Young Talents Awards
SUB-SAHARAN AFRICA

For Women in Science

FONDATION L'ORÉAL

Summary

Editorial and key figures

Determination and hope for women scientists in Sub-Saharan Africa

After a year still marked by the Covid-19 pandemic and its consequences, the way we look at the place and role of women in scientific research in Sub-Saharan Africa gives rise to contradictory feelings.

Firstly hope, and even pride. We can see the needle moving. Once more this year, the 20 laureates of the 12th edition of the L'Oréal-UNESCO For Women in Science Sub-Saharan Africa Young Talents Awards show the numerous female faces of scientific excellence in this region of the world. Importantly, it also shows the resources that the continent has at its disposal to find solutions to Africa's great challenges.

From 17 countries – among which for the first time Swaziland and Gabon – these women are biologists, physicists, engineers, mathematicians, and geneticists. These young women have been chosen by a jury of renowned experts, from hundreds of applications. They work every day to advance science, research and knowledge in the areas that are particularly important for the continent, including water management, screening for cancer and genetic illnesses, the fight against malaria, and creating value from the potential of local flora, nanomaterials, and new medicines.

And this year, the Fondation L'Oréal and UNESCO are pleased to invite them to Kigali, in Rwanda. Over a week, they will be recognised in a ceremony gathering a prestigious audience, and will also be able to meet, engage in conversation, benefitting from a series of leadership and negotiation training sessions – gaining the soft skills they need to complement their academic journey and enabling them to be better equipped to tackle the glass ceiling which still weighs on scientific research, across the world.

Recognised for its progress on gender equality, Rwanda has the highest literacy rate on the continent, with 65% of girls attending school, while more than half of university graduates are women, compared to 6% ten years ago.

However, beyond these multiple reasons to celebrate, to feel hope and pride, concern and determination are always present. At a time when progress made on women's rights is finally becoming visible, and women's voices are starting to be heard, there are still difficulties that are substantial.

In a significant majority of countries, not only scientists are less likely to be figures of authority in the media, but women scientists are even more underrepresented.

> *Despite significant progress, African women engaged in scientific research today still have to overcome substantial obstacles and confront stereotypes, discrimination and invisibilisation.*

In Africa, the situation is particularly pronounced – a study by the British Medical Journal has revealed that among more than 2,000 articles published since the beginning of the pandemic, only 4% have been produced by African scientists. And an even more minute number authored or co-authored by African women.

So despite significant progress, African women engaged in scientific research must still today overcome substantial obstacles and confront stereotypes, discrimination and invisibilisation. With little or no involvement with vaccines, discussions on treatments or health strategies, African women scientists have more need of support than ever to address these challenges.

Today, as Covid-19 demonstrates the importance of science in everyday life and for our future, it is vital to evolve our collective conscience towards a more in-depth understanding of the necessity for women scientists to not only be recognised as they deserve, but also to gain access to the most senior roles. In this way, they will be able to act as figures of authority on all topics related to science and overcome the prejudice that women are not made or not interested in science.

Because the world needs science, and science needs women.

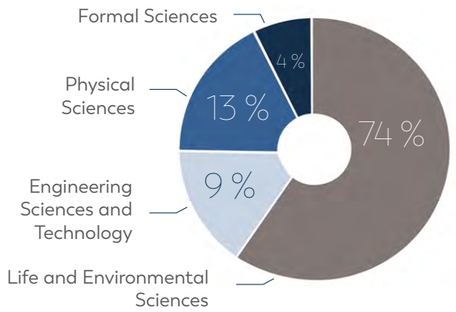
Alexandra Palt
Executive Vice President , Fondation L'Oréal

[1] Rwanda Development Board, 2021
[2] *African authorship on African papers during the COVID-19 pandemic*, by Antoinette Vanessa Naidoo, Peter Hodkinson, Lauren Lai King and Lee A Wallis.

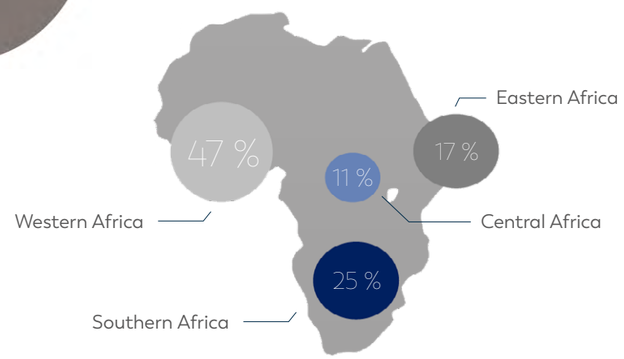
2021 APPLICATIONS REVIEW

411
ELIGIBLE APPLICATIONS

263 PhD students
148 post-doctorate students



REPARTITION
OF SCIENTIFIC DISCPLINES
AND LOCATIONS



12 YEARS
OF PARTNERSHIP
with UNESCO

MORE THAN
150
WOMEN RESEARCHERS
awarded a grant and over
86 scientists involved
in the selection process

12
LAUREATES
distinguished
for the excellence
of their scientific work

EVALUATION PROCEDURE

PEER REVIEW
65 scientific experts

411 applications

JURY
11 members

89 shortlisted candidates

20 Young Talents

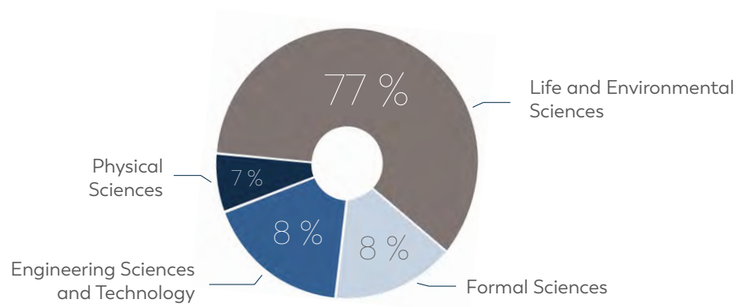
Jury chaired by the
Professor Aggrey AMBALI,
Program Funding Directorate
at the African Union
Development Agency
(AUDA-NEPAD), South Africa

