

THE POWER OF GENETICS

As scientists from the Pasteur Institute embark on the first study of the genome of the Gabonese population, DNA research in the United States leads one of the world's most famous actors, Samuel L Jackson, to trace his roots back to Gabon

“WOW, get out of here! I have to google Gabon immediately and see what's there,” was the stunned response of Hollywood star Samuel L Jackson on the unexpected revelation that his ancestors originate in Gabon.

One of the world's most prominent and well-respected actors, Jackson has starred in more than 100 films, including *Pulp Fiction*, *Jurassic Park* and *Star Wars*. Guinness World Records has named him “the highest-grossing film actor of all time”.

The revelation of his ethnicity astonished him when he appeared in the US television programme *Finding Your Roots with Henry Louis Gates, Jr*, which delves into the genealogy and genetics of famous Americans. The star's ancestral history, it turns out, is deeply rooted in Gabon. DNA testing matched him with members of the Benga tribe, an ethnic group based in the north of the country.

Slavery had stripped Jackson of the knowledge of his roots, as it has so many African-Americans. However, DNA and painstaking archival research has now provided him with answers on his family heritage. He now knows that his ancestors would most likely have left Gabon several centuries ago on a slaving ship bound as labour for plantations in the New World.

The Portuguese began the slave trade in Gabon in the early 16th century. They were followed in subsequent centuries by the Dutch, the English and the French. The trade continued illegally, despite the passing of international abolition legislation, late into the 19th century.

To uncover Jackson's origins, the *Finding Your Roots* programme-makers worked with Dr Rick Kittles, a pioneering

geneticist whose African Lineage Database is the largest and most comprehensive resource of African lineages available today, covering 30 countries.

Kittles has spent his career trying to bridge the genealogical chasm of slavery by taking samples from the ethnic groups most highly represented in Africa in the American slave trade. “What we can do is search this database to look for similarities between an African-American and an African. A match means that these two people are distant cousins,” he explains. “For African-Americans, it allows them to discover their origins and their ethnic group before they were sold into slavery.”

“We look at two genetic systems inherited from the mother and the father – the Y-chromosome and the mitochondrial DNA – which are passed on unchanged

