

12th GSA Research Seminar & Poster Presentations



The Ghana Science Association (GSA) Kumasi Branch in collaboration with the Ghana Academy of Arts and Sciences (GAAS), the College of Science (CoS) and the Young Researchers' Forum (YRF) of the Office of Grants & Research (OGR), KNUST

Presents

The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)


THEME

The Role of Basic Sciences for Sustainable Development

BOOK OF ABSTRACTS



 8th & 9th March, 2023

 9:00 AM - 4:00 PM
Each Day

 Aboagyee Menyeh
Complex, CoS-KNUST

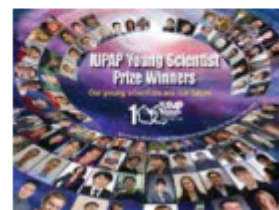
 ZOOM

ID: 895 5070 3380
Passcode: IYBSSD-23



Sponsor:

International Union of Pure
and Applied Physics



12th GSA Research Seminar & Poster Presentations



The Ghana Science Association (GSA) Kumasi Branch in collaboration with the Ghana Academy of Arts and Sciences (GAAS), the College of Science (CoS) and the Young Researchers' Forum (YRF) of the Office of Grants & Research (OGR), KNUST

Presents

The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

THEME

The Role of Basic Sciences for Sustainable Development



SPECIAL GUEST OF HONOUR
PROF. RITA AKOSUA DICKSON
VICE-CHANCELLOR, KNUST-KUMASI



SPECIAL GUEST
PROF. ABA BENTIL ANDAM
FORMER PRESIDENT, GAAS
MEMBER, IUPAP COMMISSION ON PHYSICS & DEVELOPMENT



CONFERENCE CHAIR
PROF. LEONARD K. AMEKUDZI
PROVOST, COLLEGE OF SCIENCE-KNUST



GUEST SPEAKER
EMERITUS PROFESSOR
MICHAEL STEINITZ
ST. FRANCIS XAVIER UNIVERSITY, CANADA



SPECIAL GUEST
PROF. KOFI OPOKU NTI
PRESIDENT, GAAS



CONVENER
PROF. JACOB K. AGBENORHEVI
HON. PRESIDENT, GSA-KUMASI BRANCH

8th & 9th March, 2023

9:00 AM - 4:00 PM
Each Day

Aboagyie Menyeh
Complex, CoS-KNUST

zoom
ID: 895 5070 3380
Passcode: IYBSSD-23



Sponsor:
International Union of Pure
and Applied Physics



12th GSA Research Seminar & Poster Presentations



The Ghana Science Association (GSA) Kumasi Branch in collaboration with the Ghana Academy of Arts and Sciences (GAAS), the College of Science (CoS) and the Young Researchers' Forum (YRF) of the Office of Grants & Research (OGR), KNUST

Presents

The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

THEME

The Role of Basic Sciences for Sustainable Development

KEYNOTE SPEAKERS



EMERITUS PROF. MICHAEL STEINITZ

TOPIC
Some Observations on Ethical Problems and Conundrums for Scientists
Mechanics of Scientific Publishing, Peer Review & Ethics in Publishing



PROF. MARIAN A. NKANSAH

TOPIC
The Young Researchers' Forum: A Platform for Nurturing Collaborative Research for Sustainable Development



DR. JOSEPH H. K. BONNEY

TOPIC
Microbes to the Rescue-Achieving Sustainable Development



VERY REV. PROF. W. OBENG-DENTEH

TOPIC
Advances in Mathematics for Sustainable Development



PROF. BRIGHT KWAKYE-AWUAH

TOPIC
Advances in Physics for Sustainable Development



PROF. NATHANIEL O. BOADI

TOPIC
Advances in Sustainable Chemistry



8th & 9th March, 2023



9:00 AM - 4:00 PM
Each Day



Aboagyie Menyeh
Complex, CoS-KNUST



ID: 895 5070 3380
Passcode: IYBSSD-23



Sponsor:

International Union of Pure
and Applied Physics





The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

LOCAL ORGANIZING COMMITTEE

- | | | |
|------------------------------|---|-----------------------|
| • Prof. Jacob K. Agbenorhevi | - | Chair/Hon. President |
| • Prof. Sylvester K. Danuor | - | Member/GSA Patron |
| • Dr. Ishmael Takyi | - | Member/Hon. Secretary |
| • Dr. Abena Boakye | - | Member/Hon. Treasurer |
| • Mrs. Catherine Acquah | - | Member/CoS Accountant |

SCIENTIFIC COMMITTEE/ASSESSORS

- | | | |
|------------------------------------|---|------------------------------|
| • Prof. Godfred Darko | - | Advisor/Editor-in-Chief |
| • Dr. Alexander Kwarteng | - | Chair/Reviewing Editor |
| • Miss Antoinette Gbordzor | - | Member/Editorial Assistant |
| • Dr. Kingsley Badu | - | Member/Assessor/Poster Chair |
| • Mrs. Anita Nana Aba Oscar Akotey | - | Member/Assessor |
| • Dr. Eric Owusu Danquah | - | Member/Assessor |
| • Dr. Nana Kena Frempong | - | Member/Assessor |
| • Dr. Mary Amoako | - | Member/Assessor |
| • Dr. Lena Dzifa Mensah | - | Member/Assessor |
| • Dr. Edmund Ilimoan Yamba | - | Member/Assessor |
| • Ms. Charlotte Asiedu | - | Member/Assessor |
| • Dr. Michael Konney Laryea | - | Member/Assessor |
| • Dr. Denis Edem Kwame Dzebre | - | Member/Assessor |
| • Dr. Amma Aboagyewa Larbi | - | Member/Assessor |
| • Dr. Charles Kofi Kafui Sekyere | - | Member/Assessor |

SUPPORT TEAM

- | | | |
|-------------------------------------|---|-----------------|
| • Dr. Edmund Ekuadzi | - | Moderator |
| • Dr. (Mrs.) Augustina A. Sylverken | - | Facilitator |
| • Dr. Samuel Asante Gyamerah | - | Rapporteur |
| • Dr. Linda Amoako Banning | - | Rapporteur |
| • Mr. Smith C.A. Kyeremeh | - | Logistics |
| • Dr. Fredrick Asenso Wireko | - | Logistics |
| • Dr. Kate Takyi | - | IT/Media |
| • Dr. Rose-Mary O.M. Gyening | - | IT/Media |
| • Mr. Gabriel Selorm Tamakloe | - | IT/Media |
| • Mr. Ali Sadik Abubakar | - | IT/Media |
| • Mr. Abubakari Yahaya | - | IT/Media |
| • Mr. Samuel Bioh | - | IT/Media |
| • Mr. Michael Asare | - | IT/Media |
| • Mr. Michael Kwawu | - | IT/Media |
| • Ms. Ursula Azocha | - | IT/Media |
| • Ms. Josephine F. Ortsin | - | General Support |
| • Ms. Emmanuella Tetteh | - | General Support |
| • Mr. Frank Ofori Appiah | - | General Support |
| • Mr. Emmanuel Opoku | - | General Support |
| • Ms. Priscilla Baafi Nyame | - | General Support |
| • Ms. Grace A. Acheampong | - | General Support |
| • Ms. Charlotte Acquah | - | General Support |

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
 +233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: **IUPAP**
 International Union of Pure and Applied Physics





The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

GSA KUMASI BRANCH EXECUTIVES

- Prof. Jacob K. Agbenorhevi -Hon. President
- Dr. Ishmael Takyi -Hon. Secretary
- Dr. Abena Boakye -Hon. Treasurer

INSTITUTIONAL REPS/AMBASSADORS

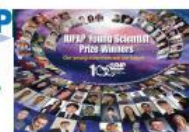
Dr. David Azanu	Kumasi Technical University (KsTU)
Ms. Lois Adutwumwaa Mensah	Kwadaso Agricultural College (KAC)
Ms. Jane Esi Monkah	CSIR -Building and Road Research Institute (BRRI)
Ms. Victoria Larweh	CSIR-Crops Research Institute (CRI)
Engr. Dr. Prosper Mensah	CSIR-Forestry Research Institute of Ghana (FORIG)
Dr. Joseph A. Bentil	College of Science (CoS), KNUST
Prof. (Mrs.) Cynthia A. Danquah	College of Health Sciences (CHS), KNUST
Dr. (Mrs.) Mizpah A.D. Rockson	College of Engineering (CoE), KNUST
Prof. Vincent Logah	College of Agriculture & Natural Resources (CANR), KNUST
Mr. Peter Ansong Frempong	CSIR-Soil Research Institute (SRI)
Ms. Antoinette Gbordzor	GSA Students Rep, KNUST

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
 +233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
 International Union of Pure and Applied Physics





The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

PATRONS

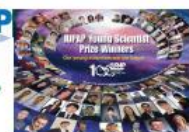
Prof. Aboagye Menyeh	Former Hon. National President/ Editor-in-Chief, JGSA/ Provost, CoS-KNUST
Prof. R.C. Abaidoo	Former Hon. President/ Provost- CANR/Director-OGR, KNUST
Ps. Prof. William O. Ellis	Former Vice-Chancellor KNUST/ Hon. Secretary
Prof. (Mrs.) Ibok N. Oduro	Former Provost, CoS-KNUST/ Hon. Treasurer
Prof. Joseph Nketiah Berchie	Former Director, CSIR-CRI
Prof. Kwasi Obiri-Danso	Former Vice-Chancellor, KNUST/ Hon. Secretary
Rev. Prof. Charles Ansah	Former Pro Vice-Chancellor, KNUST
Prof. Robert K. Nkum	Former Hon. President/ Provost, CoS-KNUST
Prof. William Oduro	Former Dean, IPO/ FRNR, KNUST
Prof. Sylvester K. Danuor	Former Hon. National President
Prof. William Gariba Akanwariwiak	Former Hon. National President/ Hon. Secretary

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
 +233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
 International Union of Pure and Applied Physics





The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

TABLE OF CONTENTS

LOCAL ORGANIZING COMMITTEE	3
SCIENTIFIC COMMITTEE/ASSESSORS	3
SUPPORT TEAM	3
GSA KUMASI BRANCH EXECUTIVES	4
INSTITUTIONAL REPS/AMBASSADORS	4
PATRONS	5
TABLE OF CONTENTS	6
ABOUT GSA	10
PROGRAMME OUTLINE	12
WELCOME MESSAGE FROM THE CONVENER/LOC CHAIR/ GSA KUMASI BRANCH PRESIDENT: PROF. JACOB K. AGBENORHEVI	14
PROFILE OF CONFERENCE CHAIR: PROFESSOR LEONARD K. AMEKUDZI	15
PROFILE OF SPECIAL GUEST: PROFESSOR ABA BENTIL ANDAM	16
GOODWILL MESSAGE FROM IUPAP COMMISSION ON PHYSICS (IUPAP C13): DELIVERED BY PROF. ABA BENTIL ANDAM (MEMBER, IUPAP C13)	17
MESSAGE FROM THE PRESIDENT, GHANA ACADEMY OF ARTS AND SCIENCES (GAAS): DELIVERED BY PROF. ABA BENTIL ANDAM, PAST PRESIDENT, GAAS.	17
SOLIDARITY MESSAGE FROM WiSTEMGh: DELIVERED BY DR. (MRS.) AUGUSTINA ANGELINA SYLVERKEN	18
PROFILES/ABSTRACTS OF KEYNOTE SPEAKERS	19
KEYNOTE SPEAKER [KSP1]: EMERITUS PROFESSOR MICHAEL STEINITZ	19
THE MECHANICS OF SCIENTIFIC PUBLISHING, PEER REVIEW, AND ETHICS IN PUBLISHING	20
KEYNOTE SPEAKER [KSP2]: PROF. MARIAN A. NKANSAH	21
KEYNOTE SPEAKER [KSP3]: VERY REV. PROF. WILLIAM OBENG-DENTEH	21
<i>Book of Abstracts: 12th GSA RSPP/IYBSSD-2023</i>	6

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



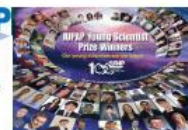
KEYNOTE SPEAKER [KSP5]: PROF. NATHANIEL O. BOADI	23
KEYNOTE SPEAKER [KSP6]: DR. JOSEPH H.K. BONNEY	24
PROFILES OF PATRONS/SESSION CHAIRS/LOC	26
GSA Patron: Prof. Aboagye Menyeh	26
GSA Patron: Prof. Sylvester K. Danuor	27
GSA Patron/President-WiSTEMGh: Prof. (Mrs.) Ibok Oduro	28
Kumasi Branch Hon. President: Prof. Jacob K. Agbenorhevi	29
Kumasi Branch Hon. Secretary: Ishmael Takyi	30
Kumasi Branch Hon. Treasurer: Dr. Abena Boakye	30
Facilitator: Dr. (Mrs.) Augustina Angelina Sylverken	31
Scientific Committee Chair/Reviewing Editor: Dr. Alexander Kwarteng	31
Editorial Assistant/GSA Students Rep: Miss Antoinette Gbordzor	32
Young Scientist Competition/Poster Session/Assessor Chair: Dr. Kingsley Badu	33
College Accountant: Mrs. Catherine Acquah	34
Moderator: Dr. Edmund Ekuadzi	34
Abstracts for ORAL Presentations	35
O-01 PROTEOME-BASED IDENTIFICATION OF MULTI-EPI TOPE SUBUNIT VACCINE AGAINST MONKEYPOX VIRUS: AN IMMUNOINFORMATICS APPROACH	36
O-02 STUDENTS' MATHEMATICS INTEREST DISCOURSE IN GHANA, THE ROLE OF TEACHER'S ABILITY TO CONNECT MATHEMATICAL CONCEPTS TO REAL LIFE PROBLEMS	37
O-03 THE RELATIONSHIP BETWEEN FOOD SECURITY, DIETARY INTAKE AND PHYSICAL ACTIVITY LEVELS AND DEVELOPMENT OF ELEVATED BLOOD GLUCOSE LEVELS OF ADULTS IN EJISU MUNICIPALITY	38
O-04 THE ROLE OF BASIC SCIENCES IN ADDRESSING GLOBAL CHALLENGES TO SUSTAINABLE DEVELOPMENT: EXPERIENCES FROM CIFOR-ICRAF	39
O-05 POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) LEVELS IN FINGER FOODS AND MULTIPLE USED EDIBLE OILS ON GHANAIAAN MARKET	40
O-06 PAPER PRODUCTION FROM PINEAPPLE LEAF FIBRES	41
O-07 ENTOMOLOGICAL ASSESSMENT AND RISK OF TRANSMISSION OF DENGUE IN KASSENA-NANKANA DISTRICT OF NORTHERN GHANA.	42
O-08 PECTIN FROM DIFFERENT OKRA GENOTYPES IN GHANA HAS POTENTIAL AS A SUSPENDING AGENT IN LIQUID FORMULATIONS	43
O-09 THE USE OF PHASE CHANGE MATERIAL TO INFLUENCE STORAGE TEMPERATURE AND HUMIDITY ON CHOCOLATE SOLD IN HOT CLIMATES	44
O-10 NUTRITIONAL AND SENSORY PROPERTIES OF BREAKFAST CEREAL MADE FROM SPROUTED PEARL MILLET INCORPORATED WITH SPICES.	45
<i>Book of Abstracts: 12th GSA RSPP/IYBSSD-2023</i>	7

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
 ☎ +233 208954223 ✉ jkagbenorhevi@yahoo.com



Sponsor: 
 International Union of Pure and Applied Physics



O-12 ACHIEVING SUSTAINABLE DEVELOPMENT THROUGH THE DNA REVOLUTION: THE CASE OF GHANA	47
O-13 <i>IN VITRO</i> ANTIOXIDANT, ANTIMICROBIAL, ANTI-INFLAMMATORY AND ANTHELMINTIC ACTIVITIES OF <i>CRYPTOLEPIS CALOPHYLLA</i> STEM	48
O-14 THE EFFECTS OF FOUR FEEDING RIVERS OF THE OWABI LAKE ON THE DISTRIBUTION AND ABUNDANCE OF PLANTS IN THE	49
Abstracts for POSTER Presentations	51
<i>P-02</i> MALARIA PARASITAEMIA IN APPARENTLY HEALTHY INDIVIDUALS AND ITS RELATIONSHIP TO SERUM FERRITIN IN A MALARIA-ENDEMIC AREA-A CROSS-SECTIONAL STUDY	53
<i>P-04</i> ANTIMICROBIAL ACTIVITY OF <i>CHROMOLAENA ODORATA</i> , <i>RICINUS COMMUNIS</i> , AND <i>SYZYGIIUM AROMATICUM</i> LEAVES AGAINST DRUG-RESISTANT CLINICAL ISOLATES FROM DIABETIC FOOT ULCERS-A CROSS-SECTIONAL STUDY	55
<i>P-05</i> PROTEOME-BASED IDENTIFICATION OF MULTI-EPI TOPE SUBUNIT VACCINE AGAINST MONKEYPOX VIRUS: AN IMMUNOINFORMATICS APPROACH	56
<i>P-06</i> EOSINOPHIL: AN INNATE IMMUNE CELL WITH ANTI-FILARIAL VACCINE AND BIOMARKER POTENTIAL	57
<i>P-07</i> MALARIA AND INTESTINAL PARASITE PREVALENCE AMONG CHILDREN IN AHANTA WEST, GHANA	58
<i>P-08</i> PREVALENCE OF ASYMPTOMATIC MALARIA AMONG CHILDREN IN THE AHANTA WEST DISTRICT, GHANA	59
<i>P-09</i> BLOOD COLLECTION TUBES IMPACT EXPRESSION OF ACTIVATED CD4 ⁺ AND CD8 ⁺ T CELLS IN HUMAN WHOLE BLOOD ASSAY	60
<i>P-10</i> LIVING WITH LYMPHATIC FILARIASIS: THE MULTIPLE ROOTS OF STIGMA	61
<i>P-12</i> LEVELS OF HAEMOLYSIS SCAVENGER PROTEINS AND RENAL FUNCTION MARKER: A REFLECTION OF SEVERE HAEMOLYSIS AND ANAEMIA IN GHANAIAN CHILDREN WITH SICKLE CELL DISEASE AT STEADY STATE	63
<i>P-13</i> GENOMIC ANALYSES REVEAL MOLECULAR FACTORS ASSOCIATED WITH AN INVERSE RELATIONSHIP BETWEEN GLIAL TUMORIGENESIS AND NEURODEGENERATION IN ALZHEIMER'S DISEASE	64
<i>P-15</i> DECODING THE ROLE OF GLYCANS IN HELMINTHIC INFECTIONS	66
<i>P-16</i> USE OF MEDICINAL PLANTS AS A REMEDY AGAINST LYMPHATIC FILARIASIS-CURRENT STATUS AND FUTURE PROSPECT	67
<i>P-20</i> NUTRITIONAL ASSESSMENT AMONG LYMPHATIC FILARIASIS PATIENTS IN THE AHANTA WEST DISTRICT	71
<i>P-21</i> PROTEOME-BASED IDENTIFICATION OF MULTI-EPI TOPE SUBUNIT VACCINE AGAINST MONKEYPOX VIRUS: AN IMMUNOINFORMATICS APPROACH	72
<i>P-25</i> DIETARY INTAKE AND NUTRITIONAL STATUS OF DIABETIC PATIENTS IN THE EJISU MUNICIPALITY	76

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
 +233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
 International Union of Pure and Applied Physics



P-40 RELATIONSHIP BETWEEN BREAKFAST CONSUMPTION AND COGNITION TEST PERFORMANCE AMONG SOME SELECTED SCHOOL-AGED CHILDREN IN GOVERNMENT AND PRIVATE-OWNED PRIMARY SCHOOLS AT EJURA-SEKYEDUMASE MUNICIPALITY IN THE ASHANTI REGION.	91
P-42 A ROBUST AUGMENTED REALITY INDOOR NAVIGATION SYSTEM WITH COMPUTER VISION	93
P-45 SYNTHESIS AND CHARACTERIZATION OF SELECTED MANNICH BASE: 2-(N, N-DIMETHYL AMINOMETHYL)-CYCLOHEXANONE HYDROCHLORIDE AND DERIVATIVES	96
P-48 REMOVAL OF PHARMACEUTICALS BY WASTE STABILIZATION PONDS IN OBUASI METROPOLIS	99
P-49 COMPOSITE MICROPLASTICS USED FOR ANTIBIOTICS REMOVAL IN AQUATIC ENVIRONMENT	100
P-54 EXTRACTION OF PECTIN FROM WATERMELON RIND	105
P-55 DEPOLYMERIZATION OF WASTE PET BOTTLES IN GHANA VIA ALKALINE HYDROLYSIS	106
P-60 EXTRACTION OPTIMIZATION AND CHARACTERIZATION OF PECTIN EXTRACTED FROM AFRICAN STAR APPLE USING RESPONSE SURFACE METHODOLOGY	111
P-67 COMPARATIVE NON-DESTRUCTIVE EVALUATION OF WELDS USING ACETYLENE GAS AND OXYHYDROGEN GAS PRODUCED FROM A HYDROGEN FUEL CELL	118
P-68 SUSCEPTIBILITY OF <i>DERMESTES MACULATUS</i> DEGEER (COLEOPTERA: DERMESTIDEA) LARVAE INFESTING SMOKED AFRICAN CATFISH (<i>CLARIAS GARIEPINUS</i>) TO <i>ALCHORNEA CORDIFOLIA</i> (SCHUM. & THONN.) LEAF POWDER	119
P-70 REMEDIATION OF CADMIUM-CONTAMINATED PADDY SOIL USING ORANGE RESIDUE BIOCHAR	121
P-72 REPELLENT AND LARVICIDAL PROPERTIES OF SOME INDIGENOUS PLANTS IN THE CONTROL OF <i>Anopheles</i> MOSQUITOES	123
P-73 EVIDENCE OF TRANSMISSION OF ATYPICAL TRYPANOSOMIASIS IN HUMANS IN SELECTED COMMUNITIES IN THE SUHUM MUNICIPALITY OF GHANA	124
P-75 MOLECULAR SURVEILLANCE OF <i>HRP2/HRP3</i> GENE DELETION TYPING IN ASYMPTOMATIC INDIVIDUALS IN GHANA USING HIGHLY SENSITIVE DIGITAL PCR	126
P-76 DIVERSITY OF ENTEROBACTERIACEAE FROM LIVE BIRDS MARKETS IN KUMASI, GHANA AND YAOUNDÉ, CAMEROON.	127
P-79 COMPARATIVE NON-DESTRUCTIVE EVALUATION OF WELDS USING ACETYLENE GAS AND OXYHYDROGEN GAS PRODUCED FROM A HYDROGEN FUEL CELL	130
P-82 THE IMPACT OF ACID AND ALKALINE EXTRACTION ON THE USEFULNESS OF PLANTAIN PEEL PECTIN AS A SUSPENDING AGENT IN PHARMACEUTICAL FORMULATIONS.	133
P-83 THE POTENTIAL OF <i>MELIA AZEDARACH</i> GUM AS A RELEASE MODIFIER IN CONTROLLED-RELEASE MATRIX TABLETS	134
APPRECIATION	137
	9

Book of Abstracts: 12th GSA RSPP/IYBSSD-2023

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
 ☎ +233 208954223 ✉ jkagbenorhevi@yahoo.com



ABOUT GSA

The Ghana Science Association (GSA) traces its origin to the West African Science Association (WASA) which was formed in 1953 at the University College of the Gold Coast. WASA was formed to provide West African Scientists the forum to advocate the importance of Science and Technology as a necessity and bedrock for national development.

The inauguration of the GSA in 1959 broadened the scope of activities from reading of scientific papers to involvement in national and international affairs. The very first international Conference of GSA was held in Accra in 1961 with a theme “The world without the Bomb”. The Conference attracted several eminent Scientists from all over the world. It was this event that catapulted the young nation of Ghana into the world’s scientific arena and moved Osagyefo Dr. Kwame Nkrumah, the first president of the Republic of Ghana, to adopt the Association and give it regular budgetary support from the consolidated fund. The GSA was mandated to promote, popularize, and demystify science and create a scientific culture in the country.

The Association is made up of seven branches namely Accra, Cape Coast, **Kumasi**, Koforidua, Tamale, Sunyani, Asante Mampong, Navrongo and Ho branches. Each branch has its own officers made up of the President, Secretary and Treasurer.

Vision

To become a dominant voice in Science and Technology advocacy by promoting and popularizing Science and Technology to meet national developmental needs.

Mission

- To advance Science, Technology, Engineering and Mathematics (STEM) through interaction and cross-fertilization of ideas of all interested people,
- To popularize, promote and disseminate scientific information and technology transfer for national development,
- To establish linkages with industry to promote transfer and application of science,
- To contribute to the development of national Science and Technology policy,
- To seek affiliation and foster cooperative links with other national organizations.

The Main Policy Objectives are to:

1. Encourage scientific and technological research that contribute to socio-economic development of Ghana.
2. Promote the understanding of science and technology through formal and informal education to the rudiments of everyday life.
3. Contribute to the formulation and implementation of national policy in science and technology.
4. Promote relevant technology transfer to industry and other end users.
5. Seek affiliation and foster cooperative links with other national and international organizations.
6. Commercialize research findings and technology to promote economic development.
7. Develop strategies and effective mechanisms to track and evaluate the impact of short-term and long-term effects of under-resourcing national institutions involved in Science and Technology research.



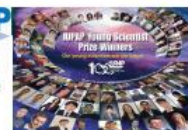
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics





KUMASI BRANCH

ABOUT US

The Ghana Science Association (GSA), a voluntary non-profit making and multidisciplinary organization of Scientists, Technologists and Mathematicians, was formed in 1959.

VISION

To become a dominant voice in Science and Technology advocacy by promoting and popularizing Science and Technology to meet national developmental needs.

MISSION

Advancing Science, Technology, Engineering and Mathematics (STEM) through interaction and cross-fertilization of ideas of all interested people.



gsakumasi@gmail.com
gsaknust@knust.edu.gh



www.ghanascience.org.gh



+233552346439
+233246086861
+233208954223

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure
and Applied Physics



PROGRAMME OUTLINE

DAY 1

PROGRAMME OF ACTIVITIES

TIME (GMT)	ACTIVITY	FACILITATOR
8:00 - 9:00 am	Registration	Support Team
9:00 - 9:05 am	Opening Prayer	Moderator/TBA
9:05 - 9:10 am	Welcome Message (Convener, GSA Kumasi Branch President)	Prof. Jacob K. Agbenorhevi
9:10 - 9:40 am	Solidarity Message	Patrons-GSA National President-GSA President-WISTEMGh President -GAAS Secretary General -GNC for UNESCO Sponsors -JUPAP Prof. Aba Bentil Andam
9:40 - 9:50 am	Conference Chair (Provost, CoS-KNUST)	Prof. Leonard K. Amekudzi
9:50 - 10:00 am	Special Guest of Honour	Vice-Chancellor, KNUST
10:00 - 11:20 am	Presentation by Keynote Speakers	Emeritus Prof. Michael Steinitz Prof. Marian Nkansah Very Rev. Prof. W. Obeng-Denteh Prof. Bright Kwakye-Awuah Prof. Nathaniel O. Boadi Dr. Joseph H.K. Bonney
11:20 am - 12:20 pm	Open forum on theme Poem on STEM	Moderator/STEM Presenter
12:20 - 12:30 pm	Closing Remarks	Conference Chair
12:30 - 1:00 pm	Announcements/Evaluation/Vote of Thanks/Closing Prayer/Group Photograph	Moderator
1:00-4:00 pm	Video presentations/poster viewing - online	Moderator/IT Team/Assessors



Certificate of Participation will be issued to those interested at a cost of GHS 200.	Prize Awards for Best Authors and Presenters.	ID: 895 5070 3380 Passcode: IYBSSD-23
---	---	--

8th & 9th March, 2023	9:00 AM - 4:00 PM Each Day	Aboagye Menyeh Complex, CoS-KNUST
-----------------------	-------------------------------	--------------------------------------

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
 +233 208954223 jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure and Applied Physics





The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

DAY 2

PROGRAMME OF ACTIVITIES

TIME (GMT)	ACTIVITY	FACILITATOR
8:00 - 9:00 am	Registration	Support Team
9:00 - 9:05 am	Opening Prayer	Moderator/TBA
9:05 - 9:15 am	Recap of previous day's activities	Rapporteur
9:15 - 9:20 am	Session Chair	Prof. Sylvester K. Danuor Prof. (Mrs.) Ibok Oduro
9:20 am - 12:20 pm	Oral Presentations Young Scientists Competitions	Moderator Assessors
12:20 - 1:20 pm	Announcements/Photography/Break	Moderator/Support Team
1:20 - 1:50 pm	Presentation of awards	Dr. (Mrs.) Augustina A. Sylverken
1:50 - 2:00 pm	Announcements Evaluation Closing Remarks Vote of Thanks Closing Prayer Group Photograph	Moderator
2:00 - 4:00 pm	Networking/ Social Media/ Online activities	Moderator/IT Team/Assessors



Certificate of Participation will be issued to those interested at a cost of GHS 200.

Prize Awards for Best Authors and Presenters.

ID: 895 5070 3380
Passcode: IYBSSD-23

8th & 9th March, 2023

9:00 AM - 4:00 PM
Each Day

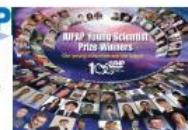
Aboagye Menyeh
Complex, CoS-KNUST

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



WELCOME MESSAGE FROM THE CONVENER/LOC CHAIR/ GSA KUMASI BRANCH PRESIDENT: PROF. JACOB K. AGBENORHEVI

On my own behalf, and on behalf of the Local Organizing Committee and GSA Kumasi Branch Executives, I am delighted to welcome you to the 12th GSA Research Seminar and Poster Presentations (RSPP) and the Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023).

This year's conference is hybrid, both virtual and in person and scheduled for two days. It is organized in collaboration with the Ghana Academy of Arts and Science (GAAS), College of Science (CoS), and the Young Researchers' Forum (YRF) of the Office of Grants and Research (OGR), KNUST.



The GSA RSPP started in 2011 and has always created the platform for scientists within Kumasi and beyond to share their research output with the scientific community. The conference has also served as a voice of the scientific community within the region, addressing pertinent issues of local, national and global concern. These include education, health, economic, environmental/climate, agricultural and food related issues.

The 2022 GSA RSPP was under the theme "***The Role of Basic Sciences for Sustainable Development***" to celebrate the *International Year of Basic Sciences for Sustainable Development (IYBSSD 2022)* in Kumasi, Ghana. This year, we continue under the same theme in a special way, with support from the International Union of Pure and Applied Physics (IUPAP). Thus, the conference presents another opportunity to showcase and educate on how Basic Sciences have contributed to and continue to make tremendous impact on achieving the sustainable development goals (SDGs) through scientific research works, technology, innovations, and partnerships.

As a fact, the Basic Sciences are the foundation for major technological advances/innovations, and key for training and capacity building of our future generation. There is an ever-increasing call for science to be more innovative, multidisciplinary, and collaborative to help achieve the Sustainable Development Goals set up by the United Nations. Therefore, let us all continue to work together relentlessly for the common good as in the UNESCO's *Recommendation on Science and Scientific Researchers*.

Over the two days, we will have discussions on the theme and propose workable solutions for the future. The Keynote Speakers and other presenters have been carefully selected to provide educational and scientific updates on the application of basic sciences and technology in our collective efforts towards sustainable development.

A greater participation and continual cooperation of all is very much expected as we strive to grow as an association to achieve our mission and vision. I would like to use the opportunity to encourage those who have not yet joined GSA to do so and participate actively in all

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



activities of the association. In this conference, we shall continue to award departments, authors, presenters, individuals, and corporate bodies who have made meritorious contributions in diverse ways towards the growth of GSA. The Book of Abstracts (100) is rich with diverse research findings and ongoing projects for our reading. However, authors are strongly encouraged to prepare full papers for consideration and publication in the Journal of Ghana Science Association (JGSA) which is indexed in SCOPUS.

Finally, the 12th GSA RSPP 2023/IYBSSD-2023 presents a unique opportunity for us to share our experiences as well as learn from what science has to offer as we face the present and future challenges in our attempt to achieve the SDGs.

I wish you a stimulating, educative and fruitful conference.

Thank you.

