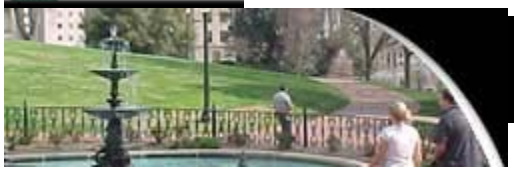

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NEWS

Who's your daddy?

Genealogists look inside their cells for clues to their ancestors

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Megan Smolenyak Smolenyak, a Williamsburg resident and genealogical researcher, signs one of her books at the visitors center in Williamsburg.
(P. Kevin Morley)

When memories fail and the paper trail runs cold, people pursuing their genealogy can look to their cells for the intimate stories of their forebears.

DNA's power to identify individuals has freed the innocent, pinned down paternity, screened for diseases, and typed tissues for transplant. Now genealogists say it helps reveal their ancestry.

Wayne Bates of Centreville said DNA testing is uncovering new information about the Bates Family of Old Virginia. The association, which Bates helped start in 1971, has some 300 members scattered along 11 branches. Members claim kinship to a John Bates who arrived in Virginia in 1623 and can document that their ancestors were here prior to 1800.

Two years ago, Bates, a retired Pentagon worker, learned about new laboratory testing that might find links among the Bates descendants that traditional genealogical research could not.

"We thought we could make those connections by the DNA."

DNA testing builds on the work by American biologist James Watson and British physicist Francis Crick, who unveiled the molecule's structure to the world 50 years ago tomorrow in the pages of Nature. In discovering heredity's fundamental nature, they paved the way to understanding who we are as individuals as well as peoples.

When Watson and Crick made their discovery, "I don't think that they ever thought they would find such enormous [DNA] variation that would

be of interest and useful," said Dr. Thomas H. Roderick, a molecular biologist who pursues the intertwining of genetics, genealogy and disease at the Center for Human Genetics in Bar Harbor, Maine.

With the inherited variations, scientists can provide evidence for genealogical relationships over a few or many generations, he said.

DNA testing became available commercially in just the past few years. Genealogists seized on the technique after hearing how molecular anthropologists for the past two decades have examined genetic variation in those who share ancestors from thousands of years ago. They realized that the same lab techniques could shed light on more recent forefathers and mothers.

When parents pass DNA, deoxyribonucleic acid, to their offspring, some of it passes on almost untouched, but some changes greatly. This helps reconstruct lineage, because although an individual's DNA is unique, some genetic information is shared among those who share ancestors.

Relatives might scribble wrong dates or misspell names in the family Bible or even conceal information. For a few hundred dollars, DNA testing can provide a more definitive way to compare identities.

Filling in the holes

"Genealogists are a curious bunch, and this opens up a new avenue for them," said Wendy W. Herr, executive director of the National Genealogical Society in Arlington. "People are just looking to fill holes in their family history."

That's what Wayne Bates hoped when he told subscribers of his Bates Booster newsletter that they could get a group rate on DNA testing. He thought descendants of the Bateses listed in the Order of First Families of Virginia reference book would spend $99 to confirm hazy explanations of kinship.

First Families of Virginia aren't the only ones turning to their DNA. Just as DNA is more likely to be similar among family

More on DNA

Some commercial labs offering DNA testing

- Family Tree DNA: www.familytreedna.com
- Oxford Ancestors: www.oxfordancestors.com
- African Ancestry: www.africanancestry.com
- GeneTree: www.genetree.com

Genealogy

- Ancestry.com: www.ancestry.com
- Virginia Genealogical Society: www.vgs.org, or call 285-8954
- National Genealogical Society: www.ngsgenealogy.org, or call (800) 473-0060
- Honoring Our Ancestors: www.honoringourancestors.com

Family groups

- Bates Family of Old Virginia: www.bfoov.org
- Smiths of Virginia: www.halcyondays.com/Smith

Milestones in DNA history

- **1865:** Gregor Johann Mendel, an Austrian botanist and monk, reports his discovery that heredity is transmitted in discrete units. His research gets little notice until 1900.
- **1909:** Wilhelm Johannsen coins the term "gene" for Mendel's unit of heredity.
- **1911:** Working with fruit flies, Thomas Hunt Morgan shows that genes, strung along chromosomes, are the agents of heredity.
- **1944:** Oswald Avery, Colin Macleod and Maclyn McCarthy show that DNA is the hereditary material for almost all living organisms.
- **1953: James Watson and Francis Crick discover the double-helical structure of DNA. They describe how DNA carries the genetic code in its sequence of bases, and significantly, suggest how the genetic material is**

members, people who share ethnicity are more likely to share similar DNA.

DNA testing can help people learn whether they descend from American Indians, can claim membership to the ancient Jewish line of Cohens, or discover which part of Africa their ancestors inhabited.

As a child, Phylicia Fauntleroy Bowman was entranced by stories of Africa told by an elderly cousin with diplomatic ties to Madagascar. Her mother's family Bible noted an 18th-century ancestor from Zaire.

Bowman, an economist who regulates public utilities in Washington, wanted to know more.

"So it was natural to me to find out from whence I came," she said soon after learning that she descends from the Akan people of southern Ghana and shares DNA with United Nations Secretary General Kofi Annan.