WINNERS 2021

20
YOUNG TALENTS

15 PhD students
5 post-doctorate students

REPARTITION OF SHORLISTED CANDIDATES
BY SCIENTIFIC DISCIPLINES



Southern Africa

Motswedi Anderson

Botswana

POST-DOCTORAL RESEARCHER

LABORATORY : BOTSWANA HARVARD AIDS INSTITUTE PARTNERSHIP
INSTITUTION : BOTSWANA HARVARD AIDS INSTITUTE

Occult Hepatitis B Virus Infections in HIV-1-Infected Individuals in Botswana: Incidence Kinetics and Mechanisms

Motswedi ANDERSON is a post-doctoral candidate in Life and Environmental Sciences from Botswana, specializing in virology. Her project is entitled "*Occult Hepatitis B Virus Infections in HIV-1-Infected Individuals in Botswana: Incidence Kinetics and Mechanisms*".

Her decision to pursue a career in this field and her engagement in virology was inspired by the Botswana Harvard AIDS Institute Partnership's Director, Dr Rosemary Musonda. Overall, Motswedi ANDERSON's ambition is to help eliminate viral hepatitis and solve this public health challenge.

The hepatitis B virus (HBV) leads to around 820,000 deaths annually. Chronic HBV infection is usually diagnosed by the presence of viral envelope proteins (HBsAg) present in the serum using serological tests, which determine whether a person has been exposed to a particular microorganism. However, in the case of occult HBV infection (OBI), HBsAg is negative while the HBV genome is detectable, which poses challenges to detecting the virus. Motswedi Anderson's research will address this challenge by determining the prevalence, kinetics, and mechanisms of OBI in untreated HIV patients in Botswana.

OBI, which is transmissible and can cause cancer, requires nucleic acid testing for its detection and therefore goes undiagnosed in developing countries. The impact of OBI-associated mutations on the virus is first determined using predictive algorithms, then evaluated in the laboratory. Importantly, Motswedi ANDERSON's study will guide future diagnostic kits and preventative strategies.

Just like her mentor, Motswedi ANDERSON also wants women to build confidence in promoting their work. Empowering women to succeed in science will generate more role models to inspire the next generations of women scientists, she believes, and ultimately help achieve gender equality in science.

> *"Empowering women to succeed in science will generate more role models to inspire the next generations of women scientist."*

Lenye Dlamini

Swaziland

PHD STUDENT

LABORATORY : STRUCTURAL BIOLOGY RESEARCH UNIT
DEPARTMENT OF INTEGRATIVE AND BIOMEDICAL SCIENCES
INSTITUTION : UNIVERSITY OF CAPE TOWN

Engineering nitrilases for enhanced thermostability

Lenye DLAMINI is a PhD student in Life and Environmental Sciences from Swaziland, specializing in protein chemistry. She is currently conducting a research project entitled "*Engineering nitrilases for enhanced thermostability*".

She believes that it is through science that she can best serve and contribute to humanity and help protect our planet. By working hard to pay for her tuition, she has furthered the studies that have enabled her to acquire experience and build her career. Her research focuses on protein chemistry.

Understanding how proteins work is critical to understanding infection and disease progression within the human body. As a diverse group of biological molecules found in all living organisms, proteins are involved in a plethora of reactions and processes that are vital for our survival. Additionally, most pathogens infect the human body through proteins and our immune response to infection is mediated primarily through different kinds of specialized proteins. The ability of other organisms to survive harsh conditions is also primarily dependent on proteins adapting to the context.

By understanding the structure and chemistry of these robust proteins, Lenye DLAMINI is engineering proteins with the same properties, thereby creating sustainable ways to catalyze industrial reactions, reduce environmental pollution and protect natural resources and ecosystems. Her work to date involves visualizing proteins using x-ray crystallography and cryogenic electron microscopy in order to better understand their chemistry.

> *"It is through science that I can best serve and contribute to humanity and help protect our planet."*

In Lenye DLAMINI's view, the issues faced by women in scientific fields reflect wider perceptions of women in society, particularly as they relate to women in positions of power and decision-making. While there have been some changes in mindset within African countries, there is still a long way to go to achieve gender equality.

With few female role models to inspire her own journey, she is committed to transforming what it means to be a woman scientist - someone who can have a fulfilling career with opportunities to grow, be creative and make a good living.

Theresa Mazarire

Zimbabwe

PHD STUDENT

LABORATORY : VECTOR CONTROL REFERENCE LABORATORY
INSTITUTIONS : WITS RESEARCH INSTITUTE FOR MALARIA,
NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES, SOUTH AFRICA

Exploring the potential of geospatial tools to understand Anopheles arabiensis population dynamics: Steps towards the application of mosquito sterile insect technique programme in South Africa

Theresa Taona MAZARIRE is a PhD candidate in Formal Sciences from Zimbabwe, specializing in information science. Her research is entitled "*Exploring the potential of geospatial tools to understand Anopheles arabiensis population dynamics: Steps towards the application of mosquito sterile insect technique programme in South Africa*".

She grew up in a community where science was considered the only worthwhile career. Raised by her grandmother, who encouraged her to succeed, Theresa Taona MAZARIRE made it her goal to become a scientist, studying by candlelight after long days working in the fields.

As she pursued her studies, she became inspired by geographical information science. Her excellent grades and commitment to solving public health issues saw her chosen to become a PhD candidate by South Africa's Health Science department. Today, she is exploring the potential of geo-technology tools to understand the population dynamics of anopheles arabiensis [mosquito], a principal vector of malaria in arid or montane areas in South Africa and across Sub-Saharan Africa. She is also contributing towards the country's Sterile Insect Technique (SIT) programme.

Theresa Taona MAZARIRE is among the first scientists in South Africa to use geographical information systems and remote sensing technology to monitor the movements of a mosquito species on a large scale, saving time and resources. She and her team are capturing detailed information on the ecological, land use and climatic conditions that enable mosquitos to survive, in order to identify the largest populations. This enables her to identify where best to release laboratory-grown sterile males for them to mate with native females, preventing the spread of malaria.