Prof. Jacob K. Agbenorhevi

Hon. President - GSA Kumasi Branch

PROFILE OF CONFERENCE CHAIR: PROFESSOR LEONARD K. AMEKUDZI

Leonard K. Amekudzi is a Professor of Atmospheric and Climate Science and Provost, College of Science at Kwame Nkrumah University of Science and Technology (KNUST), Kumasi. He holds a BSc Degree in Physics with DipEd, MPhil (Theoretical Physics) from the University of Cape Coast, Ghana, in 1997 and 2001. After completing one year of MSc course work at the Institute of Environmental Physics and Remote Sensing at the University of Bremen, Germany, in 2002, the European Space Agency (ESA) ENVISAT (Environmental Satellite) awarded him a PhD fellowship. He obtained a PhD in Atmospheric Physics and Satellite Remote Sensing in 2005 from the University of Bremen, Germany, and continued as a Post-Doctoral Research Scientist on the ESA ENVISAT project. On this project, he was involved in



retrieving atmospheric trace gases information from occultation and limb observations of SCIAMACHY (Scanning Imaging Absorption Spectrometer for Atmospheric Cartography) until May 2008, when he joined KNUST as a Lecture in Meteorology and Climate Science Programme at the Department of Physics. Leonard has over 20 years of research experience in Atmospheric and Climate Science, Remote Sensing, Biometeorology, precipitation processes, and Hydrological Modeling. He has worked extensively with different research clusters across the globe. Among the research-collaborated projects include; ENVISAT SCIAMACHY Limb and Occultation Validation (SCILOV), Quantifying Weather and Climate Impacts on Health in Developing Countries (QWeCI), Building Stronger Universities (BSU), West Africa Science

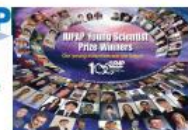
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



Service Center for Climate Change and Adapted Land Use (WASCAL), Dynamic-Aerosol-Chemistry-Cloud interactions in West Africa (DACCIWA) and International Development Research Center - Climate Change Adaptation Research and Training Capacity for Development (IDRC-CCARTCD), Global Challenge Research Fund Africa Science for Weather Information and Forecasting Techniques (GCRF African SWIFT), Current and Future risks of urban and rural flooding in West Africa- An integrated analysis and ecosystem-based solutions (FURILOOD), and Green gas emissions and mitigation options under climate and land-use change in West Africa-A concerted regional modelling and assessment (CONCERT).

He was a regular research fellow at The Abudus Salam International Centre for Theoretical Physics. He has trained over a dozen M.Sc/MPhil and PhD students and participated in local and international terrain research. He has also served as an external examiner for the Postgraduate Programme in Ghana and other African countries' universities. Besides, he serves as an advisory board member for local and international PhD programmes and a visiting professor to WASCAL-CCWR at Abomey-Calavi (Benin), WASCAL-CCHH, FUT-Mina, Nigeria and a Professor for WASCAL Common Course in Atmospheric Science. He is a lead consultant for five different Climate and Environmental projects in Ghana, a resource person for climate and related impact workshops, key speaker and facilitator of several climate change workshops in Ghana and other parts of Africa. He is a career guidance and counseling expert and involves science curriculum development for the school. He is a scientific mentor/host to young faculty members on the Climate Impact Research Capacity and Leadership Enhancement in Sub-Saharan Africa (CIRCLE) Programme. He has participated in several university career and leadership training and has served in several statutory and non-statutory committees of the university. Leonard has over 90 publications in high-impact peer-reviewed journals and over 100 oral and poster presentations at international conferences, an entrepreneur, a farmer, a practicing Christian, and married with three children (all boys).

PROFILE OF SPECIAL GUEST: PROFESSOR ABA BENTIL ANDAM

Professor Aba Bentil Andam is a Consultant Physicist with current research interest in environmental radon monitoring. She is a Fellow of the UK Institute of Physics, the Ghana Institute of Physics, and the Ghana Academy of Arts and Sciences, of which she is a past President. She is a member of the Committee on Physics and Development (C13) of the International Union of Pure and Applied Physics (IUPAP). She is a Foundation Member of the First IUPAP Working Group on Women in Physics, and Leader of the Ghana Team of the IUPAP Conferences on Women in Physics. Having served in various capacities in research and teaching at Kwame Nkrumah University of Science and Technology (KNUST) and the Graduate School of Nuclear and Allied Sciences (SNAS) of the Ghana Atomic Energy Commission, she continues to fulfill a role in the World Scientific Community, where she is now a member of the UNESCO Advisory Committee, and Chairman of the Ghana Committee for the celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD).



For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
 +233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
 International Union of Pure and Applied Physics



GOODWILL MESSAGE FROM IUPAP COMMISSION ON PHYSICS (IUPAP C13): DELIVERED BY PROF. ABA BENTIL ANDAM (MEMBER, IUPAP C13)

The IUPAP Commission on Physics and Development (IUPAP C13) has a programme in which donor funding for international conferences is managed, disbursed, and carefully accounted for.

The application process usually closes in early June, and successful applications are made public in August or September, each year.

The application for funding is keenly contested and applications are received from all over the world. Needless to say, all applications are vetted by rigorous international standards, and discussed by a panel of experts to assess their suitability.

The IUPAP C13 is happy to have had a successful application from Ghana, in 2022, for the **International Conference on the role of basic sciences for sustainable development**, which is starting today as the 12th Research Seminar of the Ghana Science Association and celebrating the International Year of Basic Sciences for Sustainable Development, 2022-2023.

IUPAP C13 congratulates the Ghana Science Association, (GSA) and Kwame Nkrumah University of Science and Technology (KNUST), with best wishes for a successful conference.

MESSAGE FROM THE PRESIDENT, GHANA ACADEMY OF ARTS AND SCIENCES (GAAS): DELIVERED BY PROF. ABA BENTIL ANDAM, PAST PRESIDENT, GAAS.

Distinguished ladies and gentlemen.

The 76th meeting of the United Nations General Assembly, on 2nd December 2021, proclaimed July 2022 through to June 2023 as the **International Year of Basic Sciences for Sustainable Development**, emphasizing the need for the application of basic sciences as vital for the development of medicine, industry, agriculture, water resources, energy planning, environment, communications, and culture.

Ghana has been at the forefront of championing the study of Basic Sciences in education. The Ghana Academy of Arts and Sciences (GAAS), Ghana's premier learned society, is happy to lead the celebration of IYBSSD, 2022/23.

The General Meeting of Fellows of the Ghana Academy of Arts and Sciences (GAAS) set up a committee to support the Ghana National Commission for UNESCO to plan and recommend some activities relating to the application of basic sciences for the national celebrations.

The National Committee agreed to invite some scientific institutions including the Ghana Atomic Energy Commission, the Council for Scientific and Industrial Research and UNESCO-Ghana, AIMS Ghana, the National Mathematics and Science Quiz Programme, the Ghana Science

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Association, the Sharks Quiz Programme of the Academic Talent Development Programme, the IYEGlobal Foundation, and the Dext Technology Limited to join.

Today's event is the outcome of the keen commitment which the Ghana Science Association has brought to the deliberations of the National Committee. This is truly commendable.

It is with great pride that the Ghana Academy of Sciences congratulates the Ghana Science Association, and sends greetings for a successful International Conference.

SOLIDARITY MESSAGE FROM WiSTEMGh: DELIVERED BY DR. (MRS.) AUGUSTINA ANGELINA SYLVERKEN

I bring you greetings from the Office of the President and the Executive Body of the Women in Science, Technology, Engineering and Mathematics, Ghana (WiSTEMGh). As enshrined in our Mandate, we inspire, motivate, Mentor and Maintain the next generation of scientists. In doing this, we provide mentorship, career guidance and leadership training and programs for females at all levels.

WiSTEM opines that the Basic Sciences which are typically curiosity-driven plays an important role in development that meets the needs of the present without compromising the ability of future generations to meet their own needs. As such, on the occasion of the 12th Ghana Science Association, the Kumasi Branch's Research Seminar and Poster Presentation, towards the celebration of the International Year of Basic Sciences for Sustainable Development.

WiSTEMGh appreciates the impact Ghana Science Association continues to make and looks forward to engaging in fruitful discussion and participating in this year's program as we showcase the important role basic sciences plays in sustainable development.

Let us all keep up the momentum and the spirit and show that we can use basic sciences to make a lot of things happen for generations unborn. We all can make this happen!

Long live WiSTEM Ghana

Long live GSA, Kumasi branch.

God bless us all.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



PROFILES/ABSTRACTS OF KEYNOTE SPEAKERS

KEYNOTE SPEAKER [KSP1]: EMERITUS PROFESSOR MICHAEL STEINITZ

SOME OBSERVATIONS ON ETHICAL PROBLEMS AND CONUNDRAS FOR SCIENTISTS

Michael Steinitz

St. Francis Xavier University, Antigonish, Nova Scotia



ABSTRACT

In our time, when problems of population growth, consumption demands and climate change are matters of daily concern, I want to mention some of the ethical problems that have confronted scientists. The fact that any discovery may turn out to have both wonderful and disastrous consequences has been discussed many times before. The discovery of nuclear fission brought us both the atomic bomb and nuclear power generation. One may lead to the end of human life on earth and the other may be the only way that we can avoid catastrophic global climate change. Among the German Nobel laureates who worked on poison gas in WW1 were Fritz Haber, Walther Nernst, Otto Hahn, James Franck and Richard Willstätter. Americans who worked on poison gas included James B. Conant, later president of Harvard and supervisor of the Manhattan Project. There is no science that cannot be misused. The fertilizer that helps to feed millions and is made using Haber's Nobel-prize-winning process, is the main ingredient in home-made bombs, along with diesel fuel. Often totally benign discoveries lead to consequences that society has been unprepared or unwilling to deal with. These include DDT and Penicillin, which led to wonderful reductions in infant and adult mortality, but caused population growth that made demands on food resources that were often unmet. More mundane problems include decisions that we have to make about attending conferences in countries with serious human-rights abuses or governments whose policies and actions we may find abhorrent. The work of editors of scientific journals involves daily questions of ethics. About 10% of submissions to CanJPhys are plagiarized. Are the authors acting with criminal intent or, as my children would say, "they're not ignorant, they just don't know..." A controversy in the late 1930's revolved about Nobel laureate Peter J. W. Debye, then president of the German Physical Society (DPG), signing a letter to the society with "Heil Hitler". Debye, a Dutch Catholic, voted with his feet, emigrating to the US to teach at Cornell where he helped to save Jewish scientists trapped in Germany. How humans work under a brutal dictatorship offers numerous ethical questions.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



THE MECHANICS OF SCIENTIFIC PUBLISHING, PEER REVIEW, AND ETHICS IN PUBLISHING

St. Francis Xavier University, Antigonish, Nova Scotia

ABSTRACT

This brief talk will be a condensed version of a short course given at UNAM in Mexico City. I will discuss what your editor is looking for and what exactly it is that he or she does. This will, of course, deal with scientific content, but also with questions of attribution of textual material used and the avoidance of any possible implications of plagiarism or duplicate publication. It will be emphasized that communication is an essential part of scientific endeavor. If you cannot communicate what you have done (verbally and in writing) then you haven't done it! Whether we like it or not, English has become the world-wide language of communication and a working knowledge is a great, if not essential, part of your preparation to be a working scientist. If you don't have it, a friend or colleague with good English skills is a very important asset. To write well requires not only language skill, but an understanding of how to write briefly and concisely in a manner that will inform and interest a reader who is not a specialist in your narrow sub-field.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



KEYNOTE SPEAKER [KSP2]: PROF. MARIAN A. NKANSAH

THE YOUNG RESEARCHERS'S FORUM: A PLATFORM FOR NURTURING COLLABORATIVE RESEARCH FOR SUSTAINABLE DEVELOPMENT

Marian Asantewah Nkansah (Lead, Young Researchers' Forum)

ABSTRACT

The Young Researchers Forum (YRF) of the Office of Grants and Research was established by the Office of the Vice-Chancellor to promote a culture of research and researcher citizenship among younger faculty and researchers at Kwame Nkrumah University of Science and Technology. The presentation will provide an overview of the essence of the YRF, highlight some of their activities and engagements, and discuss their aspirations moving forward.



KEYNOTE SPEAKER [KSP3]: VERY REV. PROF. WILLIAM OBENG-DENTEH

ABSTRACT

“Development is expected to be purposeful and sustainable to benefit society. However, without sustainability, development itself is ultimately counterfeit and counterproductive. Therefore, it is essential to sustain the progress that has been made. Research is vital to maintaining these developments, and mathematics is no exception in this regard. For sustainable development, it is necessary to build comprehensive mathematical models for predictive studies. Many real-world problems have been solved with developed mathematical techniques. The findings of research show that mathematics is applied across the social sciences, health and all physical and applied science areas. Thus, we can conclude that mathematics is the driving force behind sustainable development in the scientific and industrial revolutions as well as in the digital world.”

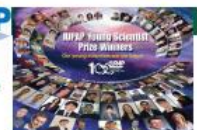


For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



KEYNOTE SPEAKER [KSP4]: DR. LINUS KWEKU LABIK

Dr. Linus Kweku Labik is a lecturer in the Department of Physics at KNUST. His research interests include energy storage materials, construction materials, recycling, and the conversion of end-of-life waste materials. His research aims to contribute to attaining the Sustainable Development Goals (SDGs) 7, 9, 12, and 13. Dr. Labik studies the microstructure of materials using characterization techniques such as microscopy and spectroscopy. This provides opportunities to understand and improve their properties, as well as for sustainable processing, utilization, and recycling of such materials. His past research includes the treatment of mine wastewater and thermal energy storage using zeolites, pyrolysis of plastics for conversion into fuel oil, development of plastic-sand bricks, and the safe discharge of lithium-ion batteries. Dr. Labik enjoys science communication and uses social media to promote science and learning of science.



ADVANCES IN PHYSICS FOR SUSTAINABLE DEVELOPMENT

ABSTRACT

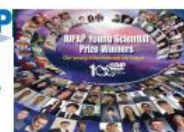
The role of Physics in an advanced technological world is of intractable relevance underpinning several sustainable development objectives. Physics, in its several areas of disciplines such as Materials Science and Technology, Terrestrial Physics, Quantum Physics, Computational Physics, Astrophysics, Environmental Physics, among others, are indispensable for ending poverty and hunger, handling climate change, reducing inequalities and achieving the SDGs in general. One of the major roles Physics continues to play in achieving sustainable developments is the creation and/or development of new materials. Research studies of structures and properties of existing materials have not only helped Physicists to apply these materials in the appropriate areas but have also informed the tweaking of such structures and properties to obtain sustainable materials, theories, and processes. These materials include smart materials, functional materials, nano materials among others that are applied in the various sectors of life. To achieve sustainability, there is the need to bridge the gap between research, science, and knowledge, on the one hand, and policy on the other. Bridging this gap will promote knowledge-based action that requires an increase in the resources and support available to scientists and research institutions. The advent of these materials provides several advantages such as low impact on natural environment, energy efficiency, minimal usage of water, protection of human health, increasing productivity, and minimizing waste.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



KEYNOTE SPEAKER [KSP5]: PROF. NATHANIEL O. BOADI

ADVANCES IN SUSTAINABLE CHEMISTRY

Nathaniel Owusu Boadi

*Department of Chemistry, Kwame Nkrumah University of Science and Technology,
Kumasi, Ghana*

ABSTRACT

Sustainable chemistry addresses environmental, economic, and social challenges by developing and implementing innovative chemical technologies and processes. This includes the design of sustainable materials, the use of renewable resources, the development of green synthesis methods, the improvement of energy efficiency in chemical processes, the reduction of waste and emissions, and the development of safer products. Additionally, advances in computational chemistry, such as molecular simulation and predictive modeling, contribute to sustainable chemistry. The goal is to create a more sustainable future through responsible, efficient, and innovative use of chemical resources. There have been several advances in green and sustainable chemistry in recent years, including Biocatalysis, Atom economy, Non-toxic solvents, Renewable feedstocks, and Circular economy. Overall, these advances in green chemistry are helping to reduce the environmental impact of chemical production and support the transition to a more sustainable chemical industry. This presentation focuses on the sustainability of chemistry, its advantages and disadvantages, and its future global impact.



Keywords: sustainability, green chemistry, renewable energy, SDGs, Basic sciences

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



KEYNOTE SPEAKER [KSP6]: DR. JOSEPH H.K. BONNEY

Dr Joseph Humphrey Kofi Bonney is a Senior Research Fellow at the Noguchi Memorial Institute for Medical Research, University of Ghana.

He has won numerous grants, honors, and awards to participate in and carry out research projects/investigations, or indeed to be given global acknowledgement and recognition for his work.

His current research focuses on emerging and re-emerging infections – particularly viral zoonoses, including Viral Haemorrhagic Fevers such as Ebola, Lassa Fever, Crimean-Congo, Rift Valley, and Arboviruses. Work emphasizes on studies of their evolution, epidemiology, diagnostics, ecology, and host-virus interactions from molecular to population level. The aim is to enhance biomedical research on emerging and re-emerging infections and build preparedness for emerging infectious diseases presently and the future. In recent times I have built interest and conducted both basic and applied research focusing on developing new diagnostic methods and investigating the epidemiology at molecular and population levels for viral diseases including hepatitis and respiratory tract infections.



Dr Bonney has supervised and co-supervised close 35 Undergraduate and Postgraduate Level Thesis and examined master's and PhD-level thesis at the University of Ghana where he also lectures at Allied Health Sciences, the graduate entry medical program and the schools of Public Health and Nursing.

Amongst others, he is a member of the following societies and groups - Society for General Microbiology (SGM) – UK; American Society for Microbiology (ASM); The Royal Society of Tropical Medicine and Hygiene – UK; American Society of Tropical Medicine and Hygiene; Member, ECOWAS Regional Rapid Response Team (ERRRT) on Pandemic and Emerging Infectious Diseases; Member, African Unit of European Mobile Laboratory Operations for Outbreak Response; Member, National Technical Coordinating Council (NTCC) on Pandemic and Emerging Infectious Diseases; Member, National Ebola Preparedness and Response team – Surveillance Sub-Committee.

He has been invited to and attended over forty-five (45) prestigious national and international conferences and workshops where he often plays key roles, presented papers, posters, and research findings,

He has 53 published research work in refereed Journals.

He is married with 2 children.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure and Applied Physics



MICROBES TO THE RESCUE – ACHIEVING SUSTAINABLE DEVELOPMENTS

ABSTRACT

The world stands to change through basic and fundamental scientific studies in the area of applied sciences which continuously paves the way to evolving systems including education by arming society with knowledge. Basic sciences provide the essential means to meet crucial challenges such as universal access to food, energy, health coverage and communication technologies. Sustainability science focuses on the dynamic interactions between nature and society. The study of the cell, inheritance, molecules, microorganisms, tissues and organs, and the study of the ecosystem makes up basic science. The last decade has witnessed the emergence of an array of increasingly vibrant movements to harness science and technology in the quest for a transition toward sustainability. Recent experiences have shown the ecology of Cucumber mosaic virus (CMV) as a pertinent example of how a virus can affect the sustainability of an important crop. Studies have demonstrated that the benefits expected from the introduction of new and highly productive plant varieties may be eroded by the concomitant introduction of new virus strains which can greatly change the structure of the resident virus population. However, to help achieve sustainability, genetic engineering has been suggested as a tool. It can therefore be concluded that sustainable development in many fronts can be mediated by microbes with the potential to stabilize the requirements of the environment and make resources available for use for future generations, as well as conserve the resources provided by nature.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



PROFILES OF PATRONS/SESSION CHAIRS/LOC

GSA Patron: Prof. Aboagye Menyeh

Prof. Aboagye Menyeh is a full Professor of Geophysics in the Department of Physics, KNUST. He served as the last Dean of the then Faculty of Science from 2000 – 2004. He was appointed as the First Provost of the College of Science, serving two terms, from 2004 to 2010. He has served the University in several capacities, such as the Professorial Member of the University Council, Acting Vice-Chancellor (VC) by virtue of his statutory position as the Professorial Member of Council, between 2003 and 2005. He also served on virtually all the statutory and non-statutory committees of KNUST from 2000 to 2010, either as a Chairman or as a Member.

In recognition of his distinguished services to the University and to the College of Science in particular, he was honoured by the University with a Commemorative Plaque (Gold Division), during the Special Congregation to commemorate the 60th Anniversary of KNUST in November 2011.



During his tenure as Dean and Provost of Science, several Laboratories in Physics, Chemistry, Biology and Optometry Departments were modernized to international standards. He also initiated and saw to its completion, the construction of the magnificent College of Science Block. For this singular vision and the immense contribution to the infrastructural development at KNUST, the University honoured him by naming the Science Building Complex after him as *ABOAGYE MENYEH COMPLEX*, in June 2015.

He is a Church Elder (Presbyter) of Christ Congregation of the Presbyterian Church of Ghana, KNUST, Kumasi. He is married to Mrs. Adelaide Aboagye with whom they have four children: 2 females and 2 males.

He has several scientific peer-reviewed publications in international and local journals.

He has been an active member of the Ghana Science Association since 1981 and has held the following important positions/achievements:

- The National Secretary of the Ghana Science Association, 1996 - 1997
- The National President of the Ghana Science Association, 2001- 2003,
- The Chairman of the National Executive Committee, of Ghana Science Association, 2001-2003
- The Founding Editor-in-Chief of the Journal of the Ghana Science Association, 1998-2013
- Currently Patron of the Ghana Science Association.
- He is known as the Scientific Father & Patron for his exemplary leadership and scientific impacts.
- He was awarded the GSA Member of the Year 2021 for his outstanding and exemplary contributions.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



GSA Patron: Prof. Sylvester K. Danuor

- Prof. Sylvester K. Danuor is a Professor in the Department of Physics, KNUST.
- Former Head of Department, Vice-Dean, Dean and CoS Professorial Rep on Academic Board-KNUST
- Former Senior Tutor of University Hall (Katanga), KNUST
- Chairman/Coordinator of several Committees/Programs/Projects at KNUST
- Former National President of GSA.
- Former KNUST Rep on the Academic Board of the Christ Apostolic University College & Data Link Institute.
- Visiting Scholar/Research Scientist and External Examiner to several Universities. Institutions and Universities visited include the University of Frankfurt/Main, University of Munich and the University of Kiel, all in Germany, the University of Toronto, University of Alberta and the University of Waterloo, all in Canada, Stanford University in California and Duke University in North Carolina, all in the USA, University of Leeds in the UK, the International Center for Theoretical Physics, Trieste, Italy, University of Paris Sud 11, Paris, France among others.
- Member of the Governing Council of Accra Technical University (ATU).
- Fellow of the Ghana Academy of Arts and Sciences (GAAS).
- Member of the Advisory Committee of Public Records and Archives Administration Department (PRAAD), representing the Ghana Academy of Arts and Sciences (GAAS).
- KNUST Representative on the Governing Council of Kessben College at Patriensa, near Kuntense, Ashanti Region, since 2020.
- Coordinated a number of international projects including the Lake Bosumtwi Project for Geophysical and Remote Sensing Investigations and on the Deep Drilling into the Crater; some EU-funded projects within the 7th Framework of the European Union such as the African Monsoon Multidisciplinary Analysis Project (AMMA), Quantifying Weather and Climate Impacts (QWeCI) on Health in Developing Countries project, the Dynamics-aerosol-chemistry-cloud-interactions in West Africa (DACCIWA) project and the Global Challenge Research Fund (GCRF) African Science for Weather Information and Forecasting Techniques (African SWIFT) project.
- Attended and presented papers at local, national, and international conferences.
- Published in several international peer reviewed journals.



For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



GSA Patron/President-WiSTEMGh: Prof. (Mrs.) Ibok Oduro

Mrs. Ibok Oduro is a Professor of Post-harvest Technology at the Department of Food Science and Technology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana. She had her BSc. (1985) and MSc. (1987) degrees in Chemistry at the University of Ibadan, Ibadan, Nigeria. Upon graduating, she worked as a Research Assistant at the International Institute of Tropical Agriculture (IITA) in Nigeria from 1988 to 1991. She later obtained her Doctorate degree (Ph.D) in Postharvest Technology at the University of Cranfield, UK (1996).



Prof. Oduro is the Former First Female Provost of the College of Science, KNUST, and the first female Provost in the University. She has served as Dean for the Faculty of Biosciences (2015– 2016), Vice Dean for Faculty of Biosciences (2008-2010), the Head of Department for Food Science & Technology (2014-2016) and Biochemistry & Biotechnology (2007-2009, 2010-2014). She also served as the Vice Dean for International Student Affairs (2002-2004) and Vice Dean of Students (2004-2006). She was the Hall Warden of Hall Seven now Chancellor's Hall (GUSSS Hotel) March 2006 – September 2007. She serves on several educational and government institutions. She is an Imminent Council Member of the Council for Scientific and Industrial Research (CSIR), Ghana. Prof Oduro is a remarkable leader and scholar recognized both locally and internationally. She is a member of the International Leadership Foundation (ILF), the Organization for Women in Science for the Developing World (OSWD), the African Scientific Institute (ASI), Women in Science, Technology, Engineering and Mathematics (WiSTEM_{GH}) and Ghana Science Association (GSA). She is one of the Patrons of GSA - Kumasi Branch who has been recognized by GSA for her contribution to the Association. Prof. I. Oduro serves as an Editor of the Journal of Science and Technology, (JUST). She is also an External Assessor for several Universities/Institutions Nationally and Internationally.

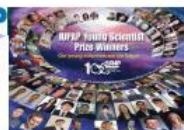
Prof. Oduro is currently a Mentorship Champion at KNUST, where she mentors undergraduate and postgraduate students, senior members, and other staff. She is also a mentor for the Food System Research Network for Africa (FSNet Africa), providing support to early career scientists. Additionally, she serves as the Chairperson for the KNUST Wellness Centre. Outside of academia, Prof. Oduro is passionate about values-based leadership development and collaborates with various leaders to effect transformation. She has conducted training sessions for senior leaders of the African Union, senior management of the Forestry Commission of Ghana, and several youth leadership initiatives. Currently, she is the Chairperson of the Board of the International Leadership Foundation (ILF) Ghana and a facilitator for the Executive Diploma in Leadership (EDL) program for Southern and Eastern Africa, which is piloted by the International Leadership University in Ghana.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



Kumasi Branch Hon. President: Prof. Jacob K. Agbenorhevi

Prof. Jacob K. Agbenorhevi is an Associate Professor in the Department of Food Science and Technology (FST), KNUST, Kumasi. He holds a BSc (Hons) degree in Biochemistry from KNUST, MSc degree in Nutrition and Food Sciences, and PhD in Food Science from the University of Huddersfield, UK. He has served on several committees within the university and internationally. He served as the Head Coordinator and Foundation President of the Commonwealth Scholars and Fellows Alumni, Ghana (CoSFAG) (2015-2020). He is also a Member of Ghana Young Academy, Ghana Academy of Nutrition and Dietetics, and the Commonwealth Scholarships Commission Alumni Advisory Panel.



Prof. Agbenorhevi serves as an External Examiner/Assessor for several institutions in Ghana and abroad. He is also a Reviewer for several journals in the field of Food Science and Technology. He served as Editor for Scientific African (2019-2020). He is also the Editor of Everyday Science for Schools (ESS) Magazine of the Ghana Science Association (2017-Date).

Prof. Agbenorhevi's research areas include Food Chemistry (composition and analysis), Food Biopolymers (polysaccharide/protein systems) and Rheology, Food Product Development and Sensory Evaluation, Food Safety, Nutrition and Health. His research interests are focused in the area of polysaccharide characterization, physical chemistry of food systems and nutritional improvement of foods. Served as a collaborating scientist and coordinator on a number of projects/research teams.

Currently working on the evaluation of some underutilized crops for potential food applications. Isolation and characterization of polysaccharides as functional ingredients in food and/ or pharmaceutical systems. These include physical, chemical, and technological properties of starch, pectin and gums found in underutilized sources for their beneficial applications to improve livelihood and global food and nutrition security.

Prof. Agbenorhevi has successfully supervised 6 PhDs, 8 MPhil, 45 MSc, and 45 BSc Students/Theses. He has over 63 publications in peer-reviewed journals, 100 conference papers, 2 books, 2 book chapters, and 15 other articles including handbooks/training manuals/magazines.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



Kumasi Branch Hon. Secretary: Ishmael Takyi

Dr. Ishmael Takyi is a Mathematical Physicist, employed as a Lecturer in the Department of Mathematics at Kwame Nkrumah University of Science and Technology (KNUST). His route to the current position in KNUST included a Ph.D. and M.Sc in Physics at the Institute for Theoretical Physicists at the University of Stellenbosch, an M.Sc in Mathematical Sciences at the African Institute for Mathematical Science (AIMS) via the University of Cape Town, and B.Sc Hons. in Mathematics at the University of Ghana. His research interest is in high energy physics and nuclear physics with a background in solitons in field theory, quantum energies of solitons, nonlinear dynamics, and quantum field theory. His



quest to answer basic questions about nature won him two academic prizes; the Stephen Hawking award at AIMS and the Vice-Chancellor award for best graduating Mathematics Students at the University of Ghana. He is also a recipient of a STIAS Doctoral scholarship award during his Ph.D. studies at the University of Stellenbosch. Ishmael has 9 published papers in refereed journals to his credit. He has supervised several undergraduate and Ph.D. candidates in his few years at KNUST. As a science enthusiast, Ishmael was elected as a Secretary-General of the Ghana Science Association (GSA) Kumasi Branch, he is also a fellow of the International Association of Mathematical Physics (IAMP), National Institute of Theoretical Physics (NiThec) South Africa, and the National Institute of Mathematical Science (NIMS) Ghana. He is an adept reader and encourages students to excel and participate fully in class.

Kumasi Branch Hon. Treasurer: Dr. Abena Boakye

Dr. Abena Boakye is a Food Scientist and a faculty member of the Department of Food Science and Technology, KNUST Kumasi.

Dr. Boakye's research interests span climate smart agriculture, food compositional studies, traditional food systems and food and nutrition security endeavors, within the context of developing countries. Thus, her investigations explore the health benefits of indigenous food commodities to enhance their food use and value addition interventions on marginalized/ underutilized species to expand existing markets, create new ones, and update their food use.



Dr. Boakye also consults for institutions and businesses on Food Product Development, Process Modification and Standardization as well as Sensory Evaluation of Products. She is an active member of a number of professional bodies and is the current Kumasi branch Treasurer of the Ghana Science Association. Outside academia, Dr. Boakye channels her efforts in community engagement activities that seek to “**Demystify Science and make it friendly**” particularly to basic school pupils. She initiated the *annual Science and Technology Seminar Series for Girls*. She also loves teaching, and outreach activities that educate food vendors and consumers, on ‘safe food practices and postharvest management of perishable crops.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure and Applied Physics



Facilitator: Dr. (Mrs.) Augustina Angelina Sylverken

Augustina Angelina Sylverken is an exceptionally motivated and innovative Female Researcher who is a Senior Lecturer at the Department of Theoretical and Applied Biology at KNUST. She is also a Senior Research Fellow at the renowned Kumasi Center for Collaborative Research in Tropical Medicine at KNUST. Augustina is highly driven in her research area of interest, mainly in the area of developing innovative and using state-of-the-art approaches to investigate the contribution of viruses as a proxy to zoonosis in the area of One Health. In addition, she continues to champion activities related to the transformation of young females in the areas of Science, Technology, Engineering and Mathematics (STEM) and related programs. Augustina has been in large scale multidisciplinary and interdisciplinary studies with teams of investigators with sponsorship from prestigious funders notably, the German Research Council (DFG), Global Fund, European and Developing Countries Clinical Trials Partnership (EDCTP), Global Challenges Research Fund (GCRF), the Royal Society – UK, and the KNUST Research Fund (KReF). With such funds, she has been a Lead Investigator, Co-investigator or Project Coordinator in executing research activities. She serves on several committees and boards including the National Tuberculosis Control Program Board of Ghana. She is also an Editor and serves as Reviewer for a number of reputable journals. She has won several awards including the 2021 KNUST College of Science (KNUST-CoS) Excellence Awards Senior Member for Grants and Research. She is a member of the prestigious Ghana Young Academy. Augustina continues to publish widely and has over 98 publications to her credit in reputable journals.



Scientific Committee Chair/Reviewing Editor: Dr. Alexander Kwarteng

Dr. Alexander Kwarteng is a Senior Lecturer at the Department of Biochemistry and Biotechnology at the Kwame Nkrumah University of Science and Technology and a Senior Research Fellow at KCCR, KNUST. Dr. Kwarteng holds an MPhil in Clinical Microbiology from KNUST in Kumasi, Ghana, and a PhD in Immunology from the University of Bonn in Germany, where he worked in the laboratory of distinguished Professor Achim Hoerauf. He completed his post-doctoral studies at the Kumasi Centre for Collaborative Research into Tropical Medicine (KCCR) and the National Cancer Institute, National Institute of Health, in Bethesda, Maryland, USA. Dr. Kwarteng has extensive experience in immunobiology, microbiome research, and transcriptomics related to infectious diseases. He has also been involved in several field clinical trials for both infectious and non-communicable diseases with sponsorship from European and Developing Countries Clinical Trials Partnership, Canadian Institute of Advanced Research, Canadian Institute of Health Research, KNUST Research Funds, National Institute of Health, National Cancer Institute, ARNTD, among others.



