L'ORÉAL-UNESCO FOR WOMEN IN SCIENCE

2018 Sub-Saharan Africa Fellowship programme

For Women in Science

FONDATION L'ORÉAL

CONTENTS

Africa is a continent of incredible richness, creativity and diversity. By 2050, it will be home to another 1.3 billion people, representing more than half of global population growth.[1] Yet, people across the continent face significant challenges, including climate change, poverty, lack of access to energy and safe water, along with resource scarcity. Science and technology are among the principle keys to addressing these challenges. It is vital that women and men are enabled to contribute fully and equally to the development of solutions, foster innovation and enrich locally relevant research.

Today, there are simply not enough women scientists in Africa to drive change at the scale at which it is needed. In Kenya, for instance, only 300 people gain PhDs annually, of a population of 48 million, and just 26% of researchers are women. Distinct barriers exist to advancing scientific endeavours, particularly among the continent's poorest countries,[2] with insufficient funding and resources directed to equipping laboratories and supporting scientific research. And with few women scientists to act as role models, and deeply engrained cultural attitudes surrounding gender roles and motherhood, girls may feel discouraged from studying science from an early age. Balancing their studies with family commitments presents a further challenge for aspiring women scientists, who may also face open bias in the academic system.

Therefore, it is critical to support and highlight outstanding African women in science, technology, engineering and mathematics, as we desperately need their talents.
For the last 20 years, the L'Oréal Foundation has partnered with UNESCO to honour 102 laureates for their scientific achievements, three of whom have received a Nobel Prize. Through our joint For Women in Science programme, we have recognised and raised the profile of more than 3,100 women scientists in 110 countries.

For the first time since its inception, the regional L'Oréal-UNESCO For Women in Science Africa fellowship awards ceremony is taking place in Nairobi, Kenya. We are offering our fellows grants to support and accelerate their research. But we want to go further than this - we want to empower them to break the glass ceiling and strengthen their career through a dedicated leadership training programme. As networking among women is a strategic lever for change, we will also connect scientific women all over the continent.

This year, as we honour 14 emerging women scientists from Ghana, Kenya, Mauritius, Nigeria and South Africa, we reaffirm our commitment to empowering more African women scientists, so that they receive the recognition they deserve. So it is with great pleasure that I invite you to discover the brilliant research of this year's 14 For Women in Science Africa fellows in these pages. You will learn of everything from novel approaches to treating tuberculosis to building climate resilience among smallholder coffee farmers to preserving bee colonies and better understanding the chemical relationship between mosquitoes and humans.

Every one of our fellows is an inspiration for those who want to shape the world through science, protecting nature and promoting biodiversity, uncovering the secrets of the universe or pioneering innovative solutions to complex diseases. African women scientists will be instrumental in solving the great challenges facing humanity, and helping to create a more inclusive and sustainable world. We must recognise the imperative for a collective acceleration of progress. Because the world needs science and science needs women.

Alexandra PALT
Executive Vice President, L'Oréal Foundation

1 - United Nations, World Population Prospects, 2017 https://esa.un.org/unpd/wpp/Publications/Files/WPP2017_KeyFindings.pdf
2 - United Nations, LDCs at a Glance https://www.un.org/development/desa/dpad/least-developed-country-category/ldcs-at-a-glance.html

L'ORÉAL-UNESCO
For Women in Science
Global Programme

Over the last
20 YEARS,
more than
3,100
women scientists recognized

102
laureates honored for excellence in science, including three who have gone on to win the Nobel Prize

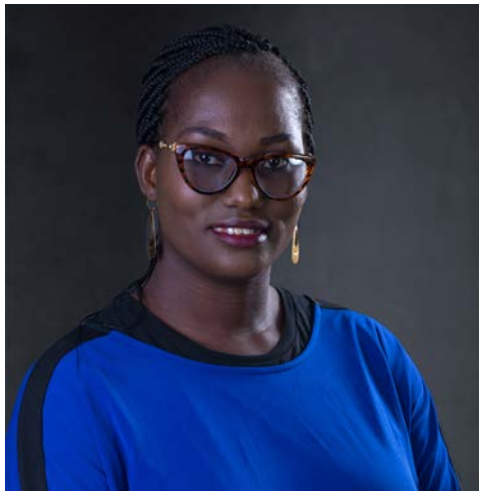
53 national and regional fellowship programmes established in
117 COUNTRIES.

L'ORÉAL-UNESCO
For Women in Science
Africa

2010
Creation of the sub-Saharan fellowship programme

140
African women scientists supported:
- 11 laureates
- 129 doctoral and post-doctoral fellows

49
countries are part of the regional programme



Olanike AKINDUYITE

PhD candidate - Nigeria

DEPARTMENT OF
COMPUTER SCIENCE,
FEDERAL UNIVERSITY OF
TECHNOLOGY, AKURE

COMBINING BIOMETRICS TECHNOLOGY AND TRADITIONAL CRYPTOGRAPHY

Ms Olanike Akinduyite is very proud that she and her seven siblings have all become scientists. "My choice in science was firstly greatly influenced by my mother, who happened to be the first motivation I had to study science. She, unfortunately, did not have an opportunity of having a formal education but vowed to make sure all her children were educated," she says.

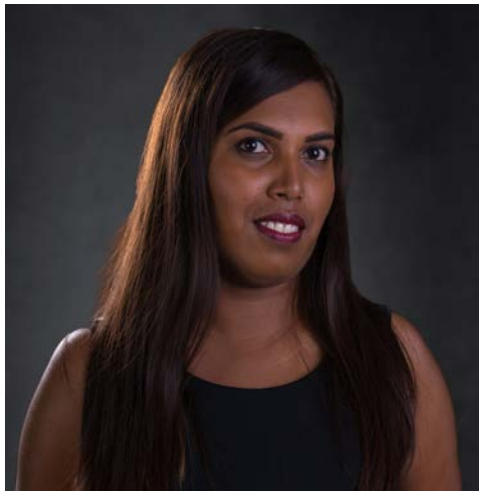
Thanks to her love of mathematics and problem-solving, Ms Olanike Akinduyite gained admission to the Osun State Polytechnic, Iree, Nigeria, where she gained a diploma certificate in computer science. It was here that she began her career. "I loved every aspect of the courses I undertook at such a foundational level of my profession in computer science," she says. In pursuit of a university education, she sought admission to the Federal University of Technology, Akure, Ondo State, Nigeria and was admitted to study Computer Science.

