FACES OF KENYAN SCIENCE 2018

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INTRODUCTION

Welcome to the Faces of Kenyan Science!

Science affects everything in our lives, from the food that we eat to the tech we use every day. Despite how relevant it is to us, we often only view it with a narrow lens: stereotyping and oversimplifying who a scientist can be and the kind of scientific work that can be done within our country.

Africa Science Week, an initiative by the Next Einstein Forum (NEF), is an annual week-long celebration science and technology taking place across the continent. The 2018 Africa Science Week - Kenya (ASW-Kenya), amplifies this conversation in Kenya by showcasing the variety of scientific work happening in the country, educating young people on academic and career opportunities within science, and demonstrating the many ways that science is accessible, interesting, and important.

As CEO of the Mawazo Institute, inclusivity in the sciences has always been important to me. To that end, Mawazo provides research funding and training for early career women scientists, creating the next generation of female thought leaders in our region. Our partnerships with NEF, the L'Oréal Foundation, and Johnson & Johnson Innovation has allowed us to publicize the work of Kenyan scientists to the general public through ASW-Kenya. We are especially proud to emphasize the work of women and those who are using science for social good.

In the Faces of Kenyan Science campaign, ASW-Kenya has cast a wide net to highlight individuals who are contributing diverse scientific work to Kenya. The men and women highlighted are working in health, tech, education, agriculture, nutrition, economics, literature, astronomy, engineering, entomology and conservation. Each of them has a passion and creative ingenuity that is moulding the future of their field and inspiring their contemporaries and the youth who will follow.

As the Kenyan ambassador of NEF, I am honoured to present a snapshot of the scientific work being done by the 20 Faces of Kenyan Science in 2018.

Happy reading,

DR. ROSE M. MUTISO

CEO, Mawazo Institute
Next Einstein Forum Ambassador

ABOUT AFRICA SCIENCE WEEK

Africa Science Week is an initiative of the Next Einstein Forum comprised of concurrent week-long science engagement events taking place in 35 countries across the continent.

The 2018 Kenya edition of the event, Africa Science Week-Kenya (ASW-Kenya), will be held from December 3rd to 7th 2018 under the theme, 'Science at Work in Kenya.'

At the centre of ASW-Kenya is our flagship Faces of Kenyan Science campaign, a nationwide multi-media and multi-platform campaign featuring 20 exceptional Kenyan researchers, practitioners, innovators, educators, tinkerers and makers of all stripes. Throughout the week, we will be sharing stories of their work and scientific journeys through a number of creative outlets such as podcasts, social media, and public events. The campaign will also feature interesting facts about Kenya's long history of excellence in science, connecting the public both to Kenya's scientific past and its scientific future. We are taking the exceptional work of Kenyan scientists out of labs and offices and into our streets, homes and minds.

SPONSORS

THE TEAM

Dr. Rose M. Mutiso

CEO, Mawazo Institute &
Next Einstein Forum Ambassador for kenya

Dr. Rose M. Mutiso is the Co-Founder and CEO of The Mawazo Institute, which supports the next generation of female scholars and thought leaders in East Africa, and promotes public engagement with research. Rose has worked extensively as a researcher and practitioner focused on technology and policy dimensions of energy, environment and innovation issues globally. She is a Materials Scientist with research experience in the fields of nanotechnology and polymer physics. Rose is passionate about harnessing science & technology to improve lives, and elevating women to positions of leadership and influence in African society

Kari Mugo

ASW-Kenya Co-ordinator

Kari is an activist, writer and communications consultant based in Nairobi, Kenya. In her professional role, she supports the work of agitators, dreamers and social justice workers who believe in a universe of equals. She has worked as a communications consultant in Minneapolis, Minnesota, U.S.A and Nairobi, partnering with nonprofits and local government agencies in developing their external communications, fundraising and community engagement. She continues to write and publish at the intersection of issues related to gender, identity, immigration and arts and culture.

Maina Wachira

ASW-Kenya Research and Writing Assistant

Maina is a recent graduate of the University of Chicago, where he earned a Bachelor of Arts in Philosophy while exploring his interdisciplinary interests through coursework in mathematics and literature. Before joining Mawazo, he worked on the editorial team of Sliced Bread Magazine, volunteered at Open Books Chicago, and organised on Chicago's South Side with the Midwest Workers' Association in order to connect local residents to public utilities and legal help. During his time as a student, the sight of major academic institutions neglecting their local communities sparked his passion for supporting diverse research environments and publicly accessible knowledge.

Eric Kithuka

ASW-Kenya Social Media and Events Assistant

Eric is a digital marketing professional with a specialization in social media marketing. He is passionate about the digital media space and has worked on brands such as Power Malt West Africa, PrEP and Anza Sasa in his previous experience at Scangroup Kenya. Using his skills in content creation, community management, analytics interpretation and media buying, he is able to help to grow brands, spread their message and localize their communities online as well as provide new insights that spearhead them into uncharted frontiers in the vast digital landscape.

Naliaka Odera

ASW-Kenya Writer and Content Creator

Naliaka is a freelance writer, editor and social media consultant. She is the Co-Founder and Managing Editor of 'Of Africa', an online platform that celebrates women of African descent while fostering editorial talent. She is also a founding member of 'Social 4 Rookies', a training and consultancy group that teaches companies and individuals the integral concepts of branding online at a beginners level. She holds a BA from the University of British Columbia and has an ongoing love affair with words. Through Of Africa and her consulting, she stresses the importance of people learning vital communication skills to be able to speak for themselves.

Kendi Ntwiga-Nderitu

ASW-Kenya Stories for Impact Trainer

Kendi is a strong believer in the power of sharing experiences. She is a part time instructor with The Moth - a New York based not for profit organization that works with communities to train individuals on the art of crafting and telling true stories. She is a Woman in Tech and works full time running Africa Regional Business for Global Tech Companies She has won several STEM related awards with the most rewarding one being a 2015 TechWomen fellow. She is the founder of She-Goes-Tech, an initiative she uses to mentor and coach younger women on pursing and staying in STEM careers. Kendi is very deliberate about spending time with her family and enjoys their company the most.

Gladys Mutiso

ASW-Kenya Media Advisor

Gladys Mutiso ia an experienced senior communications professional with a track record of delivering strategic communications for national and international organizations. She believes that communication is a powerful tool any organization can use to demonstrate the impact of their work in enhancing the lives of people. She help organizations tell their stories better by helping them: understand their strengths, create impactful brand equity, and build skilled communications teams.

The Faces of Kenyan Science Campaign highlights individuals who are contributing diverse scientific work to Kenya. Covering health, tech, education, agriculture, nutrition, economics, literature, astronomy, engineering, entomology and conservation. Each of them has a passion and creative ingenuity that is moulding the future of their field and inspiring their contemporaries and the youth who will follow.

DR. ROSE M. MUTISO

Mr. Anthony Muthungu

Founder of TotoSci Academy, AlexKyan, and Jenga Citi

A serial entrepreneur, inventor and educator who is always looking for "the loopholes in life" and finding ways to bridge them.

When the inventor Mr. Anthony Muthungu was in Standard Five, his father jokingly told him that the people who they saw on the television were trapped in the machine. He never expected his son to break apart the television to get to the bottom of the mystery. Mr. Muthungu did not find any small people in the carnage of the ruined television but he has been attempting to get answers about how things work ever since.

Indeed, Mr. Muthungu's curiosity is an integral part of his genius. He admits that anytime he sees any new tech, he always has to test it out and see if its specifications have been accurately represented in company adverts. One could not call his desire to pull things apart and put them together again a passion, instead it seems like an integral part of Mr. Muthungu's personality. He explains it as constantly "looking for a loophole".

His work consistently spills into his real life, or maybe his outside life bleeds into his work life. His house is completely automated, he mentions to me offhandedly, where his lights, television and music system are all set to turn on with a voice command. One day, when leaving home, Mr. Muthungu forgot to switch off the main power. Soon, the neighborhood kids were gathering outside his window shouting commands for electricals to turn on and off.

"His work consistently spills into his real life, or maybe his outside life bleeds into his work life."

The incident planted the seed of an idea in Mr. Muthungu's mind: to offer hands on courses in Science, Technology, Engineering, Math and Computer Science for underprivileged children that would give them actual tools to better understand the sciences and inflame their interest. The program that Mr. Muthungu founded is called TotoSci Academy and they purposefully go to schools attended by children who live in slums or other lower income areas. In Nairobi, many of the children in the Academy courses live in Mathare, and courses in Nyeri are often attended by children from Majengo slum. The Academy works closely with schools to ensure that no important course is canceled and instead ask for one dedicated hour a week of the students' class schedule.

As TotoSci grows and expands, Mr. Muthungu continues to work on new inventions. When his friend, Alex, became suddenly blind, the wheels in Mr. Muthungu's mind began whirring with a furious energy. He remembered having to continually check the water level for his parent's water tank and how they used a proximity sensor that was able to signal when the level of the water was low. He began to consider something similar to help his friend Alex maneuver more easily. Essentially, he created a cane that has proximity sensors that alert both the vision impaired user as well as their carer, if they walk too close to an obstacle. The cane also allows for the user to send a distress signal straight to their carer's phone. Currently the Alex Cane is being reviewed by the Kenya Society for the Blind for wider implementation.