> *"Every country should invest in scientific education, and actively introduce policies to encourage girls into science."*

Convinced that science is the key to sustainable development and economic growth, Theresa Taona MAZARIRE advocates for women scientists to help lead the transformation of global health systems. She also believes that every country should invest in scientific education, and actively introduce policies to encourage girls into science, standing by the renowned African proverb: "*If you educate a woman, you educate a nation*".

Hendrina Shipanga

Namibia

PHD STUDENT

LABORATORY : CANCER RESEARCH LAB
DEPARTMENT OF INTEGRATIVE AND BIOMEDICAL SCIENCES
INSTITUTION : UNIVERSITY OF CAPE TOWN

Analysis of driver gene mutations in Oesophageal Squamous Cell Carcinoma

Hendrina SHIPANGA is a Namibian PhD candidate in Life and Environmental Sciences, specializing in biochemical research methods. Her current research is entitled "*Analysis of driver gene mutations in Oesophageal Squamous Cell Carcinoma.*"

As a medical biochemistry PhD candidate with experience in the genomics and molecular biology of cancer, Hendrina SHIPANGA is dedicating her studies and career to natural science, life science and biology.

> *"My dream is to collaborate with fellow Namibian scientists to open the country's first laboratory focused on cancer research."*

Her research focuses on characterizing and identifying distinct driver gene mutations in oesophageal squamous cell carcinoma (OSCC) in the South African population. This study aims to contribute and identify diagnostic markers for the early detection and effective treatment of oesophageal cancer in Africa. The project entails isolating DNA from normal and tumour samples of OSCC patients and subjecting them to whole genome sequence analysis. In this way, she was able to detect insertions, deletions, copy number variations (CNVs) and single nucleotide variations (SNPs) that may be responsible for or associated with increased risk of OSCC in South Africa.

Through her study, she was able to identify various genes that were significantly mutated and is currently exploring the frequency of these gene mutations on her study population and their biological role in the development and prognosis of OSCC.

Hendrina SHIPANGA'S dream is to collaborate with fellow Namibian scientists to open the country's first laboratory focused on cancer research. The facility would focus predominantly on the types of cancer most prevalent among the Namibian population, including identifying risk factors and genomic variations.

Additionally, she strives to improve the significant gender gap that exists in higher levels of education, and to improve the representation of women scientists in Science, Technology, Engineering and Mathematics. She is confident that career fairs and school science days, together with mentorship programmes and strong role models, can inspire young women to pursue a career in these fields. Gender diversity in science is crucial for the continent's socioeconomic development and competitiveness on the world stage.

Central Africa

Jacky Sorrel Bouanga Boudiombo

Gabon

POST-DOCTORAL RESEARCHER

LABORATORY : SUPRAMOLECULAR CHEMISTRY (HAYNES' GROUP), BERNAL INSTITUTE
INSTITUTIONS : UNIVERSITY OF STELLENBOSCH, UNIVERSITY OF LIMERICK

Drug formulation and development: Systematic analysis of solid solutions by co-sublimation

Jacky Sorrel BOUANGA BOUDIOMBO is a Gabonese Post-Doctorate in Physical Sciences, specializing in material chemistry. Her current research is entitled "*Drug formulation and development: Systematic analysis of solid solutions by co-sublimation*".

Originally keen to study medicine, Jacky Sorrel BOUANGA BOUDIOMBO began her scientific journey by studying chemistry. This has also allowed for more flexibility and innovation when it came to her overall ambition - improving people's lives. To fulfill this aim, she is dedicating her career to scientific research and the improvement of medication.

In 2018, she was among the five winners to be recognized by the European Crystallographic School for the high quality of her involvement in crystallographic courses and material science. The school's aim is to give attendees a fundamental understanding of the principles underpinning crystallography, through a combination of lectures and practical tutorials.

Many chronic diseases are managed efficiently with prolonged pharmaceutical regimes combining multiple synergistic or complementary drugs. Although effective, such therapies are not ideal for patients, and require strict administration for a prolonged period. Jacky Sorrel BOUANGA BOUDIOMBO's research focuses on developing new formulations of approved active pharmaceutical ingredients for improved therapeutic delivery.

In particular, she is exploring protease inhibitors such as saquinavir, which are typically used in combination with other HIV medications to boost its effectiveness in the metabolism of the patient.

The successful formation of combined HIV drugs within one component could help ease the lives of many patients suffering from the virus. Achieving these objectives will result in new and solid multi-drug forms of existing APIs that can be more easily administered, thus increasing therapeutic safety and patient compliance.

> *"There is a need for greater representation and the promotion of science at school."*

In Gabon, where students often lack access to laboratories, Jacky Sorrel BOUANGA BOUDIOMBO advocates for greater representation and the promotion of science at school. Above all, she aims to encourage more young girls to pursue a career in science.

Vinie Kouamou

Cameroon

PHD STUDENT

LABORATORY : INFECTIOUS DISEASES RESEARCH LABORATORY
INSTITUTION : UNIVERSITY OF ZIMBABWE

The Effect of Pre-treatment Drug Resistance on the Effectiveness of Dolutegravir (DTG) in Zimbabwe: A Cross-Sectional Study

Vinie KOUAMOU is a Cameroonian PhD student in Life and Environmental Sciences, specializing in HIV Molecular Virology. Her research is entitled "*The Effect of Pre-treatment Drug Resistance on the Effectiveness of Dolutegravir (DTG) among Adults who had Initiated or Re-Initiated First-Line Antiretroviral Therapy Containing DTG in Zimbabwe: A Cross-Sectional Study*".

Guided and inspired by her late grandfather who was a surgeon, her mother, a former laboratory scientist, and her mentors, Vinie Kouamou has always been fascinated by science. Through her research, she is characterizing host and viral genetic mechanisms associated with the acquisition of the HIV virus and its clinical consequences. She dreams of helping to eliminate the disease.

