UNIVERSITY OF GHANA

June 2019

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Inspiring UG™

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ORID

OFFICE OF RESEARCH, INNOVATION AND DEVELOPMENT

UNIVERSITY OF GHANA PLASTIC RECYCLING PROJECT (UGPRP)

(A student-led initiative under the auspices of the VC's Green Project)

CIYZOE Supported By:

EDITORIAL

This second issue of **'Inspiring UG'** features a compilation of articles that reflect the diversity and scope of research underway at the University of Ghana (UG). The publication characterizes UG's quest to intensify research and build capacity across all spheres of scientific endeavour.

The selection of research in this issue encompasses the humanities, applied sciences and medicine, and demonstrates the impact of adding value to basic resources, the benefits of engaging local communities for solutions to health care challenges and the rooting of religious and behavioural practices in poetry among others.

Our scientists have identified health interventions that remedy the adverse effects of livelihood practices to empower and safeguard the fisheries value chain. In the engineering sciences, solutions have been proffered to the menace of plastic pollution of water bodies, while agricultural produce is being transformed into a therapeutic agent in the biological sciences.

As competition for research funding intensifies, emphasis on the *impact* of research outcomes is key to sustain funding. We seek therefore to present scholarly work in practical ways that speak to communities and make positive impacts on livelihoods.

Publication, Dissemination and Translation (PDT) Team

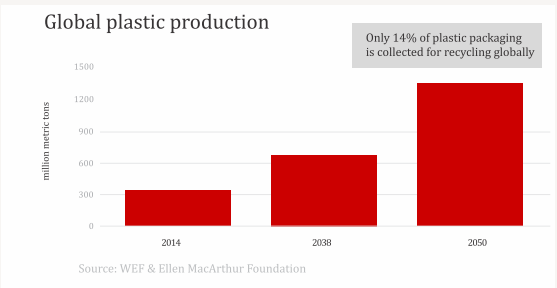
CONTENTS

GARBAGE-IN, ENERGY-OUT: VALORISING PLASTIC WASTE IN GHANA

Plastics, which are basically long hydrocarbon-chained compounds synthesized from petroleum products, have become very popular because of their unmatched usability, wide range of application, non-degradable nature and low cost. In Ghana, the estimation is that over 1.7 million tonnes of plastics are used annually. The ever-increasing demand has also resulted in a huge amount of plastic waste, and due to disposal challenges, pose a serious threat to the environment, waterways, water bodies and farmlands. The greater risk of plastic pollution to general human health has become a major global concern.

As a result, the implementation of prudent plastic waste management and valorisation systems is imperative to minimize these adverse environmental impacts. Recycling, reusing, incineration and energy recovery are the main techniques of plastic waste management. Energy recovery is a promising route for converting waste material into useful energy products; the most commonly used method of energy recovery is thermal cracking (Pyrolysis), which produces liquid and gaseous fuel products with high energy values.

With the exponential growth in industries as well as in population, the demand for energy, which is mostly petroleum-fuel based has likewise increased. Coupled with the ever-increasing world price of crude oil, the resultant search for alternate energy resources can be mitigated by the recycling and conversion of the infinitely growing plastic waste into energy to diversify the energy resource.



These issues are precisely what preoccupy ***Dr. David Dodoo-Arhin*** of the Department of Materials Science and Engineering and his colleagues, as they explore the conversion of plastic waste into liquid fuel and gas, as well as their potential utilization in light-duty engines. Their early studies, supported by the University of Ghana BANGA-Africa seed grant fellowship, in collaboration with CNRS Centré RAPSODEE of Ecole de Mines d'Albi-Carmaux, France, are already yielding very promising results, as they explore further funding opportunities to scale up their research and engage trans-disciplinary approaches to valorising plastic waste in Ghana.

CONVENTIONAL DRUGS, PLANT MEDICINES AND FOODS:

A Complementary Combination?

Plant medicines are patronized by about 80% of Africans and are generally considered safe remedies that may be ingested over long periods of time. For many people, plant medicines are first-line remedies. Scientific investigations have revealed, however that the concurrent intake of some plant medicines and conventional drugs can result in therapeutic failure or drug toxicity. A classic example regards the intake of ginseng, which has been reported to increase physical stamina and alertness, when taken with several conventional drugs for example, those substrates of a particular catalyst, such as Cytochrome P450 3A4 (CYP3A4). Examples of drugs metabolised by CYP3A4 include cyclosporin and acetaminophen (paracetamol). When such conventional drugs are taken together with CYP3A4 substrates, it appears to cause a rapid breakdown of the drugs which, in turn, generally translates into the therapeutic failure or ineffectiveness of these conventional drugs. This can also result in further adverse effects if the broken-down products or newly formed ones are harmful.

Similarly, consumption of some foods while taking conventional drugs has the potential to also result in adverse outcomes. For instance, eating of cruciferous vegetables such as lettuce, cabbage and broccoli, increases the breakdown or biotransformation of acetaminophen; thus, effectiveness of the drug is reduced by eating such foods.

Prof. Regina Appiah-Opong


Morinda Lucida

Although the interaction potential of drugs is assessed during pre-clinical studies in developed countries, for instance by the Food and Drug Administration in the USA, this is not typical in many developing countries. Neither is the evaluation of the drug-food interaction potential a conventional study norm of regulatory bodies. It would appear that reports on the drug interaction potential with natural products are hardly requirements of safety assessments of drug manufacturers.

Professor Regina Appiah-Opong, Head of the Department of Clinical Pathology at the Noguchi Memorial Institute for Medical Research (NMIMR), is extremely passionate about this subject and has devoted much of her working life to biomedical research. Working in the field of toxicology/pharmacology, where drug-metabolizing enzymes are employed in evaluating drug candidates as part of pre-clinical studies on these drug candidates, Professor Appiah-Opong is exploring the interactions between conventional drugs, herbs and foods. Her particular interest in drug-drug/drug-herb/drug-food interactions, pharmacokinetics, pharmacogenomics, drug discovery, antioxidants and environmental contaminants (heavy metals, aflatoxins), has seen her collaborate extensively with domestic and international partners. Professor Appiah-Opong's current work has focused on anti-cancer and anti-malarial agents, and her collaboration with colleagues in Japan and Ghana has resulted in a filed patent on an anti-typanosomiasis agent. She has played a major role in the construction of a DNA cassette vector that is useful for drug susceptibility testing of anti-HIV protease inhibitor drugs.

Globally, the pharmaceutical industry is highly regulated with approval regimes for drug therapies subjected to extensive pre-clinical and clinical trials. While the rigorous nature of clinical trials provides a safety net for end users, the use of approved drugs in a particular jurisdiction does not necessarily translate into safe use in other populations. According to Professor Appiah-Opong, these dynamics raise questions about the generalized applicability of drugs approved by authorities in other parts of the world.

