Chapter 23

DNA - deoxyribonucleic acid

Page

Introduction

DNA is a self-replicating material that is present in nearly all living organisms, as the main constituent of chromosomes. It is the carrier of genetic information. It the very reason behind why this book has been produced.

The author's wife did not know who her grandfather was, and so she took a DNA test, to see whether he could be identified. He was. We learned that he was a Fulcher, and this revelation led to the research that resulted in this book being written.

So, what is DNA, in a broader sense? In short, it is who we are, it tells us where we came from, it is a genetic identity that is unique to each and every one of us, it is in our blood, our bones, our skin and hair. Brother and sister will have DNA that is similar, but not identical to each other. Their DNA is given to them by their parents, who inherited their own DNA from their parents. Four grandparents will have passed their DNA to their grandchildren, as will the eight great grandparents have done also, and so on, ad infinitum. This DNA can be analysed and used to create a DNA 'footprint' of our ancestry.

Unlike the paper documents that we use to build family trees, DNA cannot be altered, edited, falsified. DNA does not lie. It is a science based subject that is used in many fields of science, and especially, and increasingly, by family historians. For all DNA studies, there is a reliance on people taking DNA tests, in order that a database can be built and used to show (hopefully) close genetic connections with other people – our family. It can tell us much more than just family connections but, for we family historians, all we are interested in is our blood ties.

It is an ever changing science; the more people that test, the bigger the database gets and more that we therefore benefit. At the time of writing,over 30 million people world wide, have taken a DNA test.

If people from your family do not test, we cannot establish a genetic link with them.

Fulcher DNA

This chapter will explain the subject of DNA, how it is useful to us, and how works.

In short, we belong to a tribe, scientifically known, in DNA circles, as a haplogroup. This haplogroup is passed from father to son by the male sex chromosome Y. Women do not have a Y chromosome, so they can only discover their haplogroup through their brother or father, or any other paternal male in her family tree. It may seem unfair, but that is the way it is. A chart demonstrating this, is shown later in the chapter under Y-DNA Testing.

However, as briefly mentioned earlier, we all receive our DNA from our parents, approximately 50% from each. This is in the form of the 23 pairs of chromosomes that we have, 22 pairs of autosomal chromosomes and one pair of sex chromosomes, X (female) and Y (male). Autosomal DNA is discussed later in this chapter.

Fulcher DNA is determined through Y-DNA, the Y chromosome, which is only possessed by Fulcher males. There will be other males that have our Fulcher DNA, perhaps because there was a Fulcher who made a girl pregnant, but whose resulting child did not take the Fulcher surname. Also, as the Y chromosome has passed down through thousands of years, but the Fulcher surname is arguably only 1000 years old, there will be men carrying the Fulcher DNA whose family tree dates back to a time before when surnames were created. For our purposes, we are only really interested in Fulcher DNA that might enable us to connect Fulcher family branches that cannot be connected through paper records, say 1600 onwards.

When we first set about taking a DNA test, it was an autosomal (atDNA) test, not a Y-DNA test. It was a complete 'shot in the dark', as we had no idea what we might (or might not) find. As it was, it connected us very clearly with a Fulcher male. Once we had found that connection, we decided to test for a more positive DNA connection by using Y-DNA. Autosomal DNA gets weaker and weaker, the more generations you go back, with anything beyond 6th cousin (approx.) being so weak, that it becomes useless. Not so with Y-DNA. Y-DNA remains virtually unchanged over hundreds of generations, and so it is a very accurate way of determining kinship. All that we needed were two males, one from each side of the matching families, to prove what the autosomal DNA had revealed. We tested the author's wife's brother and the grandson of the suspected newly discovered grandfather. The result was conclusive and the paper records bore it out, as did family memories and folklore.

We discovered that our tribe, our haplogroup, was R, more precisely R-M269, a quite common European tribe of at least 25,000 years in age, originating in Western Europe; low frequencies in Turkey, and the Northern Fertile Crescent. Migration brought the tribe from Africa, into Europe and the small group that became Fulchers, settled in what was to become East Anglia in the British Isles.

With our results, we checked to see whether a Fulcher DNA project existed with our testing company, FTDNA. There was one. The following chart shows at least eleven men that have been accepted into the Fulcher project (a USA based group), two of them being 'ours'. We have no idea who the other men are, but must assume they are all from American pioneer families, some genetic distance from ours. We have asked, but have received no details, for family trees of those tested.

