



# Science\*Policy\*Africa

Newsletter of The African Academy of Sciences

Volume 20 Number 4

December 2016

ISSN 1015-4957

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**Prof Kevin Marsh**

**AAS Fellow; Senior Advisor at AAS; and  
Director of the Africa Oxford Initiative.**

# Message from the President



Aderemi Kuku, AAS President

It is indeed a great pleasure for me to write my message for this last edition of SPA Newsletter for 2016. In doing so, I first observe that 2016 has been a year of some stellar activities in the AAS. The AAS General Assembly featuring seven high profile scientific lectures and panel discussions (among others) was declared open by His Excellency Lt. General Stretse Khama Ian Khama, President of Botswana who was also inducted as a Honorary Fellow of AAS. The year also witnessed further progress in AAS various activities-AESA (Alliance for Excellence in Science in Africa) and its associated programmes: DELTAS (Developing excellence in leadership Training and Science) Africa; GC Africa (Grand Challenges Africa); GFGP (Good Financial Grant Practice), CIRCLE (Climate Impacts Research Capacity Leadership Enhancement); Stem cell research and regenerative medicine. Moreover there was the second AAS-KAST (Korean Academy of Science and Technology) Bilateral Symposium in Seoul April 20-21, 2016 on the topic "Bio-Natural Resources and their Utilisations) etc.

The current Newsletter reports the great news that Professor Kevin Marsh, an AAS Fellow and Senior Adviser at AAS and a Professor at the University of Oxford was awarded the Al-Sumait prize worth one million US dollars for his spectacular research efforts in the direction of controlling and eradicating malaria. It is also great news that Prof

Marsh has donated the whole money

for the development of young African Scientists - USD 400, 000 of the money to the AAS and the remaining USD 600,000 to the African Oxford Initiative which aims to support partnerships and collaborators with African Institutions and Researchers comprising over 300 Academic Staff, over 120 collaborations in 26 African countries. I seize this opportunity to congratulate Prof Marsh once again for winning this prize and I like to express my profound gratitude to him once again for donating the whole money towards the promotion of sustainable development of our continent.

Another great news is that the Wellcome Trust has transferred two major research programmes - DELTAS Africa and H3 Africa (Human, Heredity and Health in Africa) to AAS-AESA. H3 Africa is a major genome programme established in 2012 to apply cutting-edge genomic techniques to diseases that constitute big health problems in Africa. On behalf of AAS, I thank Wellcome Trust for the confidence it has in AAS-AESA.

The last few years have witnessed a lot of capacity building workshops in stem cell research and regenerative medicine. The third workshop on Stem cell research and applications was hosted by the Stellenbosch Institute for Advanced Studies. It is envisaged that the third AAS-KAST bilateral symposium will take place in Nairobi in 2017 and will be devoted to Stem Cell Research and Application.

There was a three-week AAS activity "AAS/AMU (African Mathematical Union) Symposium on Current Research Trends in the Mathematical Sciences and applications together with a pre-Symposium School", May 3-20, 2016. This activity was meant to address lack of enough focus of African Science Academies on STEM disciplines. The programme of the Symposium and the communique from the symposium and School are on AAS website and the communique is reproduced in this

edition of the newsletter.

It is now my singular pleasure to congratulate our colleagues who have been in the news of recent:

1) I congratulate Professor Nobert Hounkonnou, a Professor of Mathematics and Physics at the University of Abomey-Calavi, Republic of Benin, for winning the C. N. Rao prize for his distinguished research contributions in mathematics as well as his sustained contribution to mathematics education.

2) I congratulate Professor Esi Awuah for her being awarded the Ghanaian National Honour of Officer of the order of the Volta (OV) for her outstanding contributions to public service especially in the field of Engineering, environment and sanitation education in Ghana

3) I congratulate Professor Calestous Juma of Harvard University, winner of the Breakthrough Paradigm Award for his scholarship and thought leadership in biotechnology and innovation.

4) I congratulate Dr. Marian Nkansah of the Chemistry Department, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana and AAS Affiliate for winning the inaugural Al-Kharafi (TWAS) Prize, which recognises exceptional women from scientifically and technologically lagging countries. She won the prize for her distinguished contributions to research on health risks associated with human exposure to hazardous heavy metals

Finally, it is with a heavy heart that we announce the passing on of Professor Najia Kbir Ariguib, FAAS, an eminent Tunisian Chemist. May her soul rest in perfect peace.

It is now my great pleasure to wish all members of the AAS MC, GC, all AAS Fellows, all AAS secretariat staff, all AAS Affiliates, and all our partners a very happy holiday season and most delightful 2017 ■



# From the ED's desk

**A**s I write this "Message from the Executive Director" for this edition of the SPA, I am aware that this will be my last message as the Executive Director of the African Academy of Sciences. I am reaching the end of six years (two terms of 3 years each) of service to this noble academy. I have, therefore, taken time to reflect on some of the positives of the journey and raise a key issue that requires the urgent attention of all AAS fellows.

AAS had glorious early years in the late eighties and nineties, but it had slowly become dormant and lethargic in the closing years of the first decade of this century; that is how I found it when I arrived. It was Mohamed Hassan, former president of AAS who wrote to me in mid-2010 while I was Professor of Chemistry in the University of Botswana and personally asked me if I would consider working for AAS. I responded in the affirmative and assumed duty on 3 March 2011.

I am deeply honoured for the opportunity given to me to serve this august academy and to contribute to the phenomenal growth that it has achieved during the last six years and I must hasten to express my appreciation for the extraordinary team at the AAS Secretariat and some members of the AAS Governing Council who have been of immense support to me with their advice and encouragement.

AAS has gained huge political recognition. It is no longer an observer, but a strategic partner of the AU for Vision 2063 and an implementing partner of AU Strategy - STISA 2024. The AAS-AU relations have blossomed to include jury selection and adjudication over the AU awards, review of AU research grants to African scientists and the AU summit of 2015 endorsing the establishment of AESA (see below) and other partnerships. In 2014, AAS and NEPAD created the Alliance for Accelerating Excellence in Science in Africa (AESA), with the support of three global partners, Wellcome Trust, Bill & Melinda Gates Foundation and UK Department for International Development (DFID). This agenda-setting and funding platform for Africa has gone through a "set-up" phase and is now consolidating and stabilising. AESA's current portfolio of programmes (DELTAS,

GC Africa, H3A, CIRCLE, GFGP) have achieved collective investments of over \$130M over the period of a few years and are making an impact in supporting science in Africa.