She is also collaborating with colleagues at the University of Ghana and the University of Washington, Bothell, in research on genes of CYP3A4 drug metabolising enzymes to identify differences in Single Nucleotide Polymorphisms (SNPs) between Caucasian and Ghanaian ethnicities, and is seeking funding to extend her work to different ethnic groups in West Africa with the goal of determining:

i. The effect of drugs approved and tested in other countries on Ghanaians
ii. Plant-based medicines and foods that interact with conventional medicines

Ultimately, her goal is to create awareness and establish in Ghana, the means of screening drugs, drug candidates, plant medicines and food for drug interaction potential. This is to safeguard public health and support the efforts of pharmaceutical industries. She seeks to develop appropriate medical protocols for imported drugs and provide education to maximise the effects of drugs and other therapies through nutrition.


Moringa Oliefera

LITERATURE, MUSIC, AND PRAYER REPERTOIRES AS SOURCES OF AFRICAN VALUES, SPIRITUALITY AND CHRISTIAN THEOLOGY

The argument that Christian faith is not a matter of opinion, but "*a community-building or community-transformative appropriation of the very deepest poetic truth*" runs deep in many communities, provoking the question of how these traditional spiritual traits and values have survived and modulated within contemporary African Christianity.

With a unique focus on the critical role of poetic elements such as language, literature and oral forms as repositories and vehicles for such spirituality and values, ***Dr. Rose Mary Amenga-Etego*** and colleagues from the University of Ghana (Dr. Abraham Nana Opare Kwakye), Ebonyi State University (Dr. Ngozi Emeka-Nwobia), Canada (Dr Sara Fretheim), and USA (Dr. Paul Onovoh) are examining 'Literature, Music, and Prayer Repertoires as Sources of African Values, Spirituality, and Christian Theology' with a grant from the African Theological Advance programme.

Their work bridges theology, social sciences, and the arts and seeks to make a creative contribution by analyzing selected literary works, gospel songs, prayers, archival and oral histories, as well as praise poetry from selected societies and individuals in Ghana and Nigeria, so as to discern ways in which African Christian spirituality and values are perceived and expressed by members of these communities.

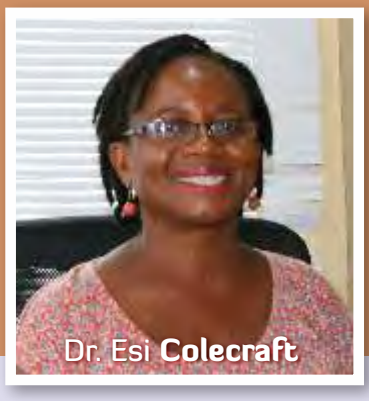
The literary, liturgical, musical, archival and historical works that are being analysed in combination with interviews, participant observation and archival studies raise issues of gender, ethnicity, identity, agency, and colonialism/post-colonialism. The team seeks to demonstrate the ways in which these linguistic works are sources of 'reflective theology' in and of themselves, while also elucidating the importance of these oral and written forms as resources for wider theological scholarship.

Thus, literature, music and prayer repertoires are not just tools or avenues for African Christians at the grassroots to theologise, but also, sources of social mobilisation (religious and/ or social capital) for community development.

It is therefore important to note that such reflective or grassroots theology is neither a replacement nor competitor for academic theology. Rather, when the two function together, theology acquires an authentic character in which scholars and believers work together within the same context.

Within the scope of this project, and as a community of theological scholar-practitioners ourselves, Dr. Amenga-Etego and her collaborators endeavour to elucidate the myriad ways in which African writers, singers, historians, and lay church people theologise.

Dr. Sara **Fretheim**, Dr. Abraham **Kwakye** & Dr. Rose Mary **Amenga-Etego**



EMPOWERING WOMEN BY CREATING SAFEGUARDS AGAINST Anemia

Anemia among reproductive-age women persists as a public health problem, putting many of them at risk of adverse health, pregnancy and delivery complications, poor birth outcomes and even death. These outcomes have unfortunate implications for their livelihoods and ability to support their families. With complex and multifaceted causes, resolving the problem requires multi-disciplinary actions, particularly involving the agriculture, infectious disease control and nutrition sectors. Since 2016, ***Dr Esi Colecraft***, of the Department of Nutrition and Food Science, has been collaborating with colleagues at the University of Michigan, to address the various and interlocking mechanisms associated with anemia prevention. The Pathways to Anemia Prevention project explored agricultural, nutritional, and infectious disease pathways to addressing anemia among women, with a focus on the regions with the highest burden of anemia in Ghana: the Northern, Volta and Central regions.

In 2018, the Pathways project team with collaborators from the University of Michigan, Innovations for Poverty Action (IPA), Netherlands Development Agency (SNV), and Viamo received additional funding from the Bill and Melinda Gates Foundation (BMGF) and the Department for International Development (DFID) for a follow-up study titled: *The Invisible Fishers: Empowering and Safeguarding Women in Fisheries Value Chains in Ghana to Reduce Anemia.*

This latter study builds on specific key insights from the Pathways project, including the fact that the fisheries value chain (post-fish landing) in Ghana is dominated by women, although they remain largely invisible. The biomass-based fish-smoking livelihoods predisposes women to anemia due to changes in iron metabolism associated with chronic smoke inhalation, and that anemia-related social behaviour change education is needed to address knowledge and cultural barriers to anemia prevention.

The Invisible Fishers project is piloting the feasibility of intervention strategies for addressing anemia among women engaged in fish-smoking livelihoods in the Volta and Central regions of Ghana. In each region, six fishing communities were selected, and ten women with small- to medium-scale fish-smoking enterprises have been chosen (from each of these communities) to participate in the study.

For the 120 women fish smokers in the twelve communities, three intervention strategies (packages) are being tested, over a nine-month period:

A) anemia-based social behaviour change education delivered via mobile voice messages;

B) discounted micro-loans with entrepreneurship training; and;

C) introduction of improved smoking oven technology (Ahotor oven) and associated practices.

The experimental study randomly assigns the following three package sets to two communities in each region:

Group 1: Package A ONLY (education only)

Group 2: Package A PLUS Package B (education plus micro- loans with entrepreneurship training)

Group 3: Package A PLUS Package C (education plus smoking over technology)

The findings from this pilot work are intended to inform a national level study, refining intervention strategies and design/implementation of data collection processes for a future full-scale study.