For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



Dr. Kwarteng was the first black African elected to the Canadian Institute of Advanced Research (CIFAR), where he worked closely with distinguished members of the Human and Microbiome program around the world. His ongoing research projects focus on filarial infections, infectious diseases and cancers, and the use of immunoinformatics tools to discover vaccine candidates for Neglected Tropical Diseases. He serves as an external examiner for several distinguished institutions of higher learning in Ghana and abroad and has contributed to the training of several undergraduate and postgraduate students. Additionally, he serves as a reviewer and editor for several reputable international peer-reviewed journals. Dr. Kwarteng has published over 75 peer-reviewed articles in prestigious journals worldwide.

Editorial Assistant/GSA Students Rep: Miss Antoinette Gbordzor

Miss Antoinette Gbordzor holds a Bachelor of Science degree in Environmental Science from Kwame Nkrumah University of Science and Technology (KNUST). She served as a Teaching and Research Assistant (under the National Service scheme in the Department of Environmental Science, KNUST). She had her secondary school education at Notre Dame Girls' Senior High School, Sunyani, Fiapre. She plays a key role at the Environmental Leadership Forum (ELF) as a Facilitator of the Sustainable Futures Project (SFP) which focuses on mainstreaming environmental sustainability in basic schools.



Miss Gbordzor is currently pursuing an MPhil in Environmental Science under the prestigious Future Leaders-African Independent Research (FLAIR) Fellowship, which is funded by the Royal Society led by Prof. Philip Antwi-Agyei. Her thesis is focused on exploring how smallholder farmers in the Upper West Region of Ghana are willing to pay for Climate-smart Agricultural interventions.

Her research interests are in climate change, environmental sustainability and water resource management. Miss Antoinette is currently the Students Representative of Ghana Science Association (GSA), Kumasi Branch.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Young Scientist Competition/Poster Session/Assessor Chair: Dr. Kingsley Badu

Dr. Kingsley Badu is the Principal Investigator and lead of the Vector-Borne Infectious Disease Research Group based at the Department of Theoretical and Applied Biology, KNUST. He Holds a Ph.D. (Biological Science - immuno-Biology) and M. Phil in Clinical Microbiology from KNUST He also holds other certificates in Cell Biology and Molecular Parasitology. He has extensive experience investigating transmission of vector-borne infectious diseases such as; malaria, onchocerciasis, lymphatic filariasis and lately leishmaniasis. His predoctoral research focused on quantifying transmission intensity, and identification of medically important vector species to understand their role in disease transmission. These studies highlighted the need for alternative approaches towards estimating malaria transmission intensity (MTI). Due to EIR becoming laborious, high cost and increasing inaccuracies (at low transmissions) and unethical approaches, his PhD and postdoctoral research was dedicated to developing serosurveillance tools for measuring malaria transmission intensity in the western Kenyan highlands and the forest zone of Ghana.



He is a recipient of the prestigious Africa Research Excellence Fund (AREF) in 2015, the African German Network of Excellence in Science (AGNES) 2016 Awards and the KNUST College of Science (KNUST-CoS) Excellence Awards Senior Member for Grantsmanship. He has worked both as a staff scientist and a visiting scientist at local and international research institutions. Notably the Kumasi Center for Collaborative Research (KCCR), KNUST, Kenya Medical Research Institute (KEMRI), Kisumu, Noguchi Memorial Institute for Medical Research (NMIMR), Ghana, Yan lab UCI, USA, and the AG Kelm lab CBIB, University of Bremen, Germany. He currently serves as the Chairman for the Affiliates Coordinating Committee for the African Academy of Sciences, the Secretary to the Malaria working group to the Alumni Network of the European, Developing Countries Clinical Partnership (EDCTP). He has raised significant funding to support post-graduate training in the department Theoretical and Applied Biology here at KNUST, including ARNTD, KREF, DFG, EDCTP and NIH. He is a member of the African researchers in network in Neglected Tropical diseases, the Entomological Society of Ghana, the Immunological Society of Ghana and a member of the American Society of Tropical Medicine and Hygiene.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



College Accountant: Mrs. Catherine Acquah

Mrs. Catherine Acquah is a Professional and Senior Accountant at the Finance Office of Kwame Nkrumah University of Science Technology (KNUST). Currently, she is the Acting College Finance Officer at the College of Science (CoS). She holds Bachelor of Commerce degree from UCC, Master of Business Administration (Accounting) from KNUST and member of Institute of Chartered Accountants, Ghana (ICAG)

Catherine started her career at KNUST as a Senior Accounting Assistant in 1999, rising through the ranks to Principal Accounting Assistant, Accountant and Senior Accountant in 2018.

Mrs. Acquah has held various positions in the University, notable among them are; Head of Accounts Office, Photocopy Unit, Accountant, University Printing Press, Accountant, KNUST School of Business and Acting College Finance Officer, College of Art and Built Environment (CABE).

Catherine is hardworking, result oriented, self-motivated, team player and ambitious person, ability to work under pressure to meet deadlines and has the desire to help the less privileged to achieve their goals.



Moderator: Dr. Edmund Ekuadzi

Dr. Edmund Ekuadzi obtained his doctorate from the Kwame Nkrumah University of Science and Technology, Ghana and obtained his Bachelor of Pharmacy from the same institution. He is a Senior Lecturer, Department of Pharmacognosy and Head, KNUST Central Lab. Edmund is a Visiting Research Scholar, Welcome Center for Anti-infective Research, Drug Discovery Unit, University of Dundee, Scotland. Edmund is also a Next Generation Scientists fellow of the Novartis Institute for Biomedical Research, Basel, Switzerland. Edmund was appointed a Lecturer in 2013.



His research focuses on multidisciplinary studies to identify new drug candidates (pure compounds or extracts) or new leads from natural origin and control their quality. His specific scientific interests include evaluate the activities of crude extracts from traditional medicinal plants and obtain data to support their traditional uses, their indications and analyze potential toxicities, isolate, and identify bioactive compounds which could constitute new prototypes for drug development and analyse their modes of action and control their quality to limit adulterations and standardize treatments.

He has publications in peer-reviewed journals and articles published in conference proceedings. He is a reviewer of peer-reviewed journals. You can see his work [here](#),

Edmund is also a member of the American Society of Tropical Medicine and Hygiene. He is a member of the Medicinal Plant and Natural Product Research and the Royal Society of Chemistry. Edmund is a pharmacist and a former Chairperson of the Ashanti region branch of the Pharmaceutical Society of Ghana. He is a member of the Ghana Young Academy (GhYA)

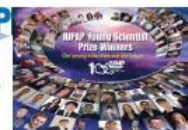
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics





The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

Abstracts for ORAL Presentations

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



O-01 PROTEOME-BASED IDENTIFICATION OF MULTI-EPIOTOPE SUBUNIT VACCINE AGAINST MONKEYPOX VIRUS: AN IMMUNOINFORMATICS APPROACH

Caleb Mensah¹, Ebenezer Asiedu^{1,4}, Priscilla Osei-Poku^{1,2}, Amma Larbi², and Samuel Asamoah Sakyi³, Alexander Kwarteng^{1,2}

¹ Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi, Ghana, akwarteng@knust.edu.gh

²Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana

³Department of Molecular Medicine, School of Medical Science, Kwame Nkrumah University of Science and Technology

⁴Van Andel Institute, Grand Rapids, Michigan, USA

ABSTRACT

The recent widespread occurrence of monkeypox disease beyond its endemic regions in Central and West Africa has become a global concern. With over 79,000 confirmed cases reported across 110 countries on multiple continents, there is an urgent need for therapeutic interventions to be developed to address its surge. To this end, we employ immunoinformatics and computational approaches to screen the proteome of the monkeypox virus. This has enabled us to design a potential multi-epitope-based vaccine candidate that can train the immune system to identify and target multiple cell surface proteins on the monkeypox virus, ultimately leading to a rapid recognition and response by host immune cells against monkeypox viral infection. Here, we identify four B-cell epitopes, four cytotoxic T-cell epitopes, and two helper T-cell epitopes that are non-toxic, non-allergenic, IFN- γ inducing, and structurally stable. Immune simulation responses of the proposed vaccine construct indicate robust aspects of humoral and cellular-mediated immunity, followed by the development of long-lasting memory cytotoxic and helper T-cells for future infection. The findings from this study can help in the development of vaccines specific to monkeypox infection, and the proposed vaccine should therefore be considered for further experimental validation.

Keywords: monkeypox virus, proteome, vaccine design, immunoinformatics, Bioinformatics

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-02 STUDENTS' MATHEMATICS INTEREST DISCOURSE IN GHANA, THE ROLE OF TEACHER'S ABILITY TO CONNECT MATHEMATICAL CONCEPTS TO REAL LIFE PROBLEMS

Yarhands Dissou Arthur

*Akenten Appiah Menka University of Skills Training and Entrepreneurial Development
(AAMUSTED)*

*Faculty of Applied Sciences and Mathematics Education
Department of Mathematics Education
day1981boyy@gmail.com.*

ABSTRACT

Stakeholders in mathematics education have expressed concerns about students' performance in mathematics and the potential negative impact of a decline in interest in mathematics. The present study models students' interest in mathematics (SIM) using four factors: mathematics facility (MF), mathematics connection (MC), teacher motivation (TM), and instructor quality and availability (IQA). The study randomly selected 1,263 participants from 10 high schools in the Ashanti Region of Ghana. Participants were asked to respond to validated self-administered questionnaires with reliability scores of 0.74, 0.69, 0.70, 0.699, and 0.68 for SIM, MC, MF, IQA, and TM, respectively. The findings of this study show that MC, MF, IQA, and TM collectively explain 71.6% of the variance in students' interest in mathematics. The study concludes that students' interest in mathematics is significantly influenced by the ability of teachers to connect mathematics to real life and the immediate environment, the availability of mathematics facilities, teacher motivation, and instructor quality and availability. The study recommends that mathematics educators take into account these factors and integrate them into the delivery of mathematics in high schools.

Keywords: Students interest; Mathematics facility; Mathematics connection; instructor quality; Teacher Motivation

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-03 THE RELATIONSHIP BETWEEN FOOD SECURITY, DIETARY INTAKE AND PHYSICAL ACTIVITY LEVELS AND DEVELOPMENT OF ELEVATED BLOOD GLUCOSE LEVELS OF ADULTS IN EJISU MUNICIPALITY

Fiifi Amoako Atta Panyin Essiam, Akosua Konadu Boateng, Benjamin Arthur Desmond, Afoakwa, Nathaniel Ackon, Adokwei Ernest¹, Mary Amoako, Collins Afriyie Appiah

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Email: essiamamoakofiifi@gmail.com

ABSTRACT

Diabetes is a serious global public health issue with increasing prevalence over the years. This study assessed the relationship between food security, dietary intake, and physical activity levels on the development of elevated blood glucose levels in adults in Ejisu municipality. In this cross-sectional study, 94 participants were recruited and qualitative data were collected using a structured questionnaire. Socio-demographics, anthropometry, fasting blood glucose (FBG), dietary assessment, physical activity and food security were collected. Of the 94 eligible respondents aged 18 years and above, 37.2% were men while 62.8% were women. The mean age, BMI and FBG levels were 33.27 years, 26.83kg/m² and 6.43mmol/l respectively. Only 46.8% of the respondents were food secure. The participants were found to consume high-calorie diets (3901.14 kcal) and this had a significant association ($p < 0.01$) with the prevalence of elevated blood glucose levels. The prevalence of fasting blood glucose in the pre-diabetes range was found to be 71.3% while the prevalence of blood glucose in the diabetes range was also found to be 19.1%. About 52.1% of the population were physically active with males (54.3%) being more physically active than females (50.8%). Total energy intake ($p < 0.01$), total carbohydrate intake ($p = 0.006$) and BMI levels ($p = 0.009$) were significantly associated with the FBG levels. However, there was no significant relationship between physical activity and food security on FBG. The results of this study indicate that participants were likely to develop type 2 diabetes. To prevent the progression of type 2 diabetes, there is a need for stakeholders to devise strategies to promote a healthy diet, high physical activity and healthy weight in the municipality.

Keywords: Prediabetes, diabetes, body mass index, diet, physical activity

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



O-04 THE ROLE OF BASIC SCIENCES IN ADDRESSING GLOBAL CHALLENGES TO SUSTAINABLE DEVELOPMENT: EXPERIENCES FROM CIFOR-ICRAF

Eureka Emefa Ahadjie Adomako¹, Leigh Ann Winowiecki², Aster Gebrekirstos³ and Ramni Jamnadass⁴

¹*Department of Plant and Environmental Biology, University of Ghana, P. O. Box LG 55, Legon, Accra, Ghana, eadomako@ug.edu.gh*

²*Soil and Land Health Theme, CIFOR-ICRAF, Nairobi, Kenya*

³*Dendrochronology Laboratory, CIFOR-ICRAF, Nairobi, Kenya*

⁴*Tree Productivity and Diversity Theme, CIFOR-ICRAF, Nairobi, Kenya*

ABSTRACT

Human-induced global challenges, including climate change, biodiversity loss, land degradation and broken food systems militate against the attainment of the United Nations' Sustainable Development Goals. The Centre for International Forestry Research and World Agroforestry (CIFOR-ICRAF) has, for many decades, worked in support of research in development initiatives aimed at addressing these challenges through a holistic systems approach that recognizes the complexity of interactions between humans and ecosystems. With reference to the functions of selected research units and laboratories located at CIFOR-ICRAF's Nairobi head office in Kenya, e.g., the Genetic Resources Unit, Dendrochronology and Living Soils Laboratories, this paper highlights the application of the basic sciences in tackling the afore-mentioned challenges. Reference is also made to the Land Degradation Surveillance Framework (LDSF), designed for the collection of reliable soil, vegetation and geo-spatial data to inform climate action such as landscape and ecosystem restoration. Recommendations to improve the inclusion and funding of the basic sciences (particularly as university departments) in sustainability-focused research programmes are discussed.

Keywords: climate change, biodiversity loss, land degradation, ecosystem restoration

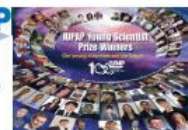
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



O-05 POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) LEVELS IN FINGER FOODS AND MULTIPLE USED EDIBLE OILS ON GHANAIAN MARKET

Suraj Sam Issaka¹ Joseph Richmond Fianko¹ Anita Asamoah² Abass Gibrilla³

¹Graduate School of Nuclear and Allied Sciences, Ghana Atomic Energy Commission, Accra Ghana

²Ghana Atomic Energy Commission, Environmental Resources Research Centre, Accra Ghana

³Ghana Atomic Energy Commission, Water Recourses Research Centre, Accra Ghana

Corresponding author: aniata.asamoah@gaec.gov.gh

ABSTRACT

Boiling, roasting, baking and frying are all food preparation methods that can have a significant impact on food quality. Frying and baking are popular methods of preparing finger food in Ghana. It is common among Ghanaians to use the same batch of oil to fry food multiple times. In this study, the effect of multiple frying on the composition and concentration of PAHs in three commonly used cooking oils—soybean, mixed vegetable, and sunflower—was examined. PAH levels were measured in fresh (unused) as well as used oil samples. Bean cake, doughnuts, and plantain chips were fried alternately using the three types of oil, and PAH levels were quantified. Gas chromatography and mass spectrometry were used to determine the PAH content of the oils and finger foods. PAHs, mostly low-ring, were found in the unused (fresh) oil. The total concentration of the PAHs in the fresh oil was 223 µg/kg. A total of 15 individual PAHs congeners were recorded in the oils after repeated fries. The sum concentrations of the 15 PAHs was 15612µg/kg. It was also discovered that the PAH composition differed depending on the type of oil, finger food, and number of frying cycles. The percentage increase for high molecular PAH (HM-PAH) in the second and third fry sessions was, on average, 22% and 40%, respectively. The PAHs levels recorded in the edible oils after repeated fries were above the recommended guideline limit. It is, therefore, recommended that repeated use of edible oil in frying should be avoided to protect public health.

Keywords: Edible oil, Finger food, PAHs, Ghana

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-06 PAPER PRODUCTION FROM PINEAPPLE LEAF FIBRES

F. Appiah¹, O. A. Nzubechukwu¹, I. K. Wematu¹, M. A. D. Rockson¹

¹Department of Chemical Engineering, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana,
E-mail: madrockson.coe@knust.edu.gh

ABSTRACT

Pineapple waste is among the abundant biomass in Ghana. The objective of this study was to explore efficient pulping methods for producing paper from pineapple leaf fibres (PALF). Two pulping methods were studied: mechanical pulping and chemi-mechanical pulping (treatment leaf sample with 10% and 20% (w/v) NaOH at 140°C and a 6:1 wood-liquor ratio before mechanical pulping). The pulp was filtered, washed, and bleached with hydrogen peroxide. The obtained pulp was formed into sheets of paper using a mould and deckle. The formed sheets were sundried for nine hours. The findings suggest that chemi-mechanical pulping (CMP) results in high-quality paper with a high tensile strength of 20.76 ± 1.95 MPa. However, increasing the sodium hydroxide concentration during CMP could lead to reduced tensile strength. In contrast, mechanical pulping was found to produce paper with the lowest tensile strength of 3.18 ± 0.11 MPa. These results demonstrate the potential of CMP as a viable method for paper production using PALF.

Keywords: Pineapple Leaf fibre (PALF), Mechanical Pulping, Chemi-mechanical pulping, Yield. Paper

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
☎ +233 208954223 ✉ jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-07 ENTOMOLOGICAL ASSESSMENT AND RISK OF TRANSMISSION OF DENGUE IN KASSENA-NANKANA DISTRICT OF NORTHERN GHANA.

Bernice Olivia Ama Baako^{1,2}, Seth Offei Addo³, Ronald Essah Bentil³, Deborah Pratt⁴, Patience Adams⁴, Joseph Humphrey Kofi Bonney⁴, Shirley Nimo-Paintsil⁵, Samuel K. Dadzie³, Victor Asoala¹, Sandra Abankwa Kwarteng²

¹Navrongo Health Research Centre, Navrongo, Upper East Region, Ghana,
bernbaako@gmail.com

²Department of Theoretical and Applied Biology, College of Science, KNUST, Kumasi, Ghana.

³Parasitology Department, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Accra, Ghana

⁴Virology Department, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Accra, Ghana

⁵U.S. Naval Medical Research Unit No. 3, Ghana Detachment, Accra, Ghana.

ABSTRACT

For several decades, the emergence and resurgence of dengue fever globally have become a major public health concern. Despite the lack of reported dengue cases in Ghana, the presence of the *Aedes* mosquito vector and the seroprevalence of dengue have been reported in the country. Given the dearth of knowledge of dengue fever and the distribution and biology of the vector in the Kassena-Nankana district of Ghana, this study aimed to assess the potential risk of dengue transmission in the Kassena-Nankana district. (DENV). A total of 823 mosquitoes were collected during the rainy and dry seasons and morphologically identified. The predominant species identified was *Aedes aegypti* (58.2%). Paga recorded the highest number of *Aedes* mosquitoes (33.86%) in the rainy season while Bonia recorded the highest *Aedes* population (40.51%) in the dry season. All *Aedes* pools (90) were negative when examined for DENV and other viral hemorrhagic fevers such as YFV, CHIKV and ZIKV using RT-PCR. Larval indices including House Index (HI), Container Index (CI) and Breteau index (BI) were estimated as a measure of the risk of transmission in the study area. High larval indices were observed for Bonia (HI, 100%, CI, 66% and BI, 165), Paga (HI, 90%, CI, 66.6% and BI, 400) and Nogsenia (HI, 80%, CI, 54.1% and BI, 100) in the rainy season. In the dry season however, larval indices estimated for the study communities were relatively low except for Paga which recorded high larval indices (HI, 40%, CI, 40% and BI, 60%). Lorry tires and earthenware pots were the main breeding source of *Aedes* mosquitoes. This study is the first to assess the risk of transmission of dengue and other viral hemorrhagic fevers in communities in the Kassena-Nankana District. Information from this study will equip public officials about the distribution of *Aedes* mosquitoes and potential *Aedes*-related diseases in the district, enabling effective monitoring and implementation of vector control strategies to prevent any potential or future outbreak.

Keywords: *Aedes*, dengue, arboviruses, Kassena-Nankana

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-08 PECTIN FROM DIFFERENT OKRA GENOTYPES IN GHANA HAS POTENTIAL AS A SUSPENDING AGENT IN LIQUID FORMULATIONS

Frederick William Akuffo Owusu¹, Mariam El Boakye-Gyasi¹, Marcel Tunkumgnen Bayor¹, Kwabena Ofori-Kwakye¹, Prince George Acquah Jnr¹, Emmanuella Anowaa Quarcoo², Jennifer Asare², Benjamin Amponsah Anokye²

1. Department of Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
frederickakuffo.owusu@knust.edu.gh

2. Department of Pharmaceutics, School of Pharmacy, Central University, Miotso, Ghana.

ABSTRACT

Natural suspending agents are being investigated increasingly due to their relative non-toxicity, lower cost, availability, and biocompatibility when compared to currently used synthetic and semi-synthetic suspending agents. This study aimed to evaluate the suspending properties of pectin extracted from five different okra (*Abelmoschus esculentus* L.) genotypes, namely PL1, PL2, PL3, PL4, and PL5. The extracted pectin was characterized by investigating various properties such as pH, swelling index, proximate compositions, mineral content, and degree of esterification. A 5% w/v paracetamol suspension was formulated using okra pectin as a suspending agent at concentrations of 0.5%, 1%, and 2% w/v, with Tragacanth (0.5%, 1%, and 2% w/v) used as a standard. All extracted pectins had low degrees of esterification (less than 50%), high swelling indexes (greater than 200%), low moisture contents, and a pH range of 6.39-6.92. The suspensions were stable, as evidenced by no significant ($p \geq 0.05$) fluctuations in pH during the study period. Compared to the Tragacanth suspension, the sedimentation rates, flow rates, and redispersibility of the pectin suspensions were lower, while the sedimentation volumes were higher at all concentrations utilized and met the standard requirements. Based on this evidence, okra pectin can be generally applied as a suspending agent, and all five genotypes ultimately have better suspending properties than Tragacanth.

Keywords; Paracetamol suspension, Okra Pectin, Suspending agents, Natural polymers.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-09 THE USE OF PHASE CHANGE MATERIAL TO INFLUENCE STORAGE TEMPERATURE AND HUMIDITY ON CHOCOLATE SOLD IN HOT CLIMATES

Juliet Opoku¹, Rejart Adomah¹, Nutifafa Agbenor-Efunam Yao², Latifatu Mohammed¹, Francis Agyenim Boateng¹, Samuel Tekpetey¹, Trinity Ama Tagbor¹, Bismark Boateng¹, Michael K. E. Donkor², Jacob K. Agbenorhevi³, Ibok N. Oduro³, Frank A. Asante⁴, Genevieve Pawar⁴, Gloria Boafo Mensah¹

¹CSIR-Institute of Industrial Research, CSIR, Accra, Ghana, latifatu.mohammed@yahoo.com

²Department of Physics, KNUST, Kumasi, Ghana

³Department of Food Science and Technology, KNUST-Kumasi, Ghana

⁴Cocoa Processing Company Limited, Tema,

ABSTRACT

Maintaining the storage life and quality of chocolate on the streets of Accra and Kumasi is difficult due to the unregulated surrounding temperature to which they are exposed by sellers. When exposed to temperatures higher than required, chocolate becomes softer, and a whitish heat-related bloom forms around it, leading to physical changes that affect the quality and marketability of the chocolate. In this study, a Phase Change Material S27 (PCM) was used to regulate the temperature surrounding the chocolates and preserve them. To simulate street conditions, the experiment was set up in an open space directly under the sun. Two (2) and three (3) packs of PCM were placed in a chest with the chocolate for 8 hours during the day, and a box of chocolate was placed directly under the sun. Temperature and humidity were measured using a data logger. The environmental temperature was 38.9°C. The chest with 3 packs of PCM recorded a maximum temperature of 29.8°C and a minimum temperature of 23.1°C, while the chest with 2 packs of PCM recorded a maximum temperature of 33.7°C and a minimum temperature of 26.3°C. The chocolate placed directly under the sun recorded a maximum temperature of 45.2°C, causing the chocolate to melt due to the accumulated heat in the box, and a whitish substance formed around it when left to dry after a few days. In contrast, the chocolate kept under PCM conditions retained its physical properties after 8 hours. The humidity of the chocolate with 3 packs of PCM recorded the highest value, followed by the 2 packs of PCM. The chocolate placed directly under the hot sun had the lowest humidity since the heat dried up the moisture around it. Therefore, the chocolates kept under 3 packs of PCM were more effective since they kept the chocolates cooler for a longer period and had no traces of moisture around them.

Keywords: Phase change Material, Chocolate, Temperature, Humidity, Preservation.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-10 NUTRITIONAL AND SENSORY PROPERTIES OF BREAKFAST CEREAL MADE FROM SPROUTED PEARL MILLET INCORPORATED WITH SPICES.

Monica Nuworkpor¹, Rosemond Godbless Dadzie²

¹*Department of Clinical Nutrition and Dietetics, University of Cape Coast, Cape Coast, Ghana, mnuworkpor@stu.ucc.edu.gh*

²*Department of Agricultural Engineering, University of Cape Coast, Cape Coast, Ghana*

ABSTRACT

In Ghana, 'Hausa koko', a millet-based porridge, is a common breakfast meal enjoyed by many. However, the traditional method of preparation results in the loss of fiber, making it less healthy for people living with diabetes and other nutrition-related health conditions. Therefore, this research sought to explore a new method of preparing 'Hausa koko' to safeguard the fiber content and improve its quality. Specifically, the study examined the effect of sprouting and fermentation on the nutritional composition and sensory characteristics of the newly developed product. Soaked pearl millet was sprouted, incorporated with spices, milled, and divided into three (3) samples. Sample 1 was solar-dried immediately, while samples 2 and 3 were mixed with water, fermented for 12 hours and 24 hours, respectively, and then solar-dried. The findings of this research show that the moisture and fat content of sprouted pearl millet flours ranged from 4.30% to 5.23% and 3.15% to 4.7%, respectively. The moisture and fat content decreased in sprouted pearl millet flours compared to non-sprouted pearl millet flours, but increased with an increase in the fermentation period. The protein and fiber contents (10.20% to 13.58% and 2.69% to 4.88%, respectively) increased with an increase in fermentation period, while carbohydrate content decreased (77.74% to 69.45%) with an increase in fermentation period. Overall, sprouted pearl millet flour fermented for 12 hours was the most well-liked and was ranked better in terms of color, flavor, mouthfeel, and aftertaste. Breakfast cereal made from sprouted pearl millet incorporated with spices has an improved nutritional composition, especially in terms of fiber content

Keywords: 'Hausa koko', sprouting, millet, breakfast cereal, spices

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-11 ADSORPTION OF TOXIC METALS FROM LANDFILL LEACHATE ONTO GUINEA FOWL EGGSHELLS IN THE ERA OF GREEN CHEMISTRY

Abudu Ballu Duwiejuah*, Elijah Yinigani Ayine, Joseph Payne

*Department of Biotechnology, Faculty of Biosciences, University for Development Studies,
Tamale, Ghana*

*All correspondence and request for additional materials should be addressed to:
aduwiejuah@uds.edu.gh*

ABSTRACT

One of the best and most affordable ways to remove harmful metals from water is through adsorption. This study investigated the efficiency of guinea fowl (*Numida meleagris*) eggshells as a low-cost adsorbent for the removal of cadmium (Cd) and nickel (Ni) in landfill leachate. In replicates, 100 mL of wastewater was added to each of the weighted adsorbent dosages (1 g, 1.5 g, 2 g, 2.5 g, 3.0 g, and 3.5 g) in a flat bottom flask and agitated for 60 minutes at a pH of 7.82 and a temperature of 24°C. The adsorption efficacy of cadmium and nickel by guinea fowl eggshells was 90.51% to 96.49% and 96.14% to 99.33%, respectively. The maximum adsorption capacity of cadmium was 4.89×10^{-2} mg/g, and the adsorption equilibrium (KL) was 22.74 mg/L. The Langmuir isotherm model was a better fit to the results of the experiment than the Freundlich isotherm model. This suggests that inexpensive guinea fowl eggshells can be employed as effective adsorbents to remove cadmium and nickel from landfill leachate

Keywords: Adsorption, guinea fowl eggshells, landfill leachate, nickel, wastewater

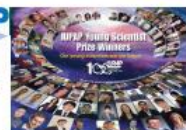
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-12 ACHIEVING SUSTAINABLE DEVELOPMENT THROUGH THE DNA REVOLUTION: THE CASE OF GHANA

Yahaya Sumara Sulley¹, Osman Abdulai Seidu², Mohammed Lawal³, Isaac Oboakoh⁴, Shamsiyatu Murtala⁵, Mariam Dauda⁶, Lydia Quansah⁷

^{1, 4, 7} *University for Development Studies, Faculty of Biosciences, Department of Forensic Sciences, Ghana (y.asumara2016@gmail.com, kboakoh@yahoo.co.uk, lquansah@uds.edu.gh)*

^{2, 5, 6} *University for Development Studies, Faculty of Biosciences, Department of Biotechnology, Ghana (osmanseiduabdulai@gmail.com, mhizzshamsy@gmail.com, mariamdauda12@gmail.com)*

^{2, 3} *Africa Centre of Excellence for Mycotoxin and Food Safety, Federal University of Technology, Minna, Niger State, Nigeria (mohammedjack3@gmail.com)*

ABSTRACT

The DNA revolution has brought about immense changes in various fields, such as medical diagnosis, forensics, and agriculture, leading to improved health outcomes, increased justice and accountability, and sustainable food systems. Despite these advancements, the national significance of the DNA revolution remains underutilized, particularly in the context of sustainable development goals (SDGs). This paper calls for policy action to address this issue and harness the full potential of the DNA revolution in the pursuit of the SDGs. The paper highlights the need for investment in research and development as well as the implementation of policies that promote equitable access to DNA-based technologies. By doing so, the paper argues that the DNA revolution can become a powerful tool for achieving sustainable development and improving the lives of people in Ghana and around the world.

Keyword: DNA, Ghana, Policy, Revolution, SDGs

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-13 *IN VITRO* ANTIOXIDANT, ANTIMICROBIAL, ANTI-INFLAMMATORY AND ANTHELMINTIC ACTIVITIES OF *CRYPTOLEPIS CALOPHYLLA* STEM

Elena Takyiwaa Ali, Lydia Tima Amankwah, and Akwasi Acheampong

Department of Chemistry, Fac. of Physical and Computational Sciences, College of Science,
Kwame Nkrumah University of Science and Technology, Kumasi.

ABSTRACT

Cryptolepis calophylla, a medicinal plant from the Apocynaceae family, has been used in Africa to treat malaria, prolonged bleeding in females, and gonorrhoea. This study aimed to investigate the phytoconstituents and the *in-vitro* antioxidant, anti-inflammatory, anthelmintic, and antimicrobial activities of the methanolic stem extract of *C. calophylla*. Standard methods were used to perform phytochemical screening, antioxidant (total antioxidant capacity (TAC) and DPPH radical scavenging), anti-inflammatory (egg albumin denaturation method), anthelmintic (*Eudrilus eugeniae* (earthworms)), and antimicrobial (broth dilution method) assays. FTIR and thin-layer chromatography analysis were conducted on the extract. The phytochemical screening revealed the presence of alkaloids, phenols, polyphenols, saponins, tannins, phlobatannins, steroids, phytosterols, quinones, anthraquinones, cardiac glycosides, coumarins, terpenes, and terpenoids in the methanolic stem extract. The methanol extract had a total antioxidant capacity of 38.369 ± 1.962 gAAE/100 g. The DPPH assay recorded IC₅₀ values of 130.378 ± 0.081 and 58.460 ± 0.885 $\mu\text{g/mL}$ for the methanol extract and ascorbic acid, respectively. Both the methanol extract and aspirin displayed concentration-dependent anti-inflammatory activity. The methanol extract showed significantly higher anthelmintic activity compared to mebendazole-treated helminths. The minimum inhibitory concentration (MIC) for the methanol extract was 50.00 mg/mL in all test organisms but ranged between 1.953 and 0.977 $\mu\text{g/mL}$ for ciprofloxacin. The bioassay results suggest that the methanol extract of *C. calophylla* could be effective against diseases associated with oxidative stress, inflammation, helminth, and microbial infections, and could become a potential therapeutic agent for their treatment. Furthermore, the findings of this research indicate that the ethnomedical use of the stem of *C. calophylla* for the treatment of gonorrhoea is justified.

