

In search of the differences that make the difference ^[1]

Discovery ^[2]

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Born to parents who had fled war-torn Angola for the relative safety of the Democratic Republic of Congo, Mamana Mbiyavanga is now pursuing cutting-edge genomic questions at an ultramodern research lab in Switzerland.

A doctoral student at the University of Cape Town (UCT) in South Africa, Mbiyavanga is in the middle of a Next Generation Scientist internship at the Novartis Institutes for BioMedical Research (NIBR) in Basel, Switzerland. Mbiyavanga is using his three-month stint at NIBR to conduct genetic analysis of DNA samples from two major African populations. His aim is to contribute to the understanding of genomic diversity of African populations and the discovery and development of more effective drugs and diagnostics.

“Until now, most studies of genomic variation have been performed in European populations. There’s much less data for African populations, even though there is far greater diversity in these groups,” explains Mbiyavanga. “Investigating diversity among subpopulations in Africa will help in mapping the genetic causes of disease – for African people and, by implication, humanity as a whole.”

As part of his project, Mbiyavanga is also drilling into pharmacogenomics. “Genomic differences play a big part in how people respond to drugs,” he says. “Understanding the impact of these differences will help in developing medicines and dosing regimes that are safe and effective for African people.”

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Mamana Mbiyavanga, doctoral student and Next Generation Scientist intern at Novartis

Mbiyavanga’s work at NIBR is the latest phase in a story that began when his parents left Angola at the height of the country’s long and bloody civil war. They settled in the neighboring DR Congo, where Mbiyavanga was born. Early on, and encouraged by family and teachers, his first ambition was to become a medical doctor, but a talent for numbers took him on a different path that led to a degree in computer science and mathematics. During post-grad studies at the African Institute of Mathematical Sciences ^[3] in South Africa, Mbiyavanga was introduced to bioinformatics – the study of biological data using computer science, statistics and mathematics. “My boyhood wish to go into medicine had never gone away,” he says. “Bioinformatics gave me a chance to understand disease and help develop therapies by

applying my interest and training in mathematics and computer science.” He moved on to UCT for a master’s degree in bioinformatics and then enrolled in his current PhD program.

Following the science at NIBR

Mbiyavanga saw an internship at NIBR as a way to accelerate his PhD research by getting hands on experience using next-generation sequencing technology. This technology has revolutionized genomic research by enabling an entire human genome to be sequenced in a single day.

“I knew the technology would be right at the cutting edge,” says Mbiyavanga. “It’s way ahead of what’s available in most academic labs.”

Mbiyavanga’s day-to-day interactions with his colleagues have been equally rewarding. “People have been so ready to answer questions and share their knowledge,” he says. “And the emphasis everyone puts on innovation – on accepting risk and embracing failure – has been enriching. It’s given me a new perspective on the scientific endeavor.”

On a practical level, Mbiyavanga says he will return to Africa with newly acquired scientific skills. “The team here has a great depth of expertise in analysis of sequencing results. What I’m learning will be a real asset to my lab back at UCT.”

Over the longer term, Mbiyavanga wants to continue building genomics capability in Africa in order to improve how disease is diagnosed and treated on the continent. “I’m a firm believer in African scientists working on African problems,” he says. “Who knows – one day I might even play a part in building an African pharmaceutical industry.”

The mentor’s perspective

Martin Beibel, a bioinformatics specialist on NIBR’s molecular profiling team, has been Mbiyavanga’s mentor during his internship. “Normally, we examine single genes or genetic pathways to inform the search for new drug targets or elucidate the molecular mechanism of drug action and response. It has been thought-provoking to work with Mamana and apply our technology to African populations that have not been adequately studied so far.”

Guglielmo Roma, Head of Molecular Profiling in the Developmental and Molecular Pathways group at NIBR, adds: “Having Mamana on the team has given us all new insights into healthcare challenges in Africa and opened our eyes to the progress and potential of the work being done on genomic diversity.

“We plan to stay in touch with him over the years – as we have done with other interns we’ve worked with. This helps us expand our network of potential future scientific collaborators.”

Supporting the next generation

The Next Generation Scientist initiative gives young researchers and academics from emerging economies exposure to pharmaceutical research and development through internships at Novartis. Since 2011, more than 120 scientists from 24 countries in Africa, Asia and Latin America have taken part.

Main image: Mbiyavanga is using his three-month stint at NIBR to conduct genetic analysis of DNA samples from two major African populations. Photo by Gabriel McClelland

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