Mr. Muthungu continues to tinker with small- and large-scale inventions. Now he has a small team behind him who help him work out new ideas and theories and look for additional resources. For him, there is always the burning of curiosity and excitement with a new project and the inevitable ambitious question with the end of another one: What next?

Dr. Barbara Burmen

Senior Research Officer HIV and TB Implementation Science at KEMRI

A medical doctor, an epidemiologist, researcher and mentor pursuing innovative ways to enhance HIV and TB program outputs to make sure that "The most updated research evidence gets to the end-user."

When Dr. Barbara Burmen first graduated as a medical doctor, a profession she wanted to pursue since childhood, HIV/AIDS was prevalent and life-saving HIV treatment was not available in Kenya. At the time, "a HIV diagnosis was still a death sentence." Soon after, antiretroviral (ART) medication became freely available in Kenya; there was an urgent need to enhance her clinical skills in HIV management and get the medication to as many people as possible within the shortest time possible. She made the move to begin working in a HIV clinic within a Kenyan District Hospital and later managed HIV infected patients within the private sector. Dr. Burmen, is now a thought leader in TB and HIV operations research in Kenya.

Currently, Dr. Burmen's research is focused on the use of patient education and health worker reminders to enhance screening for Cervical Cancer among HIV infected women. Once a woman becomes sexually active, she is likely to contract Human Papilloma Virus HPV which is known to be associated with the development of cervical cancer. If the woman is HIV positive, then the progression of HPV lesions to cervical cancer is faster than in HIV negative women. Dr. Burmen and her team are currently evaluating the frequency of screening for cervical cancer among HIV positive women . Although existing Kenyan guidelines direct health workers to screen HIV positive women at diagnosis, at month six following diagnosis, then yearly thereafter, her preliminary results show that less than 25% of HIV infected women at her study site have been screened for Cervical Cancer at least once.

"Her concern as a doctor is that "The most updated research evidence gets gets to the end user."

With the presence of ART medication, active screening and timely intervention for cervical cancer, being HIV positive is no longer a death sentence, neither is cervical cancer. Screening and treatment for both diseases is now available and accessible.

In the past, Dr. Burmen research has covered the health outcomes of HIV exposed- infants. Her prospective research will now focus on HIV exposed uninfected infants. i.e. children born to HIV positive mothers who turn HIV negative. "Ironically this stems from the success of Prevention of Mother to Child Transmission of HIV Programs," she explains, " We have a new problem...These children, the HIV exposed uninfected infants, have poorer health outcomes because of their exposure to HIV and HIV medication in the womb." Although these children have better health outcomes than HIV infected infants, their outcomes are not similar to those of children born to HIV negative mothers. Her research, within the Collaborative Initiative for Pediatric HIV Education and Research, CIPHER Cohort Global Collaboration will provide an international focus on correctly 'defining' these infants, their health outcomes and propose possible interventions for HIV health programs globally.

DID YOU KNOW?

SCIENCE IN KENYA

KENYAN RESEARCHERS ARE AT THE FOREFRONT OF THE FIGHT AGAINST A DEADLY CROP DISEASE THREATENING THE WORLD'S WHEAT.

ROUTING THE RUST

Plant breeders at the Kenya Agriculture and Livestock Research Organization are at the forefront of the global effort to develop wheat varieties resistant to a new virulent form of stem rust (Ug99), which once destroyed up to 80% of the wheat crop in parts of Kenya and threatens wheat production globally. Their field research site in Njoro has emerged as a leading global collaborative platform where thousands of plant samples from all over the world are routinely tested and screened for wheat rust vulnerability. They work closely with farmers to develop and test new resistant strains with diverse genetic backgrounds, getting ahead of the mutating Ug99 gene. These efforts are crucial to the world's food security.

Professor Bitange Ndemo

Associate Professor of Entrepreneurship at University of Nairobi

A leading economist, educator and former Permanent Secretary at the Ministry of Information and Communications Technology who is passionate about sharing knowledge and encouraging innovation.

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Although he was not a professional educator, Professor Bitange Ndemo refers to his mother as his most effective teacher who taught him, "You can't learn unless you discipline yourself." Today, as a leading economist, educator and ICT specialist, Professor Ndemo is still certainly living by his mother's words. As a columnist, researcher and professor, he writes 8,000 to 10,000 words a week and runs every morning before he starts the day. But of all of his roles, Professor Ndemo values his teaching the most. He remarks that there is something unique about the relationship between teacher and student, and being able to inform young minds brings him an unparalleled level of satisfaction.

Beyond the classroom, Professor Ndemo is a teacher in the real world as well. Volunteering monthly to work with women's groups, entrepreneurs and farmers to answer the question "why does it not work?" His main focus in seeking sustainable economic development is to urge businesses and entrepreneurs towards the model of social enterprise. "Funding that is not sustainable is worse than not even trying," he argues. Every project should have a sustainability model, he urges people in development to ask themselves, "What will we do when you leave?" With social enterprises, businesses can use a sustainable development model where the same resources can be reinvested to make sure the project does not halt activity.

> ***"Funding that is not sustainable is worse than not even trying. Every project should have a sustainability model."***

A trend that Professor Ndemo is concerned about is what he refers to as the 'male conspiracy' where there is a work culture of women working hard and men entering as the brokers. No matter the industry, brokers will always, he argues, come out on top financially. They are the ones who make the most money. Given this pattern, Professor Ndemo advocates for educating women before the investment in the business even begins. This will also ensure that women entrepreneurs will come up with necessary business solutions based on problems as opposed to replicating already existing business ideas, which is currently the most popular thought process. In this way, innovation is vital to a successful business idea.

As an example, in farming, entrepreneurs rarely ask the questions, "Where [in the processes] does the money come from?" and "How do we make [that] money?" Instead the culture is to simply follow what others are doing. But that decision is entirely to their detriment, cautions Professor Ndemo, when they are participating in a process that is not tipped in their favor. Instead, one could take a step back and realise that if one was to cut out, or significantly decrease middle men, for example, then much more money would reach the hands of farmers.

This is the importance in sharing information and knowledge, as opposed to "allowing it to just die." Professor Ndemo's passion for teaching entrepreneurial theory and practice has real world benefits and potential. It could make all the difference for an entrepreneur or a smallholder farmer to understand their business value and make a change accordingly. With discipline and diligence, Professor Ndemo is ensuring that his message reaches as many people as possible.

Dr. Chao Mbogo

Head of Computer Science Department at Kenya Methodist University

An award-winning mentor, leader, innovator, and change-maker whose work in education, mentorship, and research has gained local and international recognition and who is nurturing the next generation of Kenya's computer scientists.

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The most important goal for programmer Dr. Chao Mbogo is accessibility and simplicity. After falling in love with programming in her Computer Science undergraduate degree, she went to Oxford University to pursue her Masters. While there, she had a startling realisation, while her previous education had taught her the relevant technical skills, there had not been as much focus on problem solving. She felt herself struggling to adapt to the new teaching methods at first, but eventually appreciating the new ways in which the education system challenged her. She realised, "this is what education should be."

In Kenya, she wonders, "Do we do enough to prepare our students for the world?" She suggests that guidance should extend beyond the classroom and not necessarily just be about technical skills. This, she realised, was the importance of mentorship: to allow for young computer scientists to be able to access skills outside of the classroom. Skills like how to present oneself in a job interview, or how to navigate grant writing or even a problem as simple and as common as how to balance work and the rest of one's life. She stresses, "Formal learning is important, but role models play a key role in paving the path and showing what is possible."

"Do we do enough to prepare our students for the world?" She suggests that guidance should extend beyond the classroom and not necessarily just be about technical skills."

To fill the gap, Dr. Mbogo founded KamiLimu, a mentorship program for university students in computer scientist. The strategy is five pronged. One, encouraging personal development, which is everything from mental health to public speaking skills. Two, providing professional development which includes CV, cover letter writing and job interviewing skills. Third, building their innovation skills, which involves pitching ideas and considering how to apply tech skills to real world problems. Fourth, scholarship application and awareness, which imparts information about available grants and scholarships. Lastly, community engagement which encourages the participants to attend constructive and applicable workshops and conferences. Ninety-five students from twelve different universities in Kenya have gone through the program and in February 2019, they expect to welcome forty more.

If her KamiLimu mentorship addresses accessibility, then a recent app that she has created addresses how simple accessibility can be. The app, launching in 2019, takes into consideration potential computer science students who do not have easy access to computers by allowing users to create code on their mobile phones. The possibility that the next generation of coders will come from lower income communities is just one of the ways that Dr. Mbogo is changing the world.

DID YOU KNOW?

SCIENCE IN KENYA

TRAILBLAZING KENYAN ENVIRONMENTALIST PROF. WANGARI MAATHAI WAS THE FIRST EAST AFRICAN WOMAN TO EARN A PH.D., THE FIRST FEMALE PROFESSOR IN KENYA, AND THE FIRST AFRICAN WOMAN TO WIN THE NOBEL PEACE PRIZE.

A WOMAN OF FIRSTS

In 1977 Wangari Maathai, then studying Animal Science at the University of Nairobi, left her position as Kenya's first woman professor to start the Green Belt Movement, an initiative that supported communities as much through reforestation as it did through nutrition, family planning, and women's empowerment. By 1997 the movement had planted 15 million trees in over 30 countries across the world while providing income for thousands. Maathai only continued to break barriers when she became the first African woman to win the Nobel Peace Prize in 2004.