Keywords: *Cryptolepis calophylla*, phytoconstituents, antioxidant, anti-inflammatory, anthelmintic, antimicrobial, FTIR analysis, TLC

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-14 THE EFFECTS OF FOUR FEEDING RIVERS OF THE OWABI LAKE ON THE DISTRIBUTION AND ABUNDANCE OF PLANTS IN THE LITTORAL ZONES OF THE LAKE

Arkoh Martin Abed*, Anning Alexander, Addo-Fordjour Patrick

*Theoretical and Applied Biology Department,
Kwame Nkrumah University of Science and Technology,
Kumasi, Ghana*

Corresponding Author: maarkoh.sci@knust.edu.gh

ABSTRACT

The littoral zone of water bodies serves as a habitat for plants and a food source for fish, but it could be detrimental to the longevity of the lake if the growth and spread of plants are not controlled. The littoral zones of Owabi Lake are influenced by four river inlets that bring a lot of sediment and other pollutants into the lake. Though these may be detrimental to the water body, they also serve as a nutrient source for the plants around the edges of the lake. No work has been done on the nature of plants in the littoral zones of Owabi Lake and the effects of the feeding rivers on their distribution. The study assessed the general floristic characteristics and their distribution in Owabi Lake. The littoral perimeter of the lake was purposely divided into 78 plots with 5m x 5m quadrats at 50m intervals. Effort was made to include the inlet zones of the four feeding rivers. The plant species within each plot were assessed and enumerated. The physico-chemical characteristics of the rivers in the littoral zones were determined using standard protocols. The study yielded a total of 30 plant species belonging to 25 families. *Acrocera zigzinoides* recorded the highest relative cover of 91.21% but a relative frequency of 16.08%, and distribution skewed towards the lower portion of the lake. An algae, *Lemna minor*, registered the highest relative frequency of 16.35% but a lower relative cover of 0.013%, and was found more in the inlet of the Owabi feeding river. *Acrocera zigzinoides* had the highest IVI of 107.30, with the herb *Ludwigia alata* indicating the lowest IVI of 0.27. Species from the Asteraceae family had the lowest relative cover (<1.0%). The lower portion of the lake recorded higher plant cover and distribution with lower diversity indices through H' and 1-D analysis. The physico-chemical characteristics of the lake indicated lower values at the upper portion, and all were within WHO limits. The relatively high level of nitrate at the lower portion of the lake and inlet of the Owabi River influenced the growth and spread of new plants into the lake. The uncontrolled inward growth of these plants in the littoral zones of Owabi Lake poses a danger to the sustainability of the water body.

Key words; Littoral zone, Physico chemical, Nutrients, Species, Owabi lake

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



O-15 RELATIONSHIP BETWEEN BIOFILM FORMATION AND ANTIBIOTIC RESISTANCE IN BACTERIA ISOLATED FROM CUTANEOUS LEISHMANIASIS WOUNDS AND THE ANTIBIOFILM PROPERTIES OF SELECTED PLANT EXTRACTS

Emmanuel Asante^{1,2}, * Vivian Etsiapa Boamah^{1,2}, Comfort Yeboah² and Kingsley Badu²

¹*Department of Pharmaceutics, KNUST*

²*Vector-Borne Infectious Diseases Research Group (VBID-RG), TAB-KNUST*

*Corresponding author's email: etsiapa@yahoo.com

ABSTRACT

Cutaneous leishmaniasis is a disease caused by various species of the protozoan belonging to the genus *Leishmania* and transmitted to humans by a sand fly. One of the major concerns associated with cutaneous leishmaniasis wounds is the occurrence of secondary bacterial infections. This results in prolonged treatment of the disease and increases the cost of disease management. One of the mechanisms of virulence used by bacteria to establish these infections is biofilm formation, which is also a mechanism of resistance. This study aimed to investigate the relationship between biofilm formation and antimicrobial resistance of bacteria isolated from cutaneous leishmaniasis wounds and to determine the antibiofilm property of *Terminalia macroptera* and *Ageratum conyzoides* plant extracts. A total of 23 isolates from cutaneous leishmaniasis wounds were obtained from the Department of Pharmaceutics at Kwame Nkrumah University of Science and Technology. Isolates were identified by standard microbiological procedures. Biofilm detection was carried out using the Tissue Culture Plate (TCP) method. Antibiotic susceptibility testing of biofilm-producing bacteria was performed using the Kirby-Bauer disc diffusion technique following Clinical and Laboratory Standards Institute (CLSI) 2018 guidelines. Biofilm inhibition activity of the plants was carried out using the Tissue Culture plate. Several relationships were observed between biofilm formation and antibiotic resistance for each strain. Ciprofloxacin, erythromycin, and tetracycline resistance was related to biofilm formation in *Staphylococcus aureus* strains and ceftriaxone, meropenem, ciprofloxacin, amikacin, chloramphenicol, and aztreonam in the strains of *Serratia* spp. However, no relationship was observed for higher antibiotic resistance in moderate biofilm producers than in weak biofilm producers. The hydroethanolic extract of *A. conyzoides* exhibited biofilm inhibition potential

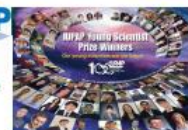
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics





The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

Abstracts for POSTER Presentations

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-01 GROWTH PERFORMANCE, NUTRIENTS DIGESTIBILITY AND CARCASS CHARACTERISTICS OF GROWER RABBITS FED GRADED LEVELS OF SAMANEA SAMAN LEAF MEAL.

Alhassan Osman¹, Abdul Aziz Yunus², Frank Idan², Chris Antwi², Emmanuel Larley Kwame Osafo² and Victoria Attoh-Kotoku²

¹*Dairy/Beef Cattle Research Station, Department of Animal Science, KNUST, Kumasi*

²*Department of Animal Science, KNUST, Kumasi*

ABSTRACT

The effects of incorporating graded levels of Samanea saman leaf meal (SSLM) as a partial replacement for soya bean meal on the growth performance, nutrient digestibility, and carcass characteristics of grower rabbits were investigated in a feeding trial that lasted for ten weeks. Twenty-four grower rabbits of mixed breeds and sexes aged 8 weeks and weighing between 960 – 980g were used. Four dietary treatments were imposed in a completely randomized design (CRD) with six replications. The control diet, which had no SSLM, was designated T0. The other treatments designated as T1, T2, and T3 had 10%, 20%, and 30% of SSLM, respectively. Feed intake, live weight changes, and feed conversion ratio were monitored during the study. A digestibility study was undertaken during the sixth week. Market prices for feed ingredients used were used to economically appraise the feeds. At the end of the study, three rabbits per treatment were randomly selected and slaughtered. Carcass measurements and weights of internal organs were taken. Significant differences ($P>0.05$) were not observed in live weight changes. Nonetheless, there were differences in feed cost/Kg gain, which saw a reduction with an increase in the level of SSLM. Significant differences ($p<0.05$) were observed in DM, CF, EE, and ash digestibility. Except for dressed weight, dressing percentage, and weights of the empty gut and caecum, all other carcass parameters measured were similar ($p>0.05$). It was concluded that SSLM could be used up to 30% in a grower rabbit diet to reduce feed cost without compromising productivity. SSLM could be included in the diets of grower rabbits up to 30% without any deleterious effects on nutrient digestibility and weights of internal organs.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure and Applied Physics



P-02 MALARIA PARASITAEMIA IN APPARENTLY HEALTHY INDIVIDUALS AND ITS RELATIONSHIP TO SERUM FERRITIN IN A MALARIA-ENDEMIC AREA-A CROSS-SECTIONAL STUDY

Solomon Wireko¹, Alexander Kwarteng²

¹*Department of Laboratory Technology, Kumasi Technical University, Kumasi*

E-mail: Solomon.wireko@kstu.edu.gh

²*Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, Kumasi*

ABSTRACT

This study aimed to determine the prevalence of asymptomatic malaria parasitaemia among apparently healthy individuals in an endemic community and its relationship to ferritin levels. A total of 138 apparently healthy residents of the Ayigya community aged 5 – 45 years were studied. Blood samples were collected from each subject and thick and thin smears were prepared and stained with 20% Giemsa and 100% Leishman solutions for identification and speciation, respectively. The prevalence of asymptomatic parasitaemia in the 138 subjects studied was found to be high (8.7%). The mean ferritin levels were 65.2 ug/L in males and 35.6 ug/L in females. In parasitaemic subjects, the mean ferritin levels were 55.8 ug/L in males and 24.5 ug/L in females. The mean haematocrit values for parasitaemic males were 43.5%, and for females were 42.3%, while the mean Hemoglobin levels were 14 g/dL and 12.1 g/dL, respectively. The mean MCV, MCH, and MCHC were 83.2 fl, 26.9 pg, 33.7 g/L for males, and 91.1 fl, 27 pg, 33 g/L for females. Ferritin was found to have a positive correlation with hemoglobin ($r = 0.25$; $p = 0.0141$), hematocrit ($r = 0.19$; $p = 0.0475$), and parasite density ($r = 0.33$; $p = 0.0011$). The prevalent rate of asymptomatic malaria parasitaemia in this study was 8.7%, which suggests a reservoir of infection that could threaten any malaria control program. Furthermore, this study found a significant positive correlation between asymptomatic malaria parasitaemia and serum ferritin. Therefore, asymptomatic parasitaemia should be factored into any malaria control program.

Keywords: Malaria, Asymptomatic, Parasitaemia, ferritin

For enquiries, please contact:

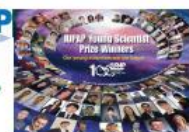
Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure and Applied Physics



P-03 ASSESSING CARDIOVASCULAR DISEASE RISK FACTORS IN TRADERS AT EJISU MARKET, ASHANTI REGION-GHANA.

Andrew Appiah Darkwah¹, Doku Ernest¹, Aryee Annabella Naa Dedei¹, Sakyi Clifford Gyebi¹, Amankwah Richard¹, Mary Amoako¹ and Collins Afriyie Appiah¹

¹*Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, Kumasi – Ghana, Email: andrewdarkwah123@gmail.com*

ABSTRACT

The prevalence of cardiovascular diseases is increasing in developing countries, but there is limited information on the prevalence of cardiovascular disease risk factors among informal workers, especially traders, in Ghana. This research aimed to assess dietary intake and lifestyle and their association with cardiovascular risk factors in traders at the Ejisu market in the Ashanti region of Ghana. This cross-sectional study assessed demography and anthropometry, nutrient intake using a 3-day repeated 24-hour dietary recall, and physical activity using the Global Physical Activity Questionnaire. The study had 107 respondents, with 43% males and 54.2% females, and a mean age of 44.5 ± 13.83 years. About 81.3% of the respondents met WHO's physical activity recommendations of at least 600 MET minutes per week. The prevalence of overweight/obesity was higher (70%) among participants who engaged in low physical activity compared to those with moderate-high physical activity. Physical activity in males was negatively associated ($p=0.02$) with waist-to-hip ratio and positively associated ($p=0.01$) with muscle mass, suggesting that physical activity plays a role in reducing obesity. Mean carbohydrate intake exceeded the Acceptable Macronutrient Distribution Range for the study population and had a significant positive association with waist circumference ($p=0.02$), hip circumference ($p=0.04$), and body mass index ($p<0.01$). Sodium, potassium, and magnesium intake exceeded the recommended daily allowance for both males and females, with low calcium intake. The high calcium and low sodium intake could potentially put the population at risk of hypertension. The findings of this study suggest the need for education on modifiable risk factors among traders and individuals in urban communities in Ghana.

Keywords: Dietary intake, physical activity, obesity, cardiovascular diseases, hypertension.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-04 ANTIMICROBIAL ACTIVITY OF CHROMOLAENA ODORATA, RICINUS COMMUNIS, AND SYZYGIUM AROMATICUM LEAVES AGAINST DRUG-RESISTANT CLINICAL ISOLATES FROM DIABETIC FOOT ULCERS-A CROSS-SECTIONAL STUDY

Solomon Wireko¹, Samuel Nii Boadu¹, Alexander Kwarteng²

¹Department of Laboratory Technology, Kumasi Technical University, Kumasi
E-mail: Solomon.wireko@kstu.edu.gh

²Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, Kumasi

ABSTRACT

Although much research has been done on the management of diabetic foot ulcers (DFU) using conventional antibiotics, these medicines have not been successful in eliminating most bacteria associated with DFU due to multidrug resistance. This study, therefore, investigated the antimicrobial activities of the leaves of *Chromolaena odorata*, *Syzygium aromaticum*, and *Ricinus communis* in controlling drug-resistant bacterial isolates among DFU patients. In this cross-sectional study, the ethanol extract of *Syzygium aromaticum*, *Chromolaena odorata*, and *R. communis* was prepared by maceration method, and their antibacterial effects on clinical strains of antibiotic-resistant bacteria, including *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Citrobacter sp.*, *Escherichia coli*, and *Pseudomonas aeruginosa*, were evaluated using the microtiter plate method to determine the Minimum Inhibitory Concentration (MIC). The MIC of *Syzygium aromaticum* extract for *Klebsiella pneumoniae* was determined to be 12.5 mg/ml and 6.25 mg/ml for *E. coli*, *Proteus sp.*, and *P. aeruginosa*. The MIC of *Chromolaena odorata* extract for *P. aeruginosa* and *P. mirabilis* was 15.6 mg/ml and 31.25 mg/ml for *E. coli* and *K. pneumoniae*. For *Ricinus communis* extract, the MIC was 250 mg/ml for *P. aeruginosa* and *K. pneumoniae*, and 125 mg/ml for *E. coli* and *P. mirabilis*. Given the positive effects of these three herbal extracts on resistant bacterial isolates, they could be used in different pharmaceutical formulations for the prevention and control of infections associated with DFU. However, more studies and trials are needed, particularly on herbal extracts that possess antimicrobial properties, to develop novel antimicrobial medicines for the treatment of infections among DFU patients.

Keywords: DFU, *Ricinus communis*, *Syzygium aromaticum*, *Chromolaena odorata*, Antimicrobial resistance

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-05 PROTEOME-BASED IDENTIFICATION OF MULTI-EPITOPE SUBUNIT VACCINE AGAINST MONKEYPOX VIRUS: AN IMMUNOINFORMATICS APPROACH

Caleb Mensah¹, Ebenezer Asiedu^{1,4}, Priscilla Osei-Poku^{1,2}, Amma Larbi², and Samuel Asamoah Sakyi³, Alexander Kwarteng^{1,2}

¹*Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi, Ghana, akwarteng@knust.edu.gh*

²*Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana*

³*Department of Molecular Medicine, School of Medical Science, Kwame Nkrumah University of Science and Technology*

⁴*Van Andel Institute, Grand Rapids, Michigan, USA*

ABSTRACT

The recent widespread occurrence of monkeypox beyond its endemic regions in Central and West Africa has become a global concern, with over 79,000 confirmed cases reported across 110 countries. As a result, it is imperative that therapeutic interventions are developed to address its surge. To this end, we employ immunoinformatics and computational approaches to screen the proteome of the monkeypox virus. Our goal is to design a potential multi-epitope-based vaccine candidate that can train the immune system to identify and target multiple cell surface proteins on the virus, ultimately leading to a rapid recognition and response by host immune cells against monkeypox infection. Our analysis identified four B-cell epitopes, four cytotoxic T-cell epitopes, and two helper T-cell epitopes that are non-toxic, non-allergenic, IFN- γ inducing, and structurally stable. The immune stimulation response of the proposed vaccine construct indicated a robust aspect of humoral and cellular-mediated immunity, followed by the development of long-lasting memory cytotoxic and helper T-cells for future infection. These findings have important implications for the development of vaccines specific to monkeypox infection, and we recommend that the proposed vaccine be considered for further experimental validations.

Keywords: monkeypox virus, proteome, vaccine design, immunoinformatics, Bioinformatics

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-06 EOSINOPHIL: AN INNATE IMMUNE CELL WITH ANTI-FILARIAL VACCINE AND BIOMARKER POTENTIAL

Caleb Mensah¹, Priscilla Osei-Poku^{1,2}, Alexander Kwarteng^{1,2}

¹ Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi, Ghana, akwarteng@knust.edu.gh

²Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana

ABSTRACT

Filarial infections continue to pose a great challenge in endemic countries. One of the central goals in the fight against human filarial infections is to develop strategies that will lead to the inhibition of microfilariae (mf) transmission. By keeping mf under a certain threshold within endemic populations, transmission can be stopped and the infection can be eliminated. A better understanding of parasite-host interactions is necessary for the development of improved treatment or vaccine strategies that could eliminate filariasis as soon as possible. In this short communication, we discuss how eosinophil-regulated genes, pathways, and networks could provide critical information on how a front-line immune player could be exploited for anti-filarial vaccine development and early infection biomarkers.

Keywords: Eosinophils, CLC, Galectins, microfilarial, filarial infections

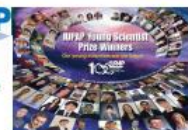
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-07 MALARIA AND INTESTINAL PARASITE PREVALENCE AMONG CHILDREN IN AHANTA WEST, GHANA

Rosemond Mawuenyega¹, Emmanuel Amewu¹, Stephen Opoku², Solomon Wireko³, Alexander Kwarteng^{1,4} and Amma Larbi¹

¹*Department of Biochemistry and Biotechnology, KNUST*

²*Department of Theoretical and Applied Biology, KNUST*

³*Department of Laboratory Technology, Kumasi Technical University*

⁴*Kumasi Center for Collaborative Research (KCCR)*

ABSTRACT

Malaria and intestinal parasites (IPs) coinfections are a major problem in tropical regions of the world, including Ghana, due to an overlap in their geographical distributions. These diseases are a major cause of morbidity in children and can have severe consequences on their cognitive development and growth. This study was conducted to determine the prevalence of Malaria and IPs coinfections among children in the Ahanta West District of Ghana. Malaria tests were performed using NexTek, Bionline, and First Response RDTs, and stool samples were examined for intestinal parasites using microscopy. The results showed that out of 113 participants with a mean age of 12.10 ± 2.3 , 60 (53.1%) had malaria, 81 (71.7%) had intestinal parasites, and 45 (39.8%) had malaria-intestinal parasite coinfection. Of the participants, 43 (38.1%) were males, and 25 (22.1%) had received malaria treatment three months prior to the study. Additionally, 75 (66.4%) of the participants had undergone deworming in the past three months. The overall prevalence of malaria, intestinal parasites, and malaria-intestinal parasites coinfection were 60 (53.1%), 81 (71.7%), and 45 (39.8%), respectively. Females were more likely to be infected with IPs than males, $X^2(1) = 11.318$, $p = 0.001$. However, the gender, prior deworming status, and prior malaria treatment status had no association with malaria-IP coinfection status in children. The high prevalence of IPs and malaria-IP coinfections can impact the cognitive performance and growth of children due to competition for nutrients that children feed on. Therefore, effective interventions are needed to reduce the burden of malaria and intestinal parasites in children in the Ahanta West District of Ghana.

Keywords: Malaria, Intestinal Parasites, Coinfection, Ascaris

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-08 PREVALENCE OF ASYMPTOMATIC MALARIA AMONG CHILDREN IN THE AHANTA WEST DISTRICT, GHANA

Amma Larbi¹, Emmanuel Amewu¹, Rosemond Mawuenyega¹, Stephen Opoku², Solomon Wiredu³, Kwadwo Boampong², Kingsley Badu^{2,4} and Alexander Kwarteng^{1,4}

¹Department of Biochemistry and Biotechnology, KNUST

²Department of Theoretical and Applied Biology, KNUST

³Department of Laboratory Technology, Kumasi Technical University

⁴Kumasi Center for Collaborative Research (KCCR)

ABSTRACT

Malaria is a persistent problem in sub-Saharan Africa, particularly among children. The World Health Organisation (WHO) has set a goal to reduce cases by 50% and mortality by 90% by 2025. However, the asymptomatic carriage of parasites continues to pose a challenge. Rapid diagnostic tests (RDTs) are recommended for surveillance due to their ease of use and low technical requirements. In this study, we evaluate the performance of three RDTs for detecting *Plasmodium falciparum* and Pan Plasmodium in asymptomatic children in the Ahanta West Municipality of Ghana in December 2022. We collected demographic and medical information using a structured questionnaire and performed venepuncture to obtain peripheral blood for the malaria RDTs. The study included 113 participants with a mean age of 12.10 ± 2.3 ; 70 (61.9%) were girls, and 25 (22.1%) reported receiving malaria treatment in the three months prior to data collection. Malaria positivity rates were 44.2% for Bioline, 49.6% for NxTek, and 52.2% for First Response, with an overall prevalence of 53.1%. No significant associations were found between asymptomatic malaria positivity and study variables. Our findings suggest a high prevalence of asymptomatic malaria even during the dry season, which may hinder current elimination strategies and contribute to the transmission of malaria. Additionally, individuals with asymptomatic malaria may act as reservoirs for malaria parasites, underscoring the need for continued surveillance and treatment.

Keywords: Malaria, Children, asymptomatic, RDT

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-09 BLOOD COLLECTION TUBES IMPACT EXPRESSION OF ACTIVATED CD4⁺ AND CD8⁺ T CELLS IN HUMAN WHOLE BLOOD ASSAY

Priscilla Osei-Poku^{1,2}, Daniel Antwi-Berko³, Augustina Sylverken^{2,4}, Amma Larbi and Kwabena Nsiah¹, Alexander Kwarteng^{1,2}

¹*Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi-Ghana, Email: akwarteng@knust.edu.gh*

²*Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi-Ghana*

³*Department of Basic and Applied Biology, University of Energy and Natural Resources (UENR), Sunyani, Ghana*

⁴*Department of Theoretical and Applied Biology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi-Ghana*

ABSTRACT

T-lymphocyte subsets CD4 and CD8 play an important role in host immune responses. However, little attention has been given to the impact of time lapse and the various anticoagulant blood collection tubes on the expression frequency and activation status of CD4⁺ and CD8⁺ T cells. To this end, we explore the impact of time (t<1 hr and t=4 hr) and collection tubes (EDTA and heparin) on the expression frequency and activation status of CD4⁺ and CD8⁺ T cells among healthy Ghanaian individuals. A cohort of healthy individuals (n=9) were recruited, and blood samples obtained in Ghana for the frequency of CD4⁺ and CD8⁺ T cells at various time points (<1 hr and 4 hr). The proportions of activation of these immune markers were profiled using immunophenotyping. We observe that the type of collection tube with preservative (i.e., EDTA or heparin) has no effect on the frequency of CD4⁺ and CD8⁺ T cells *ex vivo*. However, frequencies of activated CD4⁺ and CD8⁺ T cells in EDTA tubes differ significantly in samples processed at < 1 hr and 4 hr but not in heparin. Notably, CD8⁺ T cell activation frequency is consistently higher than that of CD4⁺ T cell at the various study time points and in the collection tubes used. Lapsed time and the type of blood collection tubes are key factors to consider in phenotypic characterization of activated immune markers.

Keywords: CD4⁺ T and CD8⁺ T cells, activation status, frequency, EDTA, Heparin

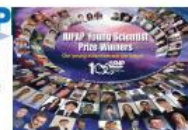
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-10 LIVING WITH LYMPHATIC FILARIASIS: THE MULTIPLE ROOTS OF STIGMA

Kristi Kenyon¹, Jonathan Roberts², Colleen McMillan³, Mary Asirifi⁴, Veronica Fynn Bruey⁵, Regiane Garcia⁶, Emmanuel Kobla Atsu Amewu⁷, Priscilla Kini⁷, Samuel Apoku Asiedu⁷, Ebenezer Asiedu⁷, Efiba Vidda Kwarteng⁷, Ada Chukwudozie¹, Sarah Steidl¹, Alex Kwarteng^{7,8}

¹*Department of Human Rights, Global College, University of Winnipeg, Canada. Email*

²*Department of History, Faculty of Arts, Mount Saint Vincent University, Halifax, Canada.*

³*Faculty of Social Work, University of Waterloo, Ontario, Canada.*

⁴*Faculty of Nursing, University of Alberta, Canada.*

⁵*Department of Legal Studies, Faculty of Humanities and Social Sciences, Athabasca University*

⁶*Faculty of Medicine, School of Population and Public Health, University of British Columbia, Canada.*

⁷*Kumasi Centre for Collaborative Research in Tropical Medicine, KNUST, Kumasi, Ghana.*

⁸*Department of Biochemistry and Biotechnology, KNUST, Kumasi, Ghana*

ABSTRACT

Lymphatic filariasis (LF), also known as elephantiasis, is a chronic tropical nematode infection that mostly affects the extremities. Besides the unbearable chronic pain and loss of livelihood, people living with LF are stigmatized and sometimes abandoned by family. This study sought to identify sources of stigmatization against people living with LF in endemic areas to inform appropriate interventions in reducing or eliminating the same. A qualitative pilot study was designed to engage diverse populations, including people living with LF, unaffected individuals, religious/community/opinion leaders, health workers, and herbal/faith healers in LF endemic communities in the Ahanta West and Nzema East districts in the Western Region of Ghana. Interview guides were developed for focus group discussion and interviews, and art-based methods, namely body mapping, community mapping, and photovoice, were used to collect additional data. The pilot had a total of 52 participants, with 20 (38.5%) males and 32 (61.5%) females. There were 22 people living with LF, eight community leaders, eight health workers, two traditional/faith healers, and 12 healthy community members. Preliminary data shows that among people living with LF, there were both inherent and extrinsic sources of perceived stigmatization. Shyness was common among individuals with advanced stages of the pathology, and they tended to cover the affected areas when outdoors and were more likely to isolate themselves. Individuals with early stages and no obvious deformities lived their lives as unaffected individuals, except when they had periodic filarial attacks, which would "expose" them. People would generally not buy from them or give their children's hands in marriage to them. Amongst the other populations, stigmatization is aptly denied when asked directly. However, effortless probing exposes ingrained stigmatization that may be described as subconscious. Preliminary information from field observations shows both perceived and actual stigmatization against people living with LF. This is likely due to the lack of understanding or unacceptance of public/health education on the etiology of the disease, which most people in endemic communities believe is demonic.

Keywords: Filariasis/ Elephantiasis, deformity, stigmatization, qualitative study, psychosocial.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-11 THE FILARIAL AND THE ANTIBIOTICS: SINGLE OR COMBINATION THERAPY USING ANTIBIOTICS FOR FILARIASIS

Fatima Amponsah Fordjour^{1,2} and Alexander Kwarteng^{2,3}

¹Department of Microbiology, University for Development Studies, UDS, Tamale, Ghana, ffordjour@uds.edu.gh

²Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana, akwarteng@knust.edu.gh,

³Kumasi Centre for Collaborative Research in Tropical Medicine, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana

ABSTRACT

Filarial infections caused by nematodes are one of the major neglected tropical diseases with public health concern. Although there is significant decrease in microfilariae (mf) prevalence following mass drug administration (IVM/DEC/ALB administration), this is transient, in that there is reported microfilaria repopulation 6-12 months after treatment. *Wolbachia* bacteria have been recommended as a novel target presenting antibiotic-based treatment for filarial disease. Potency of antibiotics against filarial diseases is undoubtful, however, the duration for treatment remains a hurdle yet to be overcome in filarial disease treatment.

Keywords: Filariasis, antibiotics, mass drug administration, neglected tropical diseases, *Wolbachia*

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-12 LEVELS OF HAEMOLYSIS SCAVENGER PROTEINS AND RENAL FUNCTION MARKER: A REFLECTION OF SEVERE HAEMOLYSIS AND ANAEMIA IN GHANAIAN CHILDREN WITH SICKLE CELL DISEASE AT STEADY STATE

Fatima Amponsah Fordjour^{1,2}, Alexander Kwarteng^{2,6}, Vivian Paintsil^{3,4}, Ernest Amanor², Ezekiel Bonwin Ackah⁵, Evans Xorse Amuzu³, David Sebbie Sackey⁷, Alex Osei Yaw Akoto³.

¹Department of Microbiology, University for Development Studies, Tamale, Ghana, ffordjour@uds.edu.gh

²Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

³Child Health Directorate, Komfo Anokye Teaching Hospital, Kumasi, Ghana

⁴College of Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

⁵School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

⁶Kumasi Centre for Collaborative Research in Tropical Medicine, Kumasi, Ghana

⁷Haematology unit, Komfo Anokye Teaching Hospital, Kumasi, Ghana

ABSTRACT

Haemolysis is a fundamental feature of sickle cell disease, contributing to the vaso-occlusive crisis in patients. However, the link between haemolysis proteins and haematological parameters in paediatric sickle cell disease (SCD) at steady state is not well-studied among children with sickle cell disease in Ghana. To this end, we assessed this link by conducting a cross-sectional study at the pediatric SCD clinic of the Komfo Anokye Teaching Hospital (KATH) with 90 sickle cell disease children (HbSC, HbSF, and HbSS), with a mean age of 9.830 (± 0.3217) years. Haemolysis protein levels as well as Cystatin C levels were compared to standard values, including A1M (1.8 μ g/L-65 μ g/L), CYS C (0.1 μ mol/L-4.5 μ mol/L), and HPX (500 μ g/ml-1500 μ g/ml). About 80% of the study patients were on hydroxyurea, a drug known to reduce complications in SCD. All but one patient had their haemopexin level (main haeme scavenger) below the reference range (<500 μ g/ml). A1M (which scavenges through the kidney) levels were within the reference range, with few patients' values below the reference range. We observed that Cystatin C, the sensitive renal marker levels, were all within the required reference values. Gender and age analysis showed that females and the older age group had higher levels of both scavenging proteins than their male and younger age group counterparts. A Spearman rank correlation test between full blood count and haemolysis proteins (HPX and A1M) generally suggested a weak but positive correlation; RBC (0.2484; 0.2484), HGB (0.2340; 0.2340), HCT (0.2537; 0.2537), and PLT (0.1567; 0.01567), respectively. MCV (-0.5645; -0.06027) had a stronger but negative correlation with HPX and A1M levels. This study depicted a positive and stronger association between CYS C and haemopexin levels ($r=0.9996$, $p<0.0001$), validating the use of CYS C as a useful marker of renal function in persons with sickle cell diseases. The degree of haemolysis in SCD patients varies based on the levels of haemolysis scavenger protein among Ghanaian paediatric patients. Depleted HPX denotes gradual elevation of A1M levels in SCD. Here, we show that A1M levels were normal for most of the patients; hence, CYS C levels were not alarming in this study. Furthermore, there exists a correlation between haemolysis scavenger proteins and haematological parameters.

Keywords: Haemolysis, Scavenger, Proteins, sickle cell, crisis

For enquiries, please contact:

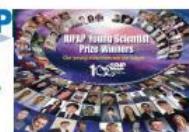
Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure and Applied Physics



P-13 GENOMIC ANALYSES REVEAL MOLECULAR FACTORS ASSOCIATED WITH AN INVERSE RELATIONSHIP BETWEEN GLIAL TUMORIGENESIS AND NEURODEGENERATION IN ALZHEIMER'S DISEASE

Ebenezer Asiedu¹, Caleb Mensah², Priscilla Osei-Poku^{2,3}, Gavin Ha⁴, Alexander Kwarteng^{2,3}

¹*Van Andel Institute, Grand Rapids, Michigan, USA*

²*Kumasi Centre for Collaborative Research in Tropical Medicine, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

³*Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

⁴*Fred Hutchinson Cancer Research Center, USA.*

ABSTRACT

A lower-than-expected incidence (inverse comorbidity) of some cancer types has been reported in individuals diagnosed with certain neurodegenerative diseases, and vice versa. Whether inverse comorbidity exists between glioma and Alzheimer's disease (AD) remains unknown. To contribute toward a molecular understanding of this, we analyzed alterations of AD-linked risk genes in glioma and assessed their influence on glioma survival outcomes. We found frequent hemizygous deletions and copy number amplifications of *APOE*, *CD33*, *ABCA7*, and *PSEN1* in glioma. Hemizygous deletion of *APOE* was strongly associated with improved low-grade glioma survival outcome, whereas *APOE* amplification showed a trend of poor glioma outcome. We also compared the biological signatures associated with glial tumorigenesis and AD-neurodegeneration and found opposing associations with the mitotic processes, regulation of SLIT/ROBO pathways, TNFR2 non-canonical NF- κ B signaling, interleukin-1 signaling, and Ub-specific protease activities. Transcriptomic analyses and histone modification patterns collectively supported a decreased expression of FOXO4 in glioma, which was strongly associated with poor survival outcome whereas increased FOXO4 mRNA expression showed a trend of improved glioma outcome. Meanwhile, FOXO4 mRNA expression was upregulated in brain tissues of AD. The conclusion drawn within the scope and limitations of this study suggests a genetic trade-off between glial tumorigenesis and AD-neurodegeneration, to which APOE serve as a potential molecular factor that mediates such interplay. The results also suggest an opposing role for FOXO4 between glial tumorigenesis and AD-neurodegeneration. Studying the protective factors that explain the inverse relationship between tumorigenesis and neurodegeneration can broaden therapeutic opportunities that target them together or individually.