Her quest for more knowledge inspired her to pursue a master's degree in computer science at the same university. Despite the challenge of balancing her studies with being a wife and mother, she never allowed this to affect her academic performance and quest for excellence. Today, she is studying for a PhD in computer science, specialising in security and privacy, in order to improve her level of attainment.

Her research, titled Fingerprint-based key-binding biometric cryptosystem, focuses on biometric template protection, with particular emphasis on fingerprint biometrics. One method for protecting biometric templates is the biometric cryptosystem, which seeks to combine the strengths of biometrics technology concepts and traditional cryptography to build a secure template database for authentication system. A biometric cryptosystem can only operate in two modes: key-binding and key-generation. Ms Akinduyite will present a key-binding approach to biometric cryptosystem, which uses a fingerprint fuzzy vault scheme.

Her husband, also a scientist, has shown his full support for her scientific career. "In marriage, no matter your career aspiration, if your spouse does not agree, you will not go far," she says. "I really want to make him proud, in view all that he has done to help me achieve my career objectives." For this mother of two, there is no doubt that, in the future, she will be an ambassador for encouraging young people, particularly girls, into sciences.

In 2018, Ms Akinduyite was selected from among 200 of the most qualified young researchers in computer science and mathematics in the world to participate in the Heidelberg Laureate Forum (HLF). In 2017, she became an alumna of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, where she attended the CODATA-RDA Research Data Science Summer School. She has also received a Super Computing (SC17) Travel Grant to attend the International Conference for High Performance Computing, Networking, Storage and Analysis at the Colorado Convention Centre as a student volunteer. Ms Akinduyite has produced four publications in line with her studies.



Rima BEESOO

PhD candidate - Mauritius

DEPARTMENT OF BIOSCIENCES AND HEALTH SCIENCES, UNIVERSITY OF MAURITIUS

IDENTIFYING BIOACTIVE COMPOUNDS WITH THERAPEUTIC POTENTIAL FROM MARINE INVERTEBRATES

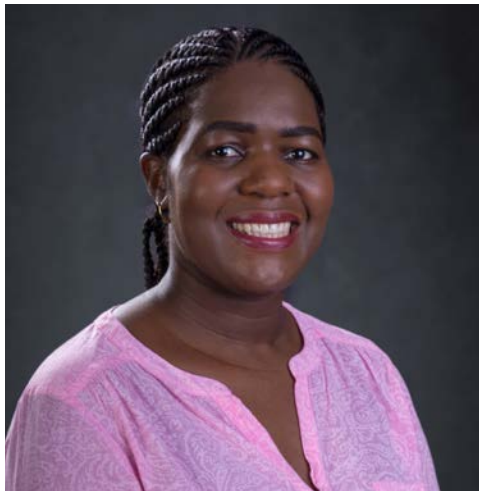
Ms Rima Beesoo is currently a PhD student at the University of Mauritius, supported by the National Research and Innovation Chair Programme, under the Mauritius Research Council. She was awarded her BSc in Agricultural Biotechnology in 2011 by the University of Mauritius, and named as a top-ranking student of her cohort. Her PhD research is an investigation of the biochemical characterisation, antioxidant, antimicrobial and anticarcinogenic potential of some selected Mauritian marine invertebrate species.

Her interest focuses examining the chemical and bioactive properties of natural products isolated from selected marine invertebrates collected from Mauritius waters in order to identify novel drug with potential application as anticancer and antimicrobial therapeutics. She emphasises the chemical composition and therapeutic effects of marine invertebrates (sponges, soft corals, jelly fish and tunicates) collected from the Mascarene region in the South West Indian Ocean (SWIO), with the aim of identifying bioactive extracts or novel compounds with potential pharmaceutical applications.

During her PhD, she has worked at the University of Edinburgh and Keele University on a collaborative project designed to understand the anti-cancer and epigenetic properties of natural products within common Mauritian flora and fauna. The project was funded by the Global Young Academy. Ms Beesoo is therefore highly motivated to pursue her postdoctoral studies in the field of drug discovery and development. Research in this area lies at the interface of chemistry and biology, and addresses multiple aspects of the drug discovery process, ranging from assay development, the identification and structure determination of small bioactive molecules to the discovery of novel drug targets.

Ms Beesoo's long-term goal is to expand existing infrastructures at the University of Mauritius to facilitate the development of a local marine-based pharmaceutical industry. Parallel to her research career, she has been working for various not-for-profit organisations. For example, through her voluntary work with the Eco-Raise Society, she has participated in several clean-up campaigns and interactive workshops on environmental pollution and waste management. She has also been actively involved in science outreach activities in schools in Mauritius and Scotland, organised by the Global Young Academy and Royal Society of Edinburgh.

In 2017, she received the UNESCO MARS Best African Woman Researcher award, and was awarded the African German Network of Excellence in Science Mobility Grant for Junior Scientists by the German Federal Ministry of Education and Research and the Alexander von Humboldt Foundation. In 2018, she received a travelling grant offered by TWAS ROSSA for participation in TWAS/BioVisionAlexandria, a conference where scientists from developing countries discuss challenges in conducting research. She was also selected as one of the Robert Bosch laureates to attend the European Science Open Forum 2018 in Toulouse, France. Ms Beesoo is the author of six publications and two chapters.



Takalani CELE

PhD candidate - South Africa

DEPARTMENT OF PHYSICS,
UNIVERSITY OF SOUTH AFRICA

APPLYING HYBRID NANOTECHNOLOGY-NUCLEAR PROCESS TO CANCER TREATMENT

Originally from South Africa, Ms Takalani Cele is a PhD student at the University of South Africa in Pretoria, South Africa. Her passion for science started when she enrolled at a young age in a science school. "I participated in every Science Expo and Science Olympiad as those were the competitions that needed one to think and be creative," she says "Mathematics and science were always the subjects with which I was most engrossed."

