



## THE REAL G: WASHINGTON

BY DIANE BOUDREAU

Close your eyes and picture George Washington. Chances are the image that pops into your head is the one on the dollar bill. The portrait is from a 1796 painting by Gilbert Stuart. It is perhaps the best-known image of our first president. However, many other portraits of Washington exist. And many do not look at all like Stuart's depiction. The fact is that no one today knows for sure exactly what George Washington looked like, especially when he was a young man. ¶ That reality is about to change. Researchers at Arizona State University and the University of Pittsburgh are discovering what our first president really looked like. Using data from sculptures, paintings, artifacts and written records, the team is creating three-dimensional computer models of Washington at different stages of his life. ¶ The models will be used to produce the most realistic replicas of George Washington to date. Eventually, all of the images will be on display as part of a new educational center at the Mount Vernon estate in Virginia. The team will create full-size replicas of Washington as he looked at three different ages. We will see him as a 19-year-old surveyor, as the 45-year-old general who led the colonial army at Valley Forge, and as the 57-year-old who took the oath of office to become our first president.

Washington

45.

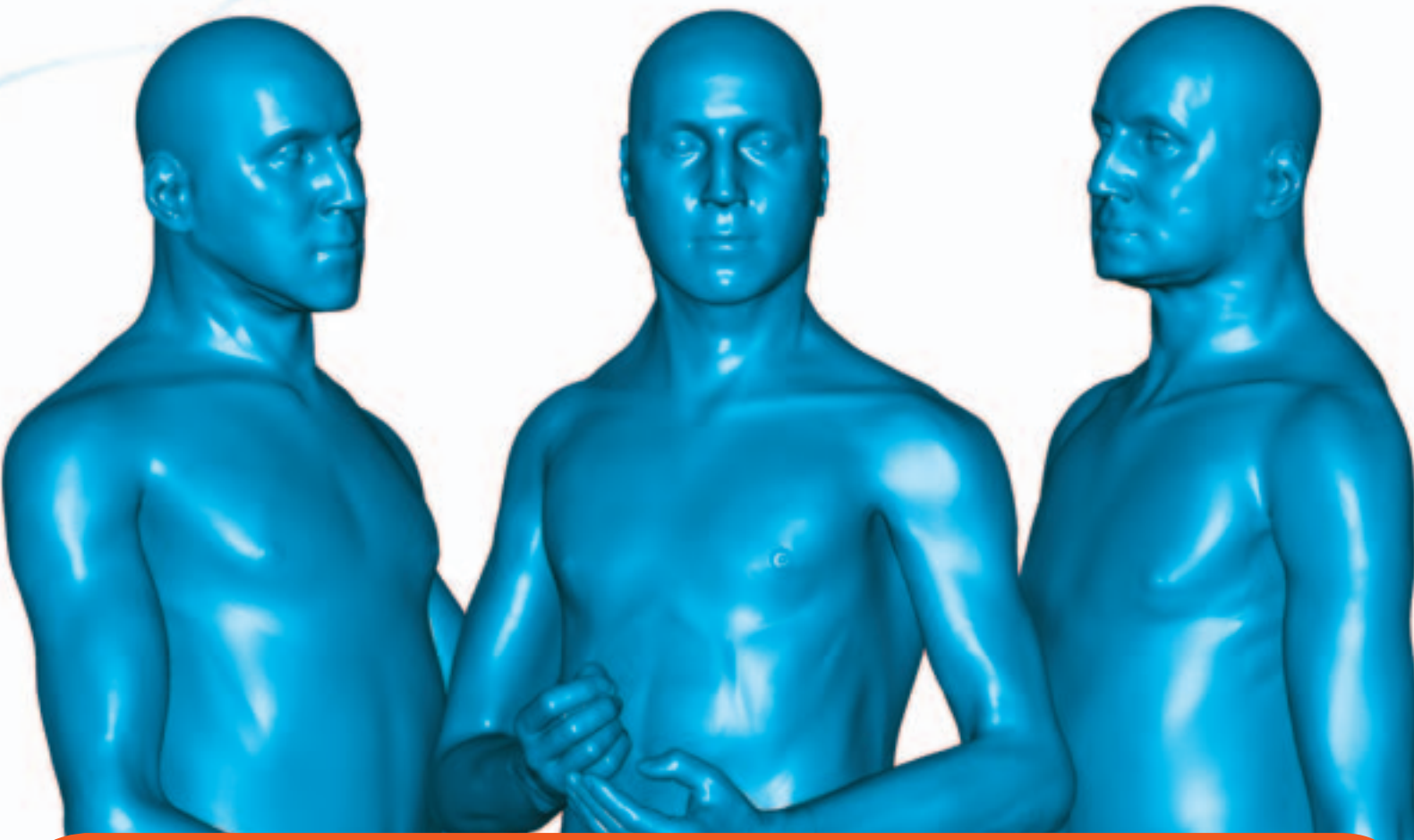
19.



PHOTO COURTESY GENE COOPER, PRISM

JEFFREY SCHWARTZ (CENTER) AND ANSHUMAN RAZDAN

57.