Anonymity is assured for all testers and it is up to them as to whether they wish to be identified.

The chart shows the fairly basic 37 marker test results and it is clear that there are various mutations between the families, something that is quite normal, especially the further apart the families are, perhaps 6th, 7th, 8th, or more, cousins. Our two sets of results are close to each other, which is to be expected, as ours are 1st, 2nd cousin matches.

Country	Haplogroup	DYS393	DYS390	DYS19	DYS391	DYS385	DYS426	DYS388	DYS439	DYS389I	DYS392	DYS389II	DYS458	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464	DYS460	Y-GATA-H4	YCAII	DYS456	DYS607	DYS576	DYS570	CDY	DYS442	DYS438
Unknown Origin	R-M269	12	24	15	11	11-14	12	12	13	13	13	29	15	9-10	11	11	25	15	19	29	14-14-15-17	11	12	19-23	16	17	19	17	35-36	12	13
England	R-M269	12	24	16	11	11-14	12	12	13	13	29	15	9-10	11	11	25	15	19	29	14-14-15-17	11	12	19-23	16	17	19	17	35-36	12	13
United States	R-M269	12	24	16	11	11-14	12	12	13	13	13	29	15	9-10	11	11	25	15	19	29	14-14-15-17	11	13	19-23	16	17	18	17	35-36	12	13
England	R-M269	12	24	16	11	11-14	12	12	13	13	13	29	15	9-10	11	11	25	15	19	29	14-14-15-17	11	13	19-23	16	17	18	17	35-36	12	13
United States	R-M269	12	24	16	12	11-14	12	12	13	13	13	29	15	9-10	11	11	25	15	19	29	14-14-15-17	11	13	19-23	16	17	18	17	35-36	12	13
England	R-M269	13	24	14	10	11-14	12	12	14	13	13	29	18	9-10	11	11	25	15	0	29	15-15-15-15	11	11	19-23	16	14	18	17	37-38	12	13
England	R-M269	13	23	15	11	11-13	12	12	12	13	13	29	19	9-10	11	11	24	15	19	29	14-16-17-17	10	10	19-23	15	15	16	17	38-39	12	12
United States	R-M269	13	25	14	11	11-13	12	12	12	13	14	29	17	9-10	11	11	26	15	18	30	15-16-17-17	11	11	19-23	16	16	19	16	37-39	12	12
Unknown Origin	R-M269	13	24	14	11	11-14	12	12	12	13	13	29	16	10-10	11	11	25	15	19	29	15-15-15-15	11	11	19-23	14	15	18	17	38-38	12	13
	R-M269	13	24	14	11	11-14	12	12	12	13	13	29	16	10-10	11	11	25	15	19	29	15-15-15-15	11	11	19-23	14	15	18	17	39-39	12	13

So there we have it!

Fulcher DNA.

