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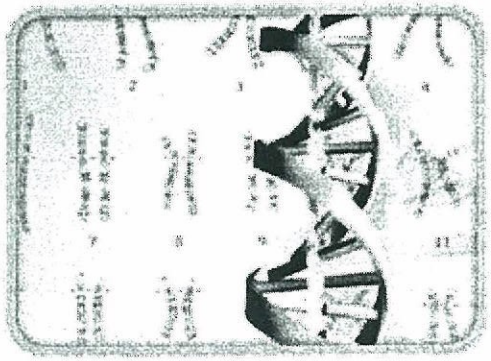
# It's All Relative: DNA Testing and Genealogy



Have you been wondering if the John Jacob Jingleheimer Schmidt you found in Kalamazoo, Michigan, by researching federal censuses is really a long-lost uncle from your father's side of the family twice removed? Ask him for a sample of his DNA.

For years, DNA testing has been applied in forensics, for heredity disorder research and diagnosis, and to disprove or verify paternity; but just recently it has been discovered to be a useful tool for building family trees. Professional and amateur genealogists alike can only go back so far in their lineage using assorted local, state, and federal records; Internet databases; old newspapers; oral histories; and family Bibles until the information runs out or can't be easily proved. Genetic testing using small amounts of DNA can remove that roadblock by refuting or establishing relatedness between two people, living or dead.

**The History Within**

All DNA tests concentrate on locations within a chromosome where many repeated copies of genetic units are found. Chromosomal mutations occur over generations, and it is these mutations—gene alleles or genetic markers—that are examined for similarities to determine two people's relatedness. For instance, if two individuals' results are identical in a 12-marker test, a recent relatedness is indicated. If their markers have one or two dissimilarities, they are more distantly related. If three or more markers are different, scientists consider the two individuals to be not related.

Scientists also take DNA testing further: they can analyze tens or hundreds of markers, and groups of "linked alleles" (or haplotypes) can be studied to identify an individual's specific geographical origin, i.e., whether a person's ancestors came from a certain Scottish clan or a Native American tribe.

**Papa's or Mama's Kin?**

Two certain types of DNA testing—Y-chromosome and mtDNA—are readily available over the Internet or by mail to the genealogist. Both require blood, a skin cell, or hair sample, but these tests focus on different parts of the DNA structure.

Y-chromosome, or Paternal Ancestry Signature testing, is the test of choice when conducting surname research. Y-chromosome tests use the gender-determination chromosome passed from father to son to reveal the relatedness between two men. (If a woman wants to build her paternal family tree, she can ask a known direct male relative like a brother or a father for a sample.) As the Y-chromosome can mutate through generations, some scientists use these changes to decipher the common male ancestor between the two men tested.

MtDNA, or mitochondrial DNA, is special DNA found in the mitochondria, separate from the 23 pairs of chromosomes in nuclear DNA and passed to all children from the mother. This Maternal Ancestry Signature test can prove if two women are related, and what genetic group they may be from, but cannot pinpoint which specific female ancestor the two have in common. Because mtDNA is small, yet abundant, it is a popular method for studying human migration patterns and for testing ancient remains and linking them to a specific genealogical group. Both the 500-year-old Ice Maiden found in the Peruvian Andes in 1995 and the 60,000-year-old Australian Kennewick Man found in 1974 were subjected to mtDNA testing.

As scientists learn more about the historical resources humans have literally within their fingertips, there will be more specific and definitive test results for relatedness. DNA testing for the lay genealogist will become less expensive and current Y-chromosome or mtDNA Internet databases will continue to expand. And maybe even some ancient, universal questions regarding who we are and where we come from will be answered.

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