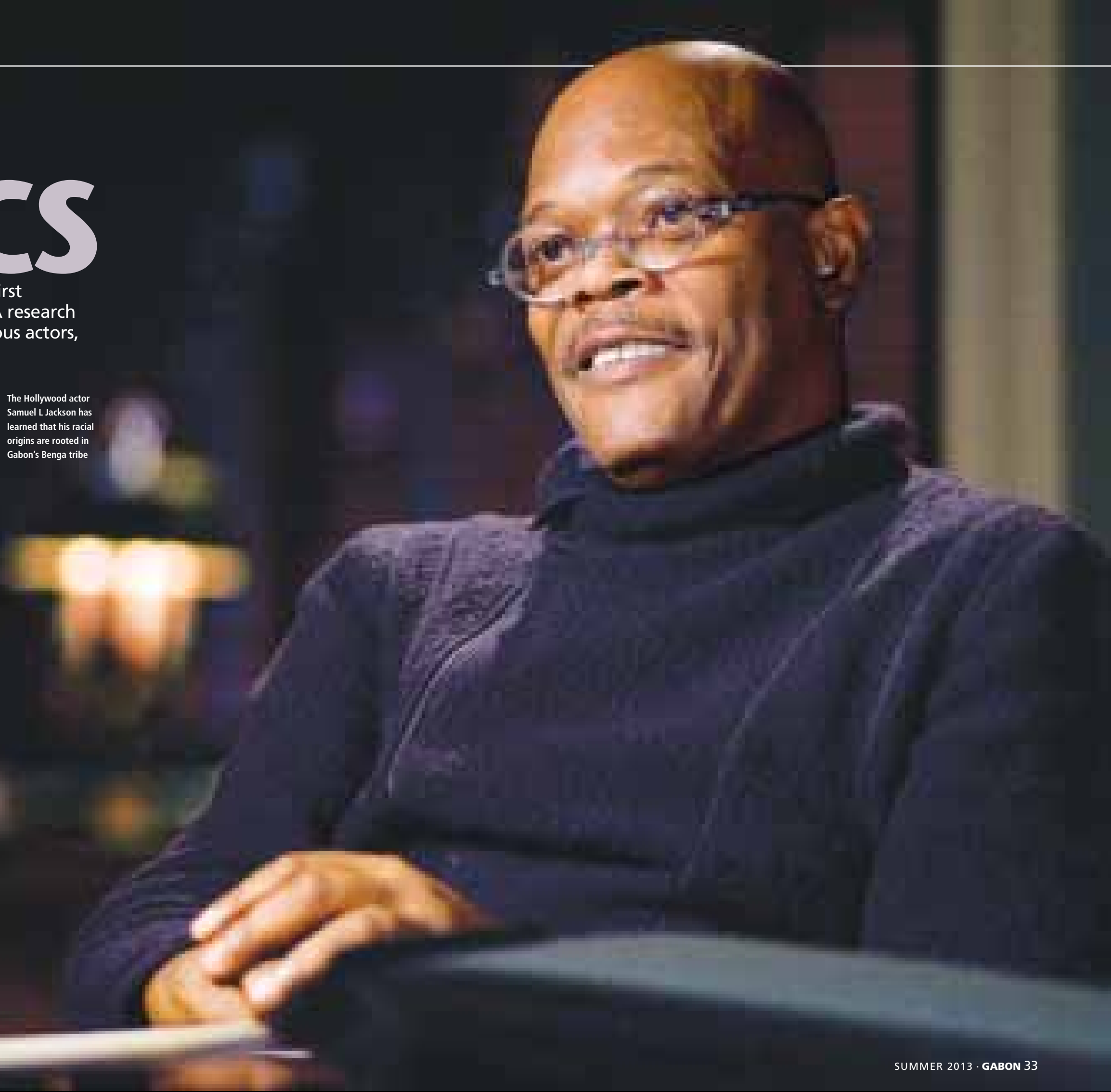
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every generation, so although the ancestor is no longer there, people in the present-day population share that combination with their ancestor,” he adds.

“Written records go back to the dawn of written history. DNA goes back to the dawn of human existence,” explains George Church, a Harvard genetics professor and the founder of the Personal Genome Project, a large cohort study which aims to sequence the complete genomes and medical records of 100,000 volunteers in the US.

Samuel L Jackson was not the only African-American celebrity guest to discover Gabonese ancestry thanks →

The Hollywood actor Samuel L Jackson has learned that his racial origins are rooted in Gabon's Benga tribe





CHESTER HIGGINS

Ruth Simmons, the first black president of an Ivy League university in the US, can trace her roots back to the Kota tribe of Gabon

to the research carried out by the *Finding Your Roots* team. The other was none other than the first black president of an Ivy League institution and a woman with a PhD from Harvard and nearly 30 honorary degrees: Ruth Simmons, who finished her tenure last year as president of Brown University (2001-2012).

"I haven't been to Gabon but I'll be going there now, I can tell you. I'd be going home," was her response to the programme presenter Henry Louis Gates Jr. "There is a certain longing to know where you come from and I have lived all my life without it." She later repeated to *The Boston Globe*: "I'm going to Gabon!" after learning that she derives from the Kota tribe, a Bantu group located mainly in the northeast of Gabon. "Don't you think that I should be welcomed back to Gabon by no less than the head of state?" she said with tongue in cheek. "As soon as that can be arranged by the consul general, I will be making my plans to go to Gabon."

History unravelled

If she does indeed visit, since Simmons is a fluent French speaker (she received her PhD in Romance languages and literatures from Harvard University in 1973), she would therefore have no difficulty in communicating within Gabon – even if she does not yet speak any of the Kota languages.

Simmons, whose ancestors would also have departed Gabon as a result of slavery, has led important research into the slave trade. In 2003, she set up Brown University's first Steering Committee on Slavery and Justice. "If you don't know the facts, the idea that you're descended

from an act of aggression is a tough thing for anybody to live with; but still, knowing is better than not knowing," she said.

