One simple DNA test. A world of discoveries.

Discover if you’re part Scandinavian, West African, or maybe Native American. Meet a third cousin for the first time. When combined with 34 million family trees and 10 billion records on Ancestry.com, the new AncestryDNA creates the most comprehensive family history experience yet. It’s family history, reinvented.

Now $99

Get AncestryDNA
Genotyped samples

Database Size

Q2 2012 Q3 2012 Q4 2012 Q1 2013 Q2 2013 Q3 2013
Communicating genetics and science to everyone
Admixture
Global ethnicity
Beta ethnicity results

Genetic Ethnicity

- Persian/Turkish/Caucasus: 23%
- Southern European: 21%
- British Isles: 17%
- North African: 13%
- Middle Eastern: 8%
- Eastern European: 6%
- Uncertain: 12%

Current political boarders
A genetic view of admixture
Ethnicity prediction
Uncertain

• “. . . was disappointed on the Uncertain which probably covers Native American ancestors.”
• “would like to know about the uncertain.”
• “The high percentage of DNA that was uncertain. It sort of made me feel like I was part ‘junk yard dog.’”
• “Things I know that are true but are not accounted for must be part of my ‘uncertain.’”
• “I couldn't understand how there could be 10% uncertainty.”
Biases & Filters
"You can see that test picks out my Native American ancestry. Crowing Rooster Tuskingo Shoe Boots, a Chief in the Cherokee nation was my forth great-grandfather, while Pochantas, Princess of the Powhatans was my ninth great-grandmother. This test gives me .80% North Amerindian, which seems to be the right amount for that ancestry."

<table>
<thead>
<tr>
<th>Population</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Asian</td>
<td>2.41%</td>
</tr>
<tr>
<td>Caucasus</td>
<td>5.02%</td>
</tr>
<tr>
<td>Southwest Asian</td>
<td>-</td>
</tr>
<tr>
<td>North Amerindian + Arctic</td>
<td>0.80%</td>
</tr>
<tr>
<td>Siberian</td>
<td>0.34%</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>24.64%</td>
</tr>
<tr>
<td>East Asian</td>
<td>0.06%</td>
</tr>
<tr>
<td>West African</td>
<td>0.13%</td>
</tr>
<tr>
<td>North European</td>
<td>66.61%</td>
</tr>
</tbody>
</table>
Context, Education, & Transparency
Historical context

Germanic Tribes Invade

After the Romans withdrew from the area, tribes from northern Germany and Denmark (the Angles, Saxons, and Jutes) came to conquer much of what is now England. English, a Germanic language.

Areas conquered and settled by Scandivians

- Norman homeland
- Norman settlement in Britain
Communicating geography

Africa Southeastern Bantu

Primarily found in: South Africa, Kenya, Namibia, Botswana, Zimbabwe, Zambia, Angola, Tanzania, Mozambique, Uganda
May also be found in: Nigeria, Congo
Communicating ranges
**Normalization to others**

### Genetic diversity in Europe East

Like most of our identified regions, the reference collection of 646 people was created to create ethnicity estimates for people native to Europe East. The typical person biologically has a certain level of diversity across this region.

#### Examples of people native to Europe East

*From our reference collection of 646 people.*

<table>
<thead>
<tr>
<th>Region</th>
<th>% of natives that have this region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy/Greece</td>
<td>34%</td>
</tr>
<tr>
<td>Europe West</td>
<td>20%</td>
</tr>
<tr>
<td>Great Britain</td>
<td>15%</td>
</tr>
<tr>
<td>Scandinavia</td>
<td>13%</td>
</tr>
<tr>
<td>Finnish/Northern</td>
<td>10%</td>
</tr>
<tr>
<td>Russia</td>
<td>10%</td>
</tr>
<tr>
<td>Ireland</td>
<td>9%</td>
</tr>
<tr>
<td>Caucasus</td>
<td>8%</td>
</tr>
<tr>
<td>Iberian Peninsula</td>
<td>8%</td>
</tr>
<tr>
<td>European Jewish</td>
<td>5%</td>
</tr>
<tr>
<td>Asia Central</td>
<td>2%</td>
</tr>
<tr>
<td>Near East</td>
<td>1%</td>
</tr>
</tbody>
</table>
Tiered educational material

Your Ethnicity estimate includes a percentage and a range. A lot of brilliant science (and math) goes into creating these data, and it is fun to learn more about it:

- How is the estimate determined?
- How is the range calculated?

Surprised by your ethnicity estimate? That’s OK—we invite you to read more on why you might have more (or less) of a certain region than your family tree would suggest.
Ethnicity Estimate White Paper

1. Introduction

The AncestryDNA test is designed to aid genealogists in tracing their family lineages. We use data from pedigrees that are known to be reliable with long shared ancestry to infer the population origin. Linking a personalized genetic profile to known pedigrees has changed the way we think about population origins, and the ancestry breakdown for each individual in the study sample label in the case of HGDP samples (see Figure 3.3).

We first define the probability of observing a particular allele at SNP j in a sample from population k as

\[
\begin{align*}
    P(\text{allele } R/\text{allele } R \text{ at SNP } j \text{ in population } k) &= P(g_{ijk} = 2) = p_{jk}^2 \\
    P(\text{allele } R/\text{allele } r \text{ at SNP } j \text{ in population } k) &= P(g_{ijk} = 1) = 2p_{jk}(1 - p_{jk}) \\
    P(\text{allele } r/\text{allele } r \text{ at SNP } j \text{ in population } k) &= P(g_{ijk} = 0) = (1 - p_{jk})^2
\end{align*}
\]

where \( p_{jk} \) is the frequency of allele \( R \) at SNP \( j \) in a sample of population \( k \).

These allele frequencies are fixed for each population \( k \) based on the allele frequencies of the reference sets, and are easily estimated. The statistical model that we use does not allow for uncertainty in the estimate of allele frequency, and so assumes that the estimate is the true value.

We now introduce the genotype for an individual as \( g_{ijk} \): the genotype of individual \( i \) at SNP \( j \) in population \( k \). For ease, we can define the genotype as the count of \( R \) alleles at a SNP position. Thus, \( g_{ijk} \) can take the values \([0,1,2]\).

Then, the probability of an individual \( i \)'s genotype at a SNP \( j \) in population \( k \) is:

\[
\begin{align*}
    P(\text{allele } R/\text{allele } R \text{ at SNP } j \text{ in population } k) &= P(g_{ijk} = 2) = p_{jk}^2 \\
    P(\text{allele } R/\text{allele } r \text{ at SNP } j \text{ in population } k) &= P(g_{ijk} = 1) = 2p_{jk}(1 - p_{jk}) \\
    P(\text{allele } r/\text{allele } r \text{ at SNP } j \text{ in population } k) &= P(g_{ijk} = 0) = (1 - p_{jk})^2
\end{align*}
\]

(Eqn. 1)
Questionnaire (n=2000)

How well did your new ethnicity results match your expectations?

In this new version, AncestryDNA predicted that you have 55% Italy/Greece ethnicity. How surprised would you be if in a future update AncestryDNA were to predict that you have:

45% Italy/Greece ethnicity?
- Not surprised
- Somewhat surprised
- Very surprised

Do you understand that your actual genetic ethnicity does not change, but your AncestryDNA estimates may change over time because of scientific improvements?

- No, I’m confused
- Yes, I understand

What do you base your expectations on?
- Family Tree
- Family Legend
- My Looks
- Other
The Future
AncestryDNA

Scientific Advisory Board
The end