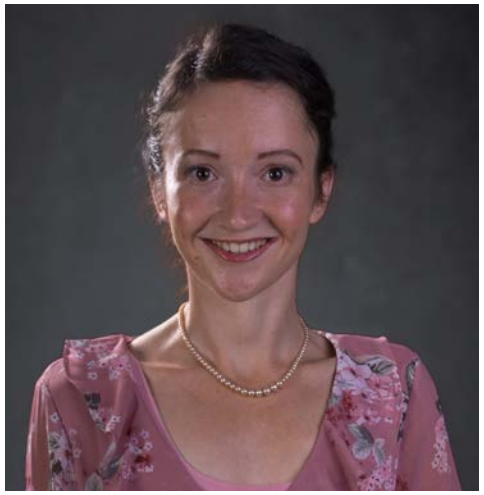
Her interest in science never diminished. She opted for physics and chemistry at the university, and has obtained three degrees: a BSc in chemistry, and a BSc (Hons) and MSc physical science. "It let me develop scientific knowledge and theory about everything in my surroundings that I might stumble across."

Her PhD research, Platinum group metals (PGM), nano-particles and hybrid nano-composites by gamma radiolysis/evaporation-induced self-assembly (EISA), focuses on the development of pure and hybrid advanced 1-, 2- and/or 3-dimensional PGM nano-composites by a versatile novel hybrid nanotechnology-nuclear process: radiolysis and EISA.

In this work, she seeks to find a way to make use of widely available minerals in South Africa. These nanoparticles can be of good use in different applications, including cancer treatment. Other applications include catalysis to be used for water treatment. "Science causes progressive and extraordinary developments, as it has assisted people in finding the cure to several diseases, increased awareness, and created endless possibilities for us," she says. "I want to be among those who are making an impact in our communities through my knowledge."

She is very aware that being a woman in what has historically been viewed as 'a man's career' is not easy. "The challenge of juggling a career and family - I am a wife and a mother of two - is quite difficult, but it teaches one to be creative, and to multi-task and impart problem-solving skills and valuable knowledge". In the future, she wants to continue "serving as a role model to aspiring scientists, especially women scientists from disadvantaged backgrounds like me". She also wants to help her country and Africa as a whole with ideas and solutions to social challenges facing the continent. "The South African government invests in scientific research and development, and continues to improve its support each year," she notes.

Ms Cele has previously received the NRF Scarce Skills Scholarship, the Merrill Lynch Scholarship, a UCT Faculty of Science Scholarship and an NRF award. She qualified to be a member of the Golden Key International Honour Society, and was part of the SA-France PROTEA programme. She also qualified for the SA-JINR Student Practice in Dubna, Russia, and the Asia-Pacific edition of HERCULES in Taiwan. Ms Cele has also produced five publications on metal nanoparticles.



Dr Marilize EVERTS

Post Doctorate - South Africa

DEPARTMENT OF MECHANICAL AND AERONAUTICAL ENGINEERING, UNIVERSITY OF PRETORIA

IMPROVING THE FUNDAMENTAL UNDERSTANDING OF MIXED CONVENTION IN LAMINAR AND TRANSITIONAL FLOWS

Being a ballerina from the age of five, Dr Marilize Everts became aware of the role of science in our daily lives from an early age. "Ballet required that I understand the science of the body as well as movements," she says. "The precision and the technique required in ballet became part of my approach to everyday life. Science is alive and explains the functioning of everything. Technology came along and made it possible to take science to the next level."

Although her curiosity to understand how things work attracted her to mechanical engineering, she considered it as a career for men, perceiving that it entailed cars, grease and gears. During the University of Pretoria's Open Day in 2008, she attended lectures on many other careers. When the Head of the Department of Mechanical and Aeronautical Engineering started his presentation with the phrase "women in mechanical engineering", she no longer had any doubt: "I was overwhelmed with joy and excitement, and just then, the little ballerina decided to become a mechanical engineer!"

Mechanical engineering has the lowest percentage of female students of all the engineering disciplines in South Africa, and as she continued her journey to PhD level, the number of women significantly decreased along the way. "I turned out to be the only female mechanical engineering student to graduate with a PhD in 2018," she says. "Instead of seeing me as the odd one out, the University of Pretoria supported and encouraged me to not only finish my postgraduate studies, but also to pursue an academic career."

For her PhD, she is primarily working on "Heat transfer and pressure drop of high viscosity fluids in solar receiver tubes." The purpose of this research is to conduct heat transfer and pressure drop experiments using water, in order to improve the fundamental understanding of mixed convection in developing and fully developed flow in the laminar and transitional flow regimes. The resulting correlations will enable engineers to not only design heat exchangers that operate in the transitional flow regime, but also to optimise the design of the heat exchangers that operate using laminar flow.

The applications of this fundamental research are very wide, and range from domestic systems such as air-conditioners in cars and buildings to renewable energy systems (such as solar energy) to large industry systems (such as the mining industry). "For example, if the efficiency of cooling equipment such as fridges is improved, it will become more cost-efficient and accessible to poorer communities, with the result that people can live healthier lives because their food stays fresh for longer," she explains.

Dr Everts has received over 20 awards, including most recently a TATA Africa Scholarships for Women in Science, Engineering and Technology. She is involved in two international research projects: The ThermaSmart Horizon 2020 project (which has €1.5 million in funding and which involves 18 universities across five continents), and a Royal Society-funded collaboration between Imperial College London and the universities of Pretoria, Mauritius and Nigeria. She has produced five publications and 17 conference papers, with a further four publications in the pipeline.

Charlene GOOSEN

PhD Candidate - South Africa

FACULTY OF MEDICINE
AND HEALTH SCIENCES,
STELLENBOSCH UNIVERSITY

FILLING THE KNOWLEDGE GAPS IN HUMAN MICROBIOME

"I am a passionate dietitian, enthusiastic researcher, married to my best friend, and the proud mother of two beautiful children," says Ms Charlene Goosen. Living with her family in the town of George in South Africa's Western Cape, Ms Goosen knew she was going to become a scientist when her younger sister was diagnosed with Type 1 diabetes. She was only 13 at the time, but still remembers: "this life-changing moment transformed our family's entire lifestyle and introduced me to the field of nutrition and dietetics".