The power of genetics is immense. It can tell us not just about ourselves, but also about human history and our place in it. Before the development of DNA testing, researchers had to rely on shipping records that listed the African ports from which slaves were exported to discover where in Africa the African-descended population of the US originated. But these lists were limited because they recorded only the port of departure and not the actual community from which the slaves came.

Fresh information, however, is likely to soon become available about the migration of people centuries ago from Gabon to America and elsewhere in the New World. A wide-reaching genetic study, led by the Human Evolutionary Genetics Department of the Pasteur Institute, has just begun in Gabon. The first major genetic anthropology study of the Gabonese population, it will entail the collection and analysis of DNA samples from a range of ethnic groups.

This mapping of Gabon's 'family tree' will, experts believe, reveal data with both medical and genographic implications. It should lead to a better understanding of disease development and resistance within Gabon's indigenous

communities, as well as provide a picture of the ancient human migration routes across the continent of Africa to Gabon. Additionally, it should shine a light on the migration paths from Gabon during the slave trade to America and elsewhere in the New World.

The study is a multidisciplinary investigation involving an international team of experts that includes ethnographers, linguists, and genetic and medical specialists from universities in Gabon, France and the US.

"Genetics offer the ultimate truth," Professor Franck Idiata, a specialist in Gabonese indigenous languages and the head of the National Centre for Scientific and Technological Research (CENAREST) in Libreville, told *Jeune Afrique* recently. His knowledge of his country's ethnic groups will form an important part of this study.

He added: "We comprehend little of the composition of the population of Gabon from 1,000 to 2,000 years ago. We know, for example, that there are now Téké people (a tribe in the east of the country) in the Republic of Congo, as well as in the Democratic Republic of Congo, but beyond that, what do we know? Where did they come from? By comparing the genes of different populations, we are going to gain a far clearer idea of the contacts they had with one another." ■



A partnership of Gabonese, French and American researchers have combined skills to carry out the first genetic study of the Gabonese population

GETTY IMAGES

IN FOCUS

Lluis Quintana-Murci, laboratory director of the Pasteur Institute's Department of Human Evolutionary Genetics, explains the motivation for the first ever genetic study of the Gabonese population



INSTITUT PASTEUR

Lluis Quintana-Murci believes the genetic study of Gabon's indigenous people will deliver answers on both medical and historical questions

permit us to grasp how these groups have adapted genetically to their environment. My department at the Pasteur Institute is interested in human genetics. We seek to understand, from a genetic standpoint, the history of population groups and how they have adapted to their environment, particularly in terms of their response to pathogens and infectious diseases.

What is the focus for the Pasteur Institute with this study?

The Pasteur Institute's principal aim is to understand what contributes to the development of infectious diseases so that we can prevent and treat them more effectively. Gaining knowledge of the genetic architecture of human populations, as we are about to do in Gabon, is the first step. We have also signed a convention with the Gabonese Republic to run a research programme for the prevention of tuberculosis.

What do you expect the end result to be? Will this genome study give answers on evolutionary questions or clarify historical accounts of migration patterns?

It will certainly help us, for one thing, to better understand the history of Gabon's human populations and their past interactions, and should also lead to understanding their genetic links with the African-American population. It will give a picture of the genetic makeup of the Gabonese population too – this is vital in finally understanding the nature of the relationship between genetic diversity and infectious disease.

CAN YOU tell me about the project's collaboration with other universities and the timescale?

The study has just begun and should be completed within three years. It is a multi-disciplinary partnership and we are very fortunate to be working with experts at the Omar Bongo University in Libreville, Gabon, on ethnological linguistic studies of the Gabonese population; with the University of Lyon, France, on linguistic studies of Bantu languages; and Stanford University in the US on genetic comparisons of the Gabonese and African-American populations.