A SOCIAL AFFLICTION:
IMPROVING EARLY CASE DETECTION OF

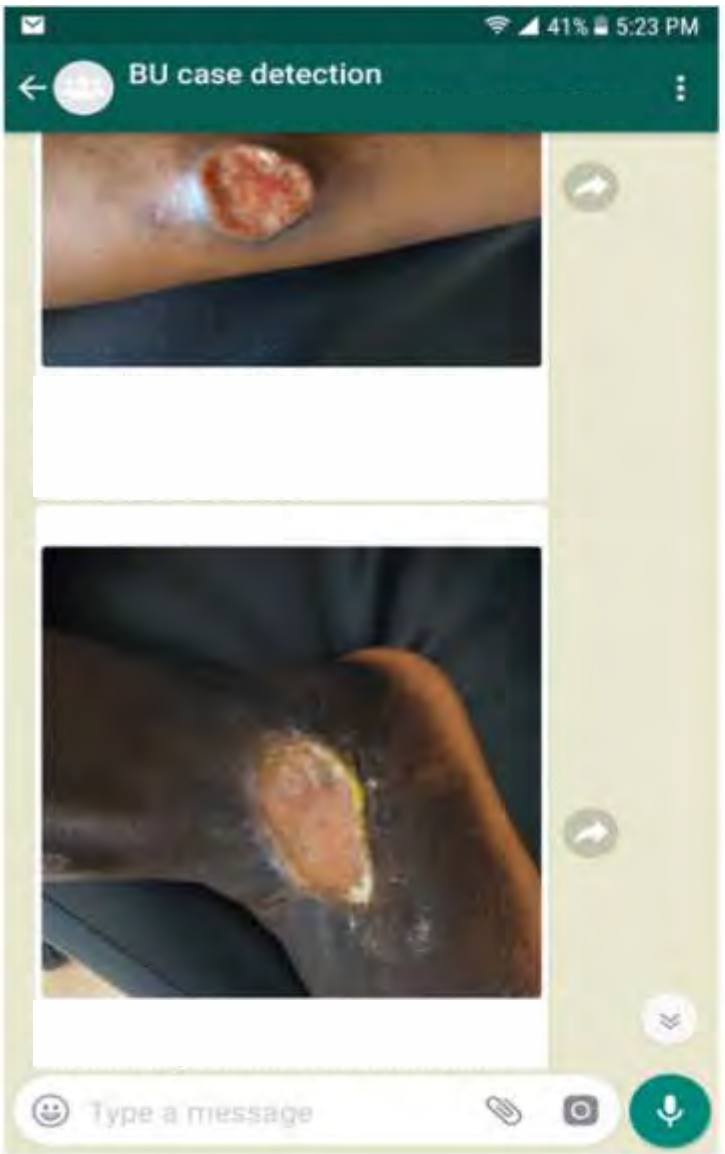
Images of Buruli ulcer sufferers, seen on both local and international media, reveal the devastating effects of a disease that affects already vulnerable societies. Despite the social stigma attached to the disease, interventions to arrest its spread and cure patients have been challenged by lack of access and information for early detection and treatment.


Dr. Lydia **Mosi**

Buruli ulcer is caused by a bacterium called *Mycobacterium ulcerans* and manifests either as a boil-like lesion called a nodule, or with parts of the skin being discolored and firm (referred to as plaque). Other manifestations are a non-pitting oedema (i.e., a swelling of mostly the lower or upper limbs) that leaves a clear impression when depressed, and open undermined lesions referred to as ulcers. This bacterium uniquely produces a lipid toxin (mycolactone) that is responsible for the progression and extensive destruction of the skin and soft tissues. In some cases, these ulcers invade up to a third of the total body surface of affected individuals.

Most Buruli ulcer cases in Ghana are found in remote and rural parts of the country where appropriate care is limited due to an overstretched health delivery service. The challenges of health care delivery in many developing countries mean that interventions to effectively estimate the burden of the disease for measured deployment is lacking. Poor understanding of the mode of transmission of the pathogen from endemic aquatic environments to humans and other mammals in affected communities compounds the Buruli ulcer menace.

Dr. Lydia Mosi, Head of the Department of Biochemistry, Cell & Molecular Biology has, for over a decade, been at the forefront of the charge to understand the epidemiology and biology of this debilitating skin infection. Working with a team of scientists, on the transmission, pathogenesis and diagnosis of the pathogen and its infections, her goal is to achieve early laboratory confirmation of the infection in order to facilitate the use of efficient antibiotics for treatment. Dr. Mosi and her colleagues have identified a novel, yet easy and efficient method to detect cases in rural communities using the WhatsApp platform on smart phones.



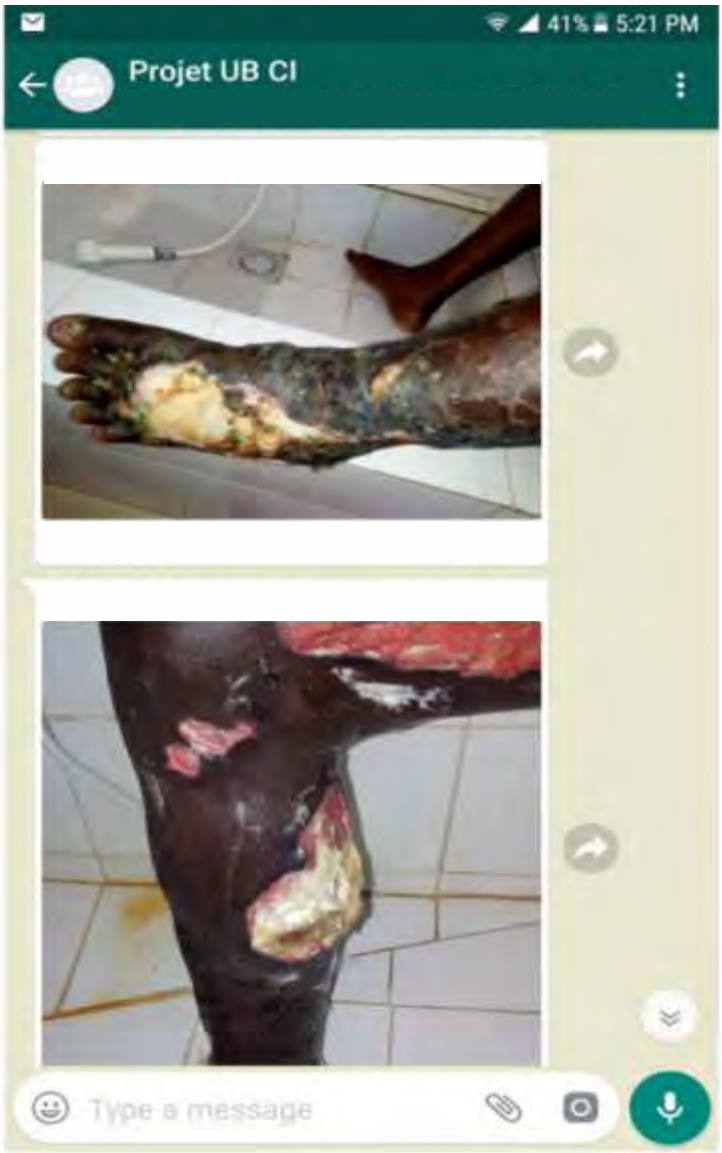
Sharing and coding of patient lesions on WhatsAp