Ms. Chepkemoi Magdaline

Founder and Executive Director at EldoHub

A computer scientist who is passionate about girls and women in STEM. She leads EldoHub, a technology and innovation hub, which empowers and supports young people to identify problems in their communities and apply different technologies to solve those problems.

Chepkemoi Magdaline, the Founder of EldoHub, believes in following your dreams. When she was in high school, she excelled in science and mathematics. Her family and those around her advised her towards medicine or a career in teaching but Chepkemoi could not ignore her growing love for computer science. Her high grades allowed her to continue to pursue her new love. "That's how I ended up here, [by] going for what I wanted, no matter what," she says firmly.

She started her career as a technician for Telkom Kenya fixing network issues in the Transmission department, but soon felt a conviction to return to her home in Eldoret and afford others the same opportunities that she had experienced. "Most programs that gives such support are based in Nairobi," explains Chepkemoi. Indeed, many initiatives geared towards youth empowerment in tech are based in the capital city. "There was a lot of talent going to waste in Western region of Kenya and so people began migrating to Nairobi to find work." She began to consider the ways in which she could make an impact in her own community where people were motivated by attempting to solve local problems with tech.

> ***"Most programs that gives such support are based in Nairobi," explains Chepkemoi. Indeed, many initiatives geared towards youth empowerment in tech are based in the capital city. "There was a lot of talent going to waste in Western Kenya."***

EldoHub seeks to do just that. Chepkemoi calls it a tech innovation and entrepreneurship hub where women and youth are taught technical, professional and personal skills to launch sustainable careers in tech. EldoHub provides co-working spaces, capacity building, mentorship and incubating startups. Chepkemoi is elated every time a success story comes out of this space. She points to the work of a group of young women working on a platform called 'Okoa Mama' where they are mapping pregnant women in rural areas and providing them with necessary maternity information via SMS/USSD in an effort to provide solution to the ailing maternal healthcare.

Chepkemoi has high hopes for the future of tech in Kenya. She would like for EldoHub to continue to inspire the youth to pursue the sciences to solve local challenges. As an agricultural region, it is especially in need of agri-tech solutions in order to address serious problems like food insecurity. Chepkemoi sees EldoHub as the perfect space for those solutions to be created. Her biggest joy with the initiative, has been to see the impossible come to life and see startups created by people from the region launch with EldoHub's support.

Dr. Damaris Seleina Parsitau

Director and Lecturer at the Institute of Women, Gender & Development Studies, Egerton University, Research Associate at Harvard University and Founder of Let Maasai Girls Learn

A researcher on religion, gender, and public life who is creating leadership opportunities for women and youth and working with the custodians of culture to create change for girls and women in Maasailand.

Dr. Damaris Seleina Parsitau is passionate about Maasai girls going to school. Incredibly, she was the first girl from her village and the second in her county to earn a PhD. Growing up in Kajiado, Dr. Parsitau remains extremely grateful to her parents for allowing her to go to school and for never creating any pressure for her to leave school early and get married. Unlike so many Maasai girls, especially of her generation, she was able to fully embrace academia, through Kipsigis Girls High School to her higher learning at Egerton University. After graduating, due to the high need for lecturers at Egerton University as well as a kindly encouraging professor, Dr. Parsitau found herself teaching philosophy and religious studies.

It was during this period that she begun to consider the role of religion and culture in the oppression of women. She thought back to her class in primary school and reflected on the fact that none of her fellow female classmates made it to university. In her entire village only two women, including Dr. Parsitau, made it to higher learning. A burning desire to enact real change in her community began to build and take hold of her.

After further research into gender studies, she felt that social sciences should be able to speak to social, cultural and political issues in Kenya. She conceptualized how faith based organizations intersect with women empowerment, gender based violence and a multitude of problems that she found were often interconnected with cultural and religious concepts. She begun to create a strategy.

> ***"When you educate a child, you educate a village. Education saved my life."***

"For me to make an impact, men must be my allies," she begins. It may seem at odds with female empowerment but begins to make sense once the issue is contextualized. In most Maasai communities, men are still the gatekeepers. They are the ones who hold all the power and sway and ability to support an initiative for the education of the girl child or block it. But Dr. Parsitau cannot stop there.

With her new initiative, Let Maasai Girls Learn, she encourages not just formal education but mentorship roles as well, where young girls can see the examples of women like her who were driven to follow through on their education and lead successful lives as adults. The initiative must be as nuanced as the issue itself. Lack of education of the girl child does not only happen when parents refuse to take their daughters to school but also when adolescent pregnancies occur or early child marriages force a girl to drop out of school. As a result, she declares that her approach is never to condemn culture but to instead work with the custodians of it to make a change.

Dr. Parsitau is living proof of that known adage that she too quotes, "when you educate a child, you educate a village." "Education saved my life," she says emphatically and with her initiative, she will go on to save many more.

DID YOU KNOW?

SCIENCE IN KENYA

IN 2008 KENYAN ACTIVISTS CREATED A CROWD-SOURCING PLATFORM THAT HAS SINCE PROTECTED THOUSANDS PEOPLE ACROSS THE WORLD.

PEOPLE AND POWER

In 2008, Kenyan activists and developers outraged by post-election violence came together to found Ushahidi, an innovative crowd-sourcing platform that collected and mapped reports of violence from across the country while traditional media struggled to keep up. Since then, Ushahidi has been used to protect human lives and human rights across the world: from mapping the destruction in Haiti after the 2010 earthquake and documenting extreme weather in Asia to recording voter suppression during the 2016 US election.

Professor Daniel Sila

Associate Professor in the Department of Food Science and Technology, JKUAT, and currently the Dean for School of Food and Nutrition Sciences

A food engineer who uses traditional and novel food processing techniques to deliver more nutritious foods to the public. He believes that innovation must be accessible to, and benefit, everyone.

A food engineer who exploits traditional and novel food processing techniques to manipulate the functional properties of foods to deliver nutritious foods to the population. He believes that innovation must be accessible to, and benefit, everyone.
What we eat matters and Professor Daniel Sila, a specialist in Food and Nutrition Sciences, is keenly aware of that. "Early in the '80s and '90s, there were a lot of people that had goitre, which is swelling of the thyroid glands, because of a lack of iodine," he begins. In response, the government then made it mandatory for all the factories producing salt to be iodized. As a result, cases of goitre reduced significantly across the country. It is so important, emphasizes Prof. Daniel, for us to think of food in diverse ways. Common staples, if fortified, can be an important vehicle to healthier diets that are accessible to all.

"Innovations should not just remain in the university," he argues. For him, the excitement of being an Associate Professor and Dean of Food and Nutrition Sciences at the Jomo Kenyatta University of Agriculture and Technology, JKUAT, is the ability to work in research as well as education and mentorship. He leads a number of projects including the European Union funded food fortification project and partnering with the Ministry of Health. The aim is to ensure that all the maize flour in the country is fortified with micronutrients of public health concern. Micronutrient deficiency in Kenya also remains a major problem as indicated by the most recent Kenya Demographic Health Survey. Both long term and short term solutions are needed including consumption of nutritious foods such as legumes that are locally available in the Kenyan market. In that premise, JKUAT launched the Legume Centre of Excellence for Food and Nutrition Security where the tactic is multi pronged: legume breeding, legume post-harvest handling and value addition, legume in nutrition and health, and a cross-cutting project that considers how Information and Communications Technology can be used to increase legume utilization.

> ***"Innovation must reach out and be disseminated to people. In such a way that it will be able to be used to create change."***

Threaded through the work that Professor Sila does, is the importance of capacity building for younger scholars. In the Legume Centre of Excellence program alone, there are seven PhD students and seventeen Masters students all gaining hands-on, practical experience in food and nutrition security. But beyond JKUAT, Professor Sila is adamant that the lessons learned in research must be shared amongst different institutions as well as to the general public. "Innovation must reach out and be disseminated to people. In such a way that it will be able to be used to create the change desired by local and even national government," he stresses. This is why much of Professor Sila's recent work is tailored research, where his work addresses very specific local issues.

The largest hindrance in food and nutrition security in Kenya, in Professor Sila's expert opinion, is the lack of a strong food processing and preservation industry. Postharvest losses are as high as 40 to 60% for most fresh produce. This is especially a problem in fruits and vegetable, cereals and legumes. This general lack of value addition can be found throughout food processing and Professor Sila is equipping people to tackle it.

His latest project, funded by the Rockefeller Foundation, has been working with mango farmers in five Counties where he assists in value addition of mangoes including product certification by KEBS. Knowledge sharing about food and nutrition is saving lives and economies, and people like Prof. Sila are ensuring that county by county, farmers are equipped to push for these changes.

Dr. Dino Martins

Executive Director of the Mpala Research Centre

A globally recognized entomologist and evolutionary biologist who sees science as, "a co-production of knowledge," and believes that Kenya can be at the forefront of global scientific discoveries.

If Dr. Dino Martins wanted to, he could have a very long and successful career in academia at his pick of Ivy League universities. But that has never been his desire. Growing up in Eldoret with no television, Dr. Martins had to find his own fun. His earliest memories are of him running around outside, identifying insects and trying to figure out aspects of their character. He got into breeding butterflies and moths and cemented "his first love of natural history and insects." He decided to go to Indiana University, in the U.S. state of Indiana, on a scholarship realising that he still wanted to be in a place where there was a connection to nature. There, he double majored in Biology and Anthropology. The intriguing mix of the study of people and the study of biological systems are quite integral to the work that Dr. Martins has gone on to do, with an emphasis on the interactions between different species and people.