Internally, significant investments have been made to recruit a competent team to support programmes and operations (today there are more than 10 PhD level scientists and senior advisors working at the Secretariat). World-class grants management systems, policies and financial systems have been put in place. Besides the competent staff and systems, we have introduced financial governance measures such as regular internal and external audits, which have helped us gain the confidence of our African and global partners.

The AAS membership of Fellows has grown from 183 (2011-12) to the present ca 350 (2016-2017) with the number of women fellows now at nearly 50 from a mere 3 in 2011/12. We launched the Olusegun Obasanjo Prize and have successfully awarded the third prize in 2016. It was my personal pleasure to welcome the Former President Olusegun Obasanjo himself, who came to preside on the occasion of the award of the maiden prize. The AESA launch of 10 September 2015 was presided by HE Ameenah Gurib-Fakim, the State President of the Republic of Mauritius, an AAS Fellow and a highly accomplished scientist in her own right. We have launched the AAS affiliates programme with the review of the second group of nominations now nearly completed. The Affiliates Programme got a boost with the donation of \$400,000 to set up a fund to help the professional development of early career scholars. I salute AAS Fellow and Senior Advisor Kevin Marsh for this extraordinary generous support.

We were also able to organise two General Assembly meetings, one in Congo and the most recent one in Botswana. I cannot thank enough for the generosity offered by the host countries, particularly the recent host institution, the Botswana Institute for Technology Research and Innovation (BITRI), whose CEO is AAS Fellow Nelson Torto.

We set out ambitious goals in our Strategic Plan 2013-2018. In some cases, we have

surpassed the set targets, yet we are just



Berhanu Abegaz, Executive Director, AAS

beyond the mid-term of the period. But we need to work a lot harder to achieve the others. AAS strength is its Fellows. We need to be fully Pan-African, yet we only have Fellows from only ca 40 of the 54 countries. AAS needs to work across Africa's historical, colonial, linguistic, geographic divides. We need to see better integration across the continent so as never have to refer to the "sub-Saharan" grouping, which, in my opinion does not make sense at all. I want to express my appreciation to many regular Fellows of AAS (not elected to leadership positions) for their generous commitment to help the Secretariat when we called on them. They have contributed hugely as reviewers, MAC chairpersons and committee members. But their numbers are small. My plea to the other Fellows is, "please devote as little as a few hours a year to get involved with the Academy's activities and programmes".

I want to conclude by raising a key issue that arises from the leadership ambiguities within the AAS constitution. This needs to be addressed urgently to further enhance the governance and management of AAS. This was brought to the attention at the General Assembly in June 2016. Addressing this governance deficiency will make the academy stronger to drive its agenda for science development in Africa. Revision of constitutions are not routine exercises, and hence I am encouraging all Fellows to use this opportunity to weed out all the weaknesses of the constitution. The African Academy of Sciences, with the high quality and exceptional knowledge that resides in its fellows, should be a model for many institutions in Africa on how to organise themselves to achieve high standards of excellence ■

# African research leaders and colleagues from the University of Oxford consult

**T**he Oxford Africa Initiative (AfOx) held a consultative meeting on 28th October, 2016, at the St Anthony's College of University of Oxford. It was a day of conversations and exchange of ideas among African research and academic leaders and colleagues from the University of Oxford on the role of international collaborations for African Academia.

This meeting is the first of interactive consultative meetings meant to tease out ideas on future focus areas for AfOx and facilitate the development of priority projects for AfOx. The meeting focused on the various facets of international collaborations including increasing postgraduate scholarships in Oxford for African students, contributing to teaching excellence in African academia, supporting the development of new collaborations through travel grant schemes and identifying innovative partnership and funding strategies.

AAS Fellow Prof Kevin Marsh is also Director of the Africa Oxford Initiative. In his welcome address, Prof Marsh gave a brief history of the Initiative. He noted the remarkable response with which the idea to create AfOx was received both within the university and among the partner African institutions. The Initiative had since grown from an idea among like-minded individuals to a functional program, whose mandate the meeting delegates would shape in the discussions of the day. The presence of research and academic leaders from different African Institutions as well as senior management of the University of Oxford in the meeting, emphasized the commitment of both parties to engage in the future development of the Africa Oxford Initiative.

Vice-Chancellor of the University of Oxford, Prof Louise highlighted the existing strong links between Africa and Oxford, including through the Kenya Medical Research Institute based in Kenya and other collaborations across the university, noting that these links provided a strong foundation on which to support the development of AfOx. The university continues to encourage broad links with Africa, with 305 African students, 2,300 alumni and 69 African staff (up more than 50% in the last three years). The VC emphasised the Initiative's focus on equitable partnerships, with a particular interest in the active involvement of the African Academy of Sciences in the day's discussion.

The Executive Director of AAS, Prof Berhanu Abegaz delivered the Keynote Speech. In his speech he recounted Africa accounting for 15% of the world population and only 1% of the world's research capacity. He bemoaned the higher education landscape being further challenged by huge expansion without the investment of the human and financial resources thus significantly diluting the quality.

Prof Abegaz also highlighted the low level of research collaboration among

African institutions. In the development of the AfOx priorities, Prof Abegaz advised an alignment with the SDGs and the African Union's Agenda 2063 which provides framework and guidelines on Africa's priorities. He laid out four pillars: (1) building and/or upgrading research infrastructures; (2) enhancing the technical and professional excellence; (3) promoting relevance through innovation coupled with entrepreneurship; and (4) creating an enabling environment for STI development in the African continent.

Prof. Abegaz recommended AfOx to focus on long term partnerships, target investing in scholars as well as institutions, prioritise expressed development needs of African countries and work to establish robust mentorship programs with career support opportunities to ensure sustained research ■

The Africa Oxford Initiative can be contacted through [afox@ndm.ox.ac.uk](mailto:afox@ndm.ox.ac.uk) and telephone +44 (0) 1865 2 81663



Picture of participants at the first Africa Oxford Initiative consultative meeting

# Kevin Marsh donates USD 400,00 to AAS for supporting Excellence

AAS Fellow and Senior Advisor at the AAS secretariat who is also a Professor of the University of Oxford, Kevin Marsh, was awarded the 2015 Al-Sumait Prize for Health for his sustained efforts to control and eradicate malaria, which impacts the health of tens of millions of African children.