To achieve this, Vinie KOUAMOU is focusing on addressing the emerging problems of HIV drug resistance and its evolution among patients failing antiretroviral therapy (ART). Additionally, she is conducting comparative analysis of diverse assays in order to detect HIV drug resistant mutations. Her most meaningful accomplishment to date has been to help implement a novel molecular diagnostic tool for HIV drug resistance detection in developing countries. Her PhD findings have also helped to inform the implementation of dolutegravir-based ART in Zimbabwe among HIV positive patients failing ART, using bioinformatics algorithms.

Vinie KOUAMOU is a reviewer in scientific peer reviewed journals and an advisory board member for the Elevate Trust Foundation, a Zimbabwean organization empowering young people, including girls, to innovate, become entrepreneurs and get involved in scientific projects. She advocates for the rise of women scientists in Africa as a vital way to address the challenges faced by women across the continent, including gender inequality, teenage pregnancy, forced marriage and dropping out of school. For Vinie KOUAMOU, women stand to lead the way on finding solutions, alleviating poverty, and enabling African girls and women to thrive.

> *"Women stand to lead the way on finding solutions, alleviating poverty, and enabling African girls and women to thrive."*

Sephora Mianda Mutombo

Democratic Republic of the Congo

PHD STUDENT

LABORATORY : BIODISCOVERY, CHEMISTRY DEPARTMENT
INSTITUTION : UNIVERSITY OF PRETORIA, FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

Investigation of the antimalarial potential of 100 plant materials from the University of Pretoria repository: A contribution to the establishment of a South African natural product library

Sephora MIANDA is a PhD researcher in Physical Sciences from the Democratic Republic of Congo, specializing in medicinal chemistry. Her research is entitled "*Investigation of the antimalarial potential of 100 plant materials from the University of Pretoria repository: A contribution to the establishment of a South African natural product library ready for high throughput screening campaigns*".

Her childhood dream of becoming a scientist was brought to life by a chance meeting with a female professor, who inspired her to pursue her passion for chemistry. She has since developed a real interest in medicinal chemistry, with a particular focus on discovering molecules that can be used for the treatment or prevention of diseases.

With the number of malaria cases and deaths in Africa exceeding 215 million in 2019, Sephora MIANDA is committed to researching ways to help combat and eradicate the disease. She dreams that scientists will one day develop a vaccine and a treatment that completely breaks the chain of transmission.

To advance this ambition, Sephora MIANDA is studying three medicinal plants with the goal of extracting molecules with antiplasmodial activity. For example, she is testing molecules against sensitive and resistant strains of Plasmodium falciparum parasite, which is responsible for severe or fatal clinical forms of malaria. By identifying molecules to combat this parasite in its sexual phase, she stands to help prevent its transmission from humans to mosquitoes, and to eventually eradicate malaria globally.

Additionally, she is helping to establish a South African Natural Products Library, a repository of crude and purified extracts as well as pure molecules from medicinal plants, stored in a standardized format and readily deliverable to high-throughput screening campaigns. The aim is for all information generated through this process to become available to researchers from a secure and searchable online database.

Sephora MIANDA is proud that women have succeeded in achieving many scientific feats, from medicinal discoveries to major contributions at NASA to new technologies for producing electricity. Women have proven their scientific ability. What matters now is fighting social stigma, cultural stereotypes, and inequalities in professional circles in order to encourage more women to pursue scientific careers.

> *"My hope is that scientists will one day develop a vaccine and a treatment that completely breaks the chain of transmission."*

Ruth Nana Njantang

Cameroon

PHD STUDENT

LABORATORY : FUNDAMENTAL PHYSICS
INSTITUTION : UNIVERSITY OF DOUALA

Estimation of patient skin dose and possibility to develop a look-up table in fluoroscopy guided interventions for optimization purpose

Ruth Nana NJANTANG is a Cameroonian PhD in Physical Sciences, specializing in nuclear physics. Her current research is entitled "*Estimation of patient skin dose and possibility to develop a look-up table in fluoroscopy guided interventions for optimization purpose*".

Her conviction that science is authentic, straightforward and has real benefits in everyday life sparked her curiosity and inspired her to study physics. She particularly enjoys explaining and predicting life with equations and theories. Today, Ruth Nana NJANTANG is an award-winning nuclear physicist.

Ruth Nana NJANTANG's study relies on medical application in nuclear physics, but most importantly, on patient and occupational radiation protection in fluoroscopy-guided procedures, a modality of radiology that consists in acquiring instantaneous, continuous dynamic images of the interior of structures using x-rays. The greatest challenge is optimizing radiation doses received by workers and patients who have been irradiated for a long period of time.

Guided by recommendations from international organizations such as the ICRP or the IAEA, Ruth Nana NJANTANG's research leverages computer codes to develop a method that can be used to easily and effectively estimate patients' and operators' radiation doses during fluoroscopy-guided procedures. Her overall ambition is to contribute to the elaboration of international rules, regulations, and recommendations on radiation protection, aiming at protecting people and the environment against the adverse effects of radiation, particularly in the medical field.

> *"Science is authentic, straightforward and has real benefits in everyday life."*

She believes that the best way to encourage more girls and young women into science is both through communication and competitions and awards that recognize and promote women in science. Ruth Nana NJANTANG is convinced that more women scientists in Africa will pave the way to overcoming cultural barriers and promoting sustainable development.

East Africa

Bibi Sharmeen Jugreet

Mauritius

PHD STUDENT

LABORATORY : DEPARTMENT OF HEALTH SCIENCES, FACULTY OF MEDICINE AND HEALTH SCIENCES
INSTITUTION : UNIVERSITY OF MAURITIUS

Pharmacological and cosmeceutical potential of essential oils from Mauritius

Bibi Sharmeen JUGREET is a PhD student in Biopharmaceutical Sciences from Mauritius, specializing in biochemical research methods. Her current doctoral research is entitled *"Pharmacological and cosmeceutical potential of essential oils from Mauritius."*

Fascinated by science from an early age, Bibi Sharmeen JUGREET grew up with a passion for understanding the complexity of the natural world. Her inclination for science led her to pursue scientific studies at high school. She subsequently chose to study biology at university, eventually opting for postgraduate studies.

