Outline

Y chromosome and history
advantages of using the Y chromosome
Thomas Jefferson/Sally Hemings debate
genetic evidence
Mitochondrial DNA
mitochondria
inheritance
evolution
recent history
human evolution

The Story

Sally Hemings, a slave of President Thomas Jefferson, had six or seven children. In 1802 James Callender, a scandalmonger, published an article accusing President Jefferson of fathering the Hemings’ children.

Arguments for: Children looked like Jefferson; Jefferson and Hemings were in France or at Monticello together nine months before the birth of each of the children; Jefferson freed Sally’s children and other members of her family. Madison claimed that Sally told him that Jefferson was his father and the father of his five siblings.

Arguments against: Jefferson’s denial; Jefferson’s personality; difference in age; Madison and Eston were born after scandal; former Monticello manager claimed another man was often seen leaving Sally’s quarters.

There are two oral histories:
The Jefferson/Randolph oral history: Peter and Samuel Carr fathered Sally’s children.
The Hemings oral history: Thomas Jefferson fathered Sally’s children.

For Jefferson and Hemings history, check out http://www.monticello.org/plantation/hemingscontro/hemings-jefferson_contro.html
Conclusions

Thomas Woodson was not the son of Thomas Jefferson or Peter or Samuel Carr.

Eston Jefferson was not the son of either Peter or Samuel Carr.

Eston Jefferson could have been the son of Thomas Jefferson.

Shortly after the DNA test results were released in November 1998, the Thomas Jefferson Foundation formed a research committee consisting of nine members of the foundation staff, including four with Ph.D.s. In January 2000, the committee reported its finding that the weight of all known evidence - from the DNA study, original documents, written and oral historical accounts, and statistical data - indicated a high probability that Thomas Jefferson was the father of Eston Hemings, and that he was perhaps the father of all six of Sally Hemings’ children listed in Monticello records - Harriet (born 1795; died in infancy); Beverly (born 1798); an unnamed daughter (born 1799; died in infancy); Harriet (born 1801); Madison (born 1805); and Eston (born 1808).

Although the relationship between Jefferson and Sally Hemings has been for many years, and will surely continue to be, a subject of intense interest to historians and the public, the evidence is not definitive, and the complete story may never be known. The Foundation encourages its visitors and patrons, based on what evidence does exist, to make up their own minds as to the true nature of the relationship.

The Thomas Jefferson Foundation

“The Scholar’s Commission, appointed by the Thomas Jefferson Heritage Society, concluded that the allegation that Thomas Jefferson fathered Sally Hemings is not proven. With the exception of one dissenter, the opinions range from skepticism to the charge being false.

“One post-DNA commentator, historian John d’Entremont, perceptively noted that the “it-could-never-be-Thomas Jefferson” school is akin to a religion. As evidence is not required to sustain the faith, there is little reason to believe that any amount of evidence could be offered to diminish it.”
Study Raises Possibility of Jewish Tie for Jefferson

Was Thomas Jefferson the first Jewish president? Researchers studying Jefferson’s Y chromosome have found it belongs to a lineage that is rare in Europe but common in the Middle East, raising the possibility that the third president of the United States had a Jewish ancestor many generations ago.

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Y chromosomes can be used to follow paternal lineages
mtDNA can be used to follow maternal lineages

Cells contain organelles
Mitochondria are organelles that produce energy.

Mitochondria
Use oxygen to produce energy efficiently (aerobic metabolism).
- Muscle cells are loaded with them.
- Contain own small genome (~17,000 bp circular DNA in humans)
- Encodes 2 rRNAs and 22 tRNAs for protein synthesis
- 13 proteins for energy metabolism
- 99.9% of the mitochondrial proteins encoded by nuclear genes.

Map of human mtDNA

Molecules that are not linked to chromosomes bearing nuclear centromeres behave differently during mitosis and do not obey Mendel’s rules.

Organelle chromosomes

Maternal Inheritance

Y-DNA Inheritance Descendants Chart (Paternal Line)

Mit-DNA Inheritance Descendants Chart (Maternal Line)
Oocytes contribute cytoplasm, and hence mitochondria during fertilization.

Digression:
How did mitochondria (and chloroplasts in plants) arise?

Lynn Margulis proposed the endosymbiont theory in the 1980s. She proposed that an anaerobic cell engulfed aerobic bacteria, and the two cells developed a symbiotic relationship. With time most bacterial genes ended up in the nucleus, but a few genes remained in what became mitochondria.

Evidence for Endosymbiont Theory

- Similar lipid compositions in membranes of bacteria and mitochondria
- Bacterial and mitochondrial genomes circular and lack associated histones
- Protein synthesis in bacteria and mitochondria similar
- rRNAs similar in bacteria and mitochondria