"Science should be a coproduction of knowledge," he asserts, reflecting on his journey in conservation and entomology in Kenya. His career has played out as a who-is-who history of science in the region. He recalls protesting land grabbing with Celestus Juma and Wangari Maathai and being arrested and dragged off to Nyayo House. He also cites Richard Leakey as a close mentor and inspiration. Through it all Dr. Martins's compass has been his love for his country and its potential in the advancement of scientific discovery. He wondered, "So much of Kenyan talent ends up leaving and I thought, that's just not right. How will we end up growing if we all leave?"

> ***"Science should be a coproduction of knowledge."***

He has contributed to six guidebooks of Kenya's national parks in partnership with the Kenya Wildlife Service (KWS), worked with the Environment Liaison Centre International (ELCI) and has spent the last few years as the Executive Director of Mpala Research Centre as well as a research scholar and a lecturer at Princeton University. His mission is to find a way of "including people rather than excluding them" and he has done so by reaching out to the next generation of Kenyan scientists and helping to build them up, much like his mentors over the years have done for him.

He cites exciting ongoing research by Dedan Ngatia on the severity of rabies amongst wild dogs as emblematic of the progress of scientific research in Kenya. He is most looking forward to a project that has just recently received funding: the building of a full lab that will allow for genomics, genetics, reading stable isotopes, and endocrinology, all led by a team of Kenyan scientists.

DID YOU KNOW?

SCIENCE IN KENYA

KENYA'S GEOTHERMAL POWER PLANTS WERE THE FIRST TO BE ESTABLISHED IN AFRICA AND ARE STILL SOME OF THE MOST PRODUCTIVE IN THE WORLD.

EARTH POWER

Between 1979 and 1996 Kenya Power Company installed the first geothermal-based power plants in Africa. Since then, the country's program has continued to be world-leading: providing almost 50% of the national electricity supply and ranking as the ninth-largest geothermal power producer in the world. Geothermal power is generated from the earth's thermal energy, and is a clean and renewable energy source.

Dr. Hamisi Babusa

Lecturer of Kiswahili, Language Education, Educational Technology and Kiswahili Media Studies, Kenyatta University

An accomplished novelist, lecturer and and senior administrator at Kenyatta University who is pioneering the use of Kiswahili science fiction novellas to educate children on science.

Dr. Hamisi Babusa is the rare academic who confidently straddles both the Arts and the Sciences. Dr. Babusa is an accomplished novelist, a lecturer at Kenyatta University and the first person to author science fiction novellas written in Kiswahili.

Although he pursued an academic path in Kiswahili and Education, Dr. Babusa informs me that science was in fact his first love. He would watch science fiction movies with his parents and be enthralled by the fictional accounts of how the world works. As he went further into academia, he began to look at the education system with a more critical eye. He noted that the new curriculum is competency based and wondered if enough emphasis was being placed on learning to understand instead of memorization. Dr. Babusa's theory is that it is easier to learn when being educated in a story format. Furthermore, he believes that learning in one's first language, in this case in Kiswahili, is much more effective and it makes complex concepts easier to understand.

> ***"Science," he emphasises, "can get married to literature."***

The idea, in fact, came quickly. What if he were to write science fiction novellas that attempted to demystify science by following the story of a young adventurer called Makumba as he discovers different human biological systems and diverse ecosystems? He notes that only in Kenya is this a novel idea, the rest of the world has long since been creating educational programming and content for children. "Science," he emphasises, "can get married to literature."

Over a two-year period, Dr. Babusa has written five novellas following Makumba: MAKUMBA KATIKA SAFARI YA TONGE (Makumba in the Journey of the Ball of Food), MAKUMBA NA SELIDAMU NYEUPE (Makumba and the White Blood Cells), MAKUMBA NA MAJANABI (Makumba and the Aliens), MAKUMBA KATIKA SAFARI YA MAWIMBI (Makumba in the Journey of the Waves), and MAKUMBA KATIKA SIRI YA MWEMBE (Makumba in the Secret of the Mango Tree). The stories are aimed at readers in Standard 6 to Form 4, with an aim to entertain while disentangling seemingly complex concepts. Dr. Babusa wants young people to feel that science "can [initially] feel difficult but it's not that hard".

Dr. Babusa is a prolific writer, and he is excitedly working on three new projects concurrently. He is writing a dictionary and other scientific novellas at the request of a new publisher. He has also authored a new series of six novellas, VISA VYA BINTI KITABU, about a girl with mythical book powers who uses them to improve her community. The full set is set to be released in January 2019. His books are available at all major bookshops around Kenya.

Ms. Jennifer Adhiambo

Project Coordinator at Busara Center for Behavioral Economics

A project coordinator who runs the daily activities at Busara Lab for Behavioral Economics and helps turn research ideas into proper design, contextualize and pilot in order to better understand Kenya's development needs.

Jennifer Adhiambo is a professional experimenter guided by her innate curiosity. As a Project Coordinator at the Busara Center for Behavioral Economics, she oversees the testing of human behavior by designing experiments and games with academics for corporations and governmental agencies alike. The research that Busara Labs produces can be applied to different facets of Kenyan society, from consumer behaviors to gender norms. The main target population of Busara Center's research is people in low income areas. Their research offers a proper reflection of the realities of Kenya and the needs of people in the development sector.

To her, the lab is a controlled environment and very unique in this setting. Because of this it offers a perfect place to test the right solutions. She's passionate about past studies around gender differences in competition and their findings. For instance, that when using gender neutral tasks, men and women are equally competitive amongst their own genders but when women compete against men, something seems to hold them back even if they possess similar abilities. Thinking about the real world scenario, it affects how women make decisions in business opportunities, employment, career and the like. She believes that more still needs to be done to reverse the norm and this could be the right place to test solutions for people in development in their attempt to create better support systems for women in a developing world context.

> ***"research offers a proper reflection of the realities of Kenya and the needs of people in the development sector"***

For Jennifer, the exciting aspect of her work is the "space to explore your potential." She is a passionate intellectual explorer and enjoys how varied the topics are that Busara deals with. From gender inequality to financial markets to political issues and the health sector, the research looks at all these aspects and more areas of behavioral economics. The variety keeps Jennifer on her toes. "There are some exciting things in the future dealing with women and empowering women," she confides.

Her job involves juggling the researchers, the participants and the bigger picture issues that her projects touch upon, often managing four to five projects at a time. But what propels her work forward is always the newest project and the newest experiment. She rubs her hands with glee and gets started.

DID YOU KNOW?

SCIENCE IN KENYA

IN 2018 RESEARCHERS FROM THE KENYA WILDLIFE SERVICE HELPED TRACE INTERNATIONAL IVORY SMUGGLING CARTELS USING GENETICS.

WILDLIFE FORENSICS

In 2018, the Kenya Wildlife Service's Forensics and Genetics Laboratory was part of an international collaboration that run genetic tests on seized shipments of ivory. By using genetic markers to trace the tusks back to the homes of the elephants they were taken from, their impressive work used science to reveal the smuggling routes of international poaching cartels.

Dr. Joy Kiiru

Senior Lecturer at the School of Economics, University of Nairobi

A development economist and expert in impact evaluation studies who has carried out research in microfinance, social protection, trade policy, gender and development, and food security and believes that research on how issues affect the African woman should be vital in shaping policy.

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Economist Dr. Joy Kiiru walks through life with her eyes and arms wide open. We get to most of life's destinations, she explains, "Partly by chance and partly by choice." From having an engaged kindergarten teacher who to this day the renowned economist still checks in with. To finding herself studying Economics when all the other courses she was interested in were full. To her husband taking the primary responsibility of raising their baby when she got accepted into a masters program in Malawi. To being able to take her family to Germany as she pursued her PhD. Her life is marked by moments filled with good fortune and her own determination to achieve her goals.

> ***"We get to most of life's destinations, she explains, "Partly by chance and partly by choice."***

Her kindergarten teacher was formative in instilling the curiosity and zest for life and academia that Dr. Kiiru still embodies today. She laughingly recounts going to university and expressing doubt to her old teacher about pursuing a Bachelor of Arts instead of Science. She recalls the response was quick, "Joy, I have never heard of a bad degree." A reminder, once again, to view moments in life with a type of tenacity and general positivity that seems to mark her entire life journey.

Studying economics was key to Dr. Kiiru understanding the world, and studying philosophy was key to understanding people. Economics laid out the set of rules that society is governed by and philosophy illuminated the important distinction between opinion and fact. It was perhaps her background in philosophy that led her to focus on impact evaluation studies. She continually stresses the importance of checking in with the effectiveness and outcome of any solution to a community.

For three years Dr. Kiiru was the director of communications for the Association for the Advancement of African Women Economist (AAAWE) where mentorship of women economists was the foremost goal. "I have been so privileged in my journey," she explains, "and there are so many women who just need to be told that it is possible." She considers women who may be driven to quit their academics because they have children, or maybe not enough funding or simply lack of support at home and stops to emphasise that they need to know, "You have got it in you."