Upon hearing of the award, Prof Marsh said: 'I am honoured to have been awarded the Al-Sumait prize in recognition of work carried out with many colleagues in Africa and in Oxford. The prize will be used to support the work of the African Academy of Sciences and the Africa Oxford Initiative, a new platform which brings together academics from across the University and from many African institutions to build equitable collaborations in all academic disciplines.'

True to his words, Prof Marsh has donated USD 400, 000 of the prize money to the African Academy of Sciences to support the development of science excellence

in Africa. This is a very excellent gesture that has brought great joy to the African Academy of Sciences in seeing its fellows going an extra mile beyond the contribution of their knowledge to the development of science in Africa but also putting their financial resources into the development of sciences in Africa.

In fact the whole amount of USD 1 million is being committed to the development of young African scientists. The remaining USD 600,000 is also committed to the Africa Oxford Initiative which is a cross university platform which involves all divisions within the University of Oxford.

The Africa Oxford Initiative aims to support the development of equitable partnerships and collaborations with African institutions and researchers from across the continent. It comprises over 300 academic staff with a commitment to supporting equitable partnerships with African colleagues and currently involves over 120

collaborations in 26 countries across the continent.

Al-Sumait Prizes honor individuals or institutions who help advance economic and social development, human resources development and infrastructure in Africa through their sustained research and or innovative projects that result in major impact on the lives and welfare of the people of Africa especially the poor and underprivileged.

Each year worth one million dollars and a gold medal, Al-Sumait awards are administered by the Kuwait Foundation for the Advancement of Sciences (KFAS) and a Board of Trustees who oversee the selection of the recipients. The awards acknowledge the work of the late Dr Abdulrahman Al-Sumait, a Kuwaiti doctor who dedicated his life to addressing the development challenges confronting Africa and established the Direct Aid humanitarian organization ■



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**“Investing in Africa’s young scientists is investing in the future of the continent. Providing opportunities for young scientists will help to attract and retain them on the continent and I am happy to be contributing to this effort.”**

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**Prof Kevin Marsh**

**AAS Senior Advisor and winner of the Al-Sumait Prize**



## Using gene drive approaches

On 11 October 2016, AAS and the Foundation for the National Institutes of Health (FNIH) convened a roundtable discussion on the potential of gene drive technology for malaria control. The roundtable brought together scientists from across Africa with expertise in infectious diseases, entomology and public health.

Discussions centred around developing modified mosquitoes for malaria control either by biasing the male to female ratio of mosquitoes, with an increasingly male mosquito population leading to a reduction in the overall population over time or to reduce female mosquito fertility, also leading to a reduction in mosquito population size.

There were concerns on the safety and efficacy aspects of the technology being used, in particular strategies being considered to address the risk of resistance. The importance of public engagement was stressed. The complex nature of the technology and the potential transboundary questions it would likely bring up, required early engagement at the regional level, both with the African scientific community and the policy-making community. NEPAD, the African Union and the sub-regional organisations such as ECOWAS and WAHO were identified as key entry points. Many noted that it was very positive to see leading institutions in the region taking part in the project and that technology transfer and capacity building were essential to ensure the technology could be successfully developed for use in Africa.

In the afternoon, a panel discussion examined the opportunities and challenges approaches such as gene drive presented for African scientists and African research institutions. Panelists highlighted the challenge of finding appropriate regulatory bodies and pathways to ensure the new technologies could be assessed in a timely fashion by experts.

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## DELTA Africa and H3Africa programmes transferred to AAS' AESA

The Wellcome Trust has transferred two major research programmes it originally managed, DELTA Africa and H3Africa, to the African Academy of Sciences' Alliance for Accelerating Excellence in Science in Africa (AAS-AESA).

The two programmes support cutting-edge research aimed at tackling some of Africa's most pressing health challenges, including infectious diseases, mental health and emerging diseases such as obesity and diabetes. There is also a strong focus on training and supporting the next generation of African researchers and research leaders.

AESA, an initiative of the African Academy of Sciences and the New Partnership for Africa's Development Agency, is an agenda-setting and funding platform established to address Africa's science, technology, innovation and development challenges. AESA will now manage both DELTA and H3Africa programmes in partnership with the funders, leading on decision making for African science, technology and innovation supported through the schemes. DELTA Africa is a £60m research programme established to promote African-led development of research leaders and to support cutting-edge research aimed at tackling some of Africa's most pressing health challenges. These challenges include infectious diseases, mental health and cross-cutting disciplines such as biostatistics. Eleven consortia have been funded with an even distribution across East, West and Southern Africa (including three awards led from Francophone Africa). It is funded by Wellcome and DFID.

H3Africa is a major genomics programme that was established in 2012 to apply cutting-edge genomics techniques to diseases that are a health burden in Africa. Wellcome has made a £9m grant to AESA to run a second phase of the programme in partnership with the US National Institutes of Health. AESA will release a call for proposals for this funding in January 2017.

The handover of DELTA Africa and the award to manage a second phase of H3Africa represents an important milestone for AAS-AESA and a significant change in the way Africa interacts with international funders. Dr Jeremy Farrar, Director of Wellcome, said: "Wellcome has a long history of investing in world-class health research in Africa. But ultimately, the biggest improvements in health will be met through research that is Africa-led and locally relevant. We're delighted that AESA will now take the lead in shaping a world-class research agenda driven by the next generation of African research leaders."

AESA Director Dr Tom Kariuki said the handover was a vote of confidence for AESA and African institutions' grant management capacities. "This represents a new era in defining partnerships between Africa and global organisations and furthers the momentum we are building for an Africa-led science and research agenda to transform this continent's future," said Dr Kariuki. "It's another step forward in our efforts to improve our research infrastructure, enhance our management and administration capabilities, expand our pool of world-class researchers and inspire African governments to increase R&D funding."