Her research focuses on the "effect of oral iron supplementation on the gut microbiome in HIV-infected children". She explains that considering the adverse effects of iron fortification shown on the gut microbiome of HIV-uninfected children, it can be postulated that in HIV, adding excess iron to an already inflamed gut may contribute to increased risk of pathogenic microbial translocation, immune activation and HIV disease progression.

There is currently no data on the effect of iron supplementation (60mg ferrous sulphate), a widely used therapeutic measure for correcting iron deficiency, on the gut microbiome in virally suppressed HIV-infected children. The gut microbiome has not been characterised in older children with perinatal HIV infection and early onset antiretroviral therapy (ART), or in those with overlapping HIV infection and iron deficiency.

Ms Goosen wants to fill these knowledge gaps and contribute to the rapidly expanding field of the human microbiome and its interactions with health and disease. Her study will also describe participants' nutritional status (in relation to iron nutrition). This is a unique opportunity to compare the nutritional status of older children with perinatal HIV infection and early onset ART to the nutritional status of HIV-uninfected children, with further comparisons in those with and without iron deficiency.

In South Africa, the field of nutrition and dietetics is strongly dominated by women. But, as a mother of two very young children, her decision to continue with her PhD offered daily challenges. She remembers thinking "I must prioritise and ensure that I find a balance between being a scientist, a mother, a wife, and a friend". Fortunately, Ms Goosen has "a very supportive and hands-on husband who enables me to find that balance". Whatever the difficulties, she believes that one should always grab opportunities with both hands. "I truly wish to make a difference in the lives of women, mothers and children, in the same way I aspire to give my own children the best chance in life," she says.

In 2011, Ms Goosen was awarded the first prize for 'Academic Poster Presentation for Experiences' of field workers employed by the Community Nutrition Security Research Project in the Breede Valley, Western Cape Province, South Africa. In 2016, she received an award for 'Best Performance in Nutrition Education and Health Promotion' at the Stellenbosch University. She has also written four publications and a chapter of a book.

Lerato HLAKA

PhD candidate - South Africa

INSTITUTE OF INFECTIOUS DISEASES & MOLECULAR MEDICINE, DIVISION OF IMMUNOLOGY
FACULTY OF HEALTH SCIENCES, UNIVERSITY OF CAPE TOWN

LAYING THE FOUNDATION FOR A NOVEL EFFECTIVE ANTI-TUBERCULOSIS FORMULATION

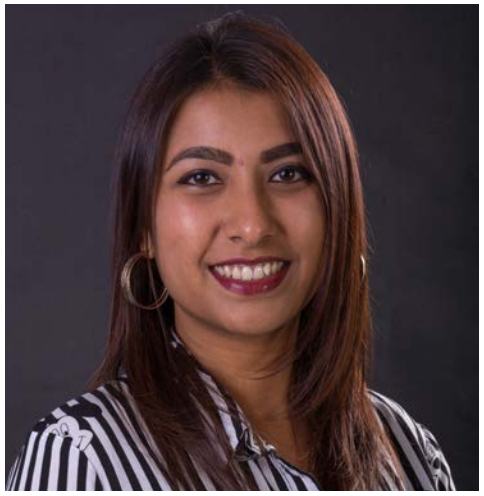
Ms Lerato Hlaka is working at the Cytokines and Disease Laboratory at the International Centre for Genetic Engineering and Biotechnology in Cape Town. Growing up in South Africa in a community with a high rate of HIV and tuberculosis (TB) cases and high incidences of MDR-TB and XDR-TB, her decision to study science was inspired by her desire to make a positive impact in her community and beyond. She wanted to contribute to improving the health of people infected or affected by these diseases through research, innovation and education.

Her research on the characterisation of minor groove binders (MGBs) as novel lead compounds and the use of non-ionic surfactant vesicles (NIVs) to improve their efficacy for treatment of tuberculosis involves identifying the anti-mycobacterial activity of MGB compounds as a foundation for the development of a novel inhalable drug formulation for the treatment of tuberculosis.

This research has the potential to lead to the development of an effective anti-TB formulation that could generate broader benefits to society, as the threat of anti-mycobacterial resistance grows. It also holds promise for MGB as a novel compound for future anti-TB therapy. "It has not been an easy journey as I have been faced with many challenges," Ms Hlaka says. "It is unfortunate that as women scientists, we must constantly prove ourselves compared to our male counterparts. To make it, you need to surround yourself with people who genuinely care about your journey and are willing to guide you towards success."

She is very thankful to her family, friends, funders (SAMRC and NRF), mentors and colleagues for the support she has received. Recognising the need for more skilled and qualified women scientists in Africa, Ms Hlaka has been involved as a tutor and practical demonstrator for undergraduates studying at the University of Cape Town, as well as in public engagement outreach programmes. "They have provided me with an opportunity to engage with many young men and women from disadvantaged backgrounds through tutoring, mentorship and sharing knowledge in STEM related subjects."

In 2017, Ms Hlaka was selected as one of the Mail and Guardian's Top 200 Young South Africans. Her project has yielded co-authorship of two publications on the subject of defeating TB. "Our first co-authored publication received a second prize award in the annual Institute of Infectious Diseases and Molecular Medicine's postgraduate student publication competition," she says. Ms Hlaka also received the Bill and Melinda Gates Global Health travel award to attend the 2018 Keystone Symposium on 21st Century Drug Discovery and Development for Global Health in Berlin, Germany, and the WhiteHead Scientific Travel Award to attend the 2017 Keystone Symposium on Integrating Metabolism and Immunity in Dublin, Ireland.



Harshna JIVAN

PhD Candidate - South Africa

DEPARTMENT OF NUCLEAR PHYSICS, UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

INVESTIGATING THE SUBTLE STRUCTURE PROPERTIES IN ATOMIC NUCLEI

Ms Harshna Jivan grew up in Lenasia, a south of Johannesburg. She attended a Hindu Ethos School called Shree Bharat Sharda Mandir (SBSM), which combined both primary and secondary education. Her father passed away when she was five months old, so her mother raised her two daughters as a single parent. "I grew up with a different perception of gender roles within a family structure, compared to the views that were typical of my community at the time," she explains.

