NATIONAL CONSTITUTION CENTER

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The Forensic Reconstruction of George Washington

An Ambitious Venture

Deciding that physical appearance is a crucial element to learning about and relating to the "real" George Washington, Mount Vernon's President and CEO, Jim Rees, determined that visitors needed to see what Washington looked like as an adventurous young surveyor and frontiersman, as the forceful Commander in Chief of the Revolutionary War forces, and as the dynamic first president of the United States.

With no existing portraits that depict Washington under the age of 40 – and not wanting to disturb the "Father of Our Country's" final resting place – Mount Vernon embarked on an unprecedented project which would unite the fields of art, science, and historical research to create three accurate life-size wax models of Washington as a 19-year-old surveyor, 45-year-old general, and 57-year-old president.

The Investigation Begins

Rees knew Mount Vernon had a priceless artifact that would be central to the project: the Houdon bust. In 1785, when Washington was 53, French sculptor Jean-Antoine Houdon traveled to Mount Vernon. For two weeks, he observed the future president, created a plaster life mask from an imprint of Washington's face, and sculpted a bust. Because the bust was made using the life mask as a reference, it was a faithful representation of the great man and the portrait Washington's family pointed to as the best likeness of him.

Not wanting to disturb George Washington's remains, Mount Vernon relied upon the expertise of a forensic anthropologist to analyze the Houdon bust, life mask, and other objects that would yield clues to Washington's facial structure and characteristics. Dr. Jeffrey Schwartz, a professor of forensic anthropology at the University of Pittsburgh who has done paleontological and archaeological fieldwork and extensive museum research throughout the world, took on the assignment.

Dr. Schwartz started by comparing two-dimensional paintings to look for consistencies in facial and body structures and to find features of identification, also called individuation. Some artists were known for reproducing realistic faces, others for their precision in painting parts of the body, all of which were taken into consideration when making comparisons.

Next, Dr. Anshuman Razdan and his team from the Partnership for Research in Spatial Modeling (PRISM), a computer "think tank" at Arizona State University, used three-dimensional software and geometric modeling to scan with a laser beam – the most accurate measurement available – the Houdon bust, Washington's dentures, the life mask of Washington, and Houdon's life-size marble statue of Washington standing in the Virginia State Capitol building in Richmond.

Special technology invented by PRISM allowed Dr. Schwartz to get a virtual understanding of Washington's features and related objects. When necessary, he was able to modify the computerized images based on information he collected. For example, after analyzing the life mask and bust, Dr. Schwartz determined that Washington most likely did not have his dentures in, a factor that would have compromised the integrity of his facial structure. Dr. Schwartz was able to virtually insert Washington's dentures into the bust so that his jaw would "properly" be depicted as the starting point from which the models would be based.

Dr. Schwartz also knew how the body changes as it ages. Cartilage grows as people age, which results in lengthened ear lobes and noses. When teeth are lost, bone around the teeth erodes, something that happened to Washington starting in his 20s. These were major areas that had to be appropriately age-regressed to arrive at a 19-year-old and 45-year-old Washington and age-progressed to create the 57-year-old president.

When Dr. Schwartz finalized the computerized models of Washington, the images consisting of hundreds of thousands of data points were sent to Kreysler Laboratories in California, which took the information and from it created foam heads that were delivered to StudioEIS, a three-dimensional design and fabrication studio in New York City, which created the bronze statues of the Founding Fathers that are seen in the National Constitution Center's *Signers' Hall*.

What Did He Wear & How Did He Look?
Before the sculptors at StudioEIS moved forward with their artistic interpretation, they consulted primary documentation including written descriptions of Washington's height and features. Scholars at Mount Vernon compiled information from 18th century letters which underscored Washington's exceptional height (roughly 6'2"), large hands and feet, and athleticism.