Dr Alphonsus Neba, the Programme Manager for DELTA Africa, said, "We are grateful to our partners at the Wellcome Trust for their commitment to shifting the centre of gravity to Africa. With this shift, funding decisions on Africa will be made in Nairobi, not London, and will help to not only ensure that science for Africa is led by Africa's researchers but also that it remains relevant to the needs of Africa" ■

# Her Excellency Ameenah Gurib-Fakim supports African Genomic Research

In an opening address to the 9th Human Heredity and Health in Africa (H3Africa) conference in Mauritius, the President of Mauritius, Prof Ameenah Gurib-Fakim, highlighted that transformation of Africa's natural resources and the translation of its ancestral knowledge could transform the continent. Empowering the youth with the necessary tools and new knowledge will help the continent leapfrog its developmental challenges. For this to happen, there is need for science - policy interaction and public awareness of the impact of research work being undertaken in universities and research centres. Such dialogue will change the narrative of leaders and invest in research and research infrastructure that will help not only attract the diaspora to the continent but also encourage young talented Africans to take up opportunities on the continent to work.

President Gurib-Fakim, herself an internationally renowned scientist who has been working in the field of biodiversity, highlighted the role of the H3Africa consortium on Africa's development agenda.

H3Africa is an initiative of the African Society of Human Genetics and has emerged as a partnership with funding agencies like the National Institute of Health (USA) and the Wellcome Trust (UK). The primary interests of H3Africa are:

- (i) exploring the rich human genetic diversity on the continent;
- (ii) human capacity development;
- (iii) technological infrastructure development;

- (iv) biobanking;
- (v) knowledge (data) generation and sharing;
- (vi) training the next generation of scientists; and
- (vii) community engagement.

Projects funded include themes such as chronic and infectious diseases including TB, cardiovascular disease (heart disease and stroke), psychiatric and neurological disease, viral diseases and podocytosis, a neglected tropical disease. ([www.h3africa.org](http://www.h3africa.org)).

H3Africa is also encouraging intra-

very lively network of researchers moving between research institutions, improving brain circulation – with a major commitment on training the next generation of researchers/scientists. Access is provided to the state of the art research facilities in the UK and the USA – as the technological infrastructure in Africa is being developed.

The funding was made available since 2012, with researchers having to meet every 6 months in a different African country. This is in recognition of the need for bringing awareness to local governments/

academic institutions. It was in this context that, while appreciating the honest effort in H3Africa to engage fully with communities in which they are doing research, Her Excellency Ameenah Gurib-Fakim emphasised the need for the genomics academic community to increase their efforts of knowledge translation in order to inform the community, governments, philanthropists,

entrepreneurs and the commercial sector.

The current funding Agencies, NIH and Wellcome Trust, have been encouraged at the progress in all of the H3A projects to the extent they have both put out calls for a further 5-year cycle funding. Appreciating this contribution, Prof Gurib-Fakim encouraged African governments to match donor support to what the H3Africa initiative is bringing – on the continent where humanity has its origins – and its greatest diversity ■



HE Ameenah Gurib-Fakim, President of Mauritius, (middle); with Dr Enoch Matovu (Left), and Dr Clement Adebamowo (right), Co-Chairs of the H3Africa Steering Committee at the opening of the 9th Meeting of the H3Africa Consortium, Mauritius

Africa research collaboration either individually or through Pan African networks.

With a view to developing the research ecosystem, funding is being made available, not through a UK or USA principal investigator, but directly to an African researcher at African institutions – with the requirement that all of the relevant administrative/financial management structures are of an international standard. To date, research in 28 African countries is funded, with a

# Stem cell science in Africa



Participants at the workshop on Stem Cell Science and Applications in Stellenbosch, South Africa.

**T**he African Academy of Sciences and the Stellenbosch Institute for Advanced Study (STIAS) held a workshop on Stem Cell Science and Applications in Stellenbosch, South Africa. Thirty-six resource persons, experts and young scientists from Brazil, Cameroon, Canada, Ghana, India, Kenya, Nigeria, South Africa, Sudan, Tanzania, Tunisia and Zimbabwe attended the workshop. This was the third workshop held under the AAS's Capacity Building in Cell Biology and Regenerative Medicine programme, which aims to train and mentor young African scientists in stem cell science through training provided by various experts from India, Brazil and South Africa.

Stem cells have the potential for treating various diseases such as non-communicable diseases which the World Health Organization predict will overtake communicable, maternal and perinatal causes of death by 2030. Building Capacity of African Scientists in CB/RM through Mentoring by experts from scientifically advanced countries of the South will enable Africa to cope with these health challenges.

The workshop discussed potential of cell therapy/regenerative medicine to address global health concerns and those that are specifically relevant to Africa as well as the status of cell therapy/regenerative medicine in Africa. They assessed the progress of

collaborations established so far from on-going CB/RM activities, highlighted new training and research opportunities, provided a platform for networking, shared the challenges faced by researchers and mapped ways of moving the programme forward.

The works presented by participants ranged from treatment of chronic wounds using stem cells at South Africa's Stellenbosch University to treatment of eye injuries using induced pluripotent cells being done at the University of Ibadan in Nigeria and at the L. V. Prasad Eye Institute in India. Mentees from the previous phase of the CB/RM programme who had received training in laboratories of experts in India, Brazil and South Africa, also presented techniques they had learnt during their research visits such as handling cell culture and viability testing of proliferated cells. They also highlighted their journey since their involvement in the CB/RM programme and how they were applying their knowledge on stem cells in their current work.

There were laboratory visits to the International Centre for Genetic Engineering and Biotechnology (ICGEB), Stellenbosch University and the University of Cape Town to learn about facilities and equipment that can be used for stem cell research.

## Challenges for stem cell research

Some of the challenges participants face include a lack of tissue culture and gene

sequencing facilities, inadequate expertise, unreliable power supply e.g. electricity rationing and lack of funding that are limiting African scientists from effectively pursuing stem cell research. Young scientists who want to venture into the field also lack mentors as it is still a relatively growing field not only in Africa but globally as well.

Participants emphasised the importance of the CB/RM programme and recommended the following to ensure its continuity:

- Concerted efforts to create awareness and raise profile of the field for more people to know career opportunities impacts on combatting diseases.
- AAS offers opportunities to mentor young scientists in grant writing and for the creation of a database to avail funding schemes for the field.
- Improved collaboration between stem cell researchers and clinicians. Researchers should educate clinicians on cell biology as they are the bridge between the public and scientists.
- More sharing of facilities and expertise for capacity building.