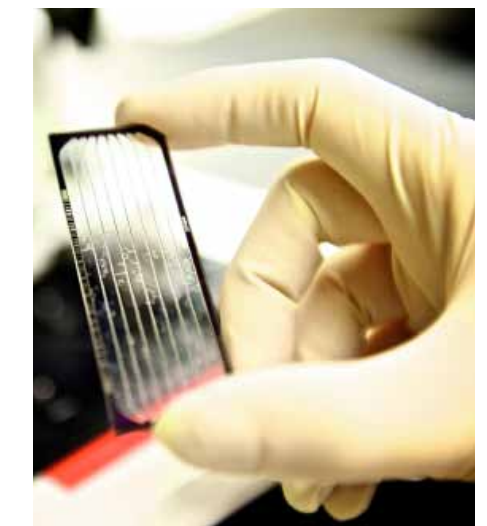
Which population groups will you be working with for DNA sampling?

We have singled out more than 20 tribal groups, which represent the most significant ethnic groupings. Among others, these include the Benga, Duma, Eviya, Fang, Galoa, Eshira, Akele, Kota,

Makina, Ndumu, Nzèbi, Obamba, Orungu, Punu, Shake, Téké and Mitsogo tribes. We chose these particular tribes to cover as much as possible the different languages spoken in Gabon.

Why is the project being carried out in Gabon and why is the Pasteur Institute involved?

The study is being carried out in Gabon for several reasons, partly scientific and partly circumstantial, following exchanges with Gabonese researchers. There are many genetic studies of this type that have been carried out elsewhere globally but far fewer in Africa. What is so unique about this work, however, is that it will allow us to study in detail the genetic makeup of Gabon's closely-knit population groups in a way that has not been done before. It will help us to better understand their history, and how they are alike and different. It will also



THE SLAVE TRADE IN GABON

LIBERATED slaves founded Gabon's capital, Libreville (meaning 'free town'), as a town in 1849 after the French navy captured a Portuguese ship, the *Elizia*, carrying slaves to Brazil. French navy captain Louis-Édouard Bouët-Willamez set free the 176 surviving members of the ship's original 400-strong 'cargo' as an example to local chieftains to push home the message that slavery had been abolished.

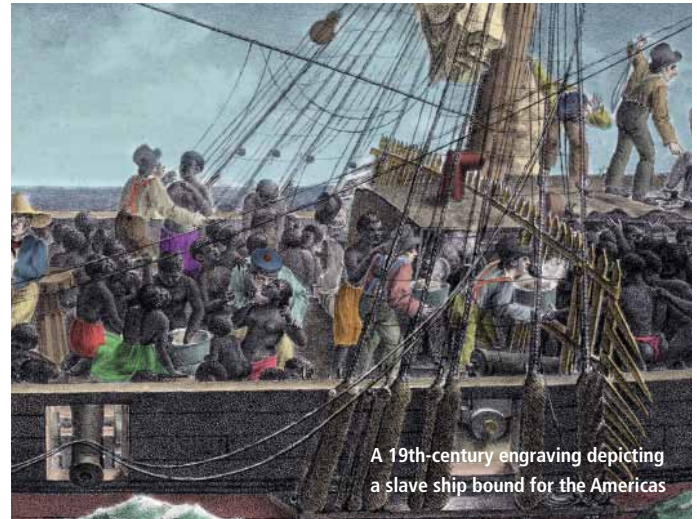
This was the bright point towards the end of a dark and complex era, however. It saw slavery in what is now modern-day Gabon controlled by foreign powers – the Portuguese, the Dutch, the French and the English – but also aided and abetted by inter-tribal slave commerce.

Well-established slave trade networks, controlled by local

populations, particularly the Mpongwe, the Vili and the Orungu, supplied the slave markets. African slavers sent slaves downriver from Gabon's interior and held them in barracoons (temporary enclosures) to await the foreign slave ships.

Certain areas of Gabon served as slave trading entrepôts and embarkation points. These included Lopé, which hosted regular slave fairs, and Cape Lopez with its sheltered bay; the Gabon Estuary and Mondah Bay; and the Loango coast, particularly the area beyond the dangerous Benguela current and towards the Mayumba area.