Keywords: glial tumorigenesis, Alzheimer's disease, APOE, FOXO4

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-14 PHYTOCHEMICAL INTERVENTION IN FILARIAL LYMPHEDEMA

Rose Bonnah¹, Felix Ayisi ², Alexander Kwarteng³

¹Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana. rosebonnah77@gmail.com

²Department of Chemistry, Kwame Nkrumah University of Science and Technology KNUST, Kumasi, Ghana. kwameasieduayisi@gmail.com

³Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana. akwarteng@yahoo.co.uk
Kumasi Centre for Collaborative Research in Tropical Medicine, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana

ABSTRACT

Filarial lymphedema is a pathophysiological chronic disease characterized by the distraction of the lymph system as a result of lymph accumulation. Although the disease does not result in immediate mortality, it is a major endemic social-economic problem in the world, especially in sub-Saharan Africa. Effective therapeutic strategies for filarial lymphedema are always in demand and as a result, several countries have initiated the use of natural products and herbal interventions as a promising source for developing effective anti-filarial agents in managing LF. This review seeks to classify the various plant molecule interventions implicated in the treatment of filarial lymphedema: their mode of extraction, anti-inflammation, and antimicrobial activities. This will provide the information required for further investigation of their efficacy in the management of filarial lymphedema presenting with chronic wounds.

Keywords: Phytochemicals, Filarial lymphedema, Anti-inflammation, Antimicrobial, Natural products.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-15 DECODING THE ROLE OF GLYCANS IN HELMINTHIC INFECTIONS

Prince Dunyo¹, Andrew Appiah Darkwah¹, Priscilla Osei-Poku^{1,2}, Alexander Kwarteng^{1,2}

¹Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

²Kumasi Centre for Collaborative Research in Tropical Medicine, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Across the world, helminthiasis is becoming very difficult to control due to their fast spread among individuals in endemic regions. It is estimated that over one billion people across the world, especially in sub-Saharan Africa, Asia and America are at risk of infection from helminths. The practice of widespread drug administration of chemotherapeutics and public education in endemic regions are the primary regulatory approaches in curbing the rise in helminthiasis. Nevertheless, due to the rising rate of worm resistance to existing chemotherapeutics, there is an increasing need for new and improved therapeutic targets capable of leveraging or bypassing the immunomodulatory effects of helminths to achieve their complete eradication. The immunomodulatory effects of helminthic glycans allow helminths to bypass inflammatory responses from the host immune system. There is growing evidence that helminth glycans, such as LeX, play a part in shifting the host immune response toward a Th2 reaction, and plausibly regulatory reactions via IL-10 initiation. Hence, this review highlights the immunomodulatory mechanisms of helminths and particularly unravels the role of glycan in this regard since such knowledge is crucial for mechanistic studies towards improving current therapeutic treatments for helminthiasis as well as other immunological disorders such as autoimmune diseases.

Keywords: helminths, immunomodulatory, glycans, Th2 IL-10 activation

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-16 USE OF MEDICINAL PLANTS AS A REMEDY AGAINST LYMPHATIC FILARIASIS-CURRENT STATUS AND FUTURE PROSPECT

Fatima Amponsah Fordjour^{1,4}, Priscilla Osei-Poku^{3,4}, Afua Kobi Ampem Genfi², Kwaw George Ainooson⁵, Kingsley Amponsah⁶, Patrick Kobina Arthur⁷, G. Richard Stephenson⁸ and Alexander Kwarteng^{3,4}

¹Department of Microbiology, University for Development Studies, UDS, Tamale, Ghana, ffordjour@uds.edu.gh

²Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

³Kumasi Centre for Collaborative Research in Tropical Medicine, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana.

⁴Department of Biochemistry, University for Development Studies, UDS, Tamale, Ghana,

⁵Department of Pharmacology, Faculty of Pharmacy and Pharmaceutical Sciences Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

⁶Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

⁷Department of Biochemistry, Cell and Molecular Biology, University of Ghana

⁸School of Chemistry, University of East Anglia

ABSTRACT

Despite the successes achieved so far with the Global Program to Eliminate Lymphatic Filariasis, there is still a significant number of lymphatic filarial patients who need alternative treatment and morbidity management strategies. The unresponsiveness of some cohorts to the drugs used in mass drug administration programs is currently prompting an urgent need for attention. Studies have shown that components of *Azadirachta indica* A. Juss, *Parkia biglobosa*, *Adansonia digitata*, and *Ocimum* spp possess anti-inflammatory, anti-cancerous, and antimicrobial activities in animal models. Therefore, this review calls for attention towards the use of natural plant components as an alternate treatment against lymphatic filariasis to contribute to reducing the World Health Organization's burden of providing drugs for people in need of treatment every year

Keywords: Anti-inflammatory, antibiotics, anticancer, Lymphatic filariasis, medicinal plants

Book of Abstracts: 12th GSA RSPPI/YBSSD-2023

67

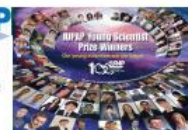
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics



P-17 IDENTIFYING THE MOLECULAR RELATIONSHIP BETWEEN HEPATOCELLULAR CARCINOMA AND HEPATITIS B

Jeffrey Asamoah-Gyawu, Simon Elikplim Alobuia, Vivian Marie Fafali Attipoe, Godfred Adjetey Pabifio, Ebenezer Adusei², Alexander Kwarteng^{1,2}

¹*Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana, Email: akwarteng@knust.edu.gh*

²*Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi, Ghana*

ABSTRACT

Hepatocellular carcinoma (HCC) is a primary malignancy of the liver and it is now the second leading cause of cancer death in the world, affecting more than 850,000 people worldwide. Despite the availability of hepatitis B vaccine and antiviral therapies, hepatitis B virus (HBV) infection is a leading global health issue, with approximately 257 million Hepatitis B surface antigen (HBsAg) carriers. In this report, the molecular pathways impacted by HCC and Hepatitis B as well as the genes controlling those processes were identified using bioinformatics. Finding biomarkers and identifying biological pathways using in-silico analysis paves the path for treatment of HBV-HCC related diseases. Enrichment analysis showed that differentially expressed genes (DEGs) were mainly enriched in cell division and DNA replication biological processes, nucleoplasm and microtubule cellular components, protein binding molecular functions and cell cycle. Kaplan–Meier analysis revealed that high expression of certain genes was associated with poor overall survival rates. Their expression value in the diagnosis and treatment of HBV-related HCC requires further investigation.

This study which involved targeting genes in biosynthetic pathways of hepatocellular carcinoma patients has proven to be an alternative therapeutic option leading to the discovery of new drugs which will help increase survival rate.

Keywords: *hepatitis B virus; hepatocellular carcinoma; differentially expressed genes*

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor:  International Union of Pure and Applied Physics



P-18 SMART GIRLS KNOW THEIR BREASTS: KNOWLEDGE AND PERCEPTION OF BREAST CANCER AMONGST ADOLESCENT GIRLS IN THE ASHANTI REGION, GHANA

Sherihane Aryeetey¹, Henry Acheampong¹, Kobla Atsu Amewu¹, Kwadwo Boahene Atua Anim², Alexander Kwarteng^{1,3}, Augustina Angelina Sylverken^{1,4}

¹*Kumasi Centre for Collaborative Research in Tropical Medicine, KNUST, Kumasi, Ghana), asherihanne@gmail.com*

²*AngloGold Ashanti Health Foundation, Obuasi, Ghana*

³*Department of Biochemistry & Biotechnology, KNUST, Kumasi, Ghana*

⁴*Department of Theoretical & Applied Biology, KNUST, Kumasi, Ghana*

ABSTRACT

The distinct presentation of breast cancer in the subregion: earlier onset age and advanced stage at diagnosis, leading to poor prognosis requires efforts to enhance early detection. Breast self-examination (BSE), a cost-effective method, has the potential to aid in early detection of abnormalities. This study assessed the knowledge, and practice of BSE amongst adolescent girls in the Ashanti region of Ghana. In this cross-sectional survey, a structured questionnaire was administered to the study participants in the selected second cycle schools in Obuasi, Ashanti region. There were 214 adolescent girls with a mean age of 17.31 ± 1.26 years. More than half, 58.9%, were urban dwellers; most, 60.7% had heard of BSE; and 7.0% reported family history of breast cancer. In assessment of the knowledge levels on BSE, nearly half, 104 (48.6%) of them had average knowledge with only 22.4% having high knowledge level. Level of education of the adolescent girls was significantly associated with knowledge levels of BSE, $X^2(2) = 18.67$, $p = 0.001$. About a third of them, 34.1% reported that they practice BSE. The major reasons for practice and non-practice of BSE were the purported benefits ($n = 49$) and lack of knowledge ($n = 108$), respectively. Knowledge of BSE was significantly associated with practice of BSE, $X^2(2) = 21.36$, $p < 0.001$. In conclusion, this study shows average knowledge level of BSE among adolescent girls and low practice of the same. Of note, knowledge of BSE was significantly associated with practice. This calls for intensified campaigns to sensitize young girls on BSE to enhance early detection of abnormalities. This is likely to reduce the increasing burden of breast cancer in the subregion due to poor prognosis.

Keywords: Adolescents, breast cancer, breast self-examination, knowledge, early detection.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-19 EARLIER, NOT EARLY DETECTION IS THE BEST PROTECTION: HIGH PREVALENCE OF BREAST ABNORMALITIES AMONG ADOLESCENTS IN THE ASHANTI REGION OF GHANA

Kobla Atsu Amewu¹, Henry Acheampong¹, Sherihane Aryeetey¹, Kwadwo Boahene Atua Anim², Augustina Annan Sylverken^{1,3}, Alexander Kwarteng^{1,4}

¹*Kumasi Centre for Collaborative Research in Tropical Medicine, KNUST, Kumasi, Ghana, amewuemmanuel@gmail.com*

²*AngloGold Ashanti Health Foundation, Obuasi, Ghana*

³*Department of Theoretical & Applied Biology, KNUST, Kumasi, Ghana*

⁴*Department of Biochemistry & Biotechnology, KNUST, Kumasi, Ghana*

ABSTRACT

Breast masses or lumps are the most common breast pathologies among adolescents and are usually benign. However, this can be unsettling for both patient and family. This important aspect of healthcare for adolescent girls is mostly overlooked. This study sought to determine the prevalence of breast abnormalities among adolescents in the Obuasi Municipality. Structured questionnaire was used to collect demographic data and medical history from participants. Midwives from the KNUST and AngloGold Ashanti hospitals performed clinical breast examinations to screen the adolescent girls for breast abnormalities. There were 214 adolescent girls between the ages of 14 and 21 years with a mean age of 17.31 ± 1.26 years. More than half, 58.9%, were urban dwellers; most, 60.7% had heard of BSE; and 7.0% reported family history of breast cancer. The prevalence of breast abnormalities in this study was 14.0%, with 70.0% being masses/lumps; 10.0% pain, 6.67% each of rashes, discharge, and abnormalities in both breasts. Nearly two-thirds of the participants, 65.9%, did not practice BSE. The major reasons for practice and non-practice of BSE were the purported benefits ($n = 49$) and lack of knowledge ($n = 108$), respectively. There was no significant association found between the study variables and the presence of any abnormality. In conclusion, this study shows a high prevalence of breast abnormalities among adolescent girls and low practice of breast self-examination. Although detection of breast cancer in adolescents may be rare, there is the need for integration of clinical breast screening in adolescent healthcare to avert potential malignancies.

Keywords: Adolescents, breast cancer, breast self-examination, knowledge, early detection.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-20 NUTRITIONAL ASSESSMENT AMONG LYMPHATIC FILARIASIS PATIENTS IN THE AHANTA WEST DISTRICT

Benedicta A. Amaglo¹, Ama Afrakoma Amoah¹, Emmanuel Kobla Atsu Amewu², Samuel Opoku Asiedu^{2,3}, Alexander Kwarteng^{1,2}

¹*Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, Email: akwarteng@knust.edu.gh*

²*Kumasi Centre for Collaborative Research in Tropical Medicine, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.*

³*Department of Theoretical and Applied Biology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.*

ABSTRACT

Lymphatic filariasis (LF) is a tropical parasitic disease caused by nematodes such as *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*, and it leads to permanent lymphatic dysfunction. Nutrition, especially a balanced diet, is critical for maintaining good health. Nutritional imbalances have been associated with diseases, with deficiencies causing poor immune function. A cross-sectional design was employed to assess the nutritional status of people living with LF in the Ahanta West District of the Western Region in Ghana. Structured questionnaires were used to collect socio-demographic profiles, a three-day 24-hour dietary recall for usual and estimated nutrient intakes, assessment of hemoglobin levels using Hemocue2.1, and anthropometric measurements. There were 109 participants in this study, with a mean age of $50.72 \pm$ and 75.2% being women. Results from this study show a malnourished population, with 84.0% being anemic. Widespread nutritional inadequacy was observed among the participants, including macronutrient inadequacies in protein (98.2%), fat (75.2%), and carbohydrate (73.4%). Additionally, deficiencies in calcium, potassium, and zinc were observed at 100%, 91.7%, and 91.7%, respectively. Iron and magnesium were also inadequate in their diets, with 58.7% and 72.5%, respectively. However, selenium (100%) and phosphorus (61.5%) were adequate among the study participants. High inadequacies in vitamin intakes were observed, with vitamin A, E, and thiamine at 100%, 100%, and 72.5%, respectively. Meanwhile, vitamin B12 and C were mostly adequate, with 81.7%, 75.2%, 70.6%, and 68.8%, respectively. This study shows a high prevalence of anemia, in addition to inadequate nutrient intake. However, these were not found to be significantly associated with the severity of LF.

Keywords: lymphatic filariasis, neglected tropical disease, nutrition, nutrients deficiencies, Ahanta West.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-21 PROTEOME-BASED IDENTIFICATION OF MULTI-EPITOPE SUBUNIT VACCINE AGAINST MONKEYPOX VIRUS: AN IMMUNOINFORMATICS APPROACH

Caleb Mensah¹, Ebenezer Asiedu^{1,4}, Priscilla Osei-Poku^{1,2}, Amma Larbi², and Samuel Asamoah Sakyi³, Alexander Kwarteng^{1,2}

¹ Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi, Ghana, akwarteng@knust.edu.gh

² Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana

³ Department of Molecular Medicine, School of Medical Science, Kwame Nkrumah University of Science and Technology

⁴ Van Andel Institute, Grand Rapids, Michigan, USA

ABSTRACT

The recent widespread spread of the monkeypox disease beyond its endemic regions in Central and West Africa has become a global concern. With over 79,000 confirmed cases across continents in 110 countries, it is ever more pressing for therapeutic interventions to be developed to tackle its surge. To this end, we employ immunoinformatics and computational approaches to screen the proteome of the monkeypox virus. This is to help design a potential multi-epitope-based vaccine candidate that can train the immune system to identify and target multiple cell surface proteins on the monkeypox virus. Ultimately, this would translate to a rapid recognition and response by host immune cells against monkeypox viral infection. We identified four B-cell epitopes, four cytotoxic T-cell epitopes, and two helper T-cell epitopes that are non-toxic, non-allergenic, IFN- γ inducing, and structurally stable. Immune simulation response of the proposed vaccine construct indicated a robust aspect of humoral and cellular-mediated immunity followed by the development of long-lasting memory cytotoxic, and helper T-cells for future infection. Findings from this study can help in the development of vaccines specific to monkeypox infection. The proposed vaccine should therefore be considered for further experimental validations.

Keywords: monkeypox virus, proteome, vaccine design, immunoinformatics, Bioinformatics

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-22 RELATIONSHIP BETWEEN DIETARY DIVERSITY WITH MATERNAL ANEMIA AND NEONATAL BIRTHWEIGHT AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN A MALARIA ENDEMIC SETTING IN GHANA

Nella Y. S. Darko¹, Nsoh G. Anabire², Mary Amoako^{1*}, Collins A. Appiah¹

¹*Department of Biochemistry and Biotechnology, Faculty of Biosciences, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi- Ghana, Email: nelladarkoanabire@gmail.com*

²*Department of Biochemistry and Molecular Medicine, School of Medicine, University for Development Studies, Tamale- Ghana*

ABSTRACT

Consuming a monotonous diet predisposes an individual to micronutrient deficiencies. Maternal undernutrition is a known risk factor for maternal mortality, neonatal mortality and low birthweight (LBW). However, in developing countries like Ghana it remains a public health challenge. The aim of the study was to assess dietary diversity among pregnant women and its relationship with maternal anemia and infant birth weight. This study assessed dietary diversity with maternal and neonatal outcomes (maternal anaemia and birthweight) among women who attended antenatal clinics and delivered in Moree Health Centre, Moree, Central region- Ghana. A structured questionnaire was used to obtain dietary intake, clinical (anaemia status/hemoglobin level) and infant birth weight factors among 100 participants aged between 14 to 42 years. Anaemia was diagnosed in 76.0% of participants. About 20.0% of the women gave birth to babies with LBW. Based on the 24-hour Women Dietary Diversity Scores (WDDS) (mean: 5.06, range: 2-8), the women consumed the minimum dietary requirement. The prevalence of anaemia and LBW was not significantly associated with consumption of the minimum 24-hour WDDS requirement ($\chi^2= 3.248$, $p= 0.071$). However, food insecurity was significantly associated with anaemia ($\chi^2= 8.809$, $p= 0.003$). Prevalence of LBW was higher in food insecure women (23%). Of the food groups, consumption of honey and sugars ($\chi^2= 6.596$, $p=0.010$) and other foods ($\chi^2= 4.424$, $p=0.035$) was significantly associated with maternal anaemia. This study reports inadequate dietary diversity, which is associated with food insecurity among the pregnant women prior to their delivery. Strategies are needed to assist pregnant women in resource-poor settings to diversify their diets.

Keywords: Pregnant women, maternal anaemia, birthweight, dietary diversity, antenatal

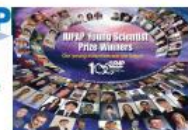
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-23 HEPATOPROTECTIVE ACTIVITY OF *ANTHOCLEISTA NOBILIS* STEM BARK IN CARBON TETRACHLORIDE INDUCED LIVER INJURY IN RATS

Michael Kofi Sarpong, Caleb Kesse Firempong*, Robert Twum, Seth Adjei Domfeh
*Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and
Technology, Kumasi, Ghana.*

*E-mail: calebuse@yahoo.com / ckfirempong.cos@knust.edu.gh

ABSTRACT

The medicinal properties of *Anthocleista nobilis* are likely to support the use of the plant in treating liver diseases. The study was therefore designed to evaluate the hepatoprotective activity of *A. nobilis* against carbon tetrachloride-induced hepatotoxicity. In vitro antioxidant studies (DPPH, TPC, and TFC assays) were carried out on both crude and fractions of *A. nobilis* extracts for the highest antioxidant activity. In vivo acute toxicity and hepatoprotective studies of the extract were also performed. Liver injury was induced by administering CCl₄ (20% in olive oil, 1ml/kg) for 5 days. The mice were post-treated with different doses (50, 100, and 300 mg/kg) of *A. nobilis* methanol fraction at 2, 24, and 48 hours with silymarin (50 mg/kg), a standard drug. The hepatoprotective effect of the extract was determined using the different levels of enzyme biomarkers including alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (GGT). Changes in organ weights, histopathology examination, haematological parameters, and total Antioxidant Capacity (TAC-ELISA) were also assessed. The methanol fraction had the most potent antioxidant activity (IC₅₀ value of 127.11 ± 1.37 µg). The levels of all the enzyme biomarkers (ALT, AST and GGT) increased after CCl₄ treatment but significantly reduced (p values < 0.001 in all cases) in a dose-dependent manner after the methanol extract treatment. The % protection was highest (78%) in the 300 mg/kg dose group (p-value < 0.001) compared with the other treated groups. TAC increased among the treated groups with an increase in extract dose (p-value < 0.001). The absolute and relative liver weights of mice were significantly reduced at 100 mg/kg and 300 mg/kg doses (p-values < 0.001) compared with the CCl₄ group. Histopathological examinations also supported the hepatoprotective activity of *A. nobilis* as the 300 mg/kg dose restored 50 % of hepatic architecture. The acute toxicity studies show that the methanol extract has a median lethal dose higher than 1000 mg with haematological parameters in the treated groups within the normal ranges. Therefore, the findings show that *A. nobilis* has hepatoprotective properties and explain their safe use among the indigenes.

Keywords: *A. nobilis*, antioxidant, hepatoprotective, CCl₄.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-24 ANTIHYPERCHOLESTEROLEMIC AND ANTIOXIDANT ACTIVITIES OF HYDROETHANOLIC STEM BARK OF ZANTHOXYLUM ZANTHOXYLOIDES IN HIGH FATS DIET-INDUCED RATS

Dominic Bampo, Caleb Kesse Firempong^{*}, Seth Adjei Domfeh

*Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and
Technology, Kumasi, Ghana.*

**E-mail: calebuse@yahoo.com / ckfirempong.cos@knust.edu.gh*

ABSTRACT

Zanthoxylum zanthoxyloides is an indigenous Ghanaian plant used to treat stroke, malaria, bilharzia, worms, and other infectious diseases. However, the effect of the *Z. zanthoxyloides* stem bark in improving lipid profile has not yet been reported. The study therefore aimed at investigating the antioxidant and hypocholesterolemic activities of the *Z. zanthoxyloides* stem bark via serum lipid profile and vital visceral organs in rats. Forty-two albino rats were randomly and equally categorized into seven groups. Group 1 (Normal control) was given only 1 ml of corn oil while Group 2 (Disease model) was given 1 ml each of corn oil and pig lard oil. The different doses of the hydroethanolic extract (100 mg/bw, 200 mg/bw, 400 mg/bw) with 1 ml of pig lard oil were administered to groups 3, 4, and 5, respectively. Group 6 (Positive control) was given 7.2 mg/bw of atorvastatin with 1 ml of pig lard oil while group 7 was given only 400 mg/bw of free extract. After six weeks, the rats were anesthetized and sacrificed for the blood and vital organs to determine the lipid profile, antioxidant capacity, and liver enzyme levels. Further analysis was carried out on the liver to assess the effect of the extract on the integrity of the cells. The oral administration of pig lard successfully induced hypercholesterolemia with a significant ($P < 0.05$) decrease in total cholesterol, low-density lipoprotein, and triglycerides, but an increase in high-density lipoprotein as observed in all extract-treated groups compared with disease group. The extract also significantly ($P < 0.05$) increased the activities of GPx with a decrease in MDA which confirmed the antioxidant properties of the plant. Histological analysis reveals that the plant did not have any significant effect on the architecture of the liver cells compared with normal control but could be toxic at higher doses. Thus, the stem bark of *Z. zanthoxyloides* was effectively used to treat abnormal lipid profiles and oxidative stress which was consistent with the indigenous use of the plant for managing lipid and oxidative stress-related diseases.

Keywords: Hypercholesterolemia, hypocholesterolemic, antioxidants, phytochemicals, *Zanthoxylum zanthoxyloides*, glutathione peroxidase, malondialdehyde, atorvastatin

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-25 DIETARY INTAKE AND NUTRITIONAL STATUS OF DIABETIC PATIENTS IN THE EJISU MUNICIPALITY

Mary Ann Nunoo¹, Samuel Kankam¹, Florence Brenyah¹, Charles Apprey¹

¹*Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, UPO, PMB, Kumasi, Ghana
E-mail; jvhugod@gmail.com*

ABSTRACT

Diabetes mellitus, a non-communicable disease with a higher occurrence rate in developing countries is mainly caused by high prevalence of obesity, dietary transitions and lifestyles. High illiteracy rate, poverty and poor knowledge attitude and practices concerning diet have led to poor adherence to diabetic care. This study assessed the dietary intake and nutritional status of diabetic patients in Ejisu government hospital. A cross-sectional study design was adopted and 120 diabetic patients aged above 18 years were randomly selected from the Ejisu government hospital. Structured questionnaires were used to obtain data on basic socio-demographic, anthropometric, 24-hour recall and biochemical data. A nutrient analysis template was used to analyze the 24-hour recall. Pearson correlation chi-square analysis was done to determine the relationship between anthropometric and biochemical variables and to determine the effects of their dietary intake on their biochemical characteristics. Significance level was set at p-value < 5%. In all, 102 (85%) females and 18 (15%) males were recruited for this study. Vitamin C, magnesium and potassium had positive but weak correlation with cholesterol ($r = 0.184$; 0.281 ; 0.231) and LDL ($r = 0.138$; 0.246 ; 0.193), respectively. Most participants had high central adiposity (82.5%), body fat percentage (87.5%) and BMI (62.5%). A high number of participants (68.4%) had elevated levels of cholesterol and LDL which were attributed to the high body fat, waist-to-hip ratio, and BMI ($p < 0.001$). The prevalence of HbA1C was 33.3%. Most of the participants (62.5%) had BMI greater than 25 kg/m². There was low consumption of foods rich in vitamin C, magnesium and potassium. Awareness should be created which is aimed to enhance fruit, vegetable and legume consumption for its potential benefits to improve nutritional status and reduce the risk for diabetes and its maintenance.

Keywords: Dietary intake, Nutritional status, Diabetic patients.

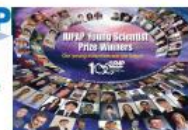
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-26 ASSOCIATION BETWEEN BODY COMPOSITION, ANAEMIA AND COGNITIVE PERFORMANCE AMONG ADOLESCENT GIRLS AT MANKESSIM, CENTRAL REGION OF GHANA

Abigail Abrokwah¹, Eugenia Tawiah¹, Veronica Tawiah Annaful¹, Samuel Selorm Atsu¹, Abigail Owusua Appiah¹, Daniel Haik², Isaac Amoah¹, and Marina Aferiba Tandoh¹

¹*Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana,*

²*UC Irvine School of Medicine, United States of America*

E-mail: abigailabrokwah971@gmail.com

ABSTRACT

Anaemia among adolescents presents a major cause of morbidity and mortality while increasing healthcare costs and reducing productivity. It is an indication of poor health and undernutrition and thus requires utmost attention. This cross-sectional study was conducted among 181 adolescent females in three basic schools at Mankessim, Central Region of Ghana. This study investigated haemoglobin levels (using the Hemocue 301⁺), cognitive performance (using the Raven's Colored Progressive Matrices), and anthropometry (using the Bioimpedance analyzer and a Seca stadiometer) among adolescent females. The prevalence of anaemia was 11.6%. About 32.6% of participants scored below the 50th percentile of the cognitive test. Also, 39.8%, 7.2%, and 1.7% of the study participants were found to be underweight, overweight, and obese, respectively. There was a positive correlation between haemoglobin levels and cognitive performance ($r = 0.018$, $p = 0.807$). A significant negative correlation existed between haemoglobin levels and BMI ($r = -0.168$, $p = 0.024$). A positive correlation was found between cognitive performance and BMI ($r = 0.034$, $p = 0.650$). Despite appreciable reductions in anaemia and malnutrition over the years, anaemia persists in different parts of the country. Thus, effective and sustainable interventions should be implemented across the country.

Keywords: Adolescent females, anaemia, underweight, cognitive performance, Mankessim

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor:  IUPAP
International Union of Pure
and Applied Physics



P-27 NUTRITION KNOWLEDGE OF PATIENTS WITH TYPE 2 DIABETES AND ITS RELATIONSHIP WITH GLYCAEMIA STATUS: A STUDY AT THE MANHYIA HOSPITAL, KUMASI, GHANA.

Ama Achiaa-Afriyie¹, Faustina O. Mensah¹, Mary Amoako¹ and Collins Afriyie Appiah¹

¹*Department of Biochemistry and Biotechnology, Faculty of Biosciences, College of Science, Kwame Nkrumah University of Science and Technology,*

Email: achiaaama22@gmail.com

ABSTRACT

Hyperglycemia is the hallmark of type 2 diabetes mellitus, a metabolic disorder caused by impaired insulin secretion or action. Dietary management plays a crucial role in controlling blood glucose. The study aimed to assess nutrition knowledge and its relationship with blood glucose levels of people living with diabetes at Manhyia Hospital in Kumasi. The study adopted a cross-sectional analytical design where data were collected from 120 participants. A structured questionnaire was used to gather relevant information. The Audit of Diabetes Knowledge questionnaire was used to assess diabetes related nutrition knowledge. Anthropometry and dietary patterns were assessed. Fasting blood sugar levels of participants were obtained with ready-to-use test kits. Most (65%) of the study participants were females with a mean age of 55.26 ± 13.72 years. A Majority of the participants were either overweight (35.8%) or obese (37.5%), with most (74.2%) of them indicating they do not exercise. The mean weight and body fat percentage of the study participants were 78.86 ± 51.13 kg, and $34.89 \pm 12.66\%$ respectively. Correlation analysis revealed an insignificant link between fasting blood glucose level and body mass index ($p = 0.107$). With regard to their knowledge in nutrition, about 88% of the participants indicated diabetic meals should be high in fiber while 97.5% stated that fiber foods had a positive impact on sugar levels. On the contrary, there was no significant relationship between fasting blood glucose levels and nutrition knowledge. Therefore, there is a need for effective nutrition communication to consider bridging the gap between nutrition knowledge and its implementation in diabetes patients.

Keywords: Nutrition knowledge, Type 2 diabetes, body mass index,, Blood glucose level

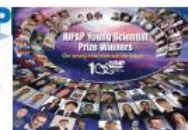
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor:  IUPAP
International Union of Pure
and Applied Physics



P-28 RELATIONSHIP BETWEEN BREAKFAST CONSUMPTION AND COGNITION TEST PERFORMANCE AMONG SOME SELECTED SCHOOL-AGED CHILDREN IN GOVERNMENT AND PRIVATE-OWNED PRIMARY SCHOOLS AT EJURA-SEKYEDUMASE MUNICIPALITY IN THE ASHANTI REGION OF GHANA

Salim Mansuru Bamba and Marina Aferiba Tandoh

*Department of Biochemistry and Biotechnology (Human Nutrition and Dietetics),
College of Science, Kwame Nkrumah University of Science and Technology, Kumasi,
Ghana,*

Email: salimbamba8@gmail.com

ABSTRACT

Breakfast is considered as the most important meal of the day, especially for school-aged children. This assumption is largely based on evidence demonstrating the positive effects of breakfast consumption on children's bodies, physical activity, school attendance and academic performance. Several studies have examined the importance of breakfast consumption on the cognitive and academic performance of school children worldwide. The aim of this project was to determine the relationship between breakfast consumption and cognition test performance among school-aged children in some government-owned and private primary schools in Ejura Sekyedumase Municipal of Ashanti region. A cross sectional study design was employed in this study. Data was collected using questionnaires, observation and interviews. The findings of the study show that 35% of the school-aged children ate breakfast everyday of the week, while only 16.5% never ate breakfast throughout the days of the week. The rest of the children either ate breakfast 1-2 days of the week, 3-4 days of the week or 5-6 days of the week. Major reasons for skipping breakfast were mostly because nobody was available to prepare breakfast for the pupils (36.5%). The majority of the children scored between 70 and 80% of the cognitive performance test, with a marginal number of them scoring less than 50%. There was no significant difference between cognitive performance, nutritional status and breakfast consumption ($p > 0.05$).