Gender also impacts her work with her joint projects with the African Women Studies Center (AWSC) where they research issues in the context of how they affect the African woman. She suggests that the discoveries from their research should in fact be used to shape policy as the experience of the African woman is wholly unique and needs to be considered carefully. Her goal in her work is, much like her kindergarten teacher, to have a lasting positive impact.

Mr. Kago Kagichiri

Co-founder of Eneza Education

Founder of one of Africa's leading mobile learning platforms and tech-enthusiast on a journey to tackle the shortcomings of the continent's education systems using technology.

"Science can be done by anyone," declares tech wizard Mr. Kago Kagichiri, Co-Founder of the social enterprise Eneza Education. This is a fundamental concept for Mr. Kagichiri, cemented by his own frustration with regimented academia. He has always gravitated towards technology and IT, something he believes was cemented by his father opening a cyber cafe in 1994, the first of its kind in his neighborhood. He performed at such a high level in high school that he was offered a part time staff position when he was still a student at Starehe Boys' Centre and School, providing technical support to the school. This building up of his confidence outside of the classroom was key to his later success and therefore a philosophy that Mr. Kagichiri thinks should be more common.

Mr. Kagichiri describes Eneza Education as a safe place for students to ask not just questions, but nuanced questions. Eneza then provides them with, "the tools to make their own decisions."

> ***"Education should be more fun and accessible. Remaining stuck in traditions and fearful of the use of technology in education is stifling potential."***

He is proud to say that destigmatizing failure by getting the students to take as many quizzes as possible has had the positive effect of freeing the students to ask more questions in the classroom. Essentially, he believes that education should be more fun and accessible and that remaining stuck in traditions and fearful of the use of technology in education is stifling potential.

Eneza is a virtual tutor that is accessible by SMS as well as online messaging and online platforms. It purposefully targets students in rural Africa and is therefore mindful of the difficulties of internet access. A byproduct of using Eneza is the familiarity it gives students with operating technology, which Mr. Kagichiri stresses is of vital importance. "I want kids to be excited about tech," he argues, because the future is in technology. He predicts that very soon, there will be no department or industry that will not be affected, influenced by and actively using technology.

In 2016 Mr. Kagichiri's team launched a campaign where they marketed Eneza exclusively on local radio stations across the country in order to directly appeal to parents of school age children. Eneza's researchers have found that some parents who are unable to have their children in school year round are willing to invest in Eneza in an effort to close the gap. It is also useful in addressing the severely high rates of adult illiteracy in Africa. They have expanded into Ghana and Cote d'Ivoire and continue to build upon the systems and philosophies that they created in Kenya.

Overall Mr. Kagichiri believes that Kenya needs to overhaul its education system. He advocates for increased apprenticeships as well as more tech inclusion that will involve young people in their own education. As it is now, he wonders about the consequences of continuing to stifle brilliant young minds by forcing them to learn in constrictive environments that have been proven not to be successful for different kinds of learning. Whatever the future holds, Eneza is only on its first step in its journey to tackle the shortcomings of the continent's education systems.

DID YOU KNOW?

SCIENCE IN KENYA

KENYAN RESEARCHERS ARE AT THE FOREFRONT OF A GLOBAL EFFORT TO DEVELOP AN EFFECTIVE TREATMENT FOR VISCERAL LEISHMANIASIS, THE SECOND MOST DEADLY PARASTIC DISEASE AFTER MALARIA.

NEGLECTED NO MORE

Neglected No More. Kenyan researchers are part of a global team of researchers who are developing a safe and effective oral treatment for Vsceral Leishmaniasis (LV), a neglected tropical disease that causes up to 40,000 deaths in East Africa each year. The new treatment has made it to the last stage of its clinical trials, moving us closer to a cure that could save thousands of lives in the region.

Dr. Kamau Gachigi

Executive Director at Gearbox

An engineer working with youth to take their ideas from development to production, by providing them with access to modern machines for prototyping, low volume manufacture, and digital fabrication.

An engineer working with youth to take their ideas from development to production, by providing them with access to modern machines for prototyping, low volume manufacture, and digital fabrication.
"We are in the fourth industrial revolution, and to be competitive, you have to have tools," starts Engineer, and Founder of Fab Labs and the initiative Gearbox, Dr. Kamau Gachigi. He describes himself as a trained scientist who also values the importance of education in both formal and informal sectors. Throughout his career, he has consistently wondered how he can reach back and help others follow suit.

This is essentially what he hopes Gearbox can be for both people with formal education backgrounds in engineering as well as those who have natural inclinations towards it. The initiative works with young men and women in order to build their skill sets and networks through the entire process of the development of an idea to production. Gearbox is also a makerspace that allows engineers full access to their equipment and space to trial and develop their projects.

> ***"We are in the fourth industrial revolution, and to be competitive, you have to have tools."***

Tinkering is an important first step in the life of an engineer. Dr. Gachigi began as a young man fascinated by the sciences. His father, although not a professional engineer, loved to dabble in designing and making new things. Dr. Gachigi remembers working with his father fondly. From extracting silver from used x ray films, washing them in acid and creating chemical reactions that would leave them with silver metal, to melting brass to make hot combs for straightening hair, they were always experimenting.

Dr. Gachigi believes that a similar formalized approach to the sciences in education would be beneficial for students as well as the future of engineering in Kenya. He wonders why a student's practical experiences in an apprenticeship or internship cannot be placed on the same level as academic achievements. "There are different types of intelligences," he emphasizes, and he would like to see an education system that catered to that idea.

As for Gearbox, Dr. Gachigi feels as though the sky is the limit. For now, the focus is on creating infrastructure for increased innovation as the lack of adequate equipment and mentoring can often hinder development. Gearbox can offer a space and culture that allows for progress. A recent partnership with the Kenya Commercial Bank Foundation will enable Gearbox to train people in the 'jua kali' sector on a human-centered design curriculum, meaning a curriculum that takes into account the usefulness of a design for human development, as well as hands on lessons on digital fabrication tools which will enable precision production. A select few who go through the course will then be awarded loans by KCB to invest in their businesses. With Dr. Gachigi's initiative, he is creating a ripple effect where more and more engineers in Kenya will have the right tools to be competitive in the global market.

Professor Mabel Imbuga

Professor of Biochemistry at JKUAT

A biochemist and former Vice Chancellor with over 33 years of experience in teaching and scholarship who is mentoring and building the capacity of women scientists and academicians.

"Women always have to have something extra... above the gentlemen," the immediate former Vice Chair of Jomo Kenyatta University of Agriculture and Technology, or JKUAT, Professor Mabel Imbuga, shares. She approaches life with a fierce determination to better herself professionally, never quite allowing for any amount of hubris that may impede her ability to stretch herself and grow in a new role or impart her wisdom to other women in science.

When she was first offered the position of Deputy Vice Chancellor of Academic Affairs at JKUAT, after focusing on Biochemistry throughout her academic journey, Professor Imbuga decided to go back to school to earn a Masters in Business Administration. This was to allow her to accept the next step of the Vice Chancellor position. She believes that every woman in science should be as equipped as possible. "The value of mentorship is just to let the women know that they can make it," she explains.

> ***"An important aspect of capacity building with women scholars is to ensure that there are positions for them to rise to."***

Having examples for young female students in science bolsters their confidence and therefore increases their chances for attempting to go further in their career. "We should not downgrade ourselves because we are women. We know that we can have it all and succeed in our careers and families as well," she encourages. Professor Imbuga has three pieces of advice that she often gives to young women: to have high integrity, to remain focused on their aspirations and to work hard towards achieving them. These characteristics are ones that can fuel a woman to succeed.

Realising how few women stood beside her in academia encouraged Professor Imbuga, with a few friends from across the continent, started the African Women in Science and Engineering, an organization that serves women scientists and engineers, through chapters in various African countries. The initiative has seen many women succeed in academia and research and also had a mentorship program that allowed university students to go to high schools and mentor female students to improve performance in mathematics and the sciences. What Professor Imbuga found was that in the process of mentoring, the university students were also learning important life lessons.

A disturbing trend that had been observed, for example, was how long it took female researchers to publish their work in contrast to male researchers. The lack of confidence in their work and seeking a level of perfection was hindering their progress. Professor Imbuga believes that an important aspect of capacity building with women scholars is to ensure that there are positions for them to rise to. This can be as simple as encouraging women to apply for more grants and awards, something that she says is not very proactively encouraged in Kenya, introducing them to important networks, or simply advising women to go into higher positions of leadership.

But Professor Imbuga is not only vested in seeing women rise to the top of their fields, but all academicians. During her tenure as Vice Chancellor at JKUAT, she is proud of the fact that 11 of staff her staff ascended to Vice Chancellor within their various departments; four of whom were women. For her, mentorship is an important aspect of creating the next generation of capable leaders who can then be empowered to pay it forward.

DID YOU KNOW?

SCIENCE IN KENYA

KENYA-BASED RESEARCHERS DEVELOPED ONE OF THE VACCINES CENTRAL TO THE ERADICATION A DEADLY DISEASE THAT PLAYED A ROLE IN THE FALL OF THE ROMAN EMPIRE AND COLONIZATION OF EAST AFRICA.