A group comprising young scientists present, was established to begin addressing Africa's capabilities in orienting Stem Cell and Regenerative Medicine research to combat African Health Issues as a priority. The group has a Chairperson with regional co-ordinators from Northern, Eastern, Central, Western and Southern Africa ■



# Building Strong Research Ecosystems – generating evidence about what works for institutions in Africa

By: Imelda Bates Liverpool School of Tropical Medicine, UK

Innovation and research is essential for countries to solve their own health and economic challenges. Consequently, over the past decade significant resources have been invested in increasing the numbers and quality of African researchers. However, if these researchers are not able to do research in conducive environment they will become dissatisfied and demotivated, and possibly disengage completely from research.

Research institutions in Africa have traditionally suffered from chronic under-investment. The Malaria Capacity Development Consortium (MCDC) an Africa-focused malaria research programme, recognised the need to strengthen research institutions so they could retain talented researchers trained through their programme in Africa. However, there was no comprehensive information about the facilities and systems needed for these research institutions to flourish within a globally competitive environment. MCDC therefore requested the Capacity Research Unit (CRU) at the Liverpool School of Tropical Medicine, which specialises in generating evidence about strengthening research capacity, to undertake a two-year project. The purpose was to devise a systematic approach for improving the institutions' research environment and to test the approach in the four MCDC partner African universities/research institutions where the doctoral students and career researchers were based.

## Box 1. Components of institutional research management systems collated from publications

- Research strategies, policies and handbooks
- Institutional facilities (e.g. laboratory, IT, library)
- Support for funding applications
- Project management and control
- Researchers employment and careers
- Research skills development
- External promotion of research
- National research engagement and uptake

There have been previous studies on research management benchmarking but there was no single document available that detailed all the components of research facilities and management systems that an institution would need to foster, support, manage internationally-competitive research. From a search of literature concerning health, education and organisational management, CRU identified eight components (box 1) with 15-25 specific items within each of these components which characterised the facilities and systems needed to be a world class research institution. These components and associated items comprised the theoretical 'optimal' institutional research facilities and systems against which the MCDC partner institutions could be benchmarked.

CRU developed tools that enabled data to be collected about all these components and items. The tools were used to review existing institutional research capacity during 2-4 day visits to the four institutions and comprised guides for interviewing different staff cadres within the institutions (e.g. deans, heads of departments, research managers, finance officers,

researchers, laboratory technicians), and for reviewing facilities (e.g. laboratories, IT suite, study areas) and documents (e.g. handbooks, policies) relevant for research. Assets and gaps in the research facilities and systems of each institution were identified by comparing

with the theoretical 'optimal' situation. Common research capacity gaps included lack of an accessible research strategy, inadequate laboratory facilities and no quality assurance for outgoing proposals or incoming contracts.

Having a clear and agreed list of gaps in research capacity meant that the institutions could implement activities to build on assets and address the gaps. In the fifteen months after the baseline review, Skype and telephone calls with the review team were used to track changes in capacity against agreed pre-determined indicators. Overall the best progress was achieved in the components of 'supporting development of funding applications' and in 'project management and control'; least progress was made in 'developing research strategies' and in 'research dissemination'. A close 'insider-outsider' collaboration between the external research team and institutional staff was essential since the independent 'outsider' researchers could circumnavigate internal sensitivities and the 'insider' staff understood the institutional and national context<sup>6</sup>.

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# Influence of indigenous knowledge in building strong science and engineering research policy in Africa

Nwaichi, E. O. and Briggs, T. A.

## Summary

*Indigenous knowledge enjoys intimate understanding of their environments and hence is a soothing oil in the wheel of development through science and engineering research. Its uptake in Africa can only be realised if there is interlace of traditional knowledge in the guiding policy for research in science and engineering. This work presents the itinerary of indigenous knowledge in Africa vis-à-vis its consumption in science and technology and policy formulation to drive the most sought - after sustainable development in Africa.*

### 1. History of Indigenous Knowledge (IK) in Africa

Indigenous knowledge is a distinctive yet dynamic society – wide native knowledge and skills that propel exchange of information and developmental decisions. In their developmental strides, World Bank (1997) underscored the importance of IK in galvanising and boosting a nation's knowledge economy for a sustainable development that maintains or improves given livelihood.

Inappropriateness of traditional practices with fast changing political arena, environment and culture mostly linked to attendant challenges, has elicited interests among researchers to properly integrate traditional knowledge (Jacob, 2009; Lwoga et al., 2010) into policies governing science and engineering research in Africa and beyond. Colonialism arrived in Africa with foreign technologies or development concepts that may have been motivated economically or politically and offered short - term gains or non – sustainable solutions to identified problems. The result of such situation is dwindled motivation for local inventors, loss of community skills (Absolon, 2010), diminishing family and societal ties, technologies, artefacts and unconventional problem solving strategies. Closely associated with people's cultural values, IK is thus the centre of a balanced knowledge system. Quiroz (1996) reported that technologies are likely to be adopted faster and applied more successfully if it consists of a mix of foreign knowledge and indige-

nous practices developed and applied under similar conditions elsewhere.

It is therefore necessary to explore opportunities and possible and potential influence of much chorused IK on the formulated policies regarding science and engineering to maximise developmental benefits in Africa.

### 2. Policy in Africa to strengthen indigenous knowledge

Policy development in Africa since its first democracy in 1960, took cognisance of the nature and strength of the institutions/organisations within the African context, their relationships with one another, and their importance to the economy and African society in particular and the implications and impact of various other government policies. The focus sought a Science and Technology alignment with new thrusts in areas such as Education, Communication, Labour, Health (Bindir, 2011), Trade and the Environment.

Policy on new science and technology guidelines should include creation of clear channels for capacity building, establishment of mechanisms to re-allocate government spending according to new priorities to promote innovative solutions, particularly related to problems of the disadvantaged, driving more support from competitive sources of funding, promoting diffusion of research and technology development results, longer-term perspectives in planning and budgeting for R&D and adoption of necessary changes to bring about

these processes.