Her current research consists in evaluating the pharmacological and cosmeceutical potential of essential oils derived from medicinal plants having ethnotraditional uses in Mauritius, using multidisciplinary approaches. Based on her research findings, she aims to design and develop an anti-microbial topical formulation with essential oils as natural antimicrobial agents, to optimize their use in the effective management and treatment of skin infections. This approach could be a great help to diabetic patients and individuals with low immune systems who are prone to recurrent skin infections.

Overall, Bibi Sharmeen JUGREET's ambition has always been to contribute to the scientific community of her country and continent, and to help find solutions that could benefit African populations. Promoting locally processed natural products will shine a new light on natural medicine and help more people gain access to treatment, she believes.

She is also convinced of the power of building networks, strengthening communities, and promoting platforms empowering and connecting women in science from different countries and backgrounds. This is particularly important in Africa, where there are still considerable obstacles to more women becoming scientists. Increasing the gender balance in science and enabling women to become scientific leaders will be integral to the continent's development and transformation.

> *"Promoting locally processed natural products will shine a new light on natural medicine and help more people gain access to treatment."*

Agil Katumanyane

Uganda

PHD STUDENT

LABORATORY : FORESTRY AND AGRICULTURAL BIOTECHNOLOGY INSTITUTE (FABI)
INSTITUTION : UNIVERSITY OF PRETORIA

Evaluation of entomopathogenic nematodes as biocontrol agents in the management of white grubs in forestry and sugarcane plantations in South Africa

Agil KATUMANYANE is a PhD student in Life and Environmental Sciences from Uganda, specializing in Agricultural Entomology, Nematology, and Biological control of insect pests. Her current research is entitled "*Evaluation of entomopathogenic nematodes as biocontrol agents in the management of white grubs in forestry and sugarcane plantations in South Africa*".

With an innate curiosity in science from an early age, Agil KATUMANYANE has always enjoyed understanding the stories behind agriculture and biology. Growing up on her family's subsistence farm, she questioned everything, and was encouraged by her father to study science in order to find the answers to the mysteries around her.

Agil KATUMANYANE is convinced that science is integral to creating safe, secure food supply chains. In particular, her research in biological sciences involves the control of insect pests using entomopathogenic nematodes, insect pathogenic round worms living in soil. Harnessing their power to manage white grubs, which pose a risk to forestry plantations sugarcane crops in South Africa, will help to reduce the need for agrochemicals, providing a more sustainable approach and helping to protect the environment.

A strong believer in the power of mentorship and career guidance, Agil KATUMANYANE agrees that sparking an interest in science for young girls should be encouraged as early as possible, in primary school. And with more women scientists acting as role models, she is confident that an increasing number of girls will be interested in science.

> *"Sparking an interest in science for young girls should be encouraged as early as possible."*

Mary Murithi

Kenya

PHD STUDENT

LABORATORY : BIOCHEMISTRY & MOLECULAR BIOLOGY LABORATORY
INSTITUTION : JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, KABARAK UNIVERSITY

Genetic profiling of single nucleotide polymorphisms in estrogen metabolizing enzymes in patients diagnosed with estrogen receptor positive breast cancer

Mary MURITHI is a Kenyan PhD student in Life and Environmental Sciences, specializing in molecular biology. Her current research is entitled *"Genetic profiling of single nucleotide polymorphisms in estrogen metabolizing enzymes in patients diagnosed with estrogen receptor positive breast cancer at Aga Khan University Hospital, Nairobi*".

Growing up, Mary MURITHI interacted a lot with her aunt, Professor Esther Magiri, who has since mentored her and has played an important role in shaping her career path. Professor Magiri, who taught at her university, was also involved in numerous research. Mary admired her determination, passion and enthusiasm for science and mentoring young girls.

Mary MURITHI's research entails the profiling of mutations in estrogen metabolizing genes in Kenyan patients diagnosed with estrogen receptor positive breast cancer. Breast cancer is one of the most prevalent forms of cancer globally. High estrogen levels, alongside other environmental and lifestyle factors, unique to every population, drive the occurrence of this disease. Genetic mutations and risk factors vary among diverse populations, and although a majority of mortalities occur in Africa, there has so far been little work conducted on genetic aspect in the African continent.

Mary MURITHI's research will therefore shine a light on this fundamental area of women's health, promoting a better molecular understanding of the disease and determining predictive risk factors, with a focus on helping women in Kenya. Additionally, she aims to help develop disease prevention policies, as well as early detection in more sensitive individuals. Mary MURITHI's dream would be to live in a world where breast cancer no longer exists.

> *"My dream is to live in a world where breast cancer no longer exists."*

Finally, with many of Africa's great challenges experienced first and foremost by women, from health to poverty to hunger or conflict, Mary MURITHI firmly believes that women should be given more opportunities to contribute to creating a better future for all.

Hyam Omar Abbass Ali

Sudan

PHD STUDENT

LABORATORIES : THE MYCETOMA RESEARCH CENTRE (MRC), SUDAN, INSERM AND INSTITUTE DENIS POISSON, FRANCE
INSTITUTIONS : UNIVERSITY OF KHARTOUM, SUDAN, UNIVERSITY OF TOURS, FRANCE, ORLEANS UNIVERSITY, FRANCE, FRENCH NATIONAL CENTRE FOR SCIENTIFIC RESEARCH (CNRS)

Development of a Novel Automated Diagnostic Method of the Common Organisms Causing Mycetoma Based on Histology Microscopic Images

Hyam ALI is a PhD student in Formal Sciences from Sudan, specialising in applied mathematics. Her current research is entitled "*Development of a Novel Automated Diagnostic Method of the Common Organisms Causing Mycetoma Based on Histology Microscopic Images*".

As a young girl, Hyam ALI loved to watch documentary films and realised that her real interest lay in the science behind the stories. She discovered the power of science and developed her interest in image-processing throughout her academic education. During her master's studies, she conducted research to investigate brain-clustering techniques through MRI images.