Bowman said taking the test was easy. She used a swab that looked "like a large Q-Tip" to scrape the inside of her cheek, and then mailed it to the lab. Washington-based African Ancestry Inc. compared her DNA to that of thousands of Africans.

copied.

- **1962:** Watson and Crick share the Nobel Prize in physiology or medicine with colleague Maurice Wilkins "for their discoveries concerning the molecular structure of nucleic acids and its significance for information transfer in living material."
- **1977:** Scientists invent methods to sequence DNA. The methods are later adapted and automated for use by high-speed computers to use to map the genomes of humans and other species.
- **1985:** Kary Mullis invents the polymerase chain reaction technique, a way to quickly copy stretches of DNA. PCR becomes indispensable for what's known as DNA fingerprinting, which is invented two years later.
- **1987:** DNA paternity testing becomes commercially available.
- **1990:** The Human Genome Project, an effort to sequence the entire stretch of human DNA, is launched.
- **2000:** Two rival teams of scientists announce completion of a draft sequence of the human genome. Their work, showing that the genome contains far fewer genes than generally believed, is published the following year.
- **2003:** Biologists announce that the sequencing of the human genome is complete.

Tests differ among laboratories, but typically involve brushing or swabbing the inner cheek and popping the brush or swab into a tube that contains a liquid to protect the cells during shipment.

At the lab, technicians extract the DNA from the liquid and add enzymes to chemically snip the DNA into small, specific pieces that vary greatly from person to person. The sections are analyzed for their unique patterns and compared to other well-documented samples in the lab's database to see how closely they resemble one another, whether they are likely to be related and roughly how long ago.

In addition to commercial labs, academic researchers also are building DNA databases; Brigham Young University recently moved its extensive and still-growing records of thousands of people who volunteer DNA to a foundation in Utah.

Bowman's test searched for certain characteristics of her mitochondrial DNA, a kind of DNA located outside the nucleus in the cell's cytoplasm. Soon after fertilization, mitochondrial DNA injected by sperm into the egg somehow disappears, leaving this short, circular piece of DNA to pass virtually unchanged from mother to child.

And while nuclear DNA soon begins degrading after death, mitochondial DNA endures, surviving even the horrendous fires of the World Trade Center disaster. It can be found in hair shafts and exhumed from long-dead remains.

Genealogists use mitochondrial DNA to overcome the difficulty of tracking surnames that can change with passing generations.

Because it is transmitted from mother to child, only female lines can be traced through mitochondrial DNA. The "mitochondrial Eves" who populated the globe came from an estimated 36 clans, stretching back some 150,000 years ago.

Oxford University geneticist Bryan Sykes said that of the 36, 12 are found predominantly in people of Africa origin, four in east Eurasia and the Americas, six in east Eurasia, 12 in central and west Eurasia, one predominantly in west Eurasia and North America, and one in Africa and west Eurasia.

Sykes said he shares mitochondrial DNA with Nicholas II, the last czar of Russia. Similar testing in the 1990s proved false the claim that a Charlottesville-area woman, Anna Anderson Manahan, was Nicholas' youngest daughter, Anastasia, and had survived the royal family's 1918 execution.

Men can learn more about their paternal heritage from their Y chromosome. Sometimes called surname testing because men typically pass their surname as well as Y chromosomes to their offspring, Y chromosomal testing is used by those with the same last name to learn if they share a common ancestor. The test was used recently to determine if Thomas Jefferson fathered some of slave Sally Hemings' children.

Males pass their Y chromosome virtually unchanged to their sons. The occasional random mutation, called a marker, might be inherited. Shared markers on the sex chromosome indicate the relatedness but not the exact relationship, of two men.

Women can determine paternal ancestry using the Y chromosome of a male relative on their father's side.

Of 65 Bates men whose Y chromosome has been tested, 51 match someone else in the group, to varying degrees. Wayne Bates considers his project such a success that he is working with his great-niece on a similar project for Smiths of Virginia, to whom he is also related.

Megan Smolenyak Smolenyak, a Williamsburg genealogical researcher, used Y chromosomal testing in her surname study in the Slovakian village of Osturna, the original hometown of Smolenyaks.

She turned to DNA research when historical documents petered out in the mid-1700s. She disagrees with genealogists who believe that it is somehow "cheating" to employ science in the search.

"It's a complement to traditional genealogy," said Smolenyak, who calls

her work for the PBS-TV "Ancestors" series and the U.S. Army "genetealogy."

"It can solve some mysteries that the paper trail will never solve."

Tracing only two lines

Others warn against putting too much stock in such a small slice of your genetic pie. Y-chromosomal and mitochondrial DNA testing trace only two lines on a family tree in which branches double with each preceding generation.

For example, tracing the Y chromosome could connect a man to a single ancestor 14 generations ago, but not to any of the other 16,383 ancestors in that generation to whom he is also related, according to Carl Elliott of the University of Minnesota and Paul Brodwin of the University of Wisconsin-Milwaukee.

"This may sound like a slender thread on which to hang an identity," they wrote in December in the British journal BMJ. "Many observers worry that this new genetic information will be given too much authority in deciding questions about identity."

For some, learning about just one ancestor among hundreds or thousands is still valuable.

Even if the results are unexpected.

To his surprise, Wayne Bates is one of the 14 Bates men who did not match any of the others. He said that suggests he's an "orphan," descended perhaps from a man once named "Bat" or "Bate."

Mutations, he said, happen.

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