A More Detailed Explanation

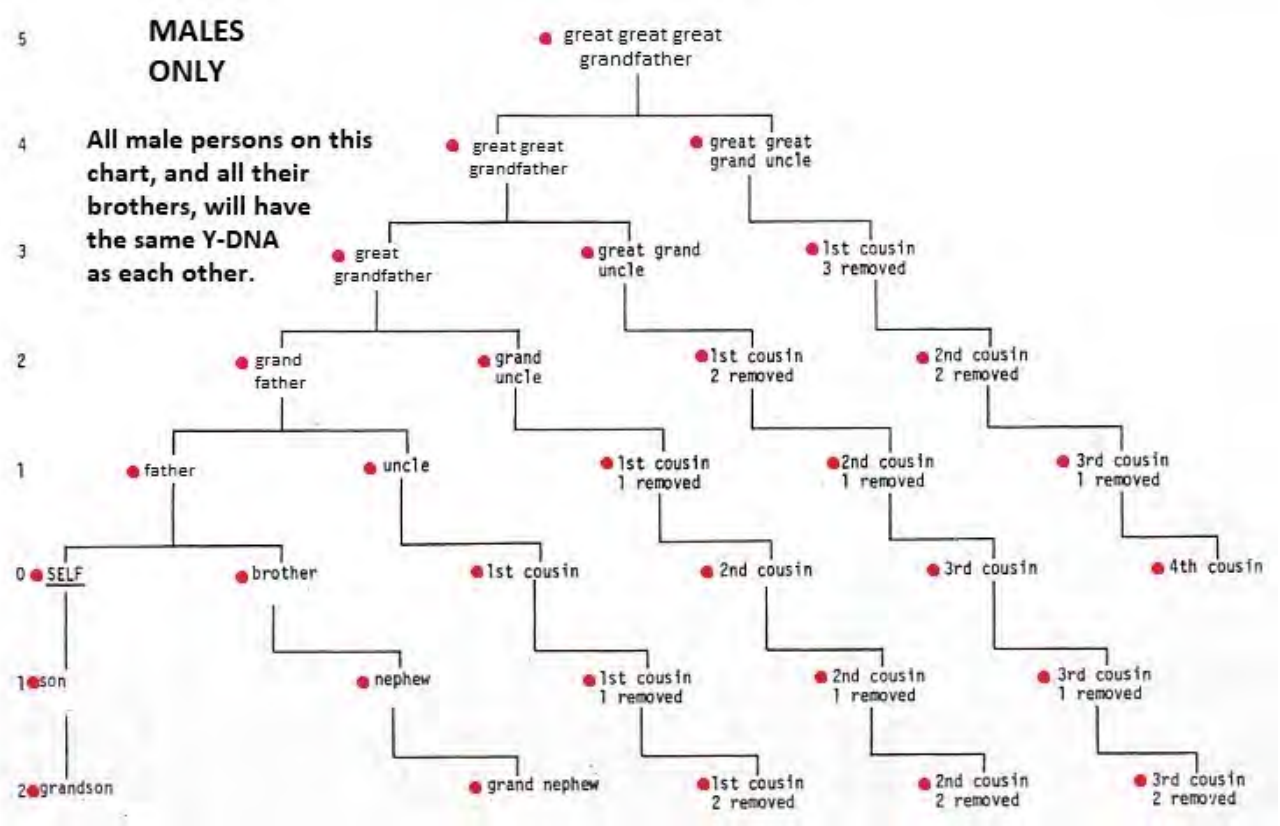
Anybody that has a one-name study will have discovered dead-ends. Whether it be a single generation away, an unknown father, an adoptive family, etc. or much further back, where you cannot be sure about merging two lines of descent together because the documentary evidence simply is not available. Perhaps you have a birth certificate or census entry or a will that simply doesn't make sense. It is possible that DNA could solve it. DNA does not lie. DNA is a reliable source of information. Written documents can lie – or deceive.

As we see it and as previously mentioned, there are two types of DNA that apply. The male Y chromosome DNA test and the autosomal DNA test that applies to everybody, male and female. Testing for the female X chromosome is of no relevance at all. We would suggest that any man that wants to get a good idea of their DNA profile and their ethnic origins, should take Y-DNA and atDNA tests. Females can only do the atDNA test.

DNA is a complementary source of information. It can only add to your knowledge of your family history.

Y-DNA Testing.

Y-DNA is a precise DNA test that applies to males only. The only matches that it will give you are those that follow the father to son line. Thus it is perfect for following a surname back to beyond the time when surnames were first used. Women cannot do this test, as they have no Y chromosome - but they can get their father, brother, uncle or cousin, who is on the paternal line of descent, to take the test, if they have such a person to ask.



This eight generation chart shows you the people that will have the same Y-DNA as the tester, but which can be taken back for hundreds more generations, beyond the age of the creation of surnames.

So, if you make contact with somebody that shares your surname, but whom you cannot place into your family tree, take Y-DNA tests.

The results will tell you:

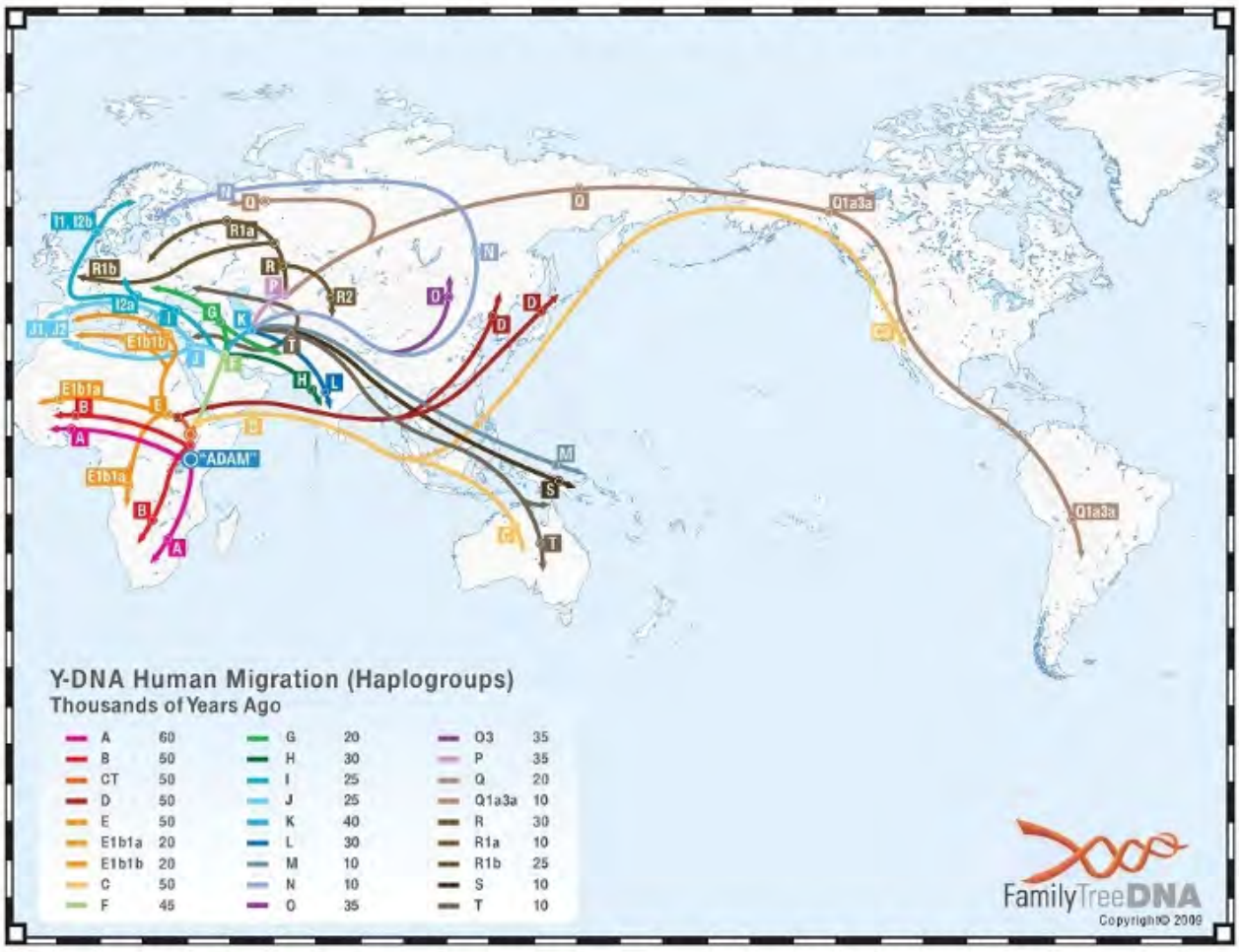
1. whether you have a common male ancestor,
2. if you have such an ancestor, it will give an indication of how many generations apart you are,
3. if you don't have such an ancestor, it will tell you the following:
    a. there is more than one family that takes your name, each with an unrelated progenitor, or,
    b. there is an illegitimacy or adoption (NPE) somewhere along the line, on your, or their, line.

The company that Fulcher males used was FTDNA. The recommendation is always to start small at 37 STRs, and to upgrade later to more detailed tests, if the results point that way. It is a complete waste of money to do a more detailed test, unless there are a lot of other testers revealed by the 37 marker test.

The results that you receive will give you a number for each STR that is tested, a list of similar tester results (suggesting a possible Y chromosome relation), an indicator of your genetic distance (or an indicator of the predicted number of generations you are apart from them), and your predicted haplogroup.

Your haplogroup is your tribe. FTDNA will point you at a haplogroup map, to show how your ancient ancestors, perhaps 50,000 or more years ago, migrated across the world, resulting in where you might be currently living. The beginning is with a theoretical 'Adam' in Africa.

This test is pure. It takes no notice of the paper documents at a record office, which we use. It is an accurate representation of male ancestry – and that of a male's sister's paternal ancestry!



Autosomal DNA Testing

You don't see Y-DNA testing advertised widely, as it is too specialised. Autosomal DNA (atDNA) is the test that we heard most about. Autosomal DNA testing is the one that was available from a range of companies and is the one that found relatives that had also tested - and the one that gave the tester details of their ethnicity.