TO RID THE WORLD OF RINDERPEST

In 1962, researchers based in Muguga, Kenya working under Walter Plowright of the East African Veterinary Research Organization (a precursor to the Kenya Agricultural and Livestock Research Organization) created the first safe and effective vaccine for rinderpest, a deadly animal disease implicated in critical events in human history ranging from the fall of the Roman empire to the colonization of East Africa. Rinderpest wreaked havoc on the livelihoods of East Africa's pastoralists since it was first introduced to the region in the 1890s. The vaccine formula developed in Kenya, along with later improvements, became one of the cornerstones of the vaccination effort that finally eradicated rinderpest in 2011.

Professor Mary Abukutsa-Onyango

Deputy Vice Chancellor of Research Production and Extension, JKUAT

An administrator, humanitarian, and horticulturist studying African indigenous plants and fruits who is re-centering the history, benefits and uses of indigenous plants in our current food culture.

Professor Mary Abukutsa-Onyango has had a strong interest in agriculture since she was a young child. Her mother was a peasant farmer and her school encouraged growing vegetables in school. Professor Abukutsa-Onyango declares that it was a passion, "that was is my blood, nobody had to tell me to be interested in it." As a child, she had trouble digesting meat protein and her family would substitute indigenous vegetables to ensure that she still had a balanced diet.

As a result of it being so beneficial to her own life, her dream was to study African indigenous plants and fruits and determine ways in which we as a wider society can use and consume them. When she first attempted to research it in academia, however, she was shocked by the derision that people seemed to regard them. "People were even laughing," she recalled, "they thought I was working on weeds. They were the poor man's crop" But the strides since then have been remarkable. "Now they have jumped into the supermarkets," she says, "and even in the West people are interested in these vegetables."

> ***"I also want us to be proud as Africans. This is our heritage."***

The history and uses of many of these plants have been erased in our cultures, but Professor Abukutsa-Onyango is determined to bring them back. "I also want us to be proud as Africans. This is our heritage," she passionately declares. She often tells the people that she mentors, "We have something in Africa to be proud of!" Throughout her career, mentorship has been important to Professor Abukutsa-Onyango. "As a woman, when you go to the women farmer groups with what you know, you tend to inspire them. Giving myself as an example helps when we are looking at how few girls are strong in the sciences."

Her research attempts to link all the different interest groups, from farmers to markets to individual consumers. She supports the spread of knowledge through demonstrations and leaflets on how to grow the plants, "They are nutritious and they have health benefits. Knowledge sharing to the end user is very important." Two projects that Professor Abukutsa-Onyango has focused on recently, is the research of the resilience and seed production of African indigenous vegetation, which has received government funding, and working with the World Vegetable Center looking at the properties of the amaranth plant. With both projects being large scale, it feels as though the tide is finally turning and the study of African indigenous plants is being prioritised.

Dr. Paul Yonga

Infectious Disease and HIV Physician at Fountain Health Care Hospital

An infectious and tropical diseases physician and clinical epidemiologist who wants to keep people living with HIV in East and Central African region healthy by identifying diseases they are likely to suffer from and finding ways to diagnose and mitigate them.

When Dr. Paul Yonga was in Standard Two, his uncle was completing his cardiology program and seemed to be living a life of adventure that a young Dr. Yonga could only dream about. The first time he had been to an airport was in seeing his Uncle off, and the excitement of receiving postcards from far away places and visiting him when he was posted to Nairobi Hospital cemented a desire to pursue a medical profession.

His experience in infectious diseases as an epidemiologist has certainly sobered him. He studies HIV co-infections and comorbidities, or diseases that often appear in people who are HIV+. "People used to die of AIDS but thankfully we are not seeing that as much. We are now seeing people ageing with HIV," he explains, "and ending up on additional drugs as well as the ARVs." The result of this is a whole host of comorbidities that doctors now need to be aware of.

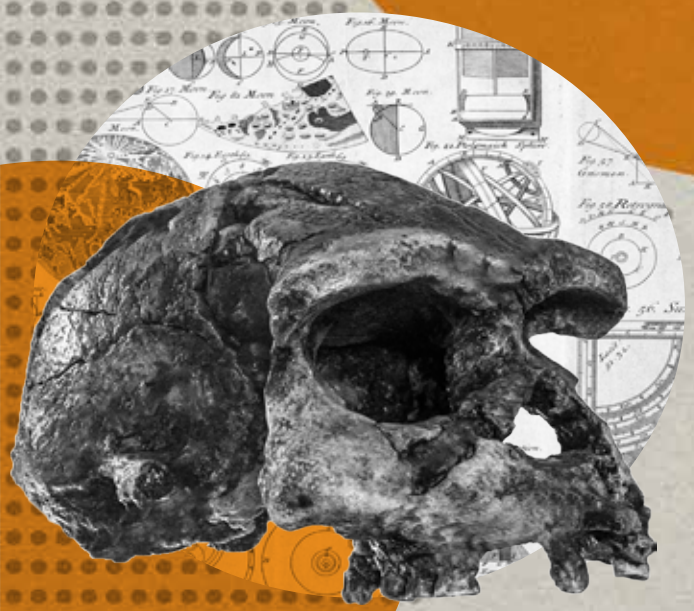
> ***"People used to die of AIDS but thankfully we are not seeing that as much. We are now seeing people ageing with HIV."***

One of the diseases that Dr. Yonga's work highlights is anal cancer. His primary concern is that doctors are simply not aware of how high the propensity is for HIV patients to contract anal cancer is. It is one of the most painful and devastating of the cancers, where early detection makes all the difference. In recent years there has been an increase in testing for the Human Papillomavirus (HPV) as it has a strong relation to cancer of the cervix, but there is no routine screening for anal cancer. In fact, Dr. Yonga is the only researcher in East and Central Africa focusing on it.

The importance of mentoring and ensuring that young doctors are trained in his field, therefore, goes without saying. The screening process for anal cancer is tedious and the learning curve is quite long. Dr. Yonga's own training occurred in Belgium, the Netherlands and Canada. The lack of equipment and screening in Kenya means that the only way to double check the results of the screenings would be for the patient to travel abroad. This is, of course, often too expensive for most patients. For doctors like Dr. Yonga, it means having to travel to keep up with his practical skills.

Needless to say, the whole process of screening in Kenya is currently not sustainable, and most doctors are not even aware that their HIV positive patients should be screened for anal cancer. The lack of screening has led to too late discoveries. Dr. Yonga's long term goal is to get a video colposcope (a machine that helps examine the lower genital tract) for the region, which will enable the screening process to become much more attainable. Dr. Yonga has turned his frustration to fuel, "I am working on this very aggressively," he explains, "I even have sleepless nights."

Through his networking and social media, he has encountered more young doctors interested in the field and in getting information out to the public. The sharing of knowledge and the continual support he receives from his colleagues both in Kenya and abroad, has Dr. Yonga excited about the future of screening for anal cancer.



DID YOU KNOW?

SCIENCE IN KENYA

IN 1984, KENYAN ARCHAEOLOGIST KAMOYA KIMEU UNEARTHED ONE OF THE MOST COMPLETE HOMINID SKELETONS EVER FOUND.

THE TURKANA BOY

The son of a goat herder, Kenyan archeologist Kamoya Kimeu is considered to be one of the greatest fossil hunters of all time. In 1984, he confirmed this standing by finding the "Turkana boy," a 40% complete skeleton of a close but now extinct evolutionary relative, Homo erectus. His finding, which is still one of the best-preserved hominid fossils in the world, also helped scientists show that H. erectus had a tall body and long legs.

Dr. Shikoh Gitau

Head of Products, Alpha at Safaricom Limited

A computer scientist and tech innovator with over 10 years of experience in ICT4D technology design and implementation, who is using mathematics and technology to make people's lives better and contribute to the economic advancement of communities..

> ***"In order for tech to have a lasting impact in a community, sustainability must be a component."***

When she was fifteen years old computer scientist Dr. Shikoh Gitau fell in love with mathematics. There are assurances in mathematics, she explains, that just don't exist in other sciences. With Maths, there is an answer, one just has to find it. Unlike most teen romances, however, this love has endured. Dr. Gitau may be a renowned expert in computer science and innovation in tech, but she still approaches everything in her life mathematically.

"For a successful career," she declares fairly early on in our interview, "I always tell people, that they need purpose plus passion, they two work together." Indeed her seemingly meandering route to computer science was rooted in a desire to follow the passion of mathematics. While attending Kisumu Girls High School, her Math's teacher, the late Loise Koile, who Dr. Gitau credits with much of her early decisions in her life journey, identified her love of mathematics and enthusiastically nurtured it by giving her extra mathematical puzzles and marking them carefully, letting her know what she had done wrong and encouraging her for what she had done right. Her teacher's and principal, Mrs. Leah Muma, belief in her were fundamental to her determination to pursue her dreams.

Dr. Gitau got into the Africa Nazarene University (ANU) and settled on computer science for her course work. While attending ANU, she volunteered with UNICEF and met a young woman, only 22 years old, who had three children and was HIV positive. The encounter haunted her deeply. She considered what meaningful way she could impact this woman's life in the long term and wondered if there was any way her passion for mathematics could be used in a way that was beneficial to social justice. Her foray in the NGO world opened her eyes to a new formula: in order for tech to have a lasting impact in a community, sustainability must be a component. She had now found her purpose.