### 3. Innovation of policy mechanisms used

Africa should recognise that the flow of knowledge and technologies is also affected by policies of other arms of government other than that of science and technology. The co-ordinating role of other structures such as of technology, arts, culture, and science should be allowed to perform and the structured relationship between each other in order to facilitate the process of ensuring that issues related to financing, procurement, regulatory, governance, privatisation and competition policies are constantly under review in so far as they impact on the innovation process. What is also important to note is that the process for identifying priorities for science, technology and innovation takes place within the broader macro-development framework (Dutfield, 2006).

### 4. Modifications of scientific institutions in Africa

African countries need to promote and review government-funded science, engineering and technology institutions (excluding higher education institutions). Included were Science agencies, National Facilities and other parastatals. Africa countries need to model a sustainable mechanism for the purposes of assessing infrastructural gaps, overlaps, overlaps, funding mechanisms and state monitoring of scientific research and technological activities ....

**Continue on page 11**



(Amadi-Echendu, 2007) and output. There is need for a strong agency, to assess the strengths and weaknesses of African research and technology system. Also, in Africa the need to provide policy and legislative framework for transforming the higher education system and its institutions to be more responsive to societal interests and needs. A successful policy must restructure the higher education system and its institutions to meet the needs of an increasingly technological-ly orientated economy. It must also deliver the requisite research, the highly trained people and the knowledge to equip a developing society with the capacity to address national and continental needs and to participate in a rapidly changing and competitive global context (Nakata & Langton, 2005). In Africa national plan for promoting and establishing centres of excellence strongly encourage within its context especially in the universities and other higher institutions.

### 5. Interface of Intellectual Property Rights and Indigenous Knowledge

In colonial times, and residually in the so-called post-colonial times, indigenous knowledge was considered 'primitive', an obstacle to progress along the path to modern civilization. It was largely ignored or suppressed; and in many places, because of dislocation from our land and way of life, most of it was lost (Nakata, 2002, 2007). The method of transfer which was basically oral tended to be ineffective. With all the surrounding hiccups, protecting Indigenous Knowledge is a challenge. Amongst these challenges, Wendland (2005) insisted that preserving and safeguarding Indigenous Knowledge risks in advertently placing traditional cultural expressions (TCEs) in the public domain; thereby exposing them against the wishes of the owners. From the foregoing, it is obvious that Indigenous Knowledge has been mismanaged even as copyrights,

patents and trademarks etc. (Wendland, 2005, Andanda, 2012). This raises the question, "How functional is the Intellectual Property Rights system and its capability to integrate IK and the interests of the indigenous peoples where the IK originates from? As alluded to earlier by the Post-Colonial theorists, the transportation of the western institutions into African indigenous areas has imposed the Intellectual Property Rights system upon the IK system. Though, the Intellectual Property Rights system has come to stay because of its invaluableness, Young-Ing (2006) pointed out that many issues have arisen in the past years regarding problems resulting from the existing Intellectual Property Rights system's apparent inability to protect IK. It has become abundantly clear to informed practitioners that including traditional knowledge is an important and helpful approach to modern research policy planning (Pathak et al., 2012) and implementation when traditional people are directly or indirectly affected.

### Conclusion

Though contributions of Indigenous knowledge to science and engineering research in Africa have not been marked, most continental knowledge have originated from indigenous people in Africa and only need a strategized step to harnessing potential gains in local experiences and practices within the continent and even globally. Local inventions and how – to – use should be preserved for their expository validation, continuity, transfer or possible adaptation in the development of Africa.

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## Marian Nkansah wins first Al-Kharafi Prize



AAS Affiliate Marian Nkansah is the inaugural winner of the Fayzah M. Al-Kharafi Prize of The World Academy of Sciences (TWAS). The award with cash prize of USD 4,000 recognizes exceptional women scientists from scientifically and technologically lagging countries.

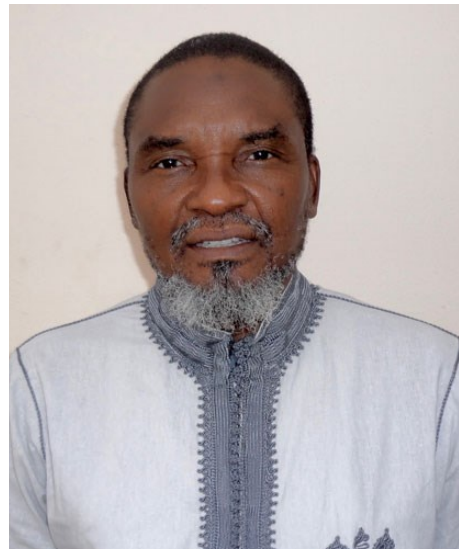
Marian Nkansah won this award in recognition of her research on the health risks associated with human exposure to hazardous heavy metals in routine activities of daily life.

Marian Nkansah's research analyses substances that Ghanaians consume to determine both whether they contain metal elements with nutritional value as advertised, such as calcium and iron – and harmful metals such as arsenic, cadmium and lead. The effects of heavy metal poisoning can be serious and long-lasting, leading to cardiovascular diseases, cancer and convulsions in children among other illnesses that can be fatal.

The Fayzah M. Al-Kharafi Prize is named after TWAS Fellow Fayzah M. Al-Kharafi from Kuwait. Al-Kharafi, the former president of Kuwait University, was the first woman to head a major university in the Middle East. She is also a former TWAS vice president for the Arab Region.

Marian Nkansah is among the first cohort the African Academy of Sciences Affiliate programme ■

## M.N. Hounkonnou wins 2016 C.N.R. Rao Prize



Mahouton Norbert Hounkonnou, AAS Fellow and professor of mathematics and physics at the University of Abomey-Calavi in the Republic of Benin is the recipient of the 2016 C.N.R. Rao Prize for scientific research. The prize acknowledges distinguished scientists from the world's scientifically lagging and Least Developed Countries who have made significant contributions to global science.

Hounkonnou was honoured for the outstanding level of his research in mathematics and his sustained commitment to mathematics education. His research in advanced theoretical fields finds application in many other disciplines, including physics, oceanography, health, management of water and ecosystems, climate studies and energy issues.

Hounkonnou is a member of the International Association of Mathematical Physics and the American Mathematical Society. He is the founder of the International Chair in Mathematical Physics and Applications (ICMPA-UNESCO Chair) of the University of Abomey-Calavi, which selects African students from over 13 French- and English-speaking countries to follow graduate programmes that attract prominent and leading mathematicians.