It must be emphasised, this is NOT the male Y chromosome Y-DNA test that pinpoints the Fulcher DNA. Autosomal DNA tests you and points at your parents, siblings, grandparents, aunts, uncles, cousins. Fulcher will only be a part of that, the paternal line part.

This is the test that the test companies want you to buy, and the one that creates their much needed databases.

Human DNA comprises of 23 pairs of chromosomes, one pair are the sex chromosomes, X for female and Y for male. The other 22 pairs are what are known as autosomes. Autosomal DNA relates to the 22 pairs of autosomes.

In the 2020s there were several companies doing these tests. They were almost fashionable. People wanted to know about where they came from. Autosomal DNA testing gives you a lot of matches to recent family members, perhaps back to 6th cousin. However it is very good at finding clues to recent unknown parents and 1st or 2nd cousins. Your chosen testing company will tell you how many centimorgans (cM) you have in common with other testers. In general, siblings will have typically 2500cM matches. 1st cousins once removed perhaps 300cM, 4th cousins 50cM. Your testing company will tell you what your matches mean with regard to how closely related you are to other testers.

Autosomal DNA is received randomly from our parents, 50/50 approximately. The parents also pass on the DNA of their grandparents (weaker, because there are four of them), great-grandparents (even weaker, because there are eight of them), and so on, back and back in time, getting weaker and weaker, the further back you go. This randomness will mean that your DNA will be different (perhaps significantly), to that of your brothers and sisters.

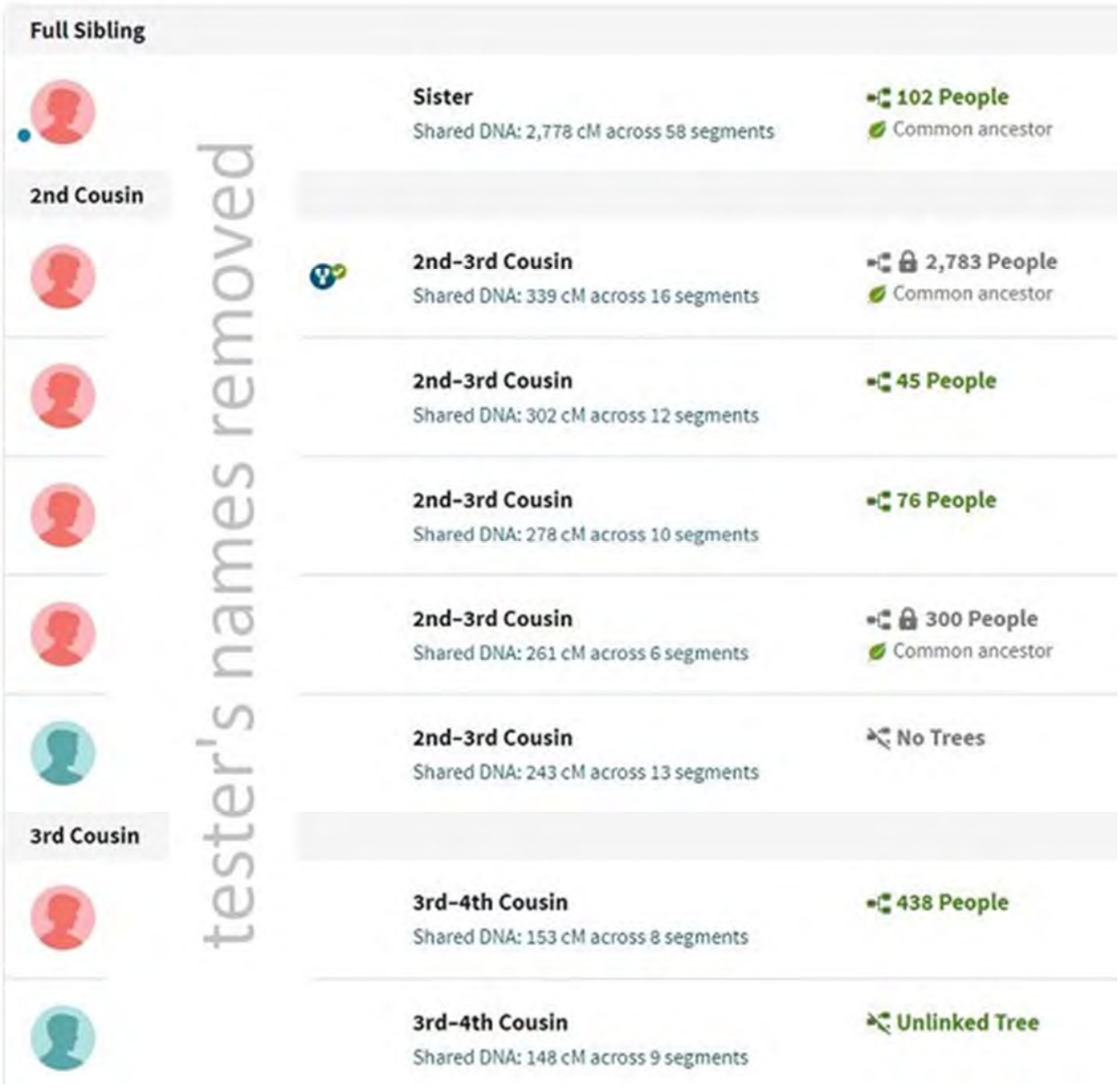
Autosomal DNA is what gives us our features, hair, eye, skin colour. Our body type, baldness/hairyness, our temperament, intelligence, sexuality perhaps, and so on. It is because of its randomly received nature that siblings resemble each other and one, or both, of their parents, most of the time, but not always. Strong characteristics, such as hair, eye or skin colour, will usually dominate, but not always.