A SOCIAL MEDIA INTERVENTION -
BURULI ULCER IN GHANA AND COTE D'IVOIRE

This novel method was presented by the team at the March 2019 biennial conference on Buruli ulcer in Geneva. The World Health Organization's (WHO) Technical Advisory Committee has made early detection and antibiotic treatment a core strategy for tackling the disease.

The work of Dr. Mosi and her colleagues in the two most affected countries in West Africa, Ghana and Cote d'Ivoire, received funding from a GCRF-MRC grant, with support from the National Buruli ulcer control programmes in both Ghana and Côte d'Ivoire.

During Buruli ulcer infections, it is expected that the interaction of the pathogen and skin cells will facilitate the production of specific metabolites.



pp® platforms (Ghana and Cote d'Ivoire)

The main research project aims to determine these unique Buruli ulcer metabolites, which can then be further developed into efficient, field applicable and easy to use diagnostic tools.

To confirm the status of the disease from a suspected Buruli ulcer patient, involves a tedious sampling process, followed by the transfer of the samples to a reference facility. Appropriate facilities for testing samples are generally absent from the communities where patients reside. Less than 50% of samples taken actually reach a reference laboratory, and an even lower proportion of the results from tested samples reach a rural health facility to trigger treatment.

The number of suspected and confirmed cases of Buruli ulcer identified in the active case district of the study showed the prevalence of Buruli ulcer in the Amansie Central District in Ghana to be high, but the lack of effective case identification and confirmation has hampered the identification of these cases. Use of the WhatsApp® group platform demonstrated that it is possible to establish a case identification and surveillance system in real time, which can also be used for monitoring case confirmation, treatment and treatment outcomes.

The use of technology will enable health care providers to reach wider audiences to offer low-cost opportunities to connect through social media platforms with populations on a large scale. Other functional benefits of the use of smart phones include the potential for real-time monitoring of the disease, identification and feedback of health indicators, real-time usage, and data being automatically generated within most technology platforms all of which are advantageous for evaluation purposes.

> ***"The use of the WhatsApp platform on smart phones has provided an easy and efficient method to detect cases in rural communities."***

Cassava as a Biomaterial Reinforcement for TISSUE ENGINEERING

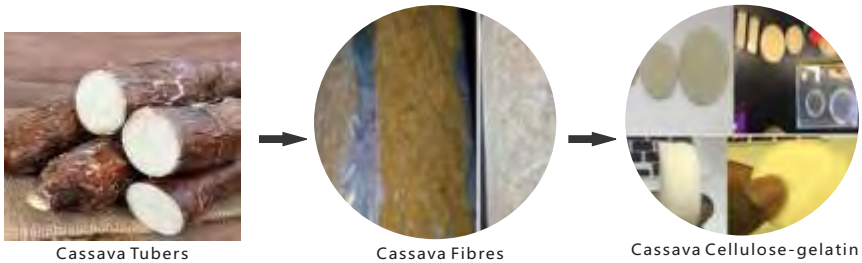
Tissue Engineering (TE) is the specialized discipline that combines cells, biomaterials, and suitable biochemical factors to form functional biological substitutes for the restoration, maintenance, or enhancement of tissue function. One major component in many TE processes is the use of scaffolds developed from natural or synthetic biomaterials to serve as support for cells as they promote cellular activity and tissue growth. A required critical property of tissue engineering scaffolds is their ability to provide mechanical strength and structural support for cells during tissue development. In recent times, natural fibres have become interesting targets as novel biomaterials for the development of tissue engineered fibre-reinforced scaffolds due to their low cost, availability, eco-friendliness, good mechanical strength, and potential ability to safely degrade inside a living host.

Cassava bagasse is a waste by-product of industrial cassava starch extraction. Despite being waste, the bagasse contains a considerable amount of natural cellulose fibres that are a potential novel biomaterial for developing tissue engineering scaffolds. Before a novel material can be successfully introduced in tissue engineering, however, it must be characterized to understand, among other things, its mechanical, physicochemical, thermal, and microstructural properties. This is one of the objectives of ***Dr. Elsie Effah Kaufmann's*** research in the Department of Biomedical Engineering, where she seeks to develop novel biomaterials from waste products, and to characterize the fibres in cassava bagasse in order to provide the necessary material properties needed for the exploitation of the fibres for use in the fabrication of scaffolds for tissue engineering.

Dr. Kaufmann and her colleagues have isolated and characterized some material properties (mechanical, thermal, physicochemical and microstructure) of cassava cellulose fibres and demonstrated the use of these fibres as reinforcement in gelatin composite scaffolds. Their recent work has indicated that cassava fibre has reasonable mechanical strength and resilience comparable to other natural fibres and further demonstrated an improvement in mechanical properties over pure gelatin scaffolds when cassava cellulose microfibres are used as reinforcing biomaterial.

Their research provides critical data for consideration in the evaluation of new biomaterials to enable biomedical engineers develop mathematical models and biomechanical simulations to predict the behaviour of the cassava cellulose fibres for *in vivo* applications. The research therefore bridges a knowledge gap regarding the material properties of cassava fibres and promotes cassava fibre as a potential biomaterial for applications in biomedical engineering.

Given the large quantities of cassava bagasse that typically go to waste in industrial starch manufacturing and the low cost of cassava, this work has potentially significant commercial and economic impact. Dr. Effah Kaufmann's research also proffers strategies for the use of cassava fibre in wound healing and tissue culture applications.



Cassava Tubers → Cassava Fibres → Cassava Cellulose-gelatin Composite Scaffold

REDUCING INCIDENCE OF HARMFUL ORGANISMS IN GHANA'S VEGETABLE EXPORT MARKET

Ghana's vegetable exports experienced several interception notifications between 2012 and 2015, largely due to the presence of harmful organisms, specifically quarantine pests; mostly thrips, whiteflies, fruit flies, false codling moth (FCM) and eggplant fruit and shoot borer (EFSB) in consignments destined for export to the European Union (EU).