The C.N.R. Rao Prize was established in 2006 by TWAS founding Fellow and former TWAS President C.N.R. Rao. The prize carries a cash award of USD 5,000 ■



## Esi Awuah receives state honour in Ghana



Prof Esi Awuah (second from left) in a picture with Ghana's president John Mahama (first from right), speaker of parliament (second from right)

Prof (Mrs) Esi Awuah, AAS Fellow, has received THE STATE HONOUR OF OFFICER OF THE ORDER OF THE VOLTA (OV) from the president of Ghana. This honour was conferred on her in recognition of her outstanding contribution to Public Service especially in the field of Engineering, Environment and Sanitation Education in Ghana.

Esi Awuah was the founding Vice – Chancellor (VC) of the University of Energy and Natural Resources (UENR), Sunyani from April 2012 to July, 2016. Among key achievements as Vice-Chancellor of the UENR are; Development of e-turbine, the power bank from used telephone battery chargers, the design of speed ramps as energy sources for street lights and the Fuelless Generator APloGo (All Power belongs to God) to supplement power supply and address the energy crisis in Ghana and other parts of the African continent by staff and student from UENR; design and development of Ecodrone to monitor nefarious activities in the forest and water bodies and for advance studies in resource conservation; and installation of the Earth Observation System to monitor fire and floods in the West African sub-region. Others include increase in student enrollment from 154 to 2,600 in 2016; increase of three (3) programs to twenty (20) in 2016 ■

## Juma honoured for thought leadership in innovation

AAS Fellow Prof Calestous Juma is the 2017 recipient of the Breakthrough Paradigm Award, given in recognition of individuals who are providing leadership to ensure the world's inhabitants live on an ecologically vibrant planet with a secure and prosperous future.

The US-based Breakthrough Institute gives out the award every year, which Prof Juma is receiving in recognition of his scholarship and thought

leadership in biotechnology and innovation.

Juma, a Professor of the Practice of International Development at the Harvard Kennedy School and Director of the Science, Technology, and Globalization Project at the Belfer Center for Science and International Affairs, will receive his prize in 2017.

Prof Juma is a prolific academic

whose work on innovation includes two books; *"The New Harvest: Agricultural Innovation in Africa"* and *"Innovation and Its Enemies: Why People Resist New Technologies"*, published in 2011 and 2016, respectively.

He is a former Executive Secretary of the UN Convention on Biological Diversity and the founder of the African Centre for Technology Studies in Nairobi ■

# Communique on AAS/AMU international symposium and pre-symposium school

The International Symposium and Pre-Symposium School on "Current Research Trends in Mathematical Sciences and Applications" organized by AAS and AMU were hosted by ECOWAS and NMC-UNESCO Chair on Mathematics in Abuja from 3rd to 20th May, 2016. The Symposium closed with various resolutions and recommendations as follows:

1. The participants at the symposium observed with appreciation that there was a two-week pre-symposium School for younger mathematicians – Post Doctoral, Postgraduate students, and young lecturers. It is hoped that such capacity building efforts would continue all over the continent.
2. All participants and lecturers commended the organizers of the Symposium for the apt topics, quality of Speakers and good facilities;
3. The participants commended AAS, IMU, AMMSI and ECOWAS for their support and urged the organizations to continue to support this capacity building exercise within the sub-regions of the continent.
4. There is a need to build up a critical mass of research mathematicians and other mathematical scientists for the overall scientific, technological and economic development of the continent;
5. More emphasis should be placed on encouraging girls/women for careers in the mathematical sciences so as to reduce the gender gap;
6. There is a need to encourage sound training at Ph.D. level including visits abroad and international contacts;
7. Emphasis should be on research quality rather than quantity; Also, substandard journals should be avoided;
8. Established mathematical scientists should use their network to open doors of opportunities for upcoming young ones;
9. There should be inducements by way of good scholarship for those who want to study mathematical sciences as well as enhanced entry opportunities into various careers for mathematical sciences graduates;
10. The dichotomy between Pure and Applied mathematics should be de-emphasized. Students should be encouraged to understand mathematics as one and single area of Knowledge;
11. Conscious effort should be made to encourage more upcoming research mathematicians to study pure mathematics at doctoral level due to the current dearth of pure mathematicians in African universities;
12. Regular meetings of HODs and Professors of mathematical sciences in Nigeria should continue to be organized by NMC, Abuja;
13. There is urgent need for a restructuring of the mathematics teacher education programme in favour of more mathematics subject matter dose for the pre-service teachers and would-be mathematics educators;
14. At the secondary level non-mathematics education graduates should not be allowed to teach mathematics;
15. Mandatory continuous professional development programme should be organized for mathematics subject teachers (and indeed all subject teachers) annually. Such trainings should provide them with modern methods and techniques of teaching Mathematics, including the integration of latest IT tools into their teaching of the subject;
16. African governments should, as a matter of urgency, declare a state of emergency on the teaching and learning of Mathematics. In Nigeria, the government should then go ahead to provide more funding for the National Mathematical Centre (NMC) to prosecute its mandate effectively and efficiently;
17. Appropriate IT tools should be used to make teaching and research more effective and enhance students learning;
18. Remarkable improvement of teaching and research facilities, infrastructure and equipment in our schools and tertiary institutions should be vigorously pursued;
19. In Africa, all Mathematical Sciences Centres and universities should be adequately funded to beef up their capacity building activities. In particular, the National Mathematical Centre in Nigeria should be well funded;
20. All Mathematical Sciences Centres in African countries should be encouraged to anchor research connections with Industries and other Research Institutions.
21. Popularisation of mathematical sciences should be intensified in its various ramifications

## Using gene drive approaches

Continued from page 6

The recent creation of the African Biological Safety Association was highlighted as a positive development, as well as the fact that the WHO Guidance Framework for Testing Genetically Modified Mosquitoes is being updated. Nonetheless the need for more capacity building of African scientists and regulators was noted as a priority, as well as the importance of seeing more Africa-based scientists convening and leading discussions on these types of new technologies. Panelists also echoed the morning's comments about the importance of early engagement, in particular across-disciplines and with the broad scientific and policy-making community ■



## Launch of Grand Challenges Africa Grants

The African Academy of Sciences and the NEPAD Agency's Alliance for Accelerating Excellence in Science in Africa (AESA) will over the next five years spend US\$7 million to fund innovative ideas and research through the Grand Challenges Africa programme to accelerate scientific breakthroughs that will improve Africa's health and developmental outcomes.