The seeds of this concept were first planted during her pursuit of her PhD at the University of Cape Town (UCT). The lesson of access to opportunity reverberated throughout her life and she asked the question again, how can mathematics make people's lives better? She began to research the most common internet uses by people in townships around Cape Town, South Africa. Even with limited access to and understanding of the intricacies of the online world, by and large, the majority of unskilled and semi-skilled workers were using the internet to look for employment opportunities. She decided to design a solution for seamless access to opportunities and creation of profiles, Ummeli, started with a small cohort of 30 people, that enabled people to upload their CVs and connect with possible employers. By the time she was graduating with her PhD, more than 1 million users had partnered with the Prakelt Foundation and Vodacom South Africa.

In her career, Dr. Gitau has worked at Microsoft, Google, the African Development Bank and now Safaricom in Kenya. Through it all, she often considers her purpose and her passion to ensure she is putting both into practice. When she first began to research mobile connectivity in the lives of Africans, there was still a large misconception that the pursuit of such research would be much too ambitious for this continent. When she first got to UCT, she studied with the late Professor Gary Marsden, who argued that not only were such tech development inevitable on the continent, it could very well be the tool to economically advance whole communities. In these cases, Dr. Gitau worked against the grain, trusted God, listened to her gut and also looked at the math. "Sometimes you just have to take risks with your life," she advises, "Sometimes that is when you will have the biggest rewards."

Dr. Stellah Bosire

Founder and Executive Director, Stella Bosire Fund

Dr. Bosire is a medical physician looking beyond the stethoscope to use science for good and who advocates for health as a human right.

"I have decided to use science for social good," declares health professional Dr. Stellah Bosire. Dr. Bosire is a passionate empath whose connection to her patients has driven her to look at her work as "beyond the stethoscope". "My work involves getting out there, speaking to policy makers... being engaged in minority communities," she continues. Her desire is to look at health through the lens of human rights. Not only emphasising that access to healthcare is a human right that is too often denied to groups like sexual minorities but also clarifying that those on the fringes of society, due to factors involving gender, age, and mental health, to name just a few, are often placed in high risk situations that are detrimental to their health.

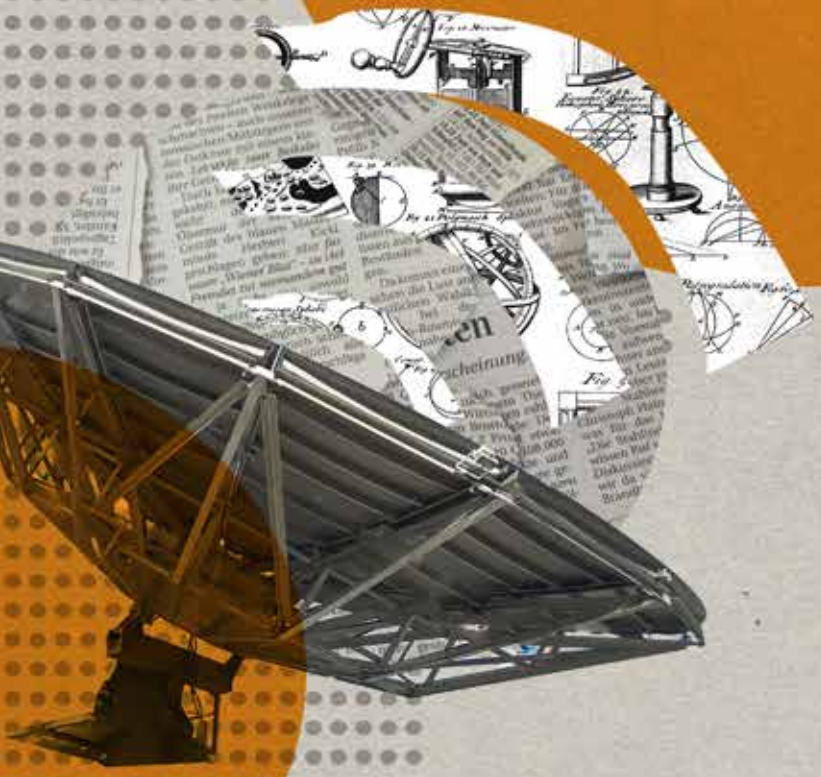
> ***"Access to healthcare is a human right that is too often denied to groups like sexual minorities"***

Dr. Bosire's understanding of this is all too personal. She grew up impoverished in Kibera, with a mother who had schizophrenia and sexual abuse rife in her community and her home. She witnessed babies and young children dying from preventable diseases and would wonder, "Why is it ok for people to die in my community from diarrhea?" It took a while for Dr. Bosire to be granted what she terms "the opportunity to be seen" which is so important for the resilience of the human spirit, especially in adolescence. Against all odds, she found herself at State House Girls with the option of three meals a day for the first time in her life. Seeing it for what it was, Dr. Bosire grasped tightly on to the academic path that opened itself up for her.

Today Dr. Bosire works as a researcher, advisor and a human rights proponent, highlighting the needs of disadvantaged communities and cohorts like adolescent girls, who make up 50% of new HIV cases in Kenya every year, sexual minority groups, where transgendered women experience some of the highest rates of sexual assault and mental health issues such as PTSD and depression, and young mothers, where the rate of maternal and infant mortality is rising annually due to entirely preventable diseases. Dr. Bosire further predicts that cases of depression, anxiety and PTSD will only increase with the next generation. To her frustration, she is constantly fighting against hindrances to progress in equal access to healthcare including bureaucratic corruption, cultural expectations and traditions, geographical access and poverty.

But most important, Dr. Bosire continues, is that we look at healing at a community level. "A community that heals itself, is a community that thrives." To that end, she has established the Stellah Bosire Fund which aims to address health and development from a different perspective: where youth are placed front and center and empowered to communicate and learn about reproductive and mental health needs. The Fund places an emphasis on building resilient communities and empowering them to manage health issues themselves.

Dr. Bosire is also the Vice Chair of the HIV/AIDS Tribunal of Kenya where they adjudicate on human rights abuses against people with HIV/AIDS. In doing so, she is part of a platform where justice and dignity are offered to people who are often denied it. People, perhaps, like her mother, who deserved both but did not quite receive either in full. With Dr. Bosire blazing her trail, equal access to healthcare, and therefore justice and dignity, feels like it is within reach.



DID YOU KNOW?

SCIENCE IN KENYA

KENYAN RESEARCHERS DEVELOPED THE FIRST LIVESTOCK INSURANCE SCHEME THAT USES SATELLITE IMAGERY TO PROTECT LIVELIHOODS OF PASTOROLISTS IN ARID AREAS.

SAVED BY A SATELLITE

Kenyan pastoralists in arid areas have long had valuable assets but little economic security. This began to change when Kenyan economist Andrew Mude and his team at the International Livestock Research Institute partnered with government and the private sector to develop an insurance product that uses satellite imagery to determine how patterns of drought affect the number of livestock likely to die. As of 2018, this initiative – which the first of its kind in Africa – has paid out over KSh 700 million to prevent 32,000 pastoralists in counties across Kenya from being pushed into poverty by their losses.

Ms. Susan Murabana

Managing Director at The Travelling Telescope Africa Ltd.

An astronomer bringing the stars closer to children, by taking a portable telescope and mobile planetarium to schools and sites around the country, and who dreams of creating the region's first public Observatory and Planetarium.

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Ms. Susan Murabana travels around Kenya to show young students the stars. "Science is everywhere," she says. "And this way we can show young girls and boys that science is cool too." When humans look through the lens of a telescope, they are forced to reckon with many important concepts. Firstly, the vastness of the universe and the planet and their own role in it. Secondly, that the possibilities for their life journeys are vast. Thirdly, that science and knowledge is accessible. Ms. Murabana believes that these concepts can embed themselves in the spirit of young people and change the trajectory of their lives.

The Travelling Telescope is a company founded by Ms. Murabana and her husband, who came up with the name. The Travelling Telescope travels around the country with educators and experts in various fields to allow students to look through a mobile telescope. "Most kids and even adults have never looked through a telescope. They have never seen the moon or the stars close up," she explains. Her goals is to change that. The team reach out to public schools and parents across Kenya and have recently also begun touring in Tanzania.

Sharing knowledge and her passion for development has always been important to Ms. Murabana. Her undergraduate degree was in economics and sociology, but she has always been interested in astronomy and pursued her masters degree in the science. As an astronomer, she believes that astronomy provides a window to so many concepts within the sciences.

Since 2002, she has been involved in outreach where she tours schools around the country and outlines different potential career paths available in the sciences. The purpose is to stimulate young minds with the possibilities that exist for their future. Touring schools implanted the idea of bringing students in rural areas a tangible connection to the world of science. It was her husband, who suggested a telescope. With the Travelling Telescope, students ask questions on every subject imaginable. From in depth astronomy queries, to philosophical thoughts about what our place is in the world, Mrs. Murabana witnesses the opening of minds and it is an experience that she has still not tired from.

But Ms. Murabana's dream is even bigger than the success of the Travelling Telescope. She dreams of creating the region's first public Observatory and Planetarium. A place where Kenyans could come for themselves to view nature's wonder and realise just how important science is to the very fabric of humanity. "Astronomy is connected to everything," she says, "Who knows where it could lead?"

Dr. Wanjiru Kamau-Rutenberg

Director at African Women in Agricultural Research and Development

A leader equipping women agricultural scientists with research and leadership skills, who is invested in creating a world where women scientists don't just survive but also thrive, excel and innovate.