This is how somebody explained how it works. Think of DNA like a bowl of M&Ms (a type of confectionery). If you plunge your hand in and your brother plunges his hand in and grab 50 M&Ms each, you will each have a different combination of colours, won't you? They won't be exactly the same number of each colour, even though you have the same overall number of M&Ms. Say, for example, you got only three blue M&Ms in your handful of several colours, whereas your brother got ten blue in his handful. Now your Child 1 takes half the M&Ms from your hand. Child 1 got only 1 blue M&M in his half. And now your grandchild takes half of those M&Ms from Child 1 and he gets no blue M&Ms at all. So even though you started out with three blue M&Ms, by the second generation, there are none left to be passed on. Meanwhile, your brother's child takes half of his M&Ms from his hand and gets seven blue ones, and when your brother's grandchild takes his half from Child 1, he gets 3 blue ones. So now these 2nd cousins (your grandchild and your brother's grandchild) can no longer 'match up' all their M&Ms because your grandchild didn't 'inherit' any blue ones. But he's still your grandchild and he's still second cousin to the one who does still have blue ones. They just grabbed their M&Ms from different 'pools' of M&Ms.

In other words, you may be siblings, but your atDNA can be very different between you. atDNA is a random process. A useful indicator or recent relationship, but not a precise art. 'Ee, our kid don't 'alf look like Uncle Bert', 'he takes after his mother', 'she has the xxxxx family chin', etc. These are the physical effects of our autosomal DNA.

In simple terms, what you get back in the form of test results are comparisons with other testers. As time went by, more and more people were getting their DNA tested and more and more test comparisons became available. You were guaranteed to get 'matches', but not guaranteed to get close 'matches'. So it was a waiting game. You put your results out there and waited to see what happened.

This is a typical results page from a testing company, which identifies a tester's sister, several second cousins, going on to 3rd, 4th, 5th, etc. cousins of both sexes.



Autosomal DNA testing also offers a bit of fun. Because of the nature of the autosomes, they give an indication of your ethnicity. Your testing company gave you percentages of racial make-up and a map showing your ethnic origins. Different companies suggested different ethnicities, as their databases were set up differently and agreement between companies was not possible. The ethnicity results that you were sent should have been treated with caution, a bit of fun, a loose guide only as to what parts of the world your ancestors came from. The random nature of the autosomal DNA you received from your ancestors, is why your ethnicity differed between you and your siblings.

Here is a typical atDNA ethnic make-up chart and a map. In both cases, very European.