The funding will be given through the Grand Challenges Africa Grants, which AESA has partnered with the Bill & Melinda Gates Foundation to provide to innovators to find local solutions to solve Africa's pressing challenges and help the continent to achieve the Sustainable Development Goals (SDGs).

The Grand Challenges Africa Innovation Grants will comprise of the Grand Challenges Africa Innovation Seed Grants (GCA-ISG) and provide funding for scaling up innovations.

The Grand Challenges Africa Grants will solicit ideas that can be developed into ground breaking research and innovations by providing up to US\$100,000 in Grand Challenges Africa Innovation Seed Grants (GCA-ISG) for two years to each of the up to 40 projects that will be funded over the five-years that the scheme will run.

GC Africa will fund innovators resident in Africa with any level of experience, working in any discipline in colleges, universities, government laboratories, research institutions, non-governmental and non-profit organisations. Innovations which receive the US\$100,000 seed grants and show promise for scaling up will qualify to apply for additional funding of up to US\$1 million.

Grand Challenges Africa is part of global Grand Challenges, a family of

initiatives fostering innovation to solve key health and development problems.

The first call for proposals of the GC Africa Innovation Seed Grants is focused on innovators seeking:

- 1) Providing new impetus and solutions and strategies to help Africa meet the SDG 3 target for Maternal, Newborn and Child Health (MNCH). These cover key areas of:

- new technologies to enable rapid identification of exposures that lead to poor outcomes in pregnancy, birth and in the first month of life — these could be exposures to communicable and non-communicable diseases.
- Precision medicine approaches and techniques to identify microbes and other exposures in Africa that may increase susceptibility to non-communicable diseases (cancer, cardiovascular diseases, etc.) in mothers and children under 5 years of age.

- 2) Creative approaches to engage the public, and inspire policy and decision makers to increase investment in African Research and Development.

The funding will also promote intra-African collaboration and promote the sharing of skills and ideas within grand challenges projects. Partnering with Institute Pasteur will also enable AESA to fund additional projects that promote intra-African collaboration.

AESA has established an open, merit based and blind review selection process, where the names and institutions of applications will be hidden from the peer review committee of scientific experts to ensure that the process is fully transparent. Find further information on how to apply for the Grand Challenges Africa Innovation Seed Grants at [www.aesa.ac.ke](http://www.aesa.ac.ke).

## AAS Strategy and Policy Manager honoured



Evelyn Naumbiru-Mwaura, Strategy and Policy Manager, AAS

Strategy and Policy Manager of the African Academy of Sciences, Evelyn Namubiru-Mwaura has been honored for her leadership in business and government. Dr Namubiru-Mwaura was selected as a 2016/17 finalist in the Agricultural Sector in the CEO Global Africa's Most Influential Women in Business and Government Awards Ceremony. The awards were held in Kampala, Uganda, on 19th August 2016.

CEO Global awards provide a platform to recognise women across Africa who are consistently making a positive impact in their different areas of expertise. CEO Global recognises women's leadership and achievements in their regional sectors, selecting winners after a lengthy process of considering thousands of nominations in 24 different sectors. Nominations are considered by a panel of 12 judges selected from prominent positions in business and government who consider each finalist's information, projects and interviews. The final results are then audited by KPMG.

Congrats, Evelyn!

## Science\*Policy\*Africa



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is published by the  
African Academy of Sciences Secretariat

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### "Science \* Policy \* Africa"

Is a quarterly newsletter of the African Academy of Sciences. The Newsletter carries information on science and policy issues on the African continent and beyond. It seeks to deepen the science-policy discourse in Africa. "Science\*Policy\*Africa" also provides information on activities of the AAS to the global science and policy community. Views and opinions expressed in this newsletter are those of the authors and do not necessarily reflect the official policy or position of the African Academy of Sciences.

## Building Strong Research Ecosystems – generating evidence about what works for institutions in Africa

### Continued from page 9

The latter could therefore validate the findings and assess the feasibility of proposed activities to address gaps in research capacity that emerged from the baseline review.

The use of an explicit process and indicators means that all the stakeholders, including researchers, institutional managers, national governments, external partners and funders can be 'on the same page' about the vision for, and progress of, the research capacity strengthening activities. It can also produce evidence for funders and others about progress and impact against targets. Real-time adjustments can be made as research capacity strengthening is implemented in response to rapid and ongoing sharing of lessons about what does and does not work in particular contexts. This 'fail fast' and 'build on what works' approach promotes optimal use of resources.

The process and tools for assessing institutional research capacity worked well across the diverse institutions and were viewed very positively by the institutional partners. Not only did they help the institutions implement activities to build on their assets and address their own research capacity gaps, but they enabled comparisons thereby highlighting impediments to improving research 'ecosystems' that were common across multiple institutions. This information could provide a powerful advocacy instrument to persuade governments and other funding partners to invest in strengths and in overcoming discrete obstacles to enhancing research capacity at that exist at national and supra-national levels.

### About the author:



Imelda Bates is the Head of Capacity Research Unit at the Liverpool School of Tropical Medicine, UK. The unit generates research evidence about what does and does not work for strengthening the research capacity of institutions in Africa as well as metrics for demonstrating the progress and impact of these initiatives.

Website: <http://www.lstmed.ac.uk/research/centres-and-units/capacity-research-unit>

## Najia KBIR ARIGUIB passes away



Najia KBIR ARIGUIB

It is with great sorrow that the African Academy of Sciences announce the passing away of Professor Najia KBIR ARIGUIB on Friday, November 17, 2016. Prof Ariguib, an eminent Chemist from Tunisia, has been a Fellow of the Academy from 1985. Najia, as she was fondly called, was an excellent scientist. Najia KBIR ARIGUIB served on the AAS Governing Council as regional representative of Northern Africa.

She was an excellent role model for all researchers and a great inspiration to female scientists in Africa and the North of Africa in particular.