Key words: Breakfast consumption, Cognitive performance, School-Age Children, Ashanti Region

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-29 THE IMPACT OF NUTRITION EDUCATION ON NUTRITIONAL KNOWLEDGE, DIETARY CONSUMPTION AND ANTHROPOMETRIC INDICES AMONG SICKLE CELL DISEASE CHILDREN IN GHANA

Lindy Adoma Dampare and Marina Aferiba Tandoh

*Department of Biochemistry and Biotechnology (Human Nutrition and Dietetics),
College of Science, Kwame Nkrumah University of Science and Technology, Kumasi,
Ghana,*

Email: damparelindy@gmail.com

ABSTRACT

Sickle cell disease (SCD) is an inherited blood disorder that mostly affects individuals in sub-Saharan Africa. SCD has a negative impact on the nutritional status of children. This is attributed to inadequate dietary intake associated with a lack of proper nutrition education (NE). Despite the nutritional deficiencies faced by these patients, frequent nutrition counseling is not part of their standard clinical care leading to a poor nutritional knowledge (NK). This study sought to evaluate the impact of NE on the NK of caregivers of SCD children, the dietary consumption and anthropometric indices of SCD children. One hundred and twenty-one children aged between 2 to 17 years were recruited from the Tema General Hospital sickle cell clinic. Following a baseline assessment of the NK of caregivers, anthropometry and dietary assessment of the children, twice-monthly NE was given for 3 months, followed by a post-intervention assessment. A majority of the caregivers had no NK on SCD (69%). Their level of NK improved significantly after the NE (5.58 ± 2.25 vs. 10.44 ± 0.846 , $p < 0.0001$). There was an increase in the weekly consumption of protein, green leafy vegetables, omega 3 containing nuts and seeds and polyunsaturated cooking oils after NE. There was a significant increase in weight (23.2 ± 11.6 vs 25.9 ± 12.1 kg, $p = 0.036$) and height (118.5 ± 21.9 vs 123.5 ± 22.2 cm, $p = 0.011$) post intervention. The rate of stunting and wasting was reduced after the NE (10.5% vs 8.6%, $p = 0.62$) and (22.1% vs 14.4%, $p = 0.30$), respectively. This study shows the potential of nutrition education in improving the nutritional knowledge, dietary consumption and anthropometric indices of SCD patients, and should be further explored.

Keywords: Sickle cell disease, children, nutrition education, nutrition knowledge, anthropometric indices.

For enquiries, please contact:

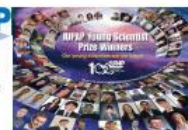
Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure
and Applied Physics



P-30 PREDICTION OF CARDIOVASCULAR RISK LEVELS AMONG SOME SELECTED WORKERS OF A GHANAIAN UNIVERSITY

Bernard Agyapong Tenkorang and Marina Aferiba Tandoh

*Department of Biochemistry and Biotechnology (Human Nutrition and Dietetics),
College of Science, Kwame Nkrumah University of Science and Technology, Kumasi,
Ghana*

Email: agyabenten@gmail.com

ABSTRACT

The World Health Organization lists cardiovascular diseases (CVDs) as one of the main causes of mortality and morbidity. The risk of CVD is influenced by non-modifiable factors such as age and sex, and by modifiable factors (weight/obesity, blood lipid profile, blood glucose and blood pressure) linked to lifestyle and behavior. This study sought to determine the prediction of CVD risk levels among some workers (teaching and non-teaching staff) at Kwame Nkrumah University of Science Technology (KNUST). A cross-sectional study was performed with one hundred and twenty staff. Anthropometric measurements were taken, and standardized WHO/ISH risk prediction charts were used to assess a 10-year risk of a fatal or non-fatal major cardiovascular event according to age, sex, smoking status, blood pressure, diabetes mellitus status and total cholesterol. Physical activities, stress levels, grip strength, family history of CVD was elicited. 72 (60%) non-teaching staff and 48 (40%) teaching staff were involved in the study. Overall, 23 (19.2%) had hypertension (non-teaching 11%, teaching 8%), 33 (27%) had high total cholesterol, 64 (53%) were diabetic or at risk of diabetes (20.8% non-teaching versus 32.5% teaching). Low, moderate and high CVD prevalence risk in teaching staff was 31.6%, 7.5%, and 0.83% respectively, while in non-teaching staff the prevalence was 32%, 9.2% and 18.87%, respectively. Risk of hypertension, diabetes, poor intake of fruits, physical inactivity, alcohol use and smoking, strongly predicted both low and moderate risk of CVD ($p < 0.05$). There was a prediction of low and moderate risk of CVD among teaching and non-teaching staff of KNUST. Nutrition Education should be intensified among such groups to curtail this risk.

Keywords: Cardiovascular risk, Total cholesterol, Blood glucose, Hypertension, Anthropometry

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
☎ +233 208954223 ✉ jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-31 MATERNAL NUTRITIONAL KNOWLEDGE AND EFFECTS OF COMPLEMENTARY FEEDING IN INFANTS 6 MONTHS TO 24 MONTHS IN THE TEMA METROPOLIS

Andrea Abokomak Kuttin-Mensah and Marina Aferiba Tandoh

Department of Biochemistry and Biotechnology (Human Nutrition and Dietetics), College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

E-mail: aakmensa@gmail.com

ABSTRACT

Good knowledge and attitude are important, however, they do not always translate into good practice in all situations. This study sought to determine the mother's nutritional knowledge in complementary feeding and its effect on child nutritional status. The study adopted an explorative quantitative study design at the Tema Metropolis using a simple random technique to select 110 mother – child pairs. About 61.8% of the mothers had average knowledge on complementary feeding, 24.5% had low knowledge on complementary feeding practices, whilst 39.1%, 42.7%, 39.1%, and 50% of them knew about the preparation, amount, frequency and consistency of complementary foods respectively. In addition, 48.2% of the mothers thought giving foods that are thick in nature was best for the child, while 30.0% of the mothers fed their child more than three times daily. About 84.5% of the mothers had received education on complementary feeding at a postnatal (weighing) clinic, whilst 8.2% of them received their education from an antenatal clinic. The proportion of underweight children was highest (33.6%) among 6–24 month olds followed by wasting (28.2%) and stunting (18.2%). Maternal knowledge on the number of times a child ate in a day and the child's nutritional status was statistically significant (underweight; $p < 0.007$; wasting: $p < 0.0004$; stunting: $p < 0.004$). The Ministry of Health in collaboration with Ghana Health Service and other Stakeholders should develop programmes that focus on empowering women to improve the nutritional status of infants through nutrition and educational inputs.

Keywords: Complementary feeding, Underweight, Wasting, Stunting and Postnatal

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-32 IDENTIFYING REPORTED STRATEGIES TO IMPROVE NUTRIENT INTAKES, ACTIVITY LEVEL, BASAL METABOLIC RATE AND TOTAL ENERGY EXPENDITURE AMONG ADULTS IN CAPE-COAST

Abigail Opuni and Marina Aferiba Tandoh

*Department of Biochemistry and Biotechnology (Human Nutrition and Dietetics),
College of Science, Kwame Nkrumah University of Science and Technology, Kumasi,
Ghana,*

E-mail: opuniabigail5@gmail.com

ABSTRACT

In order to be well nourished, individuals need access to sufficient, safe and quality food, as well as nutrition education to help reduce malnutrition and its related illnesses. This study aimed to identify reported strategies to improve nutrition and physical activity, identify the relationship Basal Metabolic Rate (BMR) and Total Energy Expenditure (TEE) has on nutritional strategies, physical activity and nutritional status, and to identify the impact of reported nutrition education on nutritional status, physical activity and TEE. A cross-sectional study design was used to sample 140 participants from Cape Coast between the ages of 18 to 60 years with no history of diet related conditions. A semi-structured questionnaire and body composition measurements were used. Results indicate that with regard to reported strategies to increase nutrient intake, respondents indicated this could be done through increasing frequency of eating (13.6%), eating oily or sugary foods (5.7%), eating more carbohydrates rich foods (18.6%), increase quantity of food portions (24.3%), and joining all these mentioned strategies (36.4%). TEE was associated with frequency of eating snacks ($p=0.048$) and BMI ($p=0.021$). BMI increased with decreasing TEE ($p=0.017$). BMR was associated with frequency of eating fruits ($p=0.021$) BMI ($p=0.032$). BMR did not have any significant correlation with nutritional strategies, BMI or physical activity (PA). Here, 20% of the respondents had received nutrition education and nutritional education was not associated with either TEE or PA. However, nutritional status (body fat) was associated with reported nutrition education ($p=0.042$) with an odds ratio of 0.964. Individuals who received nutritional education were less likely to have a high body fat percentage. Hence, nutrition education to the general public should be promoted.

Keywords: Energy expenditure, Nutritional status, Nutritional strategies, Nutritional education, Physical activity level

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-33 DIETARY PATTERNS AND ITS ROLE IN OBESITY AND COGNITIVE FUNCTION IN SCHOOL-AGE CHILDREN IN AGONA WEST MUNICIPALITY

Joseph Buabeng¹, Mary Amoako² and Collins Afriyie Appiah³

*Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.
Email: pierakofi@gmail.com*

ABSTRACT

Shifts in dietary patterns and physical activity that accompany changes in economic development, lifestyle, urbanization, and demography have contributed to a double burden of malnutrition, including child malnutrition in Africa. This study aims to assess the effect of dietary patterns on obesity and cognitive function in school-age children in Agona West Municipality. Data collection was done using a pretested semi-structured questionnaire which was administered to 350 school children (aged 11-18 years) in junior high school in Agona West Municipality. Data collected include anthropometric measurements, socio-demographics, nutrition knowledge, and physical activity level. A seven-day food frequency questionnaire (FFQ) was used to assess dietary patterns. The cognitive test tool used was the Digit Span test. From the study, the mean age of the student was 14.29 ± 1.34 years with 50.29% females and 49.7% males. In the study the prevalence of overweight/obesity among school children was 9.1%, thinness was 30%, and stunting was 5.7%. The study showed that 45% of the students have moderate physical activity, 32% have low physical activity and 23% have high physical activity. About 71.0% of the participants have low cognitive status and 29% have high cognitive status. From the study physical activity level ($p = <0.001$) and sugar-sweetened beverages (SSBs) ($p = 0.028$) were associated with cognitive status while high dietary fats consumption ($p = 0.7$) has no association with cognitive status in school-age children, CI = 95%. Also, SSBs ($p=0.4$) and a high fat diet ($p=0.6$) were not associated with obesity (CI, = 95%). The results clearly indicate that cognition is affected by physical levels and intake of SSBs. Therefore, stakeholders should formulate interventions involving school children as well as parents and teachers in promoting healthy eating behavior for optimal cognition among school children.

Keywords: Cognitive function, sugar-sweetened beverages, physical activity, school-age children, obesity.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-34 ASSESSMENT OF MICROBIAL CONTAMINATION IN SOME SELECTED FRUITS (PAWPAW, MANGO, ORANGE, BANANA, AND PINEAPPLE) SELECTED FROM THREE MARKETS IN THE KUMASI METROPOLIS

Sekou Sesay and Marina Tandoh

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

E-mail: sekousesaywise@gmail.com

ABSTRACT

Fruits are a good source of dietary fiber as well as vital micronutrients like manganese, copper, and iron that are needed for human consumption regularly to enhance well-being. Despite all the health advantages of eating fruits every day, poor handling of fruits can result in microbial contamination and an increased risk of disease transmission to consumers. According to CDC, watermelon outbreaks of Salmonella occurred in the US in 2002 and 2006. There is little knowledge on potential risk factors and the microbial quality of fruits sold in Kumasi despite the abundance of information on microbial contamination of fruits. Therefore, this study aimed to ascertain some fruits' microbiological quality/contamination. A cross-sectional study was conducted from three markets- Adum, Kejetia, and Kumasi City Mall- CanLab was used to conduct the research. Subsequently, pH and temperature of stock culture, macro, and micromorphology, and qualitative and quantitative tests were assessed. We found *Molds*, *Yeast*, *E. coli*, *S. aureus*, and *Enterobacteriaceae* from our analysis; we also got results from TCC, TAC, and FCC. We could not distinguish between pathogenic and non-pathogenic microbes; future research should focus on distinguishing them. Technologies such as sonication, UV radiation (especially from sun rays), and thermal energy should be employed in fruit processing factories to sterilize. Care should be taken at cultivation sites, during transportation, and preparation to prevent contaminations. It suggests most contamination occurred in fruit juice processing industries during preservation and processing. Proper hygiene should also be put in place in these areas.

Key Words: Microbes, Contaminations, Fruits, Cross-sectional.

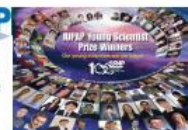
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-35 A STUDY ON ENERGY DRINKS CONSUMPTION AND ITS RELATIONSHIP WITH SOME CARDIOVASCULAR RISK FACTORS AMONG UNIVERSITY STUDENTS IN KUMASI, GHANA

Kwaku Agyekum, Eric Effah and Marina A. Tandoh

Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Email: agyekumkwaku660@gmail.com

ABSTRACT

This study assessed some cardiovascular risk factors of 105 undergraduate students (18-25 years old) from the Kwame Nkrumah University of Science and Technology in Kumasi, Ghana, and how energy drink consumption affects them. Anthropometric assessment, socio-demographics, lifestyle and dietary assessments were made. Participants were 71.4% females and 28.6% males with a mean age of 20.52 years. Results from the study showed that 6.7% were obese, 15.2% were overweight, 64.8% had normal body weight, while 13.3% were underweight. About 62.9% reported as being consumers of energy drinks while 37.1% reported as not being consumers of energy drinks. Anthropometric mean measurements were 165.5cm, 62.1 kg, 22.6 kg/m² for height, weight and body mass index respectively. The means of the blood glucose levels and blood pressure were 4.4 mmol/l and 109/72mmHg, respectively. The prevalence of diabetes among the participants was 3%, whilst 5.7% of them had hypertension, with 17.1% having prehypertension, and 69.5% having normal blood pressures. About 7.6% of the participants fell in the low blood pressure region. There was a significant correlation between participants who reported as being consumers of energy drinks 'anytime' and blood glucose ($p=0.03$). There was also a significant association between the participants who reported consuming energy drinks to study in school and their diastolic blood pressures ($p=0.036$). Findings obtained from this study suggests a closer look at the levels of caffeine consumption among university students and their cardiovascular risk factors.

Keywords: Keywords: Energy drinks, anthropometric measurements, blood pressure, body mass index, blood glucose, association, Ghana

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-36 A COMPARATIVE STUDY ON MICROBIAL AND HEAVY METALS (LEAD, ALUMINIUM, ZINC, CHROMIUM AND CADMIUM) ASSESSMENT BETWEEN PACKAGED AND UNPACKAGED PALM OILS FROM SOME SELECTED MARKETS IN KUMASI

Caroline Sekyibea Agyare, Stacy Achiaa Opoku and Marina Aferiba Tandoh

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, E-mail:

carolineagyare4@gmail.com

ABSTRACT

The purpose of this study was to assess and compare the microbial and heavy metal load of packaged and unpackaged palm oil sold in some markets in Kumasi, Ashanti Region of Ghana. Aerobic mesophilic bacterial presence, total coliform counts and pathogenic bacterial strains were evaluated. This was achieved using pour plate and serial dilution procedures followed by typical biochemical assays. Few colonies of aerobic mesophilic bacteria were identified in the oil samples with no signs of pathogenic bacterial growth detected. Heavy metals analyzed included lead, aluminium, zinc, chromium and cadmium. With a detection limit of 0.0001mg/kg, no traces of lead and aluminium were detected for both packaged and unpackaged oil samples. However, for packaged palm oil samples, cadmium recorded concentrations of 0.960 mg/kg, 2.140 mg/kg and 3.275 mg/kg. Zinc recorded 0.31mg/kg, and values which were below the detection limit. Chromium recorded 0.615 mg/kg, 6.955mg/kg and 4.77mg/kg. On the other hand, for unpackaged palm oil samples, values recorded for cadmium concentrations include 3.120 mg/kg, 2.660 mg/kg and 2.045mg/kg. Concentrations of zinc observed were values below the detection limit, with chromium recording concentrations of 2.935mg/kg and values below the detection limit. All values recorded with the exception of chromium were within the FAO/WHO maximum permissible limits for oil samples. Based on the findings of this study, there is the need to expand the study to include various regions in the country to generate a comprehensive view of the microbial and heavy metal loads of palm oils produced and sold in Ghana as a whole.

Keywords: mesophilic, heavy metals, antioxidants, palm oil, Ghana

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-37 NUTRITIONAL COMPOSITION AND ACCEPTABILITY OF COOKIES FORTIFIED WITH *SOLANUM TORVUM* (TURKEY BERRY)

Peperual Suglo Puotege, Marina Aferiba Tandoh and Isaac Amoah

*Department of Biochemistry and Biotechnology (Human Nutrition and Dietetics),
College of Science, Kwame Nkrumah University of Science and Technology, Kumasi,
Ghana. Email: peperualp2015@gmail.com*

ABSTRACT

Malnutrition is on the rise, and *Solanum torvum* (ST)/Turkey berry is one underutilized vegetable plant rich in various nutrients that can be used in food fortification. The present study investigated the nutrient composition of a newly developed snack (ST cookies), and its general acceptability. The cookies were produced from *Solanum torvum* flour and plain wheat flour blends (PB) using various percentages (10%, 20%, 30%, 40%, 50%, and 100% wheat flour as control). The proximate composition was determined using the protocol of the Association of Official Analytical Chemists (AOAC, 2000). Minerals and some phytochemical analyses were done using Atomic Absorption Spectroscopy (AAS), and Vitamin C was determined through the titration method. The proximate and mineral analysis revealed higher nutritional composition in the fortified cookies (ST1-10% and ST2-20%) than the control- PB1(100%) wheat flour. Vitamin C was found to be 0.18mg/g and 0.39mg/g in the fortified cookies and was not detected in the control. Beta-carotene and flavonoids also increased as the substitution of STF increased in the fortified cookies ST1 and ST2 (7.68 to 8.07ppm and 0.83 to 1.28mg/g) than that in the control (PB1) (5.75ppm and 0.52mg/g). Anti-nutrients such as phytate, oxalate, and tannins were higher in the control of the fortified cookies and decreased as the level of substitution increased. The sensory evaluation on all parameters (aroma, color, taste, texture, mouthfeel, and overall acceptability) were not significantly different between the control and 10% substitution of *Solanum* flour ($p > 0.05$). Hence, 10% substitution of STF was the most preferred cookie. The developed product was safe for consumption per the microbial analysis. *Solanum torvum*-fortified cookies were found to be rich in nutrients and can be employed as a healthier snack to help reduce nutritional deficiencies.

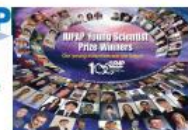
Keywords: *Solanum torvum*, fortified cookies, vitamin C, antinutrient, and phytochemicals

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-38 A STUDY TO INVESTIGATE HEAVY METAL CONTAMINATION IN SELECTED FRUITS IN THE KUMASI METROPOLIS

Ruth Adjaloko and Marina Aferiba Tandoh

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana,

E-mail: ruthadjaloko09@gmail.com

ABSTRACT

Fruits are edible plant products that are good for health. Precise qualitative and quantitative analyses of heavy metals present in them are important for accurate nutritional labelling, determination of compliance with the standard of identification and ensuring that the products are safe for consumption. This study aimed at determining the level of heavy metal contamination (Cr, Cd, Cu, Zn and Pb) in selected fruits (Orange, Banana, Pawpaw, Pineapple and Mango) in selected sites in the Kumasi Metropolis. Fruit samples were digested with 37% HCL and 69% HNO₃. The concentrations of Copper (Cu), Chromium (Cr), Cadmium (Cu), Zinc (Zn) and Lead (Pb) in the selected fruits were determined using Atomic Absorption Spectrometry (AAS). Fifteen (15) fruit samples were collected from (3) sites within the Kumasi Metropolis. There were significant differences ($p > 0.05$) in the concentration of heavy metals within the various fruit samples and across sample sites. For Kejetia Market, the concentrations of heavy metals varied considerably with Zn ranging from (0.057-0.224 $\mu\text{g/g}$), Cu (0.103-0.570 $\mu\text{g/g}$), Cd (0.228-0.353 $\mu\text{g/g}$) and Cr (2.156 $\mu\text{g/g}$). For Adum Market, Zn concentration ranged from (0.071-0.487 $\mu\text{g/g}$), Cu (0.1667-1.319 $\mu\text{g/g}$), Cd (0.116-0.353 $\mu\text{g/g}$) and Cr (3.311-26.381 $\mu\text{g/g}$) across all five fruits tested. Finally, fruit samples obtained from the Kumasi city mall had Zn ranging from (0.020-0.506 $\mu\text{g/g}$), Cu (0.103-0.570 $\mu\text{g/g}$), Cd (0.039-0.245 $\mu\text{g/g}$) and Cr (1.111-25.321 $\mu\text{g/g}$) across all five fruits tested. In general, Cadmium and Chromium levels across fruit samples and sites were above WHO/FAO levels whereas Copper and Zinc levels were within recommended limits. No lead was detected in all fruit samples from the three sites.

Keywords: Heavy Metals, Fruits, Contamination, Geochemical Index, Kumasi

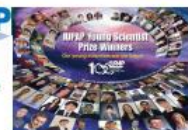
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-39 HEALTH RISK ASSESSMENT AND COMPARATIVE STUDY ON CADMIUM (Cd), IRON (Fe), LEAD (Pb) AND NICKEL (Ni) LEVELS IN BRANDED-INDIGENOUS FDA-REGISTERED, BRANDED-INDIGENOUS FDA-UNREGISTERED AND UNBRANDED-INDIGENOUS FDA-UNREGISTERED CEREAL-LEGUME BLENDS ON GHANAIAN MARKETS

Yaw Doudu Takyi and Marina Aferiba Tandoh

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, E-mail: yawtakyi79@gmail.com

ABSTRACT

Cereal-legume blends form one of the many foods enjoyed as breakfast by a majority of Ghanaians. Despite their nutritional benefits, the risk of heavy metal contamination cannot be overlooked. This study sought to measure and compare Cd, Fe, Pb and Ni levels in various blend classifications and to heavy metal specifications by regulatory bodies. Also, health risks associated with Cd, Fe, Pb and Ni pollution in the blend classifications were to be calculated. Fifteen samples grouped under three classifications were wet digested using a combination of HNO₃, H₂SO₄ and HClO₃ (15ml:3ml :3ml), then analyzed using an Atomic Absorption Spectrophotometer (AAS). Heavy metals in all samples were detectable. Measured levels ranged from 1.90 to 3.96, 25.74 to 216.78, 0.16 to 0.40 and 0.07 to 0.40 all in mg/kg for Cd, Fe, Pb and Ni respectively. There was no significant variation in measured levels of heavy metals between the three blend classifications ($p > 0.05$), with the exception of measured Pb levels ($p= 0.02$). Measured levels of Cd and Fe in all samples exceeded the maximum limit by the European Union (EU) (0.040 mg/kg for Cd), United States Department of Agriculture (USDA) (0.2mg/kg for Cd) and World Health Organization (WHO) (5.0 mg/kg for Fe). Measured levels of Pb exceeded the EU maximum limit (0.020 mg/kg), but did not exceed that of USDA (0.5 mg/kg). Measured levels of Ni did not exceed the maximum limit of WHO (1.5 mg/kg). Health risk assessment conducted in this study revealed consumption of cereal-legume blends contaminated by Cd, Fe, Pb and Ni may pose potential carcinogenic and non-carcinogenic health risks.

Keywords: Cereal-legume blends, maximum limits, heavy metals, exposure

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-40 RELATIONSHIP BETWEEN BREAKFAST CONSUMPTION AND COGNITION TEST PERFORMANCE AMONG SOME SELECTED SCHOOL-AGED CHILDREN IN GOVERNMENT AND PRIVATE-OWNED PRIMARY SCHOOLS AT EJURA-SEKYEDUMASE MUNICIPALITY IN THE ASHANTI REGION.

Salim Mansuru Bamba.

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana,

Email: salimbamba8@gmail.com

ABSTRACT

Breakfast is considered the most important meal of the day, especially for school-age children. This assumption is largely based on evidence demonstrating the positive effects of breakfast consumption on children's bodies, physical activity, school attendance and academic performance. Several studies have examined the importance of breakfast consumption for the cognitive and academic performance of schoolchildren worldwide. The study employed a quantitative research approach to derive findings under the study using SPSS, descriptive, correlation and chi-square test to present results of the study. Findings of the study showed that 35% of school aged children eat breakfast every day of the week while only 16.5% never eat breakfast throughout the days of the week. The rest of the school children eat breakfast either 1-2 days of the week, 3-4 days of the week or 5-6 days of the week. Major Reasons (36.5%) for skipping breakfast were mostly because nobody was available to prepare breakfast for the pupils. Many students scored between 70 and 80% of the cognitive test performance with a marginal number of them scoring less than 50%. The relationship between cognitive performance, students' nutritional status and breakfast consumption were tested. However, the results showed no direct association between cognitive performance and nutritional status and breakfast consumption respectively.

Key words: Cognitive, Breakfast consumption, Nutritional status, Academic, skipping.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-41 TWITTER DATASET ON GHANAIAN 26 MAN SQUAD AND BACKROOM STAFF FOR THE 2022 FIFA WORLD TOURNAMENT

Michael Eshun, Rose-Mary Mensah Gyening, Kate Takyi

Department of Computer Science, Kwame Nkrumah University of Science and Technology.

E-mail: eshunmichael2tech1@yahoo.com

ABSTRACT

Online social networks are currently the key source of data collection for researchers. Twitter specifically allows its users to express sentiments about relevant and trending topics circulating around the world. Since football is the most attractive sport in the world, it generates enormous datasets during prime events. This paper presents 132115 tweets generated using the Twitter API and a python library Tweepy, about the 26-man Ghanaian squad and backroom staff members during the 2022 FIFA World Cup. The novel dataset presented in this work can be used for sentiment analysis and other Natural Language Processing related tasks. In future works, the dataset can be used for further research regarding Ghanaian football, performance of the Ghana Football Association and the general opinion about the 26-man squad's performance at the 2022 FIFA World Cup.

Keywords: Online Social Networks (OSNs), Dataset, Sentiment, Ghana Football Association (GFA), Natural Language Processing (NLP).

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-42 A ROBUST AUGMENTED REALITY INDOOR NAVIGATION SYSTEM WITH COMPUTER VISION

Joseph Amanor Gidimadjor¹, Kate Takyi², Rose-Mary Owusuaa Mensah Gyening³.

*Computer Science Department. Kwame Nkrumah University of
Science and Technology,*

Corresponding Email :josephgidimadjor@gmail.com

ABSTRACT

Indoor navigation is an important aspect of daily life, particularly in large buildings or complex structures. The use of maps, signage, and other conventional methods of navigation helps, however, can be inconvenient, perplexing, and confounding. Augmented Reality (AR) technology provides a revolutionary solution to indoor navigation by combining real-world and virtual information to create an interactive and immersive user experience. This research aims to explore the development of an AR-based indoor navigation system that leverages computer vision technology to provide accurate and intuitive navigation guidance. The system will utilize the A-star path finding algorithm to find the shortest path from a source to destination, the feature point (point cloud) localization method to detect and track landmarks within the indoor environment, and device sensors to give accurate directions per the orientation of the mobile device in real-time, providing users with real-time navigation guidance. The system will be tested and evaluated in an indoor real-world setting to determine its accuracy, dependability, and ease of use. The primary goal of this research is to evaluate the effectiveness and potential of AR-based indoor navigation systems. The findings of this study will help to improve the indoor navigation experience for users by providing valuable insights into the design and development of AR-based indoor navigation systems. This research will also help to set the stage for future work in AR-based indoor navigation and computer vision.

Keywords: Augmented Reality, Global Positioning System, Point cloud, Indoor navigation, Digital objects.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-43 IN VITRO ANTIOXIDANT, ANTHELMINTIC, ANTI-INFLAMMATORY AND FTIR ANALYSIS OF ALKALOIDS EXTRACTED FROM STEM BARK OF *Combretum niroense*

Jacob Oguns¹, Anthony Yeboah Forkuoh¹, Clement Osei Akoto (PhD)¹

¹Department of Chemistry, Faculty of Physical and Computational Sciences (FPCS),
College of Science, Kwame Nkrumah University of Science and Technology (KNUST),
ogunsj2@gmail.com

ABSTRACT

Combretum niroense is widely used in the folkloric treatment of a variety of bacterial and helminthic infections. Traditionally, parts of *Combretum niroense* such as roots, stem barks, and leaves are boiled and used extensively as medication to treat diseases such as diarrhoea and dysentery. The study focused on identifying prime components of alkaloids from the stem bark, using standard phytochemical screening protocols, extraction techniques, chromatographic, and spectroscopic techniques. The bio-activities (antioxidant, anthelmintic, and anti-inflammatory) of the alkaloidal extracts of *C. niroense* were also investigated. The preliminary phytochemical analysis revealed the presence of targeted alkaloids from the extraction. The anthelmintic activity of the crude alkaloids extract at test concentrations was significantly ($p < 0.001$) potent compared to albendazole-treated helminths. The IC_{50} value for crude alkaloids extract in the DPPH assay was 7.062 ± 0.562 and the H_2O_2 assay was 135.4 ± 0.2030 . The Total Antioxidant Capacity (TAC) for crude alkaloids extract was 26.2427 ± 0.0021 gAAE/100g. Chromatographic separations gave four (4) fractions of alkaloids. FTIR analysis indicated the presence of various functional groups (C-N stretch, N-H stretch) in crude alkaloids extract, confirming the presence of the alkaloids identified in the screening test. The results indicate that the crude alkaloids extract of *C. niroense* exhibits antioxidant, anthelmintic, and anti-inflammatory activities and supports the traditional usage of this plant.

Keywords: *Combretum niroense*, phytochemical, bio-activities, chromatography.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-44 CYTOTOXICITY, ANTIMICROBIAL, ANTIOXIDANT, ANTHELMINTIC, AND ANTI-INFLAMMATORY ACTIVITIES AND FTIR ANALYSIS OF *Combretum niroense* STEM BARK

Anthony Yeboah Forkuoh¹, Jacob Oguns¹, Clement Osei Akoto¹

¹Department of Chemistry, Faculty of Physical and Computational Sciences (FPCS),
College of Science, Kwame Nkrumah University of Science and Technology (KNUST),
anthony1yeboah@gmail.com

ABSTRACT

Combretum niroense is widely used in the folkloric treatment of a variety of bacterial and helminthic infections. The study focused on identifying prime components of petroleum ether and ethanolic extracts of the stem bark, using standard phytochemical screening protocols and chromatographic and spectroscopic techniques. The activities (cytotoxicity, antimicrobial, antioxidant, anthelmintic, and anti-inflammatory) of the extracts of *C. niroense* were also investigated. Preliminary phytochemical analysis of the extracts revealed the presence of some important phytochemicals. The anthelmintic study showed least concentration (0.75 mg/mL) paralyzing and killing *M. ghanensis* after the maximal exposure time. The IC₅₀ values for petroleum ether and ethanol extracts in the DPPH assay were >100.0 and 27.940 ± 1.005 µg/mL, and those of the H₂O₂ assay were 400.900 ± 3.400 and 322.500 ± 1.005 µg/mL, respectively. The Total Antioxidant Capacity (TAC) for petroleum ether and ethanol extracts were 47.197 ± 0.533 and 57.968 ± 0.560 gAAE/100g, respectively. The IC₅₀ value for ethanol extract in the cytotoxicity studies was 115.4 ± 1.332 µg/mL. The MICs of the extracts against the test organisms were within the range of 0.0122 – 25.0 mg/mL. The extracts (petroleum ether and ethanol) showed a concentration-dependent increase in anti-inflammatory activity with IC₅₀ values of 31.254 ± 0.359 and 24.402 ± 0.569 µg/mL, respectively. Chromatographic separations and FTIR analysis were performed. The results indicate that both extracts of *C. niroense* exhibit aforementioned activities, thereby proving the folkloric use to treat ailments caused by worms and microorganisms.

Keywords: *Combretum niroense*, Phytochemical, Cytotoxicity, Antimicrobial.

