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DNA clues to Queen of Sheba tale

By Helen Briggs BBC News

Modern day Ethiopians show great cultural, linguistic and historical diversity

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Clues to the origins of the Queen of Sheba legend are written in the DNA of some Africans, according to scientists.

Genetic research suggests Ethiopians mixed with Egyptian, Israeli or Syrian populations about 3,000 years ago.

This is the time the queen, mentioned in great religious works, is said to have ruled the kingdom of Sheba.

The research, published in The American Journal of Human Genetics, also sheds light on human migration out of Africa 60,000 years ago.

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The Queen of Sheba

- Queen mentioned in the Bible, the Koran and the Ethiopian Kabra Nagast
- Sheba was a rich kingdom that prospered through trade with Jerusalem and the Roman Empire, and spanned modern day Ethiopia and Yemen
- Queen said to have visited Jerusalem with gold to give to King Solomon
- Some texts record that she had a son with King Solomon

According to fossil evidence, human history goes back longer in Ethiopia than anywhere else in the world. But little has been known until now about the human genetics of Ethiopians.

Professor Chris Tyler-Smith of the Wellcome Trust Sanger Institute in Cambridge, UK, a researcher on the study, told BBC News: "Genetics can tell us about historical events.

"By analysing the genetics of Ethiopia and several other regions we can see that there was gene flow into Ethiopia, probably from the Levant, around 3,000 years ago, and this fits perfectly with the story of the Queen of Sheba."

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This paper sheds light on the very interesting recent and ancient population history of a region that played an important role in both recent and ancient human migration events”

Dr Sarah Tishcoff Department of Genetics and Biology at the University of Pennsylvania

Lead researcher Luca Pagani of the University of Cambridge and the Wellcome Trust Sanger Institute added: "The genetic evidence is in support of the legend of the Queen of Sheba."

More than 200 individuals from 10 Ethiopian and two neighbouring African populations were analysed in the largest genetic investigation of its kind on Ethiopian populations.

About a million genetic letters in each genome were studied. Previous Ethiopian genetic studies have focussed on smaller sections of the human genome and mitochondrial DNA, which passes along the maternal line.

Dr Sarah Tishcoff of the Department of Genetics and Biology at the University of Pennsylvania, said Ethiopia would be an important region to study in the future.

Commenting on the study, she said: "Ethiopia is a very diverse region culturally and linguistically but, until now, we've known little about genetic diversity in the region.

"This paper sheds light on the very interesting recent and ancient population history of a region that played an important role in both recent and ancient human migration events.

"In particular, the inference of timing and location of admixture with populations from the Levant is very interesting and is a unique example of how genetic data can be integrated with historical data."

The scientists acknowledge that there are uncertainties about dating, with a probable margin of error of a few hundred years either side of 3,000 years.

They plan to look at all three billion genetic letters of DNA in the genome of individual Ethiopians to learn more about human genetic diversity and evolution.

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Africa's genetic secrets unlocked

By Victoria Gill
Science reporter, BBC News

A genetic map of Africa - the continent from which all modern humans originate - has provided information about its huge diversity of language and culture.

To operate in remote areas, some equipment had to run on a car battery

It is the result of the largest African genetic study ever undertaken.

The work revealed the continent to be the most genetically diverse place on Earth, and identified descendents of our earliest human ancestors.

The international team of scientists describe their 10-year study in the journal Science.

The team, led by Sarah Tishkoff from the University of Pennsylvania, studied genetic material from 121 African populations.

They collected over 3,000 samples, and identified 14 "ancestral population clusters". These are groups of populations with common genetic ancestry, who share ethnicity and similarities in both their culture and the properties of their languages.

"This is a spectacular insight into the history of African populations and therefore the history of mankind," said Muntaser Ibrahim, a researcher from the University of Khartoum, who was also involved in the study.

The team looked at individual ancestry, or genetic similarities in their samples, by comparing the frequencies of more than 1,000 DNA markers - sections of the DNA code that are known to reveal common genetic heritage.

"In the past, [geneticists] studied just a few Africans, and suggested they were representative of the continent, but we've found that no population is representative of all of this diversity," said Dr Tishkoff.

"Our goal has been to do research that will benefit Africans," she said. "I hope this will set the stage for future genomics research there, and future biomedical research."

The completion of the study could enable such research, allowing the link between genes and disease to be properly studied.

"The genetic variants we've identified may play a role in disease susceptibility and the different ways in which people respond to drugs," Dr Tishkoff explained.

Remote research

Her team had to gather genetic samples from some of the continent's most remote communities.

To extract the important information from blood samples, they have to be "spun down", using a centrifuge to produce a pellet containing the DNA.

"In the most remote areas, we used a centrifuge that plugged into a car battery," Dr Tishkoff recalled.

Largely as a result of these difficulties, a large amount of the group's data comes from populations that have never previously been studied genetically.

This allows the map to provide an entirely new link between biology, and existing anthropology and linguistic information.

The research also located the origin of modern human migration in south-western Africa, near the coastal border of Namibia and Angola.

This is based on the widely-accepted theory that the highest level of genetic diversity is in the oldest population - the one that has had the longest to evolve.

The site is the homeland of the indigenous San communities, Dr Tishkoff explained.

“This is the first time we have had the genetic data to reconstruct migration events”

Sarah Tishkoff
University of Pennsylvania

"It's not surprising but it's a very neat finding because the San have already been shown to have the oldest genetic lineages, suggesting they may be descendents of a population ancestral to all modern humans."

Genetic reconstruction

The data has revealed a great deal about the history of the continent. "This is the first time we have had the genetic data to reconstruct migration events," Dr Tishkoff commented.

Her team, which represented an variety of academic disciplines, showed how genetic and linguistic diversity have co-evolved. This analysis revealed some surprises.

"The Masai people [in Kenya], for example, have maintained their traditional language and pastoral lifestyle, but genetically they've mixed a lot with populations from Ethiopia [who speak a different language]," said Dr Tishkoff.

The researchers also took samples from four African American populations, and traced their African ancestry. This was, as expected, mostly pinned down to West Africa.

Mark Thomas from the Department of Genetics, Evolution and Environment at UCL praised the study, and said that the level of diversity discovered was "broadly what we would expect".

He added that because the origins of African American ancestry can be seen "all the way from Senegal down to Angola, it will be a long time before a DNA test will be able to identify someone's ancestral origin.

"That's despite the ridiculous claims of some of these DNA testing companies."