



Multispectral Imaging of the Archimedes Palimpsest

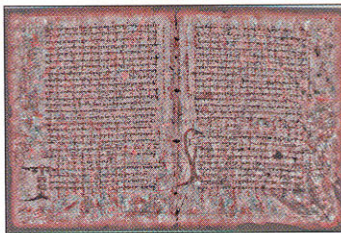
Joint Project—The Rochester Institute of Technology, The Johns Hopkins University, the Walters Art Museum and R.B. Toth Associates (Nominated by Dr. William Noel, Walters Arm Museum)

THE CHALLENGE:

The Archimedes Palimpsest, a tenth-century manuscript, was erased and overwritten with a prayer book in the 1200s. This resulted in the loss of the only known copy of Archimedes' *The Method of Mechanical Theorems*, describing the Greek scientist's use of mechanical observations to prove mathematical hypothesis.

THE SOLUTION:

A team of experts was assembled consisting of Dr. Roger L. Easton, Jr., an Associate Professor at the Chester F. Carlson Center for Imaging Science; Dr. William Noel, Curator of Manuscripts and Rare Books at the Walters Art Museum; scientist Dr. Keith Knox of the Rochester Institute of Technology; Dr. Bill Christens-Barry of John Hopkins University and Equipoise Imaging, Inc.; Mike Toth of R.B. Toth Associates; and conservator Dr. Abigail Quandt. The team conducted multispectral image collection and processing to enhance textual differences. A team of scholars assessed the images and chose a standard method of enhancement. High-res RGB images were collected (>25 pixels/mm) under visible and UV light. As the original text is fainter and redder, it is relatively invisible



*The Archimedes Palimpsest after multispectral imaging and processing.
(Photo: The Rochester Institute of Technology and The Johns Hopkins University)*

under red light. Since parchment fluoresces under UV, imaged light emitted from within the parchment rather than from its surface. The images were combined to form pseudocolor renditions, thus more easily readable.

THE TOOLS USED:

Digital cameras: Kodak DCS-760, DCS-660 & Photometrics Sensys; **lens:** 60 mm f/2.8 Micro-Nikkor; **spectrometer:** Ocean Optics S2000FL; **Omega Optical:** bandpass filters; **Cambridge Research and Instrumentation:** liq-

uid crystal tunable filter; **Velmex:** x-y-z translation table; **UVP:** UVL-56 ultraviolet lights; **software:** Adobe Photoshop, Realviz Stitcher, and Digital Optics V++, plus custom image processing software; **hardcopy:** Xerox Duocolor 2045 digital color press.

THE DIFFERENCE IT MADE:

Manuscript scholars at Stanford, Oxford and Cambridge Universities have deciphered text and diagrams of Archimedes that were unavailable for nearly 1,000 years—amazingly enough, these writings suggest Archimedes understood the principles of integral calculus nearly two millennia before Newton and Leibnitz!