After graduating (BSc, BSc Honours and MSc) at the University of Witwatersrand, she decided to pursue a PhD For her MSc dissertation, she had worked on characterising radiation damage in plastic scintillator detectors for the Tile Calorimeter of the ATLAS detector at CERN in South Africa. This project gave her the opportunity to experience working three months with the international physics community through the SA-CERN consortium.

For her PhD, she joined the Witwatersrand Nuclear Structure Physics group, which focuses on studies of the collective excitation modes of the atomic nucleus. In particular, she is investigating the role that nuclear deformation plays on the pygmy dipole resonance (PDR) mode in samarium isotopes. One interpretation of the PDR can be visualised as a saturated core of protons and neutrons, oscillating against access neutrons (a neutron "skin").

Investigations into the PDR are a current topic of interest within the nuclear physics community, as its underlying nuclear structure is not yet well understood. Such studies are important due to the possible correlation between PDR strength and neutron skin thickness, and its implications for constraining the nuclear equation of state, which plays a key role in the description of neutron stars and other dense astrophysical objects. The PDR also has an influence on the steller r-process, particularly for the synthesis of heavier nuclei.

At an early age, Ms Jivan discovered a series of general science books containing ideas for small experiments that she could do at home, each under different scientific themes, "which I loved and used religiously". At university, she applied first for a general BSc with the intention of majoring in biology and genetics, like her elder sister. After receiving a letter from the university advertising a new course, a BSc in Nuclear Science and Engineering, she decided to go for it. "It was the best decision I ever made!" she says. The course was created due to the increasing demand for Nuclear Engineers in South Africa.

She was recently awarded the NRF Scarce Skills Doctoral scholarship and has previously won the Element Six Diamond Research Laboratory and DST/NRF Centre of Excellence in Strong Materials Gold Medal (for academic performance in physics), the Jan Loubser Memorial Prize (for best honours project in physics) and a PG Masters merit award. She has also won conference prizes for oral presentations at annual physics conferences held by the South African Institute of Physics, in the Nuclear, Radiation and Particle physics track. Ms Jivan is the author of seven publications.

Dr Priscilla KOLIBEA MANTE

Post Doctorate - Ghana

DEPARTMENT OF PHARMACOLOGY, KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY (KNUST)

NANOPARTICLE FORMULATION OF A TRADITIONAL PLANT TO MANAGE EPILEPSY

Dr Priscilla Mante came to neuroscience after gaining a degree in pharmacy. "When I was 15 years old, I wanted to be President of the World Bank", she recalls. She opted to learn French during senior high school years in order to reach this goal, but her love for science led her back to study general science and, then, to Kwame Nkrumah University of Science and Technology (KNUST).

There, she graduated with a Bachelor of Pharmacy (Hons) and registered for an MPhil/PhD programme in pharmacology. Her thesis research investigated the traditional use of Antiaris Toxicaria for managing epilepsy and depression.

Today, as a postdoctoral researcher at KNUST, she is pursuing fundamental research on Anticonvulsant activity of cryptolepine and its solid-lipid nanoparticles in the management of neurocysticercosis-induced epilepsy." This project aims to develop a nanoparticle formulation of the plant isolate cryptolepine, which possesses improved permeability into the central nervous system (CNS)," she explains. This improved delivery into the CNS will enhance its activity as an anticonvulsant and potential cysticidal agent to be used in the management of neurocysticercosis-induced epilepsy.

Her project focuses on finding alternate therapeutic options for managing pharmaco-resistant epilepsy and the neglected tropical disease, neurocysticercosis. "In Africa, diseases or conditions that affect the brain are still poorly understood clinically," she explains. "Many people believe that epilepsy, for example, is caused by evil forces... Therefore, it is not very well managed. Proper diagnosis can be costly, as you may need expensive scans like MRI. Even after proper diagnosis, you need expensive drugs that are not affordable for everyone."

Dr Mante's love for understanding how the brain works, combined with her knowledge of plants (many of which are used in traditional medicine), brought her to Cryptolepis Sanguinolenta, a common plant that grows in Ghanaian forests. She is also very thankful for all the support from her mentors, as well as the help from her partners in the US, notably in Michigan, with whom she is working on putting the nanoparticle formulation through a clinical trial before ahead of its potential commercialisation. "Based on my experience, I can say that the future for African woman in science is bright," she says. "The opportunity to make discoveries through science allows you to discover your strengths. Sometimes, your amazing discoveries can make you feel godlike!"

Dr Mante has received the University of Michigan African Presidential Scholars Fellowship Award, the Horst Köhler Fellowship, the DANIDA BSU Research Grant and the International Society of Neurochemistry CAEN Award. She is also the author of 21 publications.

Gladys MOSOMTAI

PhD candidate - Kenya

INTERNATIONAL CENTRE OF INSECT PHYSIOLOGY AND ECOLOGY (ICIPE), NAIROBI

APPLYING MACRO-LEVEL PERSPECTIVES TO A MICRO-TRADITION OF STUDY

Originally from Mogotio in Kenya's Baringo County, Ms Gladys Mosomtai is currently based in the International Centre of Insect Physiology and Ecology (ICIPE), a research laboratory in Nairobi, while she waits to be granted admission to the University of KwaZulu-Natal, South Africa.

The inspiration to study sciences came during her undergraduate studies, when she specialised in environment planning and management. "I went to the field and did research without funding," she says. She would advise against this today, but at the time, Ms Mosomtai found a new "niche" for her studies, particularly in the use of remote sensing and GIS. "I was curious to know what had led to the decline of a major river in my home town, as I grew up," she explains. "Using historical satellite images, I could identify landscape modifications that led to the decline."

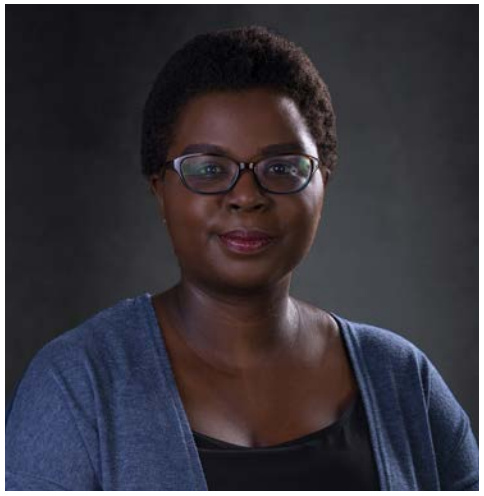
The theme for her dissertation became clear to her when she began a research project on smallholder coffee farmers in one of the counties of Kenya's former Central Province. Its largest town and capital, Murang'a - known as Fort Hall prior to Kenyan independence in 1963 - is considered the home of the Gikuyu, the largest ethnic community in Kenya.