These pests are associated with such vegetables as *Capsicum* (chilli pepper), *Solanum* (eggplant and aubergine), and the gourds (luffa, bitter and bottle gourds, i.e, *Luffa, Momordica, and Lagenaria*, respectively). These organisms, although they do not pose a threat to human health, can cause severe economic damage by affecting crop yields. Thus, such vegetable produce is banned for export to countries where these pests are absent or are present but not widespread and are under official control.

Scientists from the African Regional Postgraduate Programme in Insect Science (ARPPIS) have been engaged in a project titled '***Reducing Incidences of Harmful Pests in Ghana's Export Vegetable Sector***' with the goal of addressing the ban on export of vegetables to the EU market. A team of Entomologists, led by ***Dr Ken Okwae Fening*** of the Soil and Irrigation Research Centre and ***Dr Maxwell Kelvin Billah*** of the Department of Animal Biology and Conservation Science, in partnership with the GhanaVeg Project, the Ghana Association of Vegetable Exporters (GAVEX), and the Ministry of Food and Agriculture (MoFA), have developed interventions to manage these pests of quarantine importance associated with vegetables from Ghana. With funding from the Centre for Development Innovation (CDI), Wageningen, Netherlands, the United States Agency for International Development (USAID), the Centre for Agriculture and Bioscience International (CABI) and the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), the project aimed to reduce the incidence of harmful pest tainting vegetable produce, which lead to their rejection or interception during export.

The research team conducted participatory trials in selected exporter out-grower farms in three agro-ecological zones, (i.e., the forest, coastal savanna and forest-savanna transition zones), where most vegetables for export are cultivated, and high pest pressure exists. These are areas designated as hot spots. The research demonstrated that the interventions which they have developed could offer 100% protection against most of the key pests of quarantine importance encountered in the field. The Integrated Pest Management protocols, which involved preventive, monitoring and control interventions, were adopted in trials conducted for the most commonly intercepted pests (thrips, whiteflies, fruit flies, FCM and EFSB) on the three critical commodities (eggplant, chillies and gourds).

The pest management protocols involve the use of farm sanitation, mass trapping of pests using appropriate lures and sticky traps for the different species, use of bio-rational insecticides (botanicals and microbials) as well as other physically-acting insecticides and less persistent binary synthetic pesticides.

A survey of existing pest management practices among vegetable exporters and their cohort of out-growers engaged in the production value chain was also undertaken, with two goals:

i. to develop scientific protocols for the management of these pests of quarantine importance; and

ii. to develop a roadmap for pest reduction in exported vegetables from Ghana to the UK in order to reverse the ban.

The outcomes of this research provided baseline data for policy interventions adopted by Ghana's National Plant Protection Organization (NPPO), which is the Plant Protection and Regulatory Services Directorate (PPRSD) of the Ministry of Food and Agriculture (MoFA). It has successfully led to the establishment of a roadmap for pest reduction in vegetables for export, which is the NPPO's approved set of protocols for producing vegetables for export with endorsement from the EU authorities. These interventions contributed significantly to the lifting of the ban on the selected vegetables by the EU, and holds promise for the vegetable export sector, and indeed for an overall increase in the volume of agricultural produce from Ghana.

Dr. Fening (right) and Dr. Billah (left) inspecting catches of FCM in a delta trap in a chilli field

ANTIMICROBIAL RESISTANCE: ADDRESSING AN EMERGED GLOBAL PROBLEM WITH LOCAL SOLUTIONS


Ghanaian **Scientists**

Following Alexander Fleming's outdooring of penicillin, the first antibiotic from moulds in the early part of this century, antibiotics are now synthesized from both synthetic and semi-synthetic products. Antimicrobials are essential medicines that inhibit or kill micro-organisms such as bacteria, parasites, fungi or viruses.

In the management of bacterial infections, dosage and duration are important. Despite Fleming's Nobel Prize speech caution that "there is danger that the ignorant man may easily underdose himself and, by exposing his (bacterial) infection to non-lethal quantities of the drug, may make them resistant". We have paid little heed to the warning to the extent that bacteria have fought back, resisting every attempt by man to do away with them.

Antimicrobial Resistance (AMR), although a natural phenomenon, is 'accelerated' by improper use of antimicrobials in humans and animals. Additionally, the abuse of antimicrobial agents as growth promoters and their use in animal husbandry and aquaculture, further aggravate the problem. Increasingly, AMR has become a major global threat, eroding the gains made in modern medicine, especially in the management of both human and animal diseases. As a result, AMR undermines the safety of our food and our environment and threatens the achievement of several of the Sustainable Development Goals (SDGs) especially SDG3: ensuring healthy lives and promoting well-being for all ages.

A team of Ghanaian scientists, mostly from the University of Ghana have set out a national programme to conduct AMR surveillance with funding from the Fleming Fund, to strengthen the evidence base and help inform decision making actions. Led by ***Dr. Japheth Opintan*** of the Medical Microbiology Department, the team includes colleagues from other UG units, namely the Medical Microbiology Department (Prof. Mercy Newman, Prof. Eric Sampane-Donkor, Dr. Nicholas T.K.D. Dayie and Dr. Appiah-Korang Labi), the Noguchi Memorial Institute for Medical Research (Dr. Beverly Egyir and Dr. Gloria Ivy Mensah), the Department of Biochemistry, Cell and Molecular Biology (Dr. Lydia Mosi and Dr. Samuel Duodu), and the School of Veterinary Medicine (Dr. Sherry Johnson). Other Ghanaian collaborators include Dr. Bashiru Boi Kikimoto (Veterinary Services Directorate), Dr. George Hedidor (Ministry of Health), and Dr. Charles Ackon (Mangel Klicks).

The project goals are consistent with the core aim of the Fleming Fund, to improve laboratory capacity (personnel and infrastructure) for diagnosis, surveillance of AMR, and to develop a framework and Standard Operating Procedures for collecting data on antimicrobial use (AMU). The team from UG will work closely with the National Antimicrobial Resistance Platform in a One-Health approach, at eight (8) human and three (3) veterinary sentinel sites across the country, to achieve the following objectives:

- Enhance laboratory infrastructure
- Strengthen human resource and workforce reforms
- Strengthen surveillance systems
- Build foundations for AMR/AMU surveillance data use
- Promotion of rational use of antimicrobial medicines

Training for laboratory professionals at the selected sentinel sites will be carried out in diagnostic microbiology including bacteria identification, antimicrobial susceptibility testing and quality assurance using Standard Operating Procedures. Laboratory infrastructure will also be upgraded to provide a conducive environment to enable staff generate reliable data to inform national and global policy on AMR. Such interventions will go a long way to enhance AMR surveillance and regional data generation and to inform policy and practice at national and global levels.