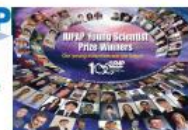
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-45 SYNTHESIS AND CHARACTERIZATION OF SELECTED MANNICH BASE: 2-(N, N- DIMETHYL AMINOMETHYL)-CYCLOHEXANONE HYDROCHLORIDE AND DERIVATIVES

Solomon Boateng Owiredu¹, John Paddy¹ and Clement Osei Akoto²

¹*Department of Chemistry, Faculty of Physical and Computational Sciences, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

ABSTRACT

The emergence of drug resistance is driven by the evolutionary pressure of survival which presents a significant challenge to modern medicine. The continuous use of anti-inflammatory, analgesic and anthelmintic drugs could lead to long-term resistance to target proteins and also result in various side effects. There is then the need to synthesize novel anti-inflammatory, analgesic, and anthelmintic drugs with increased potency, enhanced specificity to a particular target site, and with reduced or devoid of side effects. This study examines the synthesis of Mannich bases, a class of structurally heterogeneous chemical compounds made from various substrates using the Mannich reaction and known to have anti-inflammatory and anthelmintic properties. In the present study, the Mannich base 2-(N,N-dimethyl aminomethyl) cyclohexanone hydrochloride and its derivatives are synthesized using the Mannich reaction. The 2-(N,N-dimethyl aminomethyl) cyclohexanone hydrochloride was synthesized and characterized spectroscopically using FTIR. 1.34 g (87%) of the compound was obtained as white crystals. FTIR (KBr, ν_{max} , cm⁻¹); 3376 (N-H), 3000 (C-H), 2850 (C-H), 1708 (C=O), and 1215 (C-O). The product was converted into the 2- (N, N-dimethylaminomethyl) cyclohexanone oxime variant and characterized using FTIR spectroscopic analysis. FTIR (KBr, ν_{max} , cm⁻¹); 3383 (OH), 2850-3000 (Csp³-H), 1647 (C=N), 1327 (C-N), and 937 (N-OH). This work has showcased the synthesis of Mannich bases which acts as intermediates for diverse structural motifs.

Keywords: Mannich base; Mannich reaction; oxime; FTIR; anti-inflammatory; analgesic; anthelmintic.

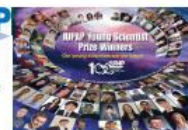
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-46 DIETARY INTAKE, PHYSICAL ACTIVITY AND CARDIOVASCULAR RISK FACTORS AMONG TRADERS AT AYIGYA MARKET IN THE KUMASI METROPOLIS

Kenneth Ofori-Panyin¹, Leslie Oduro¹, Prisca Akosua Saah Asiedu¹, Mary Amoako^{1*}, Collins Afriyie Appiah¹

¹*Department of Biochemistry and Biotechnology, Faculty of Biosciences, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, Email:brakoofori@gmail.com*

ABSTRACT

An individual's risk to cardiovascular disease is increased by unhealthy eating habits and a sedentary lifestyle. Obesity and overweight have been identified as the most common conditions among traders; these risk factors are related to their dietary consumption and physical inactivity levels. The study aimed to assess dietary intake, physical activity and cardiovascular risk factors among traders in the Kumasi metropolis. A cross-sectional study was utilized. An international physical activity assessment questionnaire (IPAQ) was used to assess the various physical activity levels in 138 study participants. Demographic characteristics and anthropometric indices were assessed, while body mass index (BMI) and waist-to-hip ratio (WHR) were calculated. A 3-day repeated 24-hour dietary recall was used to assess the dietary intake. Obesity and overweight were recorded at 27.5% and 41.3% respectively. A high intake of dietary fats (37.7%) was observed, and this positively correlated with both WHR ($p=0.04$) and BMI ($p=0.01$). Again, saturated fat intake was linked to BMI ($p=0.01$) and systolic blood pressure ($p=0.04$). High intake of dietary sodium (79%) was observed and was strongly associated with systolic blood pressure ($p=0.02$). Majority of traders (48.6%) had high physical activity levels, 39.6% had moderate levels and 11.6% had low levels. All participants in the study lived healthy lifestyles free from alcohol and tobacco use. The findings of this study suggest that dietary intake was associated with CVD risk factors among traders. There is therefore a need for nutrition and lifestyle education among traders in Ghana to reduce cardiovascular risk factors among them.

Keywords: Diet, physical activity, cardiovascular risk factors, obesity, hypertension.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-47 IN-KITCHEN AIR POLLUTION OF SENIOR HIGH SCHOOLS WITHIN THE KUMASI METROPOLIS

**Boansi Adu Ababio¹, Marian Asantewah Nkansah², Jonathan Nartey Hogarh³,
Thomas Peprah Agyekum⁴, Michael Kweku Commeh⁵**

¹*Department of Chemistry, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, boansiaduababio@gmail.com*

²*Department of Chemistry, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, mariannkansah@yahoo.com*

³*Department of Environmental Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, jhogarh@gmail.com*

⁴*School of Public Health, Kwame Nkrumah University of Science and Technology Kumasi, Ghana, thomaspagyekum@gmail.com*

⁵*Technology Consultancy Centre, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, michaelcommeh0@gmail.com*

ABSTRACT

Exposure to indoor air pollutants from cooking with solid fuels in kitchens is a leading health risk in Ghana. Indoor air pollution of institutional kitchens such as high schools in Ghana remains understudied. This study monitored the concentrations of criteria pollutants (NO₂, CO, SO₂, PM₁₀ and PM_{2.5}) of 14 kitchens during occupational hours within the Kumasi Metropolis of Ghana. Results from the study indicate that the levels of the measured pollutants in 13 out of the 14 school kitchens were far beyond recommended standards and found to be potentially harmful to human health.

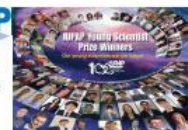
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-48 REMOVAL OF PHARMACEUTICALS BY WASTE STABILIZATION PONDS IN OBUASI METROPOLIS

Charles Ato Arthur¹, David Azanu², and David Adu-Poku³

¹ *Department of Civil Engineering, Kumasi Technical University, Box 854, Kumasi, Ghana.*

² *Department of Environmental Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.*

³ *Department of Chemical Sciences, University of Energy and Natural Resources, Sunyani, Ghana*

ABSTRACT

Pharmaceutically active compounds (PhACs) in surface water are of global concern. This study was conducted to determine 7 PhACs in influent and effluent from waste stabilisation pond in Obuasi municipality and determine the removal efficiency of these PhACs by waste stabilisation pond in the study area. Solid-phase extraction (SPE), and High-Performance Liquid Chromatography (HPLC) method were employed for the analysis. The removal efficiency of the ponds was analysed during the three sampling periods for all 7 PhACs compounds under discussion. The efficiency of removal during the first sampling period for pond 1 was 80.8% and for pond 2 was 61.5%. During the second sampling period, the removal efficiency realised for pond 1 was 82.2% and for pond 2, 68.5%. The third sampling period also recorded a similar trend with a removal efficiency of 81.9% and 62.2%. Although removal efficiencies were above 60%, if proper management and maintenance are well carried out, the waste stabilization ponds can serve as a sustainable means for wastewater treatment in developing countries like Ghana.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-49 COMPOSITE MICROPLASTICS USED FOR ANTIBIOTICS REMOVAL IN AQUATIC ENVIRONMENT

Nasser Dia¹, David Azanu², and James Darmey³

¹ Department of Civil Engineering, Kumasi Technical University, Box 854, Kumasi, Ghana.

² Department of Environmental Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

³ Department of Chemical Engineering, Kumasi Technical University, Box 854, Kumasi, Ghana.

ABSTRACT

Microplastics can behave as adsorbents to remove the antibiotics pollutant in water bodies. This study investigated the feasibility of removing amoxicillin (AMX), and metronidazole (MET) antibiotics from aqueous media using microplastics polyethylene terephthalate (PET bottles) and high-density polyethylene (HDPE, water sachets). Scanning Electron microscopy, XRD and FT-IR spectroscopy were used to characterize the microplastic. Antibiotics sorption studies were carried out and the data fitted with adsorption models of Linear, Langmuir, Freundlich, Timken, Elovich, Jovanovic, and Harkin-Jura isotherm. The results of the experiment show that the equilibrium time for sorption was 30 min. The adsorption isotherm models that best fit the data were Freundlich isotherm models with $R^2 = 0.940$ for AMX and $R^2 = 0.968$ for MET. The sorption study reveals that microplastics' sorption decrease with pH increase could be due to electrostatics attraction between them and it found that the shape of adsorption is type 2 sinusoidal. In conclusion, using plastics as adsorbent can be a suitable way to remove antibiotics pollutants from water bodies and a recycling method to reduce the amount of plastic waste released into the environment.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-50 EFFECT OF DIFFERENT EGGSHELL TREATMENT ON EGG QUALITY DURING STORAGE UNDER ROOM TEMPERATURE

Acheampong S.^{1,2} and Agyapong J. T.¹

¹*University College of Agriculture and Environmental Studies, Bunso, email:
Contact: paaby12@yahoo.com or sacheampong6.st@knust.edu.gh*

²*Kwame Nkrumah University of Science and Technology, Kumasi*

ABSTRACT

Egg is one of the most important human protein sources. Despite the usefulness, there are several factors that affect its quality. Egg starts deterioration soon after it is laid and the storage conditions and duration influence the rate at which the quality traits deteriorate. The aim of study was to examine the effects of different eggshell treatments on the internal and external qualities during storage for a period of 28 days. A total of two hundred and twenty-five (225) eggs were used for the study. Forty-five (45) eggs were analysed every week from the day the eggs were laid. Fifteen (15) eggs were analyzed for each treatment. The treatments were untreated (control), washed (with water) and coated (with vegetable oil). The external and internal quality traits were measured by appropriate instruments. The parameters assessed include weight of the whole egg, yolk and albumen. The pH of both albumen and yolk were also measured. The results show that external quality traits such as egg weight and internal quality traits such as albumen and yolk pH, albumen and yolk weight differ among the treatments.

Key words: egg, storage, yolk, albumen, eggshell

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-51 ASSESSMENT OF THE EFFECTIVENESS OF THE WASTE SEGREGATION SYSTEM ON KNUST CAMPUS.

Lyndon N. A. Sackey^{1,*}, Hamlyn Samuel Tetteh Addy¹, Kodwo Amos¹, Nana Ama Antwiwaa Ahorlley¹, Phebe Y. Kayoung¹

¹*Department of Environmental Science, Faculty of Biosciences, Kwame Nkrumah University of Science and Technology, PMB, Kumasi. Ghana, niiadjiri2004@yahoo.com*

ABSTRACT

The waste segregation system established on KNUST campus in 2020 aimed to improve waste management and provide raw materials for the plastic recycling facility. Since its implementation, no evaluation has been conducted to determine its effectiveness. This study sought to assess the system's effectiveness by conducting a waste segregation exercise and also administering questionnaires to assess the awareness and attitudes of participants. Two indicators were used to evaluate the system: the level of segregation through assessing waste disposed of in the designated bins (plastics only and all other waste) using the ASTM methods, and administering questionnaires to determine inhabitants' awareness. The study revealed that although 56.1% of the campus inhabitants were aware of the segregation system, only 46.1% practiced it. The results show that plastic segregation was highest at the commercial area (81.25%), followed by the lecturers' bungalow (72.20%), and the colleges and great hall (58.22%). On the other hand, all other waste segregation was highest at the colleges and great halls (74.91%), followed by the lecturers' bungalows (73.64%), and the commercial area (53.03%). Generally, the mean plastic waste segregation on campus was 69.36% compared to 72.69% for all other waste. Although the ideal segregation level was not achieved, the study's results suggest that the segregation effort is commendable and can be improved upon.

Keywords: Waste segregation, effectiveness, plastic waste, plastic recycling, KNUST

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-52 ENVIRONMENTAL RISK ASSESSMENT OF ANALGESICS AND ANTIBIOTICS IN EFFLUENTS FROM SELECTED HOSPITALS IN KUMASI METROPOLIS OF GHANA

Emma Kofua Nsafoah^{1,2}, Cindy Yaa Gyeniaw¹, Bernard Fei-Baffoe¹, Alhassan Sulemana¹, David Azanu¹, Daniel Nimako Amprako³, Kwame Ohene Buabeng⁴

¹ *Department of Environmental Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

² *Akrokherri College of Education, Akrokherri, Ghana*

³ *KNUST Central Laboratory, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

⁴ *Department of Pharmacy Practice, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

* *Corresponding Author Email: nsafoahemma@yahoo.com*

ABSTRACT

Hospital effluents are the main source of pharmaceuticals like analgesics and antibiotics in the environment. This study seeks to determine the occurrence of commonly administered analgesics and antibiotics in hospital effluents and assess the environmental risk they pose to inform policies on environmental protection regarding pharmaceuticals as environmental contaminants. Three replicates effluent samples from 3 hospitals within Kumasi were sampled and analyzed for the occurrence of analgesics (caffeine, diclofenac, ibuprofen and paracetamol); and antibiotics (amoxicillin, ciprofloxacin and metronidazole). Samples were prepared for HPLC analysis by filtration and SPE. Diclofenac and paracetamol were the analgesics detected in KNUST Hospital effluent samples with concentrations of 0.077 – 0.555 mg/L and 0.040 – 0.0440 mg/L respectively with the rest and antibiotics below detection levels. Apart from paracetamol (analgesic) and ciprofloxacin (antibiotic) detected at concentrations of 0.029- 0.1142mg/L and 0.074- 0.232 mg/L respectively in effluent samples from KATH, the rest were all below detection levels. With the exception of RQ for ciprofloxacin showing high toxicity risk for exposure to algae and low toxicity exposure to daphnids and fish, RQ for all other pharmaceuticals showed low toxicity exposure to algae, daphnids and fish. The presence of pharmaceuticals in hospital effluents poses risk to aquatic life and subsequently human health with its associated socio-economic consequences. Thus prior to discharge, hospital effluents must be treated to avoid or reduce such negative effects.

Keywords: analgesics, antibiotics, effluents, hospital

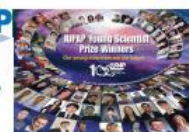
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-53 ROAD CONSTRUCTION AND ITS SOCIO-ECONOMIC AND HEALTH IMPACT: A CASE STUDY OF ATONSU-LAKE ROAD

Lyndon N. A. Sackey^{*}, Jeremiah Quartey¹, Augustus N.N. Nortey¹, Afia Tiwaa Obeng¹, Abigail Amoakoatta Okyere¹, Phebe Y. Kayoung¹

¹*Department of Environmental Science, Faculty of Biosciences, Kwame Nkrumah University of Science and Technology, PMB, Kumasi. Ghana, niiadjiri2004@yahoo.com*

ABSTRACT

The construction of roads has become very popular in our age due to heightened modernization, industrialization and the various benefits reaped from proper road systems. However, construction processes massively contribute to environmental pollution, which necessitates this study. The aim of the study was to assess the health and economic impact of road construction using Atonsu lake road as a case study. A mixed research method was employed in the research work. Quantitative and qualitative methods were used for primary data collection through the distribution of questionnaires to assess the individuals' perception of road construction. Trends and frequency data from the Kumasi south hospital were used as an indicator to analyze the impact on health. The income levels of inhabitants before and during the construction process were compared to the minimum wage in Ghana to analyze the impact on their socioeconomic lives. The research indicated that road construction has adversely impacted the health of Atonsu lake road inhabitants but saw a decline in the number of cases recorded at the hospital due to restrictions associated with COVID-19 and its accompanying stigmatization, which prevented people from reporting to the hospital. There was also a significant impact on the income levels of the inhabitants, which has a significant correlation with the frequency of client patronage before and during the construction of the road.

Keywords: Pollution, road construction, health impact, socioeconomic, Ghana

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
☎ +233 208954223 ✉ jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-54 EXTRACTION OF PECTIN FROM WATERMELON RIND

M. A. P. Boakye, L. Owusu-Bediako, J. Saka¹, M. A. D. Rockson

¹Department of Chemical Engineering, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana,
E-mail: madrockson.coe@knust.edu.gh

ABSTRACT

Watermelon rind contributes 30% of the overall fruit mass, primarily consisting of carbohydrates, fiber, and other compounds that are often discarded due to its unappealing flavor. It is estimated that the rind of a watermelon contains about 13% pectin. The objective of this research was to extract pectin from watermelon rinds that are typically considered waste. We used the Sugar Baby variety of the *Citrullus lanatus* species of watermelon, which is the most abundant in our society. Ground and dried watermelon rinds were boiled in acidified water, centrifuged, and precipitated with 96% ethanol, 70% ethanol, and acetone, respectively, to extract the pectin. The extracted pectin was then collected, washed, and dried. The pectin yield was between 8% and 11%, with 96% ethanol recording the highest value. The precipitated pectin from the solvents used recorded an anhydrouronic acid (AUA)% value above 65%, indicating high purity of the extracted pectin. The extracted pectin had a high methoxyl content (above 7%), which indicates a high gelling ability and dispersion in water. The 70% ethanol pectin had an acceptable moisture content of 11.3%, indicating its high stability. The ash content of all the extracted pectin was below 10%, which signifies low mineral content and high purity.

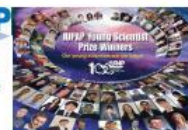
Keywords: Pectin, Watermelon rind, Extraction, Yield, Physicochemical Properties

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-55 DEPOLYMERIZATION OF WASTE PET BOTTLES IN GHANA VIA ALKALINE HYDROLYSIS

Joseph Oteng, Martina Francisca Baidoo

Department of Chemical Engineering, KNUST
mfbaidoo.coe@knust.edu.gh

ABSTRACT

Plastic waste management is a major concern in many developing countries, which includes Ghana. The primary objective was to study the effectiveness of chemical recycling of waste PETE (polyethylene terephthalate) via alkaline hydrolysis. Samples of waste PETE plastic bottles were collected and depolymerized with excess NaOH solution in ethanol solvent to produce terephthalic acid (TPA), the primary monomer of PETE. The effects of temperature and reaction times on the yield of TPA, as well as the FTIR were investigated. The laboratory results and analysis revealed that the yield of TPA at 20% NaOH increased significantly with temperature from a minimum of 78% (at 80°C), to a maximum of 89% (at 100°C). The results reveal the yield of TPA to decrease with the reaction times, with a maximum yield of 89% (for 0.5hr) of reaction, and a minimum yield of 88% (for 2hr) of reaction. The recommendation is to conduct more future studies on the alkaline hydrolysis method to scale it up to an industrial level.

Keywords: Depolymerization, Alkaline hydrolysis, polyethylene terephthalate (PETE), terephthalic acid (TPA).

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-56 QUALITY CHARACTERISTICS OF OIL PRODUCED FROM FIVE COCONUT VARIETIES

Attiogbe M.¹, Yeboah G.B¹, Akyereko Y.G^{1, 2}, Wireko-Manu F.D¹

¹Department of Food Science and Technology, KNUST;

²Department of Food and Postharvest Technology, Koforidua Technical University

*Corresponding author: fdbaah@yahoo.com

ABSTRACT

A lot of attention has been given to the causes of spoilage of coconut products, including coconut oil. These causes are mainly attributed to parameters such as the free fatty acids (FFA), moisture content, peroxide value, and iodine value of the coconut oil. However, less attention has been given to the effect of coconut varieties on the quality parameters of coconut oil. The aim of this study was to determine the effect of five coconut (*Cocos nucifera* L.) varieties on the quality parameters of coconut oils: Catigan Green Dwarf Coconut (CATD), Malayan Yellow Dwarf Coconut (MYD), Tacunan Green Dwarf Coconut (TACD), hybrid variety of Sri Lanka Green Dwarf Coconut and Vanuatu Tall Coconut (SDG x VTT), and Vanuatu Tall Coconut (VTT). Coconut oils were prepared by extracting oil from each of the five varieties using a combination of the chilling and heating methods with modifications at a low temperature of 50 °C for about 1 to 1.5 hours. Moisture content, FFA, color, peroxide value, iodine values, and oil yield percentage of coconut oil from the five varieties were determined. The data were analyzed using Past 4.03 software. The results indicated that the variety of coconut affected all the quality parameters except for moisture content. Coconut oil produced from CATD had the lowest moisture content, FFA, and peroxide value, while MYD recorded the highest values for these parameters. The order for oil yield among the varieties was CATD > VTT > TACD > SGD x VTT > MYD. Nonetheless, the values obtained for the quality parameters were all within acceptable limits for CODEX. Producers can monitor the spoilage of coconut oil prior to its production by knowing the effect of coconut variety on the quality parameters of coconut oil

Keywords: Coconut varieties, Coconut oil, physicochemical properties, percentage oil yield

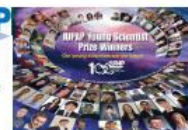
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-57 INCORPORATION OF MORINGA OLEIFERA SEED POWDER INTO BREAD

Afriyie D.¹, Yeboah G.B.¹, Akyereko Y.G.^{1,2}, Wireko-Manu F.D.¹

¹Department of Food Science and Technology, KNUST; ²Department of Food and Postharvest Technology, Koforidua Technical University

*Corresponding author: fdbaah@yahoo.com

ABSTRACT

Bread is a common staple food in many regions of the world, but it is often lacking in important micronutrients. Micronutrient deficiencies are becoming increasingly common in developing countries, particularly among children and pregnant women. This study aimed to incorporate moringa seed powder into bread at different proportions (0%, 8%, and 12.5%), using 100% wheat flour as a control. The sensory attributes of the moringa-incorporated bread samples were evaluated, and the proximate, mineral, and vitamin A content of the preferred and control bread samples were analyzed. The results of the sensory evaluation showed that increasing the proportion of moringa seed powder decreased the overall acceptability of the bread. The 8% moringa-incorporated bread was not significantly different from the control in terms of color and taste, but was significantly different with respect to aroma, texture, and general acceptability. The addition of 8% moringa seed powder significantly ($p < 0.05$) increased the protein (10.15–15.17%), ash (1.01–1.36%), fat (12.96–16.97%), and fiber content (0.50–0.56%) of the bread samples, while decreasing the moisture (1.79–1.55%) and carbohydrate content (73.59–64.39%). The mineral content of the moringa-incorporated bread also increased significantly (phosphorus, magnesium, calcium, and iron). Vitamin A content increased by 50% with the addition of 8% moringa seed powder (10.24 $\mu\text{g}/100\text{ g}$ in the control compared to 32.32 $\mu\text{g}/100\text{ g}$ in the moringa-incorporated bread). Incorporating moringa seed powder into bread samples increased the micronutrient and macronutrient content, indicating that it has the potential to contribute to food and nutrition security when used in pastry products.

Keywords: Moringa seed powder, Bread, Vitamin A, Proximate composition, Sensory evaluation

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-58 FORMULATION AND EVALUATION OF BREAD MADE FROM COMPOSITE FLOUR OF WHEAT, PLANTAIN AND MORINGA LEAVES

Baah A¹, Yeboah G.B¹, Akyereko Y.G^{1,2}, Wireko-Manu F.D¹

¹Department of Food Science and Technology, KNUST;

²Department of Food and Postharvest Technology, Koforidua Technical University

*Corresponding author: fdbaah@yahoo.com

ABSTRACT

Bread, a staple food widely consumed in Ghana, is mainly made from wheat flour. This has increased reliance on the importation of wheat flour, although there is potential for using locally available ingredients in bread making. The objective of this study was to formulate and develop bread from the composite flour of whole wheat, plantain, and Moringa leaf and determine the sensory, physical quality, and proximate composition of the composite bread. Bread formulations were developed by incorporating flours of plantain (17%, 15.75%, 14.5%) and Moringa leaves (5%, 6.25%, 7.5%) into wheat flour at different proportions using a mixture design. Whole wheat bread (100%) was used as a control. Sensory analysis (preference test) was carried out using a 9-point hedonic scale. The results revealed that bread incorporated with plantain and Moringa leaf powders up to 17% and 5%, respectively, did not significantly affect the sensory qualities ($p < 0.05$) in terms of color, taste, and overall acceptability. Physical parameters and proximate analysis were then conducted on the most preferred bread sample (Sample A, 17% plantain and 5% Moringa leaf) and the control. The results for physical parameters indicated that the addition of plantain and Moringa leaf powders resulted in a reduction in weight, volume, and specific volume of the preferred bread sample. The crude fibre (7.38%), crude protein (10.86%), and ash content (4.83%) of sample A were significantly ($p < 0.05$) higher than the 2.43%, 9.48%, and 1.34%, respectively, recorded for the control. The moisture content of both the control and the preferred bread sample were not significantly ($p > 0.05$) different. However, there was a reduction in the carbohydrate (57.91%) and fat content (8.46%) of sample A. In conclusion, the addition of plantain and Moringa leaf powder enhanced the nutritional quality of the bread sample in terms of crude fibre, crude protein, and crude ash. The incorporation of plantain and Moringa leaf powders in whole wheat bread resulted in a decrease in fat, moisture, and carbohydrate contents of the bread.

Keywords: Bread, plantain flour, Moringa leaf flour, sensory properties, physical parameters, proximate composition

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-59 CONSUMER ATTITUDES TOWARDS FOOD ADDITIVES: A GHANAIAN PERSPECTIVE

Armah, A. N. A¹., Yemoh, E. G¹., Setorwu, K¹., Yeboah, G. O¹., Rabo, M¹., Amoah, R¹., and Njie, O¹., Bimpong, D¹., Ankar-Brewoo, G¹., Zaukuu, J. L. Z¹

¹Department of Food Science and Technology-KNUST,
agnesnaaamerleyarmah@gmail.com

ABSTRACT

The use of Food Additives in the Ghanaian food industry has increased in recent years. While food additives play an important role in food production, their use over the years has raised concerns among consumers over potential health risks. This study aimed to seek consumer attitudes towards the consumption of food additives. The study was conducted in Oforikrom Municipal Assembly. A list of structured questionnaires were issued to consumers of food additives. The questionnaires included demographics, concern on health, general knowledge about food additives, and regulations on its usage. A total of 260 consumers participated. Data from the survey was collected via electronic means (google forms) and analyzed using Microsoft excel. Results from the survey showed that 97.4% of respondents were concerned about food additives' health effects. 51.9% of respondents indicated food colorants as the most alarming additive. 54.6% of the respondents believed that food additives approved in Ghana were unsafe. 98.1% of the person's preferred natural additives over synthetic ones. Additionally, 89.2% of the respondents indicated the need for programs to be held to give information on food additives which validates the need for more public education and awareness initiatives. It also highlighted the need for more research into the safety and regulatory oversight of food additives. There is an urgent need for a cooperative effort between government, regulatory bodies, industries, and academia to ensure that food additives are used safely and appropriately in the food industries.

Keywords: Food additives, Consumer, Survey, Attitude, Health

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-60 EXTRACTION OPTIMIZATION AND CHARACTERIZATION OF PECTIN EXTRACTED FROM AFRICAN STAR APPLE USING RESPONSE SURFACE METHODOLOGY

Joyce Duah¹, Jacob K. Agbenorhevi¹, Fidelis M.K. Kpodo² and Firibu K. Firibu³

¹Department of Food Science and Technology, KNUST, Kumasi, Ghana,

²Department of Nutrition and Dietetics, UHAS, volta region, Ghana,

³Department of Nutrition and Food Science, University of Ghana Legon-Accra, Ghana.

ABSTRACT

Pectin is a polysaccharide commonly used in the food and pharmaceutical industry as a textural ingredient (thickener, stabilizer, texture modifier, emulsifier, film coating) for the improvement of product quality. This study explored the potential of African star apple (*Chryophyllum albidum*) as a source of pectin. Fully ripe African star apple fruits from two geographical zones in Ghana were analysed for their physicochemical composition. The study employs Box Behnken design to determine the effects of extraction conditions; temperature (70-90 oC), time (30-90 min) and pH (2.5 -3.5) on yield, degree of esterification and uronic acid content of the pectin extracts. The pectin samples were obtained using aqueous acidic extraction (citric acid). The optimal conditions for the extraction were a temperature of 90oC, an extraction time of 60 min and pH of 2.5 using the numerical function optimizer method with best desirability. These results were validated through experiments and the highest pectin yield (8.53-10.60%), degree of esterification (66.82 - 67.11%) and uronic acid content (74.50- 76.20%) obtained agreed with predicted values of yield (10.96%), DE (65.04%) and UA (74.93%). Furthermore, the optimized pectin extracts from the two regions were characterised and compared with commercial citrus pectin based on uronic acid content, degree of esterification, degree of acetylation, methoxyl content, acetyl content, equivalent weight, carbohydrate, ash, protein, intrinsic viscosity, molecular weight and emulsion activity. The presence of polygalacturonic acid was confirmed by FTIR analysis. SEM shows that all pectin samples are morphologically similar. The pectin extracts were high methoxyl pectin (HMP) enriched with uronic acid and are suitable for commercial applications as texture modifying agents.

Keywords: Pectin, African Star Apple, Box Behnken Design, Optimal Condition

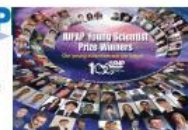
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-61 FINGERPRINTING CASSAVA FLOUR ADULTERATION IN GROUNDNUT PASTE

Bimpong, D., Boakye, A., Zaukuu, J.L.Z., Oduro, I., and Ellis, W.O.

Department of Food Science and Technology-KNUST, donaldbimpong1@gmail.com

ABSTRACT

Groundnut paste has been targeted for fraudulent activities intended at consumer deception for increased profit. Near Infrared Spectroscopy (NIRS) is an analytical tool that has been acknowledged for its rapid and non-destructive diagnostics to authenticate food products. This study aimed to detect cassava flour adulteration in groundnut paste using NIRS in a quasi-experimental approach. A market survey was conducted to know the common adulterant(s) used in groundnut paste. Survey results confirmed that cassava flour was the most prevalent adulterant used. Authentic cassava flour and groundnut kernels were obtained from reliable vendors in Kumasi. Groundnut paste was prepared and artificially adulterated in the laboratory at concentrations of 20%, 15%, 10%, 5%, 3%, 1% w/w. The samples were scanned with a hand-held spectrophotometer in triplicates. Savitsky Golay pretreatment was applied before developing the models. Principal component analysis (PCA) was employed to visualize data patterns. Linear discriminant analysis (LDA) model was then developed to classify the varying adulteration concentrations. Partial least squares regression (PLSR) was used to quantitatively predict cassava flour concentrations. Groundnut paste was also sampled from five selected markets in the Kumasi Metropolitan Assembly and scanned to test the practical application of the developed models. The concentration levels (20%, 15%, 10%, 5%, 3%, 1%w/w) and markets were clearly differentiated at 100% prediction accuracy. Cassava flour concentrations could also quantitatively be predicted by PLSR with an R^2CV of 0.98 (high accuracy) and error of 0.9 g/100g (low error). NIRS proves to be a good potential tool for groundnut paste authentication.

Keywords: NIRS, Groundnut paste, Cassava flour, Markets, Concentration.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-62 A STUDY ON ENERGY DRINKS CONSUMPTION AND ITS RELATIONSHIP WITH SOME CARDIOVASCULAR RISK FACTORS AMONG UNIVERSITY STUDENTS IN KUMASI, GHANA

Kwaku Agyekum, Eric Effah and Marina A. Tandoh

Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, Email: agyekumkwaku660@gmail.com

ABSTRACT

This study assessed some cardiovascular risk factors of 105 undergraduate students (18-25 years old) from the Kwame Nkrumah University of Science and Technology in Kumasi, and how energy drink consumption affects them. Anthropometric assessment, socio-demographics, lifestyle and dietary assessments were made. Participants were 71.4% females and 28.6% males with a mean age of 20.52 years. Results from the study showed that 6.7% were obese, 15.2% were overweight, 64.8% had normal body weight, while 13.3% were underweight. About 62.9% reported as being consumers of energy drinks while 37.1% reported as not being consumers of energy drinks. Anthropometric mean measurements were 165.5cm, 62.1 kg, 22.6 kg/m² for height, weight and body mass index respectively. The means of the blood glucose levels and blood pressure were 4.4 mmol/l and 109/72 mmHg, respectively. The prevalence of diabetes among the participants was 3%, whilst 5.7% of them had hypertension, with 17.1% having prehypertension, and 69.5% having normal blood pressures. About 7.6% of the participants fell in the low blood pressure region. There was a significant correlation between participants who reported as being consumers of energy drinks 'anytime' and blood glucose ($p=0.03$). There was also a significant association between the participants who reported consuming energy drinks to study in school and their diastolic blood pressures ($p=0.036$). The findings from this study suggest a closer look at the levels of caffeine consumption among university students and their cardiovascular risk factors.