Linda Baumgarten with the Colonial Williamsburg Foundation took detailed measurements of several pieces of Washington's clothing and examined them for any signs of alteration. From the existing breeches, waistcoats, and stockings, and taking into consideration 18th century fashion and how clothing fit on the body, Baumgarten determined Washington's posture, the length of his limbs, and the size of his chest and waist.

Baumgarten worked with Henry Cooke, a clothing expert, to figure the volumetric measurements of Washington's body. Cooke then took those measurements and created patterns from which he developed reproductions of Washington's Revolutionary War uniform and his inaugural suit. Because no original surveying clothing exists, Cooke fabricated that outfit based on historical information.

George Washington's hair color also required analysis. The hair colors of the Revolutionary War general and the president figures are based on hair samples in the Mount Vernon collection. As Washington grew more famous during and after the war, many relatives, friends, and acquaintances asked for souvenir locks of his hair, and the Washington family granted many of those requests. Several locks of hair from different time periods have made their way back into the Mount Vernon collection. They range in color from chestnut brown to deep grey. In order to determine the correct color for each figure, a variety of real and wig hair samples were compared to Washington's actual locks of hair. The sample hair was mixed and blended until a proper match was achieved.

Washington Comes to Life

Armed with the scientifically based foam forms and historical documentation, sculptors at StudioEIS in Brooklyn began the process of making George Washington look like a living, breathing person. Under the direction of co-founder Ivan Schwartz, StudioEIS took the foam heads, covered them with clay and meticulously sculpted facial expressions appropriate to the three scenarios. Using an ancient method that requires a high level of skill, piece molds were constructed around the clay models to achieve accuracy and preserve the fragile heads. This painstaking process is considered to be a lost art form in modern times and necessitated a molder with highly developed skills.

Wax was then poured into the molds to form the most realistic, lifelike head possible. Sue Day, an expert from Great Britain who learned her trade from Madame Taussaud's Wax Museum, was flown in to paint the wax to mimic skin color – including veins, blemishes, and texture – at various ages. Day implanted real human hair that matched the color of Washington's at all three ages and inserted blue eyes, aging them from a young, bright-eyed 19-year-old to a tired, but determined 45-year-old, and a battle-tested, older 57-year-old.

StudioEIS created the bodies from the clothing patterns provided by Cooke, which gave them volumetric guidelines. Muscle tone and posture were considerations for making the figures feel true-to-life. Fabricated of plaster, the bodies were dressed in accurate, hand-stitched reproduction clothing.

The figures were constructed over a period of two years and were installed in Mount Vernon's Donald W. Reynolds Education Center in September 2006, just prior to the building's grand opening in October. The figures in *Discover the Real George Washington: New Views from Mount Vernon*, organized by the Mount Vernon Ladies' Association and funded by the Donald W. Reynolds Foundation, were created by StudioEIS using the same information from the original project.

Principal Investigators

- Dr. Jeffrey Schwartz, Professor of Anthropology, University of Pittsburgh

- PRISM (Partnership for Research in Spatial Modeling), Arizona State University

  Principal: Dr. Anshuman Razdan

  3D Scanning: Dr. Anshuman Razdan, Prof. Dan Collins, Scott Van Note (Graduate Student) and Matt Tocheri (Graduate Student)

  George Washington Head/Geometry: Drs. Gerald Farin, Dianne Hansford, Anshuman Razdan; and Matt Tocheri (Graduate student) and Jeremy Hansen (Senior)

  George Washington Poses: Prof Dan Collins, Gene Cooper and Scott Van Note (Graduate Student)

- Ivan Schwartz, StudioEIS, New York, New York

  Sculptor: Stuart Williamson

  Painter: Sue Day

Advisors to the Forensics Project

- Dr. Phil Chase, Senior Editor, *The Papers of George Washington*

- Marc Pachter, Director, National Portrait Gallery, Smithsonian Institution

- Rick Sexton, Forensic Artist, Fairfax County Police Department

- Glenn Miller, The National Center for Missing and Exploited Children

- Kevin Miller, Ph.D., Anthropology Expert, Facial Recognition

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