> *"Artificial intelligence should be leveraged to address Africa's major challenges."*

In order to link biology with mathematical sciences and image processing, Hyam ALI is dedicating her work to mycetoma, a neglected tropical inflammatory disease that causes severe deformities and disabilities. In particular, with few highly qualified pathologists in many rural endemic areas, she is developing a novel, accurate and affordable computational diagnostic model, reducing the need for more expensive, time consuming or inaccurate tools.

Using microscopic images of mycetoma infected tissues, this method enables the identification of mycetoma with an accuracy of 91.8%, which is comparable to the scores obtained by experts. She is currently working to introduce a dedicated detection technique that will enable automated segmentation, further easing its use in local clinical centres.

Convinced that mathematics is the backbone for many disciplines such as biology or economics, Hyam ALI also advocates for artificial intelligence to be leveraged in addressing Africa's major challenges. Finally, she also participates in awareness and advocacy sessions among her community, in order to encourage more women to pursue scientific careers.

Annette Uwineza

Rwanda

POST-DOCTORAL RESEARCHER

LABORATORY : CENTER OF HUMAN GENETICS
INSTITUTIONS : SCHOOL OF MEDICINE AND PHARMACY, COLLEGE OF MEDICINE AND HEALTH SCIENCES, UNIVERSITY OF RWANDA AND UNIVERSITY TEACHING HOSPITAL OF KIGALI (CHUK)

Computer-assisted analysis of clinical features of Rwandan patients with rare genomic neurodevelopmental disorders

Annette UWINEZA is a postdoctoral fellow in Life and Environmental Sciences from Rwanda, specializing in Human Genetics. Her current research is entitled "*Computer-assisted analysis of clinical features of Rwandan patients with rare genomic neurodevelopmental disorders*".

As a child, she enjoyed reading science books, and was passionate about biology and chemistry. Fascinated by the human body and keen to understand the origin of diseases, she initially wanted to be a doctor. But it was her desire to explore the composition of invisible biological matter, such as molecules, cells and DNA, that ultimately guided her towards scientific research.

> *"My dream: that one day science will enable the development of low cost treatments based on gene therapy."*

Among her many achievements, Annette UWINEZA has conducted important research in the field of human genetics. Her doctoral project had a dual focus: identifying the genetic etiology of intellectual disability in Rwandan patients, and secondly, studying the characteristics of craniofacial appearance, genetic disease syndrome (dysmorphology), birth defects and genetic counselling.

Using molecular cytogenetic techniques, she was able to reach a diagnosis rate of approximately 40%, enabling her to identify pattern leading to the diagnosis of learning disabilities in Rwandan population. This genetic diagnosis allows to provide families with more information about long-term needs, health care needs, and future family planning.

She has also observed a greater variability of the facial phenotype in African patients with genetic pathologies compared to patients of European origin, which can lead to inequalities in diagnosis and treatment. She therefore has an ambition to develop an application that would allow the collection and enrichment of scientific data on the origins of genetic diseases in Africa. This will bring her closer to her dream - that one day science will enable the development of low cost treatments based on gene therapy, accessible to all patients with rare genetic diseases.

Annette UWINEZA believes firmly that gender equality in science will allow women to contribute fully to the development of science-based solutions by promoting innovation and enriching research into infectious diseases, for example. Women scientists will share their knowledge with the next generation.

West Africa

Menonli Adjobimey

Benin

PHD STUDENT

LABORATORY : CHRONIC AND NEUROLOGICAL DISEASE EPIDEMIOLOGY LABORATORY
INSTITUTIONS : RESEARCH AND EDUCATION UNIT IN OCCUPATIONAL HEALTH AND ENVIRONMENT, FACULTY OF HEALTH SCIENCES, UNIVERSITY OF ABOMEY-CALAVI
NATIONAL UNIVERSITY HOSPITAL OF PNEUMO-PHYSIOLOGY OF COTONOU, BENIN NATIONAL TUBERCULOSIS PROGRAM

Health risks associated with some chronic diseases among workers in textile plants

Mênonli ADJOBIMEY VISSOH holds a PhD in medicine and a master's degree in epidemiology. She specializes in occupational health and her current research is entitled "*Health risks associated with some chronic diseases among workers in textile plants*".

She became interested in mathematics, physics, and biology from an early age, and initially wanted to become an airplane pilot. It was later, during her time working for a hospital that she gained responsibilities in the field of research, which inspired her passion for scientific experiments. Today, she both conducts research on occupational health and plays a senior role in Benin's National Tuberculosis Programme.

The textile industry supports the livelihoods of thousands of Beninese families and helps to sustain the economy in several Sub-Saharan African countries, yet few studies exist on the occupational factors of non-communicable diseases in this area. Mênonli ADJOBIMEY VISSOH's research is therefore fundamentally important and innovative for improving textile plants workers' health and quality of life. She focuses on multiple occupational health risks and the difficulty of managing chronic diseases, with a particular focus on cardiorespiratory and hearing risks among workers in textile plants in Benin.

Mênonli ADJOBIMEY VISSOH has always advocated for the need to create balance between men and women in science. She is convinced that the development of nations starts with the encouragement of scientific potential – to serve the greater good. With women representing over 50% of the global population, especially in Africa, more women scientists will help African countries to develop more inclusive solutions.

> *"The development of nations starts with the encouragement of scientific potential – to serve the greater good."*

Motunrayo Coker

Nigeria

PHD STUDENT

LABORATORY : NEUROSCIENCE AND AGEING RESEARCH UNIT, IAMRAT, COLLEGE OF MEDICINE
INSTITUTION : UNIVERSITY OF IBADAN, IBADAN, OYO STATE, NIGERIA

Apolipoprotein E and L1 polymorphisms and cognitive dysfunction in Nigerian and Ghanaian stroke survivors

Motunrayo COKER is a Nigerian PhD student in Life and Environmental Sciences, specializing in genetics and heredity. Her thesis is entitled "*Apolipoprotein E and L1 polymorphisms and cognitive dysfunction in Nigerian and Ghanaian stroke survivors*".

She discovered science during secondary school, and decided to pursue subjects including physics, biology, and chemistry during her senior year. Driven by the dream to make the world a better place, Motunrayo COKER is exploring solutions to health problems by using genetic principles that already exist in society.