In his book *The Atlantic Slave Trade*, author Herbert Klein summarises the commerce: "The Loango coast proved to be a major region for both British and French



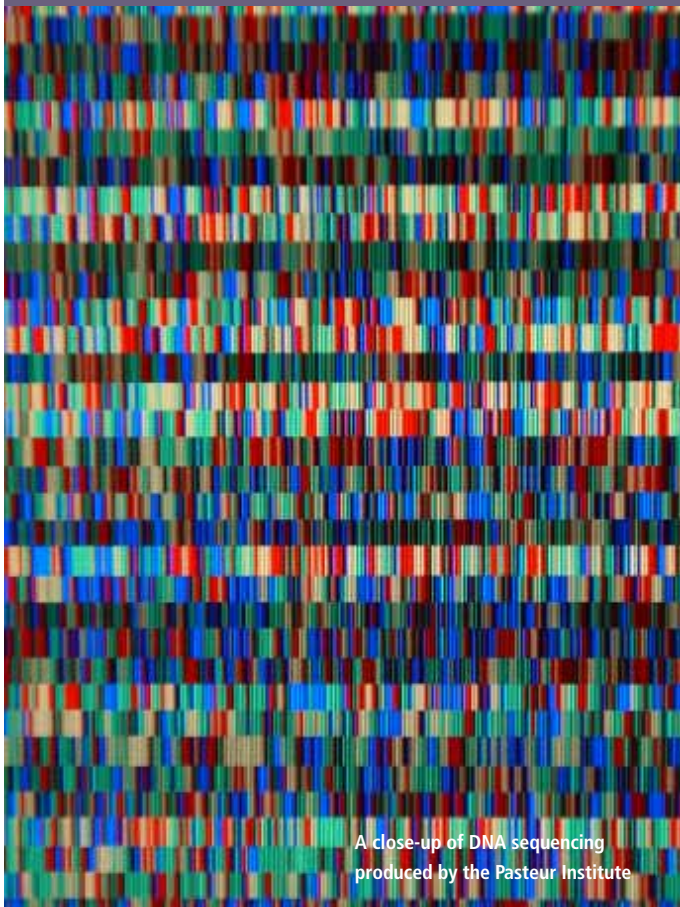
A 19th-century engraving depicting a slave ship bound for the Americas

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slaving activity from the earliest period. But it was in the 18th century that this area to the north of the River Congo became the prime trading zone for these two major traders. At the beginning of the century the French were taking 3,600 slaves per annum and by the 1790s they were

averaging 12,800 captives per annum. The English experience was similar... Despite all the efforts of the Portuguese to close this crucial area to other Europeans, these two nations alone took more than one million Africans from the Loango coast between 1700 and 1807."

MAPPING THE ANCESTRAL PAST



A close-up of DNA sequencing produced by the Pasteur Institute

PARTS OF DNA – the Y chromosome (y-DNA) passed from father to son, or mitochondrial-DNA (mtDNA) passed from mother to child – are inherited almost identically in each new generation. The key word here is 'almost'. Over thousands of years there are occasionally small changes in the mtDNA and the y-DNA that become 'time stamps' for a person's deep ancestry. Because geneticists can calculate the rate of these changes over time, the changes act as markers that conveniently match up with points in the history of human migration. As people migrated, groups of people also became more isolated from one another. The small changes, concentrated over generations within these isolated populations, set the stage for the pattern of genetic diversity we see today.

Specific y-DNA sequences and specific mt-DNA sequences are associated with certain groups that were culturally or geographically more isolated, passing certain mutations from one generation to the next. People with similar geographic ancestry share these small differences in their mtDNA or their y-DNA and are grouped together in what are called 'haplogroups' – specific clans or branches of the human family tree.

There are hundreds of different haplogroups on both the maternal and paternal sides. Some of them can indicate whether a person has ancestry in, for example, the African continent or the Middle East. In a family tree, the maternal line (like mitochondrial DNA) traces back through a string of mothers; the paternal line (like the Y chromosome) traces back through a string of fathers. ■

Sarah Monaghan

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