AN IMPACT ASSESSMENT OF SOCIAL MARKETING IN GHANA (IASMG)

The deleterious effects of smoking are widely known; with Africa the greatest laggard of all world regions and with arguably the lowest level of medical technology to address the associated problems, the question of how to temper the spread of the problem is urgent. Particularly among adolescents, whose life habits are now being shaped and who are susceptible to peer-influence to make choices that are frequently contrary to their own best interests, the problem is immediately salient. ***Dr. Naa Dodua Dodoo*** and ***Dr. Adriana Biney***, at the Regional Institute of Population Studies (RIPS), are leading a team at the University of Ghana to partner with collaborators at Tulane University in the USA, on a Bill and Melinda Gates Foundation (BMGF) funded project to investigate how social marketing can help dissuade adolescents from smoking.

The BMGF Tobacco Control Programme incorporates social marketing as a core activity to highlight policy changes and improve Knowledge, Attitudes and Practices (KAP) related to youth smoking. One initiative of the programme is a SKY Girls campaign implemented in Botswana, Uganda and Ghana. This initiative is based on the understanding that although girls are aware of the health harms of tobacco, social inclusion is everything to them and is linked to a complex process of finding their identity. The project in Ghana therefore centers its principles around activities that are important to young girls (music and fashion, for example), and on ideals that will keep them grounded and able to make the right choices concerning life in general and smoking in particular.

The IASMG evaluated the SKY Girls Campaign in Ghana with the following objectives:

- Measuring the effectiveness of the combined and individual media interventions of SKY Girls on smoking attitudes, norms, intentions, tobacco use and prevention of smoking uptake
- Calculating the cost-effectiveness of the different media interventions of SKY Girls relative to other smoking
  prevention and cessation interventions, such as multi-component, community-based interventions, other forms of mass media (e.g., public health messaging, billboards, advertisements), or school-based interventions, and
- Enhancing understanding of the links between exposure to communication and behaviour change by clarifying the mechanisms through which the specific health communication activities affect tobacco outcomes.

> ***"Advertising campaigns highlight smoking as a sign of affluence."***

Dr. Naa Dodua Dodoo (*third from right*) and **Dr. Adriana Biney** (*third from left*)

Based on an experimental design with a panel of adolescents in areas around the Ayawaso West Wuogon Constituency of Accra (treatment area), Kumasi and Teshie (partial treatment area) and Sunyani (control), a baseline survey of 7000 adolescents was conducted between March and May, 2017. Subsequently, the various components of the SKY Girls Campaign were rolled out by a partner advertising company. This included a bi-monthly magazine distributed in schools, two movies available for free, visits to schools by various role models popular with young people, SKY clubs instituted in some schools, a SKY theme song, SKY social media channels, a SKY WhatsApp group, a weekly radio programme, a SKY truck that visited various neighborhoods and schools, text messages to adolescents, a Vlog, and occasional SKY parties at various malls. During the campaign, which lasted 18 months, there were bi-monthly follow-up phone interviews of a sub-sample of the survey respondents.

Finally, an endline survey was conducted between November 2018 and January 2019. Preliminary findings indicate that most of the girls who were exposed to the intervention indicated that SKY had helped them to feel more empowered, aspirational, socially connected and have a greater sense of future orientation. In addition, greater exposure to SKY interventions increased perceptions that smoking shisha is not 'cool' and increased knowledge of the health consequences of shisha and tobacco.

Further analyses of the initiative is continuing in order to assess the relative cost-effectiveness of the different media interventions, and promises to evolve into a scaled-up study of young women's empowerment, that clarifies links between communication and behavior change.

FUNDING NEWS

1ST FEBRUARY TO 31ST MAY 2019

FUNDER	UG LEAD	ORIGINATING UNIT	PROJECT TITLE	BUDGET ALLOCATED TO UG
Bill & Melinda Gates Foundation through North Carolina State University	Dr. Seloame Tatu Nyaku	Department of Crop Science	Optimization and Deployment: Nutrient-Rich Biodegradable Matrix for Crop Protection	USD 107,844.00
Community Foundations of Canada (CFC) through McGill University	Prof. Richmond Aryeetey	Department of Population, Family and Reproduction Health	A network of interdisciplinary, solution-oriented researchers to improve the livelihoods and food and nutrition security of adolescent girls and women farmers in rural Ghana.	CAD 157,850.00
Danish International Development Agency (DANIDA)	Dr. George Acheampong	Department of Marketing and Entrepreneurship	Port Efficiency and Public Private capacity (PEPP)	DKK 1,247,258.00
Danish International Development Agency (DANIDA)	Prof. Joseph Teye	Centre for Migration Studies	Governing Climate Mobility (GCM)	DKK 3,185,340.00
Department for International Development (DFID)	Prof. Abena Oduro	Department of Economics	Examining the Implications of Women's Earnings for Household Division of Labour and Women's Welfare Outcomes in Ghana	EUR 92,203.48
Global Challenge Research Fund (GCRF)	Prof. Lydia Aziato	School of Nursing Midwifery	Improving Adolescent Sexual and Reproductive Health in Ghana and The Gambia	GBP 4,314.86
Global Challenge Research Fund (GCRF)	Prof. Joseph Osafo	Department of Psychology	Using Collaborative Visual Research Methods to Understand Experience of Mental Illness, Coercion and Restraint in Ghana and Indonesia	GBP 36,296.00
International Development Research Centre (IDRC)	Dr. Festus Ebo Turkson	Department of Economics	Soft skills for youth employment in sub-Saharan Africa: the Ghanaian context	CAD 442,500.00
International Development Research Centre (IDRC)	Dr. Amos Laar	Department of Population, Family and Reproduction Health	Measuring the healthiness of Ghanaian children's food environments to prevent Obesity and Non-communicable Diseases	CAD 521,300.00
International Research and Exchange Board (iREX)	Mrs. Diana Adobea Owusu Antwi	Office of Research, Innovation and Development	Developing an industry engagement strategy to promote research, innovation and development at the University of Ghana	USD 4,990.00
National Institute for Health Research (NIHR) through the University of Liverpool	Dr. Reginald Quansah	Department of Biological, Environmental and Occupational Health	NIHR Global Health Research Group on Clean Energy Access for the prevention of Non-communicable Disease through Clean Air in Africa: CLEAN-AIR (Africa) at the University of Liverpool	GBP 34,718.50