Her field of research lies in the role of genetics in memory loss or cognitive impairment after a stroke. This is important, as it has been observed that African people have an increased risk of stroke, a younger onset age and less favorable prognosis. Vascular Cognitive Impairment (VCI) describes a spectrum of cognitive functional changes ranging from mild cognitive impairment of vascular origin with no dementia to vascular dementia. It comprises clinical stroke, vascular brain injury and decline in cognitive function.

Cognitive impairment is a frequent consequence after a stroke but is given less attention when compared to other deficits such as sensory or mobility impairments. For example, in Sub-Saharan Africa, around 40% of stroke survivors suffer various levels of cognitive impairment, with 8.4% developing post-stroke dementia. The role of genetics is yet to be fully determined in this disorder, and that is Motunrayo COKER's aim: to unravel the role of genetics in the cognitive disability experienced by post-stroke survivors.

> *"We need to advocate for an environment that encourages women to discover and fulfil their full potential, thanks to fellowships, scholarships, grants, and awards."*

Motunrayo COKER advocates for an environment that encourages women to discover and fulfil their full potential, thanks to fellowships, scholarships, grants, and awards. She is convinced that more women scientists are needed in Africa to change the narrative on gender in scientific research. In particular, the media has a responsibility to feature more female experts and highlight the potential impact of their studies.

Esther Laurelle M. Deguenon

Benin

POST-DOCTORAL RESEARCHER

LABORATORY : RESEARCH UNIT IN APPLIED MICROBIOLOGY AND PHARMACOLOGY OF NATURAL SUBSTANCES, RESEARCH LABORATORY IN APPLIED BIOLOGY
INSTITUTIONS : POLYTECHNIC SCHOOL OF ABOMEY-CALAVI, UNIVERSITY OF ABOMEY-CALAVI, BENIN

Profiling and taming antibiotic resistant genes and antibiotic chemicals in drinking water for quality life: A Nigeria-Benin collaboration

Esther DEGUENON is a postdoctoral fellow in Life Sciences from Benin, specializing in microbiology. Her current research is entitled "*Profiling and taming antibiotic resistant genes and antibiotic chemicals in drinking water for quality life: A Nigeria-Benin collaboration*."

With a passion for promoting health and quality of life through safe drinking water, Esther DEGUENON is dedicating her career to improving lives in Benin. Selecting a paramedical field has enabled her to make important discoveries, contribute to experiments and publications from an early stage, and collaborate with scientists on a global scale.

Recognizing the interconnection between people and nature, Esther DEGUENON's is harnessing molecular microbiology and pharmacology in the fight against multidrug resistance. She has participated in research on the formulation of phytomedicines (herbal medicines with therapeutic and healing properties) to help combat minor salmonellosis in Benin, a symptomatic infection caused by Salmonella. Her research also aims to help remove antibiotic residues from reaching the waterways of Benin and Nigeria, thereby reducing the risk of bacterial multidrug resistance.

Esther DEGUENON dreams of an Africa and a world where vulnerable people and children no longer die from infectious diseases, where multidrug resistance is managed effectively and access to health is a reality for all.

She stands by the idea that we should take every opportunity to learn and make new discoveries and believes that women should strive to excel in their profession. Empowering women to lead in science will be integral to developing the continent and improving lives.

> *"My aspiration is to see an Africa and a world where vulnerable people and children no longer die from infectious diseases."*

Abena Dufie Wiredu Bremang

Ghana

PHD STUDENT

LABORATORY : REGIONAL WATER AND ENVIRONMENTAL SANITATION CENTER, KUMASI
INSTITUTION : KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Enhancing Water Security in the Transboundary White Volta Basin

Abena Dufie WIREDU BREMANG is a PhD student in Engineering Sciences and Technology from Ghana, specializing in Civil Engineering. She is currently pursuing a thesis entitled "*Enhancing Water Security in the Transboundary White Volta Basin*."

The connection between science and sustainability has always been clear to Abena Dufie WIREDU BREMANG. In particular, she believes that scientific research stands to contribute significantly to the conservation of natural resources. In Ghana and neighboring Burkina Faso and Togo, the quality and availability of water is under threat from over extraction and pollution. And with access to water and sanitation critical to sustaining the growing global population and a key focus of the UN's Sustainable Development Agenda, she chose to pursue a PhD in Water Resources Management. This ambition has been the driving force behind her career ever since. Ten years ago, she became the first female in charge of managing a Water Basin Officer in Ghana, with responsibility for the White Volta Basin.

Abena Dufie WIREDU BREMANG's research aims to provide insight into best practices to help govern and manage water resources sustainably and fairly, protecting people and the environment, while also strengthening economies, promoting collaboration, and averting political conflicts over water.

Finally, women and girls are among the first to suffer from water scarcity, yet few women scientists take a stance on water. By acting as a role model and mentor, Abena Dufie WIREDU BREMANG is determined to encourage more girls and young women to study science and play an active role in alleviating water scarcity and promoting safe water and sanitation.

> *"Scientific research stands to contribute significantly to the conservation of natural resources."*

Sandra Jusu

Sierra Leone

PHD STUDENT

LABORATORY : SOBOYEJO LABORATORY, BIOMATERIALS LABORATORY
INSTITUTION : AFRICAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, ABUJA, NIGERIA,
WORCESTER POLYTECHNIC INSTITUTE, STATE UNIVERSITY OF NEW YORK, BUFFALO STATE COLLEGE, CARDIFF UNIVERSITY

Drug Delivery Systems for the Targeted and Controlled Release of Cancer Drugs in Triple-Negative Breast Cancer Treatment

Sandra Musu JUSU is from Sierra Leone and holds a PhD in Material Science and Engineering. Her research is entitled "*Drug Delivery Systems for the Targeted and Controlled Release of Cancer Drugs in Triple-Negative Breast Cancer (TNBC) Treatment*".

