifications, and several pages devoted to the theme of navigation. There are only a few projects related to mechanical technology although one of great interest to scholars is that of a windmill with a horizontal rotor.

In regard to the manuscript's dates, the title page of Codex I states that it was written in 1493. Based on internal evidence, however, Reti determined that the volume was written over a 7 year period beginning in 1493. The dates of Codex II range from 1491 to 1505.

The first volume of the codex is spectacular for its perfectly executed drawings. These drawings, along with Leonardo's notes, enabled Roberto Guatelli, an Italian engineer and da Vinci scholar, to fabricate several sets of models as a commission for I.B.M. Corporation. In honor of Dr. Piccus' fortuitous discovery of the Madrid Codex, I.B.M. gave a selection of models from one of these sets to the University of Massachusetts Amherst. Although the University's models have been seen at other institutions, the current exhibition is their first public presentation on this campus.

The Gallery would like to extend its appreciation to Dan Gintis, an undergraduate student in the University's Department of Art, and Laurie Magriel, a graduate student in the University's Art History Program, for their contribution to and enthusiasm for this project.

Leonardo da Vinci: Art and the Machine is dedicated to the memory of Iris Cheney (1929-1994) who was a Professor in the Art History Program of the University of Massachusetts Amherst for over 20 years.