Ms Mosomtai's research on the 'Influence of landscape dynamics, microclimate variability and agronomic practices in the coffee pathosystem of smallholder farms in Murang'a County, Kenya' was prompted by the gradual decline in coffee production and fluctuation of market prices that negatively impact on smallholder farmers' livelihoods in this region, many of whom are relatively elderly.

The study seeks to understand the driving factors of epidemiology in the coffee pathosystem of smallholder farms by analysing the spatial and temporal variability of pests and occurrence of diseases in the study area; the key landscape and agro-ecological variables that influences the variability observed; how the microclimate and host plant structure contribute to the observed variability; and the management practices that influence the occurrence of pests and diseases.

The results obtained will identify risks zones for targeted control, and help to inform best practices to be adopted and determine key ecological variables. These can be used in the development of early warning systems and to help guide farmers on microclimate management specific to each agro-ecological zone, as an adaptation mechanism to climate change. "Until now most of the research studies on coffee plantations were conducted in Brazil," says Ms Mosomtai. "I will be very proud to make a difference as far as Africa is concerned."

A fervent admirer of African Nobel Prize laureate for Science, the biologist Wangari Maathai, Ms Gladys Mosomtai has obtained the African Regional Postgraduate Programme in Insect Science (ARPPIS) Scholarship 2017, a Dissertation Research Internship Programme (DRIP) scholarship (2015) and received a travel grant to Umea University in 2016. She is serving presently as the secretary of icipe scholar's association (IScA), and is the author of nine publications.



Fiona MUMOKI

PhD candidate - Kenya

SOCIAL INSECTS RESEARCH GROUP (SIRG), DEPARTMENT OF ZOOLOGY AND ENTOMOLOGY, UNIVERSITY OF PRETORIA, SOUTH AFRICA

CUTTING BACK ON THE LOSS OF BEE COLONIES TO THE 'CAPENSIS PROBLEM'

Ms Fiona Mumoki was born and educated in Nairobi, but decided to go to Pretoria to complete her PhD Thanks to her parents, she was exposed to science at an early age. After receiving her BSc in Biology from the University of Nairobi, she carried out her research internship at the International Centre of Insect Physiology and Ecology (icipe) and was awarded an MSc in Genetics from Jomo Kenyatta University of Agriculture and Technology, Kenya.

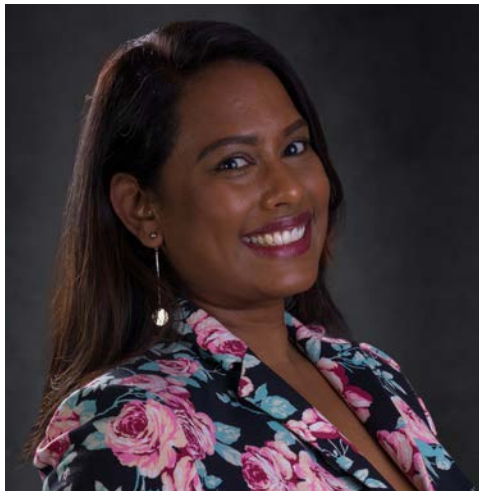
Ms Mumoki is interested in the conservation of pollinators as a means to achieving food security and improved livelihoods in Africa. Her work ranges from the molecular detection of honeybee diseases, pollinator nutrition and phylogeny to honeybee reproduction and communication, which is her current focus. She describes her research in the role of brood pheromones in inhibiting dominance in Apis mellifera capensis reproductive parasites as the honeybee queen mandibular gland secretions enabling queens to prevent the typically-sterile workers from becoming reproductive. However, anarchistic bees (workers who become reproductively dominant in the presence of the queen), do exist.

"Today, honey bee populations around the world are threatened by a myriad of factors, including pesticides, climate change, diseases, pests and changes in land use and management. However, in South Africa, an additional challenge to pollinator sustainability is presented in the form of Apis mellifera capensis laying workers. These parasitic worker bees invade susceptible host colonies and establish themselves as pseudo-queens usurping the role of reproduction from the host-queen, eventually leading to colony dwindling and collapse. Infestation by laying capensis parasitic workers has contributed to enormous colony losses since their initial emergence in 1991, with some beekeepers reporting colony losses of up to 46%, annually," she explains.

Her research will help evaluate the effects of changing social conditions on the development of reproductive dominance of bees, by examining the differences in pheromonal composition between colonies able to resist infestation against those that succumb.

Having seen the role that deliberate and systematic mentoring can play in the career of young scientists, she is extremely keen on mentoring and working with female researchers, sharing lessons and skills learned imparted to her by the "giants in her life", on whose shoulders she continues to stand.

Ms Mumoki has received various awards and accolades, including the Consortium for National Health Research (CNHR) internship award in 2010, the African Women in Agricultural Research and Development (AWARD) fellowship (2015) and the Organisation for Women in Science for the Developing World (OWSD) postgraduate fellowship (2015). Most recently, she has received a travel grant from the International Union for the Study of Social Insects' (IUSSI) North American Chapter to attend the IUSSI 2018 Congress in Brazil.



Shalena NAIDOO

PhD candidate - South Africa

DIVISION OF MEDICAL VIROLOGY, STELLENBOSCH UNIVERSITY

INVESTIGATING THE INTERPLAY OF THE IMMUNE SYSTEM AND THE VIRUS IN HIV-INFECTED CHILDREN

Born in a rural suburb of Durban, South Africa, Ms Shalena Naidoo grew up in Cape Town. Coming from an underprivileged background did not prevent her from undertaking scientific studies. "For me, it was obvious as early as my high school years that I was going to be a scientist," she says.