Ethnic Makeup Percentage

African	**0%**
South Central Africa	0%
East Central Africa	0%
West Africa	0%
New World	**0%**
North and Central America	0%
South America	0%
Central/South Asian	**0%**
Central Asia	0%
Oceania	0%
South Central Asia	0%
East Asian	**0%**
Northeast Asia	0%
Siberia	0%
Southeast Asia	0%

Middle Eastern	**0%**
Asia Minor	< 2%
East Middle East	0%
North Africa	0%
West Middle East	0%
European	**97%**
British Isles	58%
East Europe	6%
Finland	0%
Scandinavia	18%
Southeast Europe	0%
Iberia	0%
West and Central Europe	15%
Jewish Diaspora	**0%**
Ashkenazi	0%
Sephardic	< 1%

Non Paternal Events (NPEs), Bastardy, Ilegitimacy, Adoption

A Poor Law Act of 1575 punished the parents of bastard children. The mother would be questioned as to who the father of her child was and then the father would be ordered to appear before the justices in order to make provision for the child. This act remained the basis of the law until 1834. We have several instances of these Bastardy Orders in our records and our web page indicates some of these 'broken DNA' cases. Various clarifications of the law were made as:

> Act of 1609-10 'Any lewd woman having had a bastard chargeable may be sent to the house of correction for a year. If she offends again she shall be sent to her house of correction until she gives securities for good behaviour'. These acts encouraged abortion and infanticide.
>
> Act of 1623-4 to kill a bastard is murder, and one witness at least is necessary to prove a still birth.
>
> Act of 1627 gave all justices of peace power to enact the punishment of such women.
>
> Act of 1662 states that when the mother and father of a bastard run away, the overseers, on the order of two justices, may size their goods. It seems that women then kept quiet about their condition, hoping to dispose of the child quietly (sometimes a "doorstep baby"). The father often disputed paternity.
>
> Law of 1732-4 ordains that a woman pregnant with a bastard child is to declare herself so, and to name the father.
>
> Act of 1743-4 a bastard born in a place where the mother is not settled is to have its mother's settlement. The mother is to be punished by public whipping.
>
> From 1875 to the present a man could only be named as the father on a birth certificate if he consented and was also present when the birth was registered. This stopped a member of the Royal family, or any other innocent man for that matter, from being named as the father of the bastard.

The state has long been involved in the maintenance of illegitimate children. Between 1576 and 1834, the so-called 'Old Poor Law' empowered parishes to enforce maintenance orders against putative fathers, whilst mothers were entitled to receive a weekly allowance. The system was administered by individual parishes under the jurisdiction of magistrates.

Levels of illegitimacy increased across the eighteenth century and parish systems of child maintenance were geographically extensive: by the early-nineteenth century, parishes were recorded as expending as much as 38 per cent of their budgets on unmarried mothers.

Some parishes were extremely effective in enforcing paternal responsibility and recovering child support payments from putative fathers. In West Yorkshire, for example, they recovered 84 per cent of maintenance payments.

Modern Trends

Whilst many orphaned or unwanted children would have been adopted by family or strangers, there was no official scheme in place until the 'Adoption of Children Act 1926'. Then, and before then, children were often placed in orphanages. Potential parents were selected based on their good character, often in association with Christian organisations. In the 1950s and 60s, in particular, girls who found themselves pregnant would often be sent away to have their baby and then, as good as, forced to give up their child for adoption. A very difficult decision to be made.

With changing attitudes, a move away from Christian teaching and church attendance, certainly from the 1990s onwards, illegitimate children became quite commonplace, with unmarried mothers raising children on their own, often with different biological fathers in the background, but who were often not particularly involved with their children's upbringing. In the UK, the government tried to make these errant fathers responsible for the children that they had created. These girls were supported by the government to keep their babies, with the 1991 Child Support Act coming into effect to make the father's take responsibility. The act had limited success, but it did at least recognise the right of the mother to keep her child, albeit mostly at public expense.

More recently, these 'illegitimate' children often took their mother's surnames. Indeed, even when a couple married, the woman would often keep her family name; whether to rebel against the patriarchal system of taking the husband's name, or perhaps with a cynical view that the marriage wouldn't last and – so, what was the point? One assumes that

this will make family history researching quite difficult in the future, especially as sexual promiscuity oft led to the mother not being sure who the father of their child was.

In the 2020s, it was a simple matter to prove. A simple DNA test would solve who the father was. A simple test could lead the police to the perpetrator of a crime, as well! In the future, who knows? As the indigenous people of Britain are having less and less children, a new order is coming in through rapid immigration from West Indian, Islamic, Hindu, Punjabi, etc. peoples. A whole new scenario for the family historian and DNA testing in the future with mixed marriages and a lack of written records from the third world countries.