FUNDER	UG LEAD	ORIGINATING UNIT	PROJECT TITLE	BUDGET ALLOCATED TO UG
Social Sciences and Humanities Research Council (SSHRC) through University of Victoria	Prof. Kodzo Gavua Dr. Wazi Ray Apoh	Department of Archaeology and Heritage Studies	Improving African Futures Using Lessons from the Past	CAD 59,500.00
The Andrew Mellon W. Foundation	Prof. Dzodzi Tsikata	Institute of African Studies	Other Universals: Theorizing from Post-colonial Locations on Politics and Aesthetics	R 1,603,436.93
The Andrew Mellon W. Foundation	Dr. Jennifer Amanda Coffie	Legon Centre for International Affairs and Diplomacy	Women and Political Participation in Africa: A Comparative Study of the Representation and Roles of Female Chiefs	USD 500,000.00
The Cambridge Africa-ALBORADA Research Fund	Dr. Winfred-Peck Dorleku	Department of Biochemistry, Cell and Molecular Biology	A Clash of Kingdoms: Isolation of Indigenous Entomopathogenic Fungi against the Fall Armyworm and Unravlling the Molecular Signature of Insect-fungus Interactions	USD 8,787.00
The Regents of the University of California	Prof. Augustine Ankomah	Department of Population, Family and Reproduction Health	Strengthening population size estimates for key populations in Ghana	USD 40,605.00
The Secretary of State for Health, UK through the University Court of the University of Edinburgh, UK	Prof. Gordon Awandare	West Africa Centre for Cell Biology of Infectious Pathogens (WACCBIP)	Tackling Infections to Benefit Africa (TIBA) (Amendment 3)	GBP 244,650.00
UK Research and Innovation through Coventry University	Prof. Joseph Teye	Centre for Migration Studies	GCRF South-South Migration, Inequality and Development Hub	GBP 823,024.00
Universities Canada through Carleton University	Prof. Yaa Ntiamoa-Baidu	Centre for African Wetlands	Societal Transformation and Climate Change: Training the next generation of scholars in sub-Saharan Africa and Canada (NextGen Climate Change Advanced Scholars)	CAD 3,564.00
World Resources Institute	Prof. Kwasi Appeaning Addo	Institute for Environment and Sanitation Studies (IESS)	Managing resilience, restoration & infrastructure of coastlines.	USD 50,000.00
National Institute of Health through the University of Cape Town	Prof. Gordon Awandare	West Africa Centre for Cell Biology of Infectious Pathogens (WACCBIP)	Hearing Impairment Genetic Studies in Africa (HI-GENES Africa)	USD 39,443.00

AWARDS/APPOINTMENTS

Dr. Kwaku Kyeremeh of the Department of Chemistry has been awarded the prestigious Medical Research Council (MRC)/UK Department for International Development (DFID) African Research Leader Award 2018 for his project 'Development of Novel Therapeutics for Parasite Infections and Cancer by Multi-step Microbial Biodiscovery Processes and iChip'.

The African Research Leadership Award is jointly run and funded by the MRC and DFID. The Award Scheme aims to strengthen research leadership across Sub-Saharan Africa (SSA) by attracting and retaining exceptional individuals who will lead high quality research programmes on crucial global health issues relevant to SSA.

The West African College of Physicians and Surgeons has elected ***Dr. Albert Akpalu*** of the Department of Medicine and Therapeutics, School of Medicine and Dentistry as its Secretary-General. The College, established in 1976, is an association of medical the fields of Community Health, Family Medicine, Internal Medicine, Laboratory Medicine, Chemical Pathology, Haematology, Medical Microbiology, Paediatrics and Psychiatry that aims to promote professional training of physicians and healthcare specialists in West Africa.

Professor Dorothy Yeboah-Manu of the Department of Bacteriology, Noguchi Memorial Institute for Medical Research has received the Royal Society Africa Prize 2018 for her contributions and innovative approaches to understanding Mycobacterium ulcerous and Mycobacterium arcanum microbiology, genetic studies and epidemiology in the areas of her work. The Royal Society Africa Prize, previously the Royal Society Pfizer Award, recognises research scientists in Africa who are making innovative contributions to the biological sciences, including basic medical science, which contribute significantly to capacity building in Africa.

The Director of the Institute for Environment and Sanitation Studies (IESS), ***Professor Kwasi Appeaning Addo*** has been appointed a member of the Expert Group of the High Level Panel for a Sustainable Ocean Economy. The Panel is supported by the United Nations Special Envoy for the Ocean, and is made up of 14 Heads of Government. The Panel's recommendations on the Blue Economy, an emerging concept that advocates improvements in management of the ocean, will make the case for change and call for international action for the short, medium and long term.

Professor Appeaning-Addo will co-author a chapter for the Blue Papers that will play a central role in the production of the Panel's Summary of Recommendations on the Blue Economy.

HE Mrs. Rebecca Akufo Addo (left) presenting the award to Prof. Renner

The First Lady of the Republic of Ghana, Her Excellency Mrs Rebecca Akufo Addo has presented the First Lady's Excellence Award for Medicine/Health Care Delivery to ***Professor Lorna Awo Renner*** of the Department of Child Health, School of Medicine and Dentistry, on International Women's Day. The award is in recognition of her dedication to the diagnosis and treatment of children with cancer and the mobilisation of resources to support the care of childhood cancers in Ghana.

RESEARCH GRANTS AWARDED THROUGH ORID

The University of Ghana's goal to become a research-intensive University by 2024, is progressing steadily with an upward trajectory in revenues accruing from funded projects. The Office of Research, Innovation and Development (ORID), UG's office of sponsored research has restructured over the last two and a half years into six teams, the Pre-and Post-Award Services, Research Performance Services, Technology Transfer and Intellectual Property Services, Publication, Dissemination and Translation Services, Capacity Development Services and Human and Animal Research Ethics Services.

The Pre- and Post-Award Services (PPA) team comprises about half of the research administration staff of ORID and handles grants and contract management, working closely with the brilliant academics at the University of Ghana.