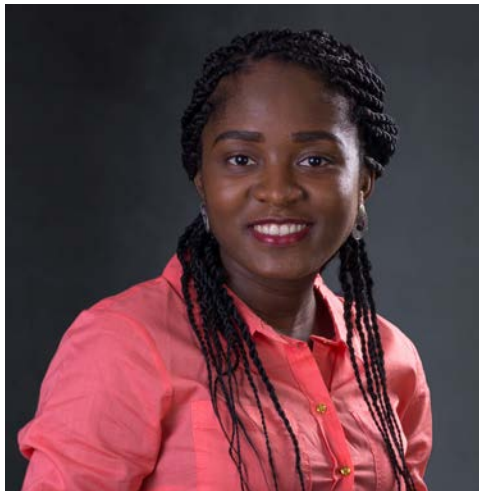
She had a long journey to achieving her dream, however, particularly since she had to work while studying. After completing her undergraduate degree in molecular biology and biotechnology at Stellenbosch University, she received her postgraduate degrees in the field of immunology, with a focus on HIV in children. She is currently pursuing her PhD at Stellenbosch University in immunology.

Her research, Longitudinal perspective on the impact of immune status on the HIV-1 latent reservoir and neurocognitive outcomes in virologically suppressed children, aims to determine how the immune system of children who are born HIV-positive develops over time in comparison to other children, and whether immune system damage inflicted early in life persists after years of therapy. Her work also aims to delineate and understand the immune risk factors involved in the development of neurocognitive impairment, and other non-infectious diseases, which may lead to novel therapies to minimise this risk in the future.

Her specialisation in immunology allows her to investigate immune mechanisms involved in HIV disease progression from the early stages of life. "Studying the cellular components of immunology in children will assist in providing knowledge on the treatment and clinical management of vulnerable children infected with the disease," she explains. "Considering the high disease burden that we are experiencing in South Africa, I found it very useful to bring that knowledge to clinicians." Understanding the interplay of the immune system and the virus in HIV-infected children will yield knowledge on vaccine development and potentially cure strategies.

For this 33-year-old scientist, who has embraced many life challenges, the time spent studying for her PhD has been "my saviour in that it has given me a fulfilling purpose and sense of direction," she believes. However, Ms Naidoo regrets that women tend to "remain isolated within our research groups without cross pollination of thought and support". She wants to help grow skills and knowledge within her community through mentorship and coaching initiatives. "One must never stop learning and giving back."

In 2018, Ms Naidoo received the Dominique Dormont Award at the AIDS Conference held in Amsterdam. The prize highlights researchers who demonstrate originality, rationale, quality, and a multidisciplinary and integrative approach in the field of HIV and AIDS research. She has also received the AIDS 2018 Conference Scholarship Award and a Polio Research Foundation (PRF) Bursary Award. In addition, she has received the Conference on Retroviruses and Opportunistic Infections (CROI) Young Investigators Scholarship Award, and won the South African Immunology Society (SAIS) Conference Scholarship Award and the SAIS Immunology Primer Training Scholarship Award. She is the author of eight publications, focusing primarily on HIV and AIDS.



Olaperi OKUBOYEJO

PhD candidate - Nigeria

SCHOOL OF COMPUTER SCIENCE AND APPLIED MATHEMATICS, UNIVERSITY OF THE WITWATERSRAND, SOUTH AFRICA

GENERATING AUTOMATIC FEEDBACK FOR COMPUTER SCIENCE STUDENTS

Ms Olaperi Okuboyejo is currently studying computer science at the University of the Witwatersrand, South Africa. She holds BTech and MSc.degrees in computer science from Bells University of Technology and Covenant University respectively, both in Nigeria. She graduated with "Distinction" and was the best graduating student in her department at both undergraduate and graduate levels.

"I'm keen on using technological initiatives to improve education, teaching and learning," she says. "I'm currently working on generating automatic feedback for students learning regular expressions, an important computer science topic." Her PhD research project (Enhanced automatic feedback generation for the learning of regular expressions) is aimed at developing a technique for the automatic generation of feedback for students learning regular expressions.

"Regular expression" is a topic in the Theory of Computation studied by computer science students at different levels. It is used for pattern-matching across several applications and domains, ranging from programming languages to web servers, search engines and natural language processors.

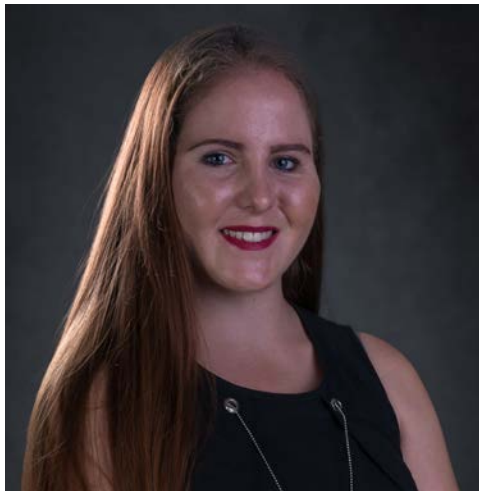
For Ms Okuboyejo, pursuing this doctoral degree at the University of the Witwatersrand allows her to meet other researchers, to collaborate and therefore advance in the science world. "It also opens up other opportunities such as competitions, awards and scholarships, like this L'Oréal-UNESCO fellowship, which provides support and encouragement through the journey" she adds.

Despite not experiencing many gender barriers in her own career, Ms Okuboyejo has often stopped to wonder why science is male-dominated. "I've found myself in some situations and wondered why I'm the only female, or why the percentage of female scientists or engineers is lower compared to the percentage of male colleagues," she says.

As for her future, she sees herself contributing to research and innovation one step at a time. "I can also say I'm in a privileged position to influence and impact knowledge to the upcoming generation of scientists in general, and younger girls in particular," she explains.

In 2012, Ms Okuboyejo was awarded the Pro-Chancellor's Leadership Award for Best Graduating Female Student with Outstanding Leadership Qualities, as well as the Departmental Prize for the Best Graduating Student in the Department of Computer Science, Bells University of Technology.

In 2015, she was awarded the Most Outstanding Graduating MSc student, College of Science and Technology, Covenant University. She has also received the University of Witwatersrand Post Graduate Merit Award and was one of the 2018 national finalists of the international FameLab competition in South Africa. She is credited with ten academic publications.