As a girl, Sandra Musu JUSU was curious and enjoyed mathematics. Inspired by her mother, who was a nurse, and the lifesaving roles played by nurses in her life and the community, Sandra Musu JUSU concluded that healthcare and science were among the most important callings in life. Her studies went from strength to strength, powered by prestigious scholarships. Today, she dreams of applying science to cure, treat and ultimately prevent cancer.

> *"An increase in the number of female scientists will prompt much needed reform throughout the continent."*

Her primary research focuses on developing targeted drug delivery systems (microparticles, nanoparticles, 3D scaffolds, and 3D-printed microcapsules) encapsulating anti-cancer drugs for the efficient diagnosis and treatment of Triple-Negative Breast Cancer (TNBC), with reduced or no side effects. Although TNBC accounts for approximately 15% of all breast cancers, its recurrence and mortality rates are high. It is typically treated with a combination of radiation therapy and chemotherapy, which can cause harmful side effects. Sandra Musu JUSU's research will help to avoid the need for these treatments. She is also focusing on using atomistic first-principle calculations for unraveling the interface chemistry between drug molecules and magnetite nanoparticles.

Sandra Musu JUSU believes that mentorship is essential for women pursuing careers in science. Two of her role models are Prof. Francisca Nneka Okeke, who is pursuing climate change research, and Prof. Wole Soboyejo, who is leveraging biomaterials to promote human health and global development.

She is passionate about women's involvement in Science, Technology and Engineering, and since 2017, has been a Fellow of the Moremi Initiative for Women's Leadership. She believes that while Africa has often been left behind in developmental and scientific advances, an increase in the number of female scientists will prompt much needed reform throughout the continent.

Ndeye Maty Ndiaye

Senegal

POST-DOCTORAL RESEARCHER

LABORATORY : LABORATORY OF QUANTUM PHOTONICS, ENERGY AND NANOFABRICATION
INSTITUTION : CHEIKH ANTA DIOP UNIVERSITY OF DAKAR, SENEGAL

Sustainable development of MXene-vanadium oxynitride for high performance in supercapacitor applications

Ndeye Maty NDIAYE is a Senegalese Post-Doctorate in Engineering Sciences and Technology, specializing in nanomaterials (production and properties). Her current research focuses on the "*Sustainable development of MXene-vanadium oxynitride for high performance in supercapacitor applications*."

From an early age, Ndeye Maty Ndiaye has always enjoyed asking questions about the world and has found science to be the best way to answer her questions and develop her curiosity. In particular, she is leveraging science to help solve the world's energy challenge, starting in her native Senegal.

> *"Gender equality is crucial for reaching the Sustainable Development Goals."*

Demand for energy is growing, as the global population rises. Yet in Senegal there is a significant shortfall in electricity production, despite a predicted 15% increase in demand by 2050. Ndeye Maty NDIAYE is focusing on energy storage as a potential solution. She is developing new and efficient electrodes for energy storage, such as supercapacitors. This effort will supply power for devices such as mobile phones and wind turbines, particularly for rural communities where people lack access to main electricity. Among the multiple benefits of this project, girls and young women will have the light to study, and people will be able to better communicate and improve their livelihoods.

Ndeye Maty NDIAYE aims to become a world leader in the scientific field as well as a decision-maker, especially in science, technology, and innovation. She is passionate about encouraging the Senegalese Government to allocate more funds to the sector.

Since 2016, she has been an active member of the Organization for Women in Science for the Developing World, helping to create a national chapter in Senegal. This includes a repository for the identification of Senegalese female scientists and their studies by disseminating scientific awareness through webinars, workshops, and leadership training. Ndeye Maty NDIAYE is convinced that gender equality is crucial for reaching the Sustainable Development Goals (SDGs) and believes in their power to change the world.

Lois Okereke

Nigeria

PHD STUDENT

LABORATORY : MATHEMATICS INSTITUTE - EMERGING REGIONAL CENTRE OF EXCELLENCE (ERCE) OF THE EUROPEAN MATHEMATICAL SOCIETY (EMS)

INSTITUTION : AFRICAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, ABUJA, NIGERIA, INSTITUTE OF SYSTEMS, MOLECULAR AND INTEGRATIVE BIOLOGY, UNIVERSITY OF LIVERPOOL, UNITED KINGDOM

External Beam Radiotherapy Inverse Planning: Optimizing outcomes predicted by biophysical models on the basis of dose distribution

Lois OKEREKE is a Nigerian PhD student in Formal Sciences, specializing in Applied Mathematics. Her current research is entitled "*External Beam Radiotherapy Inverse Planning: Optimizing outcomes predicted by biophysical models on the basis of dose distribution*".

Lois OKEREKE'S interest in science emerged 20 years ago, when her father showed her a diesel engine that brought electricity to her home. She has since been determined to pursue a career in science, achieving multiple scholarships to help support her studies. Importantly, she has a strong ambition to create positive impacts in her community and beyond.

A talented mathematician, Lois OKEREKE has focused most of her research on non-linear operator theory and its applications within medical physics, biology, and oncology. In addition, she aims to apply her findings to real life scenarios, in order to strengthen the capacity and efficiency of healthcare systems. To achieve this, Lois Okereke wants to demonstrate how these abstract mathematical notions address everyday issues faced by biologists, oncologists and medical physicists in the treatment of cancer. In particular, her research provides reliable quantitative information about tumour response to radiation treatments and helps to inform optimal treatment parameters, including radiotherapy dose prescription.

Ultimately, Lois OKEREKE'S work offers a cost-effective treatment strategy, minimises treatment side effects and increases recovery. This stands to create a positive impact in sub-Saharan Africa, where patients lack access to advanced radiotherapy facilities and treatment.

> *"Science is a critical solution to overcome Africa's diverse challenges."*

Lois OKEREKE advocates for science as a critical solution to overcome Africa's diverse challenges. She believes that building a strong network of female leaders in science will contribute to the development of the continent, starting with showing young girls how scientific concepts can be applied to solving everyday problems, and how they translate to individual and global benefits.

All the media resources of the Young Talents Sub-Saharan Africa Awards program
L'Oréal-UNESCO *For Women in Science*
are available on
www.fondationloreal.com

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