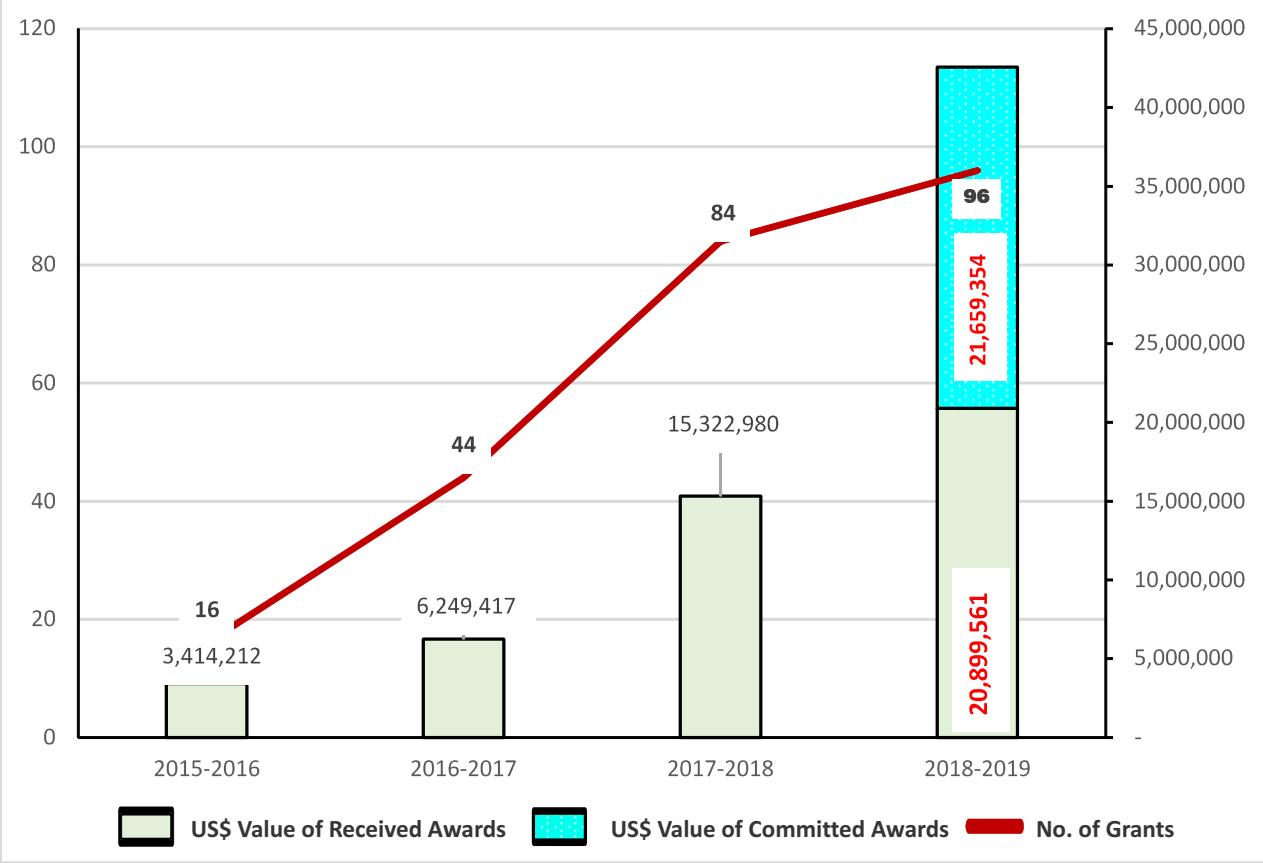
Grant revenues processed through ORID have grown sharply by over 1000% in the last three academic years from a level of $3.4 million in 2015/2016 academic year to $42.5million in the 2018/2019 academic year . (figure 1)

Table 1: Research Grants & Contracts reported through ORID (Academic Year)

Academic Year	No. of Grant Agreements	US$ Value of Grant
2015-2016	16	**3,414,212**
2016-2017	44	**6,249,417**
2017-2018	84	**15,322,980**
2018-2019	96	**42,558,915****

*** Includes 4 committed Awards of US$ 21.6 million*

Figure 1: Research Grants & Contracts reported through ORID (Academic Year)



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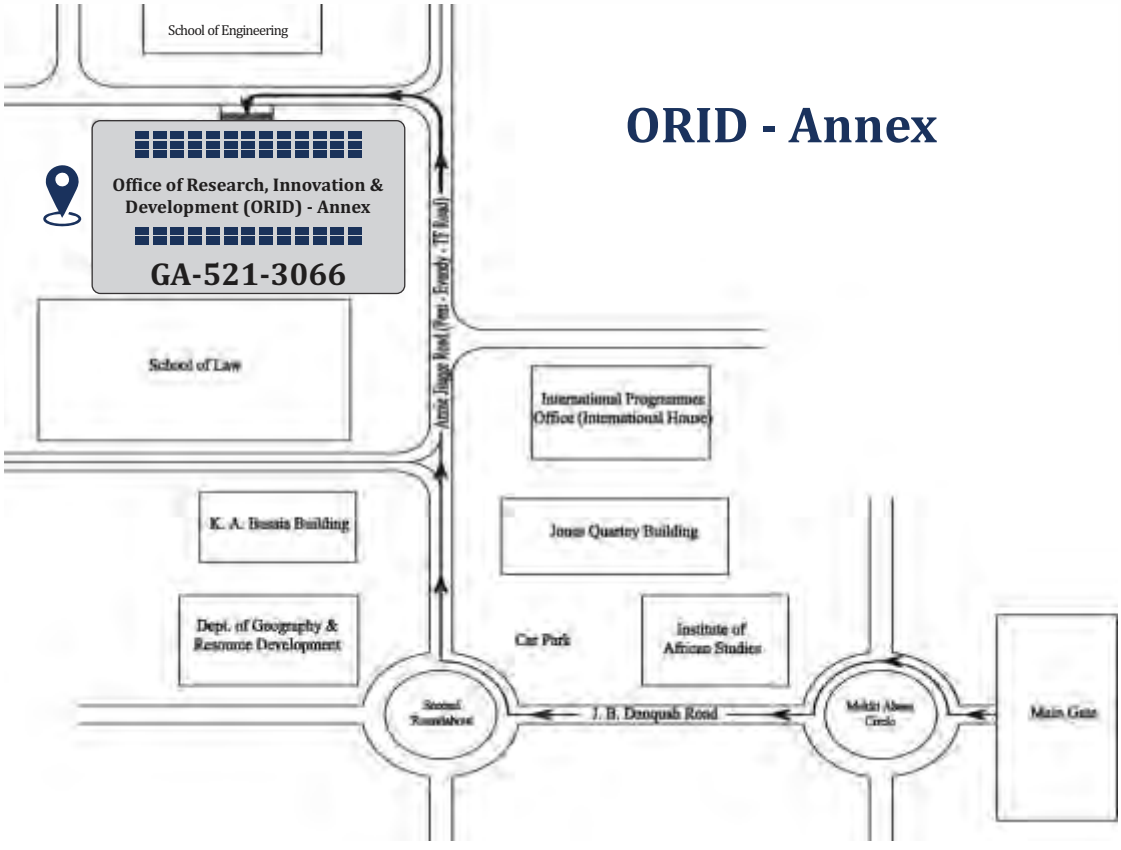
ORID - Annex



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