Andrea WILSON

PhD candidate - South Africa

FORESTRY AND AGRICULTURAL BIOTECHNOLOGY INSTITUTE, DEPARTMENT OF BIOCHEMISTRY, GENETICS & MICROBIOLOGY, UNIVERSITY OF PRETORIA

UNDERSTANDING DISEASE-CAUSING FUNGUS IN ASEXUAL REPRODUCTION

Ms Andrea Wilson is a third year PhD student at The University of Pretoria, focusing on Biological Sciences. From her early years, she remembers that she always wanted to be a biologist: "I went to high school at Uplands College, where I had a number of teachers who either had PhDs or were working towards attaining a PhD One in particular, my female biology teacher, encouraged my interest and curiosity in genetics".

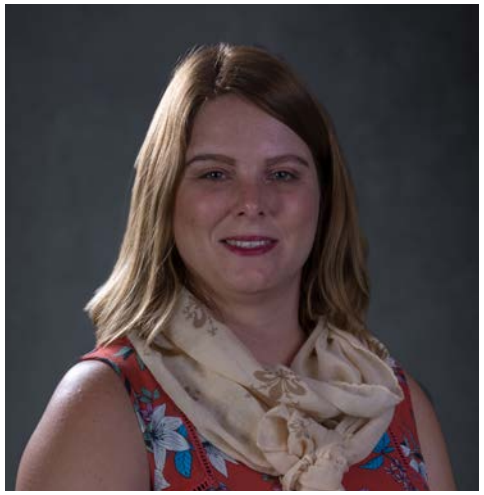
She completed her BSc, BSc Honours and MSc degrees at the University of Pretoria, where she will also complete her PhD in genetics. "My major focus is understanding the genetic mechanisms that govern sexual reproduction in a group of plant pathogenic fungi," she says. Her research is based on sexual reproduction in the Huntiella species, which characterises reproduction as an important part of the lifecycle of many other species.

"This is even true for fungi, where sex produces the spores that enable fungal spread. Thus, sexually reproducing fungi can be the result of serious disease outbreaks, whether they infect humans, animals or plants," Ms Wilson explains. Her research focuses on the unique ability of a plant disease-causing fungus to engage in sexual reproduction without a partner. Understanding how it can do this will allow researchers to develop better management and treatment strategies for disease outbreaks and epidemics, in order to help keep trees healthy.

Ms Wilson considers herself very fortunate to have been able to work at the Forestry and Agricultural Biotechnology Institute (FABI) while completing her studies. "The reason I decided to work at FABI was due to their incredible undergraduate mentorship programme, which allowed me to get two years of laboratory experience during my undergraduate degree. I was then able to get a position in FABI for my post-graduates degrees too," she says.

Her future plans include leading her own research group and lecturing at a university so that she can inspire the next generation of scientists, just as she was inspired. "The physical sciences have always been male-dominated in Africa, but there is a long tradition of women working in biology. Unfortunately, there is still a need for a positive discrimination in order to create job opportunities and include more women. Science is a very good option in terms of job opportunities for women, as it offers flexibility and allows international travel," she adds.

Ms Wilson has been awarded the Genes Journal Travel Award, WhiteSci Travel Award, Best PhD Presentation at the South African Society of Microbiology Congress, and in 2017, NRF Scarce skills scholarship for doctoral students. She has also won a variety of awards from FABI, where she received the 'Best MSc thesis' prize, an award for mentorship and its premium award – 'FABIan of the Year'. This award honours those who have particularly contributed - both academically and personally - to running the institute. Her most prestigious award, however, is the South African Department of Science and Technology's Women in Science Award for PhD candidates, which she received alongside three other women in 2017. Ms Wilson also wrote seven peer-reviewed publications.



Madelien WOODING

PhD candidate - South Africa

DEPARTMENT OF CHEMISTRY,
UNIVERSITY OF PRETORIA

TRAPPING MOSQUITOS TO SUPPLEMENT VECTOR CONTROL PROGRAMMES

Ms Madelien Wooding worked in business for a major clothing brand before going back to studying. She subsequently completed BSc and MSc degrees at the University of Pretoria, and is currently pursuing a PhD in analytical chemistry. "I was so bored [in my job], and although it was very challenging to do maths again after all those years, I did not regret having undertaken scientific studies. This runs in the family. I had a grandmother who was in biochemistry and an aunt whom I admired a lot, who is still a chemist, and my boyfriend is also in chemistry."

Ms Wooding chose to do her PhD on Chemical communication between the malaria carrying mosquito, anopheles arabiensis, and its human host because "malaria is first and foremost an African problem". The aim of her research is to identify chemical compounds on the human skin that attract mosquitoes and to employ the compounds either as a mosquito repellent or attractant. Repellent compounds can be used as topical applications for mosquito control, whereas attractants can be employed in lure-baited traps.

The ultimate goal of the project is to supplement established vector control programmes by increasing the tools available for combatting malaria. "From an analytical perspective, there are discoveries still to be made on chemicals emitted by the human that attract mosquitoes to the human host. The answer may lie in a combination of specific skin volatile chemicals, and by identifying these chemicals, applications could be investigated in order to save the life of millions of people."

She considers that female scientists in South Africa are more fortunate today than they used to be, since the government is taking steps to promote equality. "No less than three women have recently received professorship in our department, one being promoted to the Dean's office," she says. "They are all role models to me." Her plan for the future is to stay in academia and manage a laboratory. "Knowledge is the key to empowerment and you want women to be able to excel in sciences, not just conform to traditional roles," she says.

Ms Wooding recently won the following awards and sponsorships: the Nico Nibbering Travel Award to present at the International Mass Spectrometry Conference in Florence in Italy, the ChromSA Student Sponsorship for the Analitika 2018 Conference and Best Oral Presentation at the Analitika Conference 2018. She was among ten candidates selected to make an oral presentation at the 3rd International Mass Spectrometry School, Dubrovnik, Croatia and was also awarded a travel subsidy by the same institution. She has co-authored four publications.

NOTES

Media resources for the L'Oréal-UNESCO *For Women in Science* programme
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For more info on the Sub-Saharan Africa Fellowship programme,
please contact commsza@loreal.com

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