> ***"I am passionate about the African Century. I really believe this century is the African take off."***

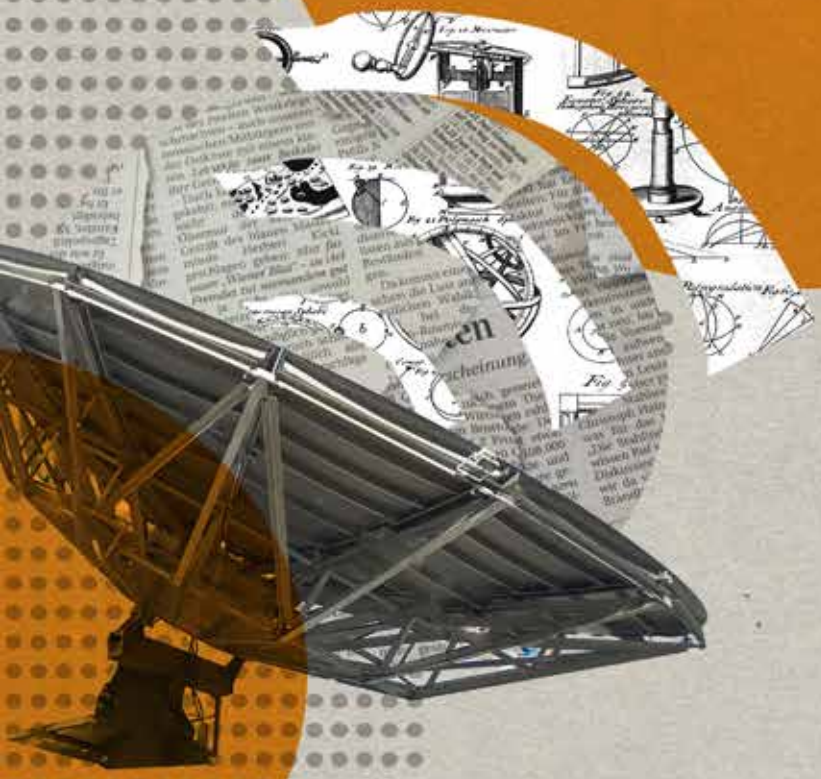
Every second sentence out of Dr. Wanjiru Kamau-Rutenberg's mouth is at once inspirational and mobilizing. "I am passionate about the African Century," she declares, "I really believe this century is the African takeoff." Dr. Kamau-Rutenberg runs AWARD, the African Women in Agricultural Research and Development, which works to bring in more gender responsive research in agriculture. In Kenya, men and women play different roles in agriculture, but Dr. Kamau-Rutenberg says that very little acknowledgement is paid to the important role that women play.

Dr. Kamau-Rutenberg has spent her career focused on the importance of leadership development for women. She founded Akili Dada in 2006 which aims to nurture and empower young women from disadvantaged backgrounds. Equally as important as mentoring young women and showing examples of success, Dr. Kamau-Rutenberg also thought it was vital to step down and allow for somebody else to take the helm. "Transitioning power," as she refers to it, is a great lesson for young people to learn and one that unfortunately we do not often see reflected.

"Science has an important role to play in Kenya," Dr. Kamau-Rutenberg says. "As a continent though, we are going nowhere if we leave 50% of us behind." Dr. Kamau-Rutenberg is referring to the gender imbalance found in the sciences, which she finds especially hard to understand in agriculture, where women are so involved on the practical side of things and yet the system is set up to ignore and devalue their work. AWARD is the perfect vehicle to address this imbalance. They support women agriculturalists in running their career, research institutions in integrating a gender lens in their research and start up agribusinesses in incorporating a gender lens into their growth plans.

In society, Dr. Kamau-Rutenberg says that gender imbalance is not addressed without the work of men. As fathers they are often seen as the cultural head of the home and therefore the last authority on what is right and wrong. The way that fathers speak to both their sons and daughters has a lasting impact on the way that women's career possibilities are viewed. Dr. Kamau-Rutenberg cites her husband, himself a scientist, as her greatest source of encouragement as an example. "It is men of purpose and women of courage taking that commitment from the home into the workplace. There is a big piece of this that is calling for our men to lead differently and not just make this woman's work."

As AWARD celebrates its ten year anniversary, it is certainly leading the forefront. They have partnered with different like minded entities to start the Global Forum for Women in Scientific Research, or GloFoWiSeR, an African led global initiative that will: encourage the building of professional skills for female African scientists, increase sharing between different research institutions to encourage them to be spaces where "women scientists don't just survive but thrive, excel and innovate," and foster conversations with research funders to encourage them to wield their power within the research space to demand better environments for women in research.



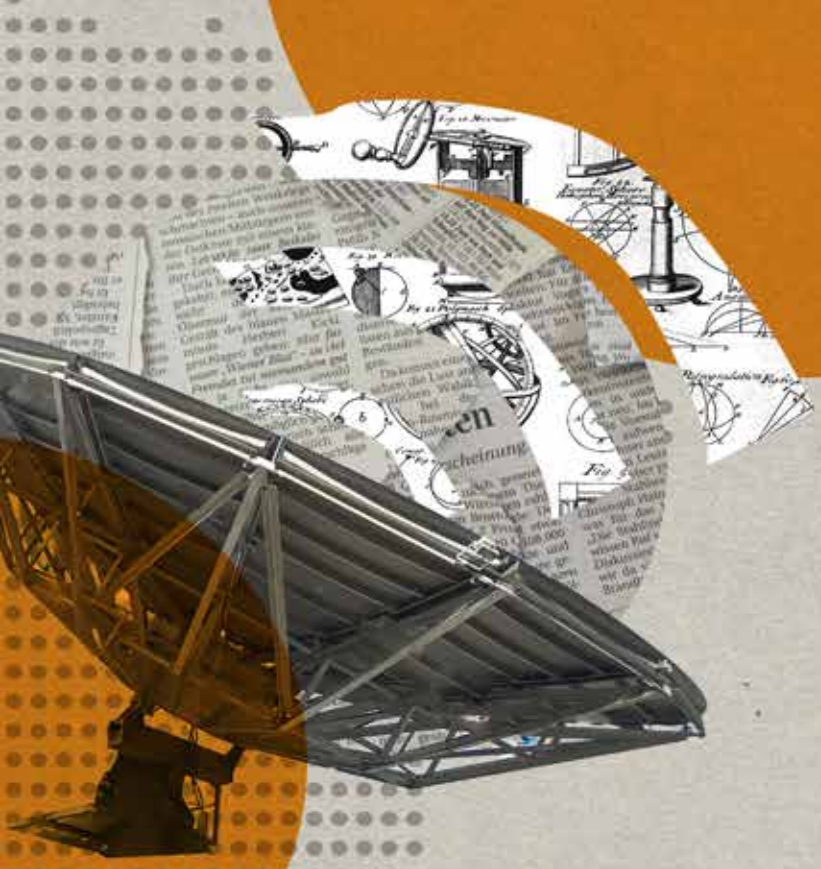
DID YOU KNOW?

SCIENCE IN KENYA

KENYA WILL SOON BE HOME TO PART OF THE WORLD'S LARGEST RADIO TELESCOPE NETWORK THAT WILL STUDY EVERYTHING FROM THE FORMATION OF GALAXIES TO THE BIRTH OF THE UNIVERSE.

AFRICA STAR POWER

In the coming years, Kenyan astronomy will get a boost as the country becomes one of eight African countries to host remote dishes for Square Kilometer Array (SKA), whose core sites will be located in Australia and South Africa. SKA will create the world's largest radio telescope and will improve our understanding of everything from exploding stars and black holes, to galaxy formation and the birth of the universe.



DID YOU KNOW?

SCIENCE IN KENYA

IN 2015, KENYA BECAME THE FIRST COUNTRY IN THE WORLD TO MAP ITS INFORMAL TRANSIT SYSTEM.

THE MATATU MAP

In 2015 Kenya's matatus became the first informal transit system in the world to have an online map when a team from the University of Nairobi worked with its international partners to begin Digital Matatus, a data crowd-sourcing project that has already documented over 3,000 stops on a system that serves 3.5 million people per day. Just this year, the project updated its routes in order to continue providing free, reliable data to passengers and policy makers alike.

FURTHER READING

Follow the links below to learn more about our scientific facts.

ROUTING THE RUST
https://www.globalrust.org/blog/kenya-wheat-team-wins-prestigious-2015-gene-stewardship-award

A WOMAN OF FIRSTS
https://www.nobelprize.org/prizes/peace/2004/maathai/facts/

PEOPLE AND POWER
https://www.ushahidi.com/blog

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WILDLIFE FORENSICS
https://qz.com/1395715/in-africa-genetics-helped-identify-three-major-ivory-cartels/

NEGLECTED NO MORE
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THE TURKANA BOY
https://leakeyfoundation.org/fossil-finders-kamoya-kimeu/

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https://rethink.earth/how-kenyas-herders-got-their-livestock-insured

AFRICA STAR POWER
https://qz.com/africa/1152775/africas-giant-ska-telescope-project-in-south-africa-ghana-botswana-zambia-kenya-and-others/

THE MATATU MAP
http://news.mit.edu/2015/digital-matatus-project-makes-invisible-visible-0826

FACES OF KENYAN SCIENCE