WASHINGTON::HEIGHT:76.INCHES::SLEEVE.COAT.FRONTSEAM:22.INCHES::OUTSIDE.LENGTH:27.5.INCHES::RISE:9.5.INCHES::INSEAM:17.5-18.5.INCHES::THIGH:19.5.INCHES::BELOW.KNEE:12.5.INCHES::WAIST:41.INCHES::WAISTLOW:35.8,INCHES::NECK:



## “It’s a once-in-a-lifetime project,” says Anshuman Razdan,

director of ASU’s Partnership for Research in Spatial Modeling (PRISM). “We are going to have a repository of very important data. For both science and art purposes it’s a valuable resource.”

Razdan is collaborating with the project’s principal investigator, Jeffrey Schwartz, a forensic anthropologist at the University of Pittsburgh. Schwartz had visited ASU in the past and toured the PRISM lab. “I was impressed,” says Schwartz. “When I was first asked to do this model of Washington I looked at what I had to work with. I realized that in order to capture this information I had to do 3D imaging. PRISM popped into mind.”

PRISM technology allows researchers to compare, analyze, and manipulate three-dimensional data. Think of a typical scanner and printer. You can scan a document or photo into a computer, manipulate the data however you choose, and then print out your finished product. PRISM technology does the same, only on a three-dimensional level. Instead of scanning flat pieces of paper, PRISM researchers scan objects such as bones or clay pots. One ASU sculptor even scanned himself!

A team of ASU computer scientists developed advanced software for analyzing and manipulating the scanned data. If desired, the computer models can also be reproduced as plastic models—sort of a 3D “printout.” For the George Washington project, some of the 3D objects being studied include a life mask of Washington’s face, a sculpted bust, and a full-body sculpture.

“Sculptor Jean-Antoine Houdon first visited the Mt. Vernon estate when George Washington was 53,” Razdan explains. “He observed Washington and took a plaster mask of his face. Then he made a positive from that mask. The original was destroyed, but the positive still exists at Morgan Library in New York. Houdon also made a bust of Washington, and a full-scale sculpture. PRISM has scanned all of these.” In addition, the researchers are using measurements from Washington’s clothing, data from his dentures, paintings, and textual descriptions to help piece together replicas of the real George Washington.

They have learned that some sources of information are less reliable than others. For example, Schwartz says they discovered that the bust of Washington must have been created from the life mask, but the face on the statue was not. “The head of the statue is different from the bust. The forehead is too angled back; the chin is too far out for a human face. The configuration of the cheekbones is unnatural. The bust looks more realistic,” says Schwartz, an expert in human skeletal analysis.

These observations surprised the researchers, because historical documents suggest that Houdon made the bust before the life mask, not after. “When I first presented this information, it knocked the socks off some people,” Schwartz says. “The finding suggests that some mold that reflected the details of the life mask was used in the bust.”

Creating a replica of young Washington requires some creativity and a lot of computer manipulation. The earliest surviving portrait of the man was painted when he was 40. The ASU team has had to work backwards to morph Washington into a younger man. One of the biggest challenges is transforming the face of an older man who’d lost most

of his teeth into a younger man who still has them. This is much more complicated than simply adding teeth to the model.

“When you lose teeth, you lose bone in which the teeth are anchored. The upper jaw deteriorates upward. The lower jawbone gets thinner in many directions. The angle at the back of the jaw opens up,” Schwartz explains.

“We are looking at a mandible and jaw of a soldier at the same age and height as George Washington,” says Razdan. “We will take the 21-year-old soldier’s mandible and deform it assuming bone loss and jaw changes to fit the 53-year-old mask. We record all those deformations, and then apply the inverse to the mask to get a young Washington.”

The replica of the 19-year-old Washington will have a more angular jaw than the older models, on which the jaw is rounded from the bone loss. The team will also reduce the tautness of Washington’s lips, which developed from years of holding in his dentures.

Washington’s body will come from a combination of historical documents, clothing measurements, and general knowledge about human development. Washington’s clothing sizes over the years remained fairly consistent, although he was a bit chubbier in his later years. “As a 19-year-old, he was not hormonally mature. He was tough and sinewy, but not bulked out. His legs were thinner, his ribs more pronounced,” says Schwartz. In addition, the fashion of the time involved corseting young boys to produce sloping shoulders and an arched back. Washington was corseted until the age of five, and his body needs to reflect that.

Once Washington’s face and body are complete, the final models will be shipped to Studio EIS in New York. Studio EIS staff will create wax replicas of the models, adding in fine details. The details include everything from Washington’s eye color—blue—to the texture of his skin, which was affected by a bout of smallpox at the age of 19. The studio will also add hair, one strand at a time.

Finally, Washington will be dressed in clothing woven at Colonial Williamsburg using 18th-century methods. The team will have to dress Washington with his limbs off, because they won’t bend like normal human limbs. The bodies will be fully assembled when clothed. Every detail will receive the closest attention, right down to wear patterns on Washington’s boots.

“The goal is to produce very realistic replicas of George Washington,” Razdan says.

“The finished product is not from any one source. This project has been treading on new ground in every way,” says Schwartz. “An important factor [in working with PRISM] was that I knew I could communicate. It’s not so much the scanning, but the willingness of these people to listen to my wild ideas!” He adds, “We’re going to have to figure out something else to do when this project is over, because I’m going to have post-partum depression.”

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