Keywords: Energy drinks, anthropometric measurements, blood pressure, body mass index, blood glucose, association, Ghana

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-63 A COMPARATIVE STUDY ON MICROBIAL AND HEAVY METALS (LEAD, ALUMINIUM, ZINC, CHROMIUM AND CADMIUM) ASSESSMENT BETWEEN PACKAGED AND UNPACKAGED PALM OILS FROM SOME SELECTED MARKETS IN KUMASI

Caroline Sekyibea Agyare, Stacy Achiaa Opoku and Marina Aferiba Tandoh

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, E-mail:

carolineagyare4@gmail.com

ABSTRACT

The purpose of this study was to assess and compare the microbial and heavy metal load of packaged and unpackaged palm oil sold in some markets in Kumasi, Ashanti Region of Ghana. Aerobic mesophilic bacterial presence, total coliform counts and pathogenic bacterial strains were evaluated. This was achieved using pour plate and serial dilution procedures followed by typical biochemical assays. Few colonies of aerobic mesophilic bacteria were identified in the oil samples with no signs of pathogenic bacterial growth detected. Heavy metals analyzed included lead, aluminium, zinc, chromium and cadmium. With a detection limit of 0.0001mg/kg, no traces of lead and aluminium were detected for both packaged and unpackaged oil samples. However, for packaged palm oil samples, cadmium recorded concentrations of 0.960 mg/kg, 2.140 mg/kg and 3.275 mg/kg. Zinc recorded 0.31mg/kg, and values which were below the detection limit. Chromium recorded 0.615 mg/kg, 6.955 mg/kg and 4.77 mg/kg. On the other hand, for unpackaged palm oil samples, values recorded for cadmium concentrations include 3.120 mg/kg, 2.660 mg/kg and 2.045 mg/kg. Concentrations of zinc observed were values below the detection limit, with chromium recording concentrations of 2.935 mg/kg and values below the detection limit. All values recorded with the exception of chromium were within the FAO/WHO maximum permissible limits for oil samples. Based on the findings of this study, there is a need to expand the study to include various regions in the country to generate a comprehensive view of the microbial and heavy metal loads of palm oils produced and sold in Ghana as a whole.

Keywords: mesophilic, heavy metals, antioxidants, palm oil, Ghana

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-64 A STUDY TO INVESTIGATE HEAVY METAL CONTAMINATION IN SELECTED FRUITS IN THE KUMASI METROPOLIS

Ruth Adjaloko and Marina Aferiba Tandoh

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, E-mail:

ruthadjaloko09@gmail.com

ABSTRACT

Fruits are edible plant products that are good for health. Precise qualitative and quantitative analyses of heavy metals present in them are important for accurate nutritional labelling, determination of compliance with the standard of identification and ensuring that the products are safe for consumption. This study aimed at determining the level of heavy metal contamination (Cr, Cd, Cu, Zn and Pb) in selected fruits (Orange, Banana, Pawpaw, Pineapple and Mango) in selected sites in the Kumasi Metropolis. Fruit samples were digested with 37% HCL and 69% HNO₃. The concentrations of Copper (Cu), Chromium (Cr), Cadmium (Cu), Zinc (Zn) and Lead (Pb) in the selected fruits were determined using Atomic Absorption Spectrometry (AAS). Fifteen (15) fruit samples were collected from (3) sites within the Kumasi Metropolis. There were significant differences ($p>0.05$) in the concentration of heavy metals within the various fruit samples and across sample sites. For Kejetia Market, the concentrations of heavy metals varied considerably with Zn ranging from (0.057-0.224 µg/g), Cu (0.103-0.570 µg/g), Cd (0.228-0.353 µg/g) and Cr (2.156 µg/g). For Adum Market, Zn concentration ranged from (0.071-0.487 µg/g), Cu (0.1667-1.319 µg/g), Cd (0.116-0.353 µg/g) and Cr (3.311-26.381 µg/g) across all five fruits tested. Finally, fruit samples obtained from the Kumasi city mall had Zn ranging from (0.020-0.506 µg/g), Cu (0.103-0.570 µg/g), Cd (0.039-0.245 µg/g) and Cr (1.111-25.321 µg/g) across all five fruits tested. In general, Cadmium and Chromium levels across fruit samples and sites were above WHO/FAO levels whereas Copper and Zinc levels were within recommended limits. No lead was detected in all fruit samples from the three sites.

Keywords: Heavy Metals, Fruits, Contamination, Geochemical Index, Kumasi

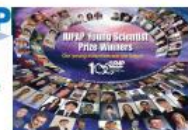
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-65 HEALTH RISK ASSESSMENT AND COMPARATIVE STUDY ON CADMIUM (Cd), IRON (Fe), LEAD (Pb) AND NICKEL (Ni) LEVELS IN BRANDED-INDIGENOUS FDA-REGISTERED, BRANDED-INDIGENOUS FDA-UNREGISTERED AND UNBRANDED-INDIGENOUS FDA-UNREGISTERED CEREAL-LEGUME BLENDS ON GHANAIAN MARKETS

Yaw Doudu Takyi and Marina Aferiba Tandoh

Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, E-mail: yawtakyi79@gmail.com

ABSTRACT

Cereal-legume blends form one of the many foods enjoyed as breakfast by a majority of Ghanaians. Despite their nutritional benefits, the risk of heavy metal contamination cannot be overlooked. This study sought to measure and compare Cd, Fe, Pb and Ni levels in various blend classifications and to heavy metal specifications by regulatory bodies. Also, health risks associated with Cd, Fe, Pb and Ni pollution in the blend classifications were to be calculated. Fifteen samples grouped under three classifications were wet digested using a combination of HNO₃, H₂SO₄ and HClO₃ (15ml:3ml :3ml), then analyzed using an Atomic Absorption Spectrophotometer (AAS). Heavy metals in all samples were detectable. Measured levels ranged from 1.90 to 3.96, 25.74 to 216.78, 0.16 to 0.40 and 0.07 to 0.40 all in mg/kg for Cd, Fe, Pb and Ni respectively. There was no significant variation in measured levels of heavy metals between the three blend classifications ($p > 0.05$), with the exception of measured Pb levels ($p= 0.02$). Measured levels of Cd and Fe in all samples exceeded the maximum limit by the European Union (EU) (0.040 mg/kg for Cd), United States Department of Agriculture (USDA) (0.2mg/kg for Cd) and World Health Organization (WHO) (5.0 mg/kg for Fe). Measured levels of Pb exceeded the EU maximum limit (0.020 mg/kg), but did not exceed that of USDA (0.5 mg/kg). Measured levels of Ni did not exceed the maximum limit of WHO (1.5 mg/kg). Health risk assessment conducted in this study revealed consumption of cereal-legume blends contaminated by Cd, Fe, Pb and Ni may pose potential carcinogenic and non-carcinogenic health risks.

Keywords: Cereal-legume blends, maximum limits, heavy metals, exposure

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-66 TACKLING DIET-RELATED NON-COMMUNICABLE DISEASES IN A GHANAIAN POPULATION: AN ASSESSMENT OF NUTRITIONAL KNOWLEDGE AND COOKING PRACTICES OF FAST-FOOD VENDORS IN THE KUMASI METROPOLIS OF GHANA

**Florence Brenyah¹, Gilbert Owiah Sampson¹, Samuel Akwei Sackar²,
Jonathan Annan-Asare³**

¹*Department of Hospitality and Tourism Education, Akonte Appiah-Menka University of Skill Training and Entrepreneurial Development- Kumasi, brenyaflorence647@gmail.com*

²*Department of Dietetics, School of Allied Health Sciences- Korle-Bu, Accra-Ghana.*

³*Department of Nutrition and Dietetics, University of Health and Allied Sciences-Ho, Ghana*

ABSTRACT

Fast foods operators have been identified as stakeholders responsible for meal preparation and provision to the majority of the populace. However, there is little known about their general knowledge on nutrition and diet-related diseases. This study therefore aimed at assessing the nutrition knowledge and cooking practices of fast-food vendors in the Kumasi metropolis of Ghana. This study was a quantitative cross-sectional design conducted in three suburbs of Kumasi (Bantama, Suame and Tafo Sub Metro). A sample of 210 fast-food vendors were recruited for the study. A simple probability sampling technique was used to select the study site and fast-food operators were selected for interviews based on chance per their location. The study used a structured questionnaire after pretesting at Kwadaso sub-metro. Data generated was entered into SPSS version 25 for analysis. Descriptive statistics such as means and standard deviations were used to analyse continuous variables. Frequencies and percentages were used to summarise categorical variables. Out of a total of 210 participants recruited for the study, 66.2% were females and 33.8% males. Majority of them (57.1%) were within the age range of 21-25 years. All the participants had received some formal education. Only 6.2% had adequate nutrition knowledge. Similarly, only 5.2% had adequate knowledge on diet related non-communicable diseases. A significant relationship ($p=0.009$, $p=0.000$), respectively were observed in the knowledge adequacy among the participants' gender and level of education. About 83.9% and 71.4% indicated there was no link between high salt intake as well as monosodium glutamate respectively and hypertension. Almost all the participants used the same oil several times for deep frying and for 'shito'. The study recommends nutrition and health seminars for all fast-food.

Key words: Nutritional knowledge, fast food, cooking practices, non-communicable diseases, Ghana

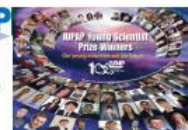
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-67 COMPARATIVE NON-DESTRUCTIVE EVALUATION OF WELDS USING ACETYLENE GAS AND OXYHYDROGEN GAS PRODUCED FROM A HYDROGEN FUEL CELL

Paulina Donkor¹, Andrew Nyamful^{1,2}, Anita Asamoah², Latifatu Adjah³, Juliet Attah²

¹ *School of Nuclear and Allied Science, Department of Nuclear Engineering, University of Ghana*

² *Ghana Atomic Energy Commission*

³ *Council for Scientific and Industrial Research, Institute of Industrial Research*

ABSTRACT

Most of the mining and petroleum industries' production plants are made of welded metal, which may influence the plant's efficiency if welding was not properly done. Historically, gases derived from acetylene or LPG have been used for welding of plants in these industries. Acetylene gas has been widely used for welding despite its negative effects on both the environment and human health. Some examples of air pollutants coming from the use of acetylene gas include carbon dioxide and carbon monoxide. These gases contribute to the greenhouse effect, thus global warming. An alternative gas that is environmentally friendly, economically viable, and readily available is needed. Hydrogen gas has been employed in many different industries such as the automotive industry and is increasingly being considered as a potential primary fuel source of the future. In this study oxyhydrogen gas (HHO) also known as Brown's gas was generated from a hydrogen fuel cell and used as a replacement for acetylene gas in welding. Brown's gas was used to weld a randomly selected test piece, which was evaluated alongside an acetylene-welded test piece. The integrity characteristics of both welds were determined using dye-penetrant and radiography testing. The assessment showed that the welds from both gases were strong. Welding with HHO gas, followed by a non-destructive inspection, has proven to be efficient, thus most recommended due to its environmental friendliness, cost-effectiveness, health implications, and global economic benefits.

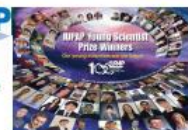
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-68 SUSCEPTIBILITY OF *DERMESTES MACULATUS* DEGEER (COLEOPTERA: DERMESTIDEA) LARVAE INFESTING SMOKED AFRICAN CATFISH (*CLARIAS GARIEPINUS*) TO *ALCHORNEA CORDIFOLIA* (SCHUM. & THONN.) LEAF POWDER

Charles Kwesi Koomson

*Department of Integrated Science Education, University of Education, Winneba,
P.O. Box 25, Winneba, Central Region, Ghana
ckkoomson@uew.edu.gh*

ABSTRACT

In the laboratory, the effectiveness of *Alchornea cordifolia* plant powder on larvae of the leather beetle *Dermestes maculatus*, a significant fish pest that causes serious damage if not controlled, was tested. The experiment was conducted in concentrations of 0g, 1.0g, 2.0g, 2.5g, and 3.0g mixed with 15g powdered smoked fish; all treatments containing 0g were devoid of plant powder, which served as a control, and all treatments were performed in triplicate. Larvae of *D. maculatus* that had just emerged (0 - 72 hours old) were introduced. The experiment was conducted in concentrations of 0g, 1.0g, 2.0g, 2.5g, and 3.0g mixed with 15g smoked fish powder; all treatments containing 0g were devoid of plant powder, which served as a control, and all treatments were performed in triplicate. Larvae of *D. maculatus* that had just emerged (0 - 72 hours old) were introduced. Larvae mortality and adult emergence were used to determine the potency of the plant powder. As an indicator of fish damage during storage, weight losses in fish were compared in treated and untreated samples. Higher plant powder concentrations were found to be significantly ($P < 0.05$) effective in killing insect larvae as well as larvae in the first and second weeks after infestation. The higher dosage rate of the plant powder significantly inhibited adult emergence in the treatment when compared to the control, and weight loss due to insect infestation was greatly reduced. The results demonstrate that *A. cordifolia* leaf powder is effective in controlling the larval stage of *D. maculatus* in smoked *Clarias gariepinus* during storage. It is therefore recommended that poor resource fish farmers, processors, and marketers use this plant to protect smoked-dried fish from *D. maculatus* infestation throughout the processing, transportation, marketing, and storage.

Keywords: *Alchornea cordifolia*, *Dermestes maculatus*, *Clarias gariepinus*, Adult emergence, Efficacy, Larvae mortality, Toxicity.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-69 TROPICAL MERCURY RESISTANT BACTERIA FROM GOLD TAILING; A POTENTIAL CANDIDATE FOR MERCURY REMEDIATION

Joseph Payne^{1*}, Vincent Aseidu-Otoo¹, Emmanuel Okoampah² and Abraham Kusi Obeng¹

¹ Department of Biotechnology and Molecular Biology, Faculty of Biosciences, University for Development Studies, Tamale, Ghana.

² Department of Biochemistry, Faculty of Biosciences, University for Development Studies, Tamale, Ghana.
Correspondence: jpayne@uds.edu.gh

ABSTRACT

The problem of mercury pollution is widespread and getting worse by the day. In the tropics, arable lands are the most affected due to illegal mining activities. Here, we reason that indigenous bacteria in mercury-contaminated gold tailings may prove tolerant to and effective for the remediation of mercury-contaminated soils. Thus, this study aimed to isolate mercury-resistant bacteria from mercury-contaminated gold tailings, condition them, and test their effectiveness for mercury removal. Among the strains, five highly potent isolates were screened for resistance to high mercury concentrations. Results revealed that the mercury-resistant bacteria belonged to the genera *Klebsiella*, *Pseudomonas*, *Staphylococcus*, and *Bacillus*. The minimum inhibitory concentration of bacteria isolates against mercury was determined. The bacteria isolates were able to tolerate and grow in the presence of 700 ppm to 1000 ppm mercury, accompanied by high saline tolerance of 15 ppt of NaCl. The mercury tolerance efficiency of the highly potent isolates was in the order of *Klebsiella* > *Pseudomonas* > *Staphylococcus* > *Bacillus*. The resistance of these bacteria isolates to high concentrations of mercury and high-salinity stress suggests that the bacteria isolates may be efficient candidates for the bioremediation of mercury

Keywords: Mercury, Gold Tailing, Tropical Bacteria, Bioremediation, Saline Tolerance

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-70 REMEDIATION OF CADMIUM-CONTAMINATED PADDY SOIL USING ORANGE RESIDUE BIOCHAR

Joseph Payne*, Najat Iddrisu and Abudu Ballu Duwiejuah

*Department of Biotechnology and Molecular Biology, Faculty of Biosciences, University for
Development Studies, Tamale, Ghana.*

Correspondence: jpayne@uds.edu.gh

ABSTRACT

Cadmium (Cd) contamination in paddy soils is on the rise in many regions resulting from high utilisation of phosphate fertilisers. In this study, residue of orange (citrus) fruit made up of peel and pulp were used as sustainable and renewable feedstock for biochar as an adsorbent. The biochar was applied to paddy soils at 0, 5, 10, and 20 t/ha rates. The study showed the pH, organic matter, total nitrogen content, electrical conductivity and average phosphorus of the Cd-contaminated paddy soil significantly increased due to the application of orange residue biochar. Whilst the available Cd in soil and cadmium uptake in rice significantly reduced ($P < 0.05$) when biochar was added at the different rates. The effects on pH and average phosphorus were ordered as follows: 20 t/ha > 10 t/ha > 5 t/ha > 0 t/ha. The order was 20 t/ha < 10 t/ha < 5 t/ha < 0 t/ha for cadmium concentration in soil after the experiment whilst it was 5 t/ha > 0 t/ha > 10 t/ha > 20 t/ha for cadmium uptake in rice. Cadmium content in paddy soil was reduced by 85.30 % and promoted rice biomass growth at application rate of 20 t/ha. Therefore, biochar produced from orange residues has a promising application in the remediation of Cd-contaminated paddy soil.

Keywords: Adsorbent, cadmium, contaminated paddy soil, orange residue biochar, rice

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-71 MALARIA AND BACTEREMIA IN FEBRILE CHILDREN

Wendy Akomeah Gyasi^{1,2} and Kingsley Badu^{1,2*}

¹*Department of Theoretical and Applied Biology, KNUST, Kumasi*

²*Vector-Borne Infectious Disease Research Group, KNUST, Kumasi*

*Correspondence: kingsbadu@gmail.com

ABSTRACT

Malaria is endemic in Ghana hence people easily opt for treatment without confirming the presence of the disease. Children who have fever may also have bacteremia. Diagnosis of malaria with existing bacteremia is difficult as bacteremia shares many clinical symptoms such as vomiting, fever, headache, fatigue etc. with malaria. Fever is a common symptom of malaria hence, it is often used synonymously which often makes individuals and health practitioners opt for malaria treatment leaving bacteremia untreated if present. The study seeks to determine the prevalence of bacteria and malaria co-infection in febrile children and to identify and characterize bacteria isolates from patients to the species level. Isolated bacteria will be subjected to susceptibility testing. Blood samples collected from each child will be tested for bacteremia and malaria parasite by culturing and microscopy/RDT, respectively. Bacteria were isolated from 48 (29.1%) of all the 165 participants recruited in the study. Pathogenic bacteria were isolated from the blood of 17 (30.9%) of 55 children with malaria and from 31 (28.2) of 110 children without malaria. However, there was no statistically significant association between bacteremia and malaria infection ($p=0.716$).

Keywords: malaria, bacteremia, paediatric febrile patients, fever

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor:  International Union of Pure and Applied Physics



P-72 REPELLENT AND LARVICIDAL PROPERTIES OF SOME INDIGENOUS PLANTS IN THE CONTROL OF *Anopheles* MOSQUITOES

Opoku-Bamfoh Obadiah¹, Owusu Nana Frema Afriyie², Akpanya Raphael³, Mensah Kelvin Abladey⁴, Gyamfi Fred Yeboah⁵, Sogbo Victoria, Morrison Morgan Henry⁶, Abankwah Kwarteng Sandra⁷

¹Kwame Nkrumah University of Science and Technology, oopoku700@gmail.com

ABSTRACT

Anopheles have developed resistance and an outdoor feeding habit in an effort to elude vector control treatments like synthetic insecticides, insecticide-treated nets (ITNs), and indoor residual spraying (IRS). This study examines the larvicidal activity of *Morinda citrifolia* against *Anopheles gambiae* larvae and the repellent properties of *M. citrifolia* (Noni), *M. oleifera* (Moringa), and *Ocimum basilicum* (Basil) against *Anopheles gambiae* adults. The effectiveness of the plant extracts was assessed using the WHO standard larval susceptibility bioassay and guidelines for repellent efficacy. Following bioassays, effective doses (ED) and lethal concentrations (LC) were determined. A gas chromatography-mass spectroscopy analysis was performed to identify the bioactive chemical components of the extracts of *M. oleifera* and *O. basilicum* leaves. Emulsified *M. citrifolia* seed oil had lethal concentration (LC), $LC_{50}=68.3$, $LC_{90}=130.9$ and $LC_{99.9}=222.5$, and $ED_{99.9}=308.3\%v/v$, the ethanolic extract of *Moringa oleifera* leaves had $ED_{99.9}=1.25g/ml$, and essential oil of *O. basilicum* leaves had $ED_{99.9}$ as $0.28g/ml$ against *A. gambiae*. The results indicated that seed oil of *M. citrifolia*, essential oil of *O. basilicum*, and crude extract of *M. oleifera* has repellent activity against *Anopheles* mosquitoes. The larvicidal bioassay showed that emulsified *M. citrifolia* oil has larvicidal properties against *Anopheles* larvae. The mean complete protection time of *Morinda citrifolia*, *M. oleifera* and *O. basilicum* was 120 minutes, 70 minutes and 84 minutes at $ED_{99.9}$, respectively.

Keywords: *Anopheles gambiae*, *Morinda citrifolia*, *Moringa oleifera*, *Ocimum basilicum*, Repellent.

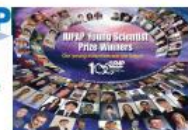
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-73 EVIDENCE OF TRANSMISSION OF ATYPICAL TRYPANOSOMIASIS IN HUMANS IN SELECTED COMMUNITIES IN THE SUHUM MUNICIPALITY OF GHANA

**Kofi Agyapong Addo^{1,2}, Austin Tweneboah^{1,2}, Thomas Addison^{1,2}, Matthew Glover
Addo¹, Soerge Kelm³, Kingsley Badu^{*1,2}**

¹Department of Theoretical and Applied Biology, KNUST. Email: kingsbadu@gmail.com

²Vector-Borne Infectious Diseases Research Group, KNUST.

³Centre for Biomolecular Interactions, University of Bremen, Germany.

ABSTRACT

Human African Trypanosomiasis is an infectious tropical disease transmitted by *Trypanosoma brucei gambiense* and *Trypanosoma brucei rhodesiense* in Sub-Saharan Africa. Nonetheless, case reports of some Trypanosomes (*Trypanosoma congolense*, *Trypanosoma evansi*, *Trypanosoma brucei brucei*, *Trypanosoma vivax*) thought to be natural parasites only to animals can infect and cause "atypical Human African Trypanosomiasis" (a-HAT). The study aimed at providing molecular-based evidence of transmission of a-HAT in humans in selected communities in the Suhum Municipality of Ghana. This study was a cross-sectional community-based study that sampled blood from 239 human participants. Questionnaires were administered to obtain relevant data from participants and PCR assays were performed, using trypanosome internal transcribed spacer 1 (ITS1) generic primers from extracted DNA. The PCR products were purified and subcloned into pJET1.2/blunt plasmid. Single clones were checked by colony PCR and positive clones were cultured overnight at 37°C at 220rpm in 5mL LB medium with 100 µg/mL Ampicillin. The cultures were purified and sequenced. The overall prevalence of trypanosome infection was 16.3% (39/239). The highest prevalence of 18.2% trypanosomiasis was recorded at Zorh followed by Nkantekwan (11.11%), while there was no evidence of infection at Santramor No.1. Trypanosome parasites found in this study were *T. evansi*, *T. congolense*, *T. vivax* and *T. simiae*. No correlation was established between tsetse fly bite and Trypanosomiasis ($X^2 = 1.344$ $p > 0.05$). However, 17.0% of those who had the parasite DNA lived close to pig sties or were keeping livestock. There is a high prevalence of atypical human trypanosomiasis(a-HAT) in the study area.

Keywords: Trypanosomiasis, Atypical, *Trypanosoma*, Assays, Sequences.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-74 AUTOMATION OF PNEUMONIA AND MALARIA DETECTION USING DEEP LEARNING

¹Abdulai Abdul-Malik Dason, ²Rose-Mary Owusua Mensah Gyening, ³Kate Takyi, ⁴Linda Banning

¹Kwame Nkrumah University of Science and Technology (KNUST), dasonmalik@gmail.com
^{2,3,4}KNUST

ABSTRACT

The manual process of interpreting medical images in the various health facilities in Ghana prolongs the period used in rendering patient diagnosis and sometimes bring about varying opposing diagnosis opinions from different medical professionals leading to misdiagnosis. The current workflow of procedures involved in the interpretation of these medical images are slow, time consuming, costly, and labour intensive. This paper presents an automated process for predicting and diagnosing the case of pneumonia and malaria using deep learning. Two different datasets were used in training a pneumonia and malaria models respectively. The modules were built and trained using deep learning based convolutional neural network technique. The *Pneumonia* model which was trained and validated using 5863 X-ray images obtained an accuracy of 0.95 and the malaria model which was also trained and validated using a dataset of 27780 CT images obtained an accuracy of 0.92. The developed models outperform existing CNN models in terms of accuracy and computational cost.

Keywords: Malaria, Deep Learning, Convolutional Neural Network, Pneumonia, Diagnosis

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-75 MOLECULAR SURVEILLANCE OF *HRP2/HRP3* GENE DELETION TYPING IN ASYMPTOMATIC INDIVIDUALS IN GHANA USING HIGHLY SENSITIVE DIGITAL PCR

Abdul-Hakim Mutala¹, Thomas Kwame Addison¹, Stephen Opoku Afriyie¹, Cristian Koepfli² and Kingsley Badu^{1*}

¹*Department of theoretical and Applied Biology- Kwame Nkrumah University of Science and Technology;*

²*Department of Biological Sciences-University of Notre Dame, USA*

*corresponding author, Email: kingsbadu@gmail.com

ABSTRACT

Malaria is still one of the devastating parasitic diseases globally, especially in the tropics and subtropics. The World Health Organization advocates for the parasitological confirmation of *Plasmodium falciparum* before treatment. These confirmatory test can be done using Giemsa stained microscopy or Rapid diagnostic test (RDT). The most sensitive RDT used for the detection of malaria targets an antigen unique to *Plasmodium falciparum*, the histidine-rich protein 2 (hrp2) found on chromosome 8. In addition, the monoclonal antibodies used to detect HRP2 also detect histidine-rich protein 3 (HRP3), a structural homolog sharing multiple epitopes with HRP2. This notwithstanding, there are reports of the deletion of the *pfhrp2/3* gene. To improve on the detection of the gene, this current study aimed to assess the presence of *hrp2/hrp3* gene deletion using novel digital PCR (dPCR). The dPCR assay provides absolute quantification of the target gene without the reliance on a calibration curve. It is observed to be highly accurate than nested PCR and can detect deletion in mixed infection with high throughput. Community-based cross-sectional study was conducted in the Oti region, Ashanti and Greater Accra Regions. A total of 1132 samples were obtained from asymptomatic individuals in the aforementioned study sites. After screening with varATS multicopy gene, 304 samples selected obtained from Oti (54.6%, $n=166$), Obom (28.3%, $n=86$) and Afamanso (17.1%, $n=52$) were typed for the presence/absence of the target gene. The assay detected deletion in the *hrp3* gene and a prevalence of 0.3% was observed. Unlike *hrp3*, no deletion was observed with respect to *hrp2* deletion. The dPCR assay is highly sensitive and has high throughput. Therefore, the assay will help facilitate the molecular surveillance *hrp2/hrp3* gene in Ghana.

Keywords: dPCR, molecular surveillance, malaria, asymptomatic, assay

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-76 DIVERSITY OF ENTEROBACTERIACEAE FROM LIVE BIRDS MARKETS IN KUMASI, GHANA AND YAOUNDÉ, CAMEROON.

Ngwene Hycentha Diengou^{1,6}, Irene Kookailey Afutu^{2,7}, Mbisa Jarvis Javason³, Daniel Kwesi Sia⁵, Vivian Etsiapa Boamah², Wilfred Angie Abia⁴, Eze Emmanuel A.,¹ and Kingsley Badu²

¹University of Nigeria, Nsukka, Nigeria, ngwene4u@yahoo.com

²Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

³St Philips Institute of health Yaounde, Cameroon.

⁴University of Yaounde 1, Cameroon

⁵Veterinary Services Directorate Ghana

⁶Institute of Medical Research and Medicinal Plant Studies Yaounde, Cameroon

⁷Kumasi Veterinary Laboratory

ABSTRACT

Poultry and its products have been shown to be highly contaminated with microorganisms especially of the Enterobacteriaceae family. This high level bacterial contamination is of great threat to the well-being of humankind as most of these organisms are capable of causing life threatening infections to both humans and birds. Also the presence of resistant genes in these organisms pose a major threat to public health in general. This study aimed at investigating the diversity of Enterobacteriaceae present in poultry in live bird markets. A cross-sectional study was conducted in live bird markets in Yaounde and Kumasi where cloacal swabs were collected. Swabs were subjected to standard microbiological isolation techniques and identified using MALDI-TOF MS. Seventeen and 16 markets were visited in Yaounde and Kumasi respectively and a total of 180 cloacal swabs from Yaounde and 114 from Kumasi were collected. A total of 78 organisms from Yaounde and 106 from Kumasi were identified belonging to 11 different species from highly pathogenic to commensals and normal flora, with most of them being opportunistic. *E coli* was the most prevalent organism in both markets (69.2% in Yaounde and 62.3% in Kumasi) followed by *Klebsiella* species (20.5% in Yaounde and 15.1% in Kumasi). *Proteus mirabilis* (2.6% in Yaounde and 14.2% in Kumasi), *Enterobacter cloacae* (2.7% in Yaounde and 1.9% in Ghana) and *E. fergusonii* (1.3% in Yaounde and 1.9% in Kumasi) were present in both markets. *Enterobacter kobei*, *Pseudomonas stutzeri* and *Enterococcus gallinarum* were present only in Yaounde, whereas *Pseudomonas aeruginosa*, *Salmonella* species and *Pseudomonas putida* were present only in Kumasi. Most of these organisms are opportunistic pathogens and can cause life threatening infections to humans as well as animals and have been implicated in chick mortality. These organisms are multi and pan drug resistant which is a big threat to public health as these resistant genes can be transferred across the food chain to humans.

Keywords: Enterobacteriaceae, Poultry, Yaounde, Kumasi, Diversity.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-77 EFFECTS OF HARVEST TIME AND STORAGE FORM ON QUALITY OF STORED MAIZE IN THE SOUTHERN PART OF GHANA

Sharon Gyekyawaa Asare¹, Sandra Abankwa – Kwarteng¹, Bismark Sekyere Owusu², Philip Kweku Baidoo¹

¹*Department of Theoretical and Applied Biology, Kwame Nkrumah University of Science And Technology, sharonzy2401@gmail.com*

²*Department of Horticulture, Kwame Nkrumah University of Science and Technology*

ABSTRACT

In Ghana, most smallholder maize farmers delay harvesting of their crops in an attempt to achieve optimum moisture content levels necessary for safe storage. Late harvesting may cause a hike in insect attacks and fungal contaminations, leading to alterations in nutrient composition of grains. This study examined the effects of harvest time and storage form on the quality of maize. Maize was harvested from 36 plots at three stages (early, mid and late), and stored in three forms (de-husked, husked and shelled). Mid-dehusked maize had the highest final starch content (69.28%) while Early-husked maize had the highest protein content (7.22%). Aflatoxin level was highest on Late-dehusked maize (60.70 ppb). Nutrient and aflatoxin levels of maize were significantly affected by harvest time. Encouraging farmers to adopt a better approach to harvesting, drying and storage of maize can reduce crop losses and ensure food security.

Keywords: aflatoxin levels; harvest time; maize; nutrient composition; storage form.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-78 HEAVY METAL ACCUMULATION IN SOILS AND PALM (*ELAEIS GUINEENSIS*) FRUITS ON RECLAIMED TAILINGS AND MINED SPOILS IN WESTERN REGION OF GHANA

Bertrand F. Nero, Mohammed S. Alhassan, Yaa Kwakyewaa

Department of Forest Resources Technology, FRNR, KNUST.

E-mail: bfnero@knust.edu; bfn8puo@gmail.com

ABSTRACT

Heavy metal contamination remains one of the unprecedented environmental pollution issues in Africa. Tree crops have the potential to phytosanitize heavy metal polluted soils but may increase the risks of contaminating the food chain. This study examined the heavy metal pollution potential and status/accumulation in soils, palm biomass and fruits. About 40 soil samples to a depth of 40 cm and 90 palm tree samples from roots, leaves/stems and fruits were collected from tailings dam/reclaimed mine spoils and control sites at two mining concession areas in the Western region of Ghana. Heavy metal concentrations and pollution indices were determined and analysed via various inferential statistics. The heavy metal concentrations in the palm roots were significantly higher ($p < 0.001$) than in the soil at GMC, Nsuta except for As which was significantly higher ($p < 0.0001$) in the fruits than in the soil. Soil heavy metal concentration was however significantly higher ($p < 0.0001$) than that of the roots, leaves and fruits at the Bogoso tailings dam sites. The contamination factors, enrichment factors, geoaccumulation indices and pollution load index (PLI) of soils at the tailings dam and reclaimed sites were significantly higher than the soils of the control sites. The pollution load index (PLI) of the tailings dam and control at Bogoso were 17.98 ± 0.56 and 6.06 ± 0.58 , respectively and for the reclaimed and control sites at GMC, Nsuta were respectively, 1.86 ± 0.08 and 0.49 ± 0.05 . Thus, the soils at Bogoso are severely polluted with heavy metals while that of the GMC Nsuta are unpolluted. Bioaccumulation factors were generally significantly higher in roots than in the leaves and fruits ($p < 0.0001$) and were all below 1 at Bogoso and greater than 2 at GMC, Nsuta. The translocation of Cu and As to the fruits was significantly higher on both study locations although that of As at GMC, Nsuta was more dramatic i.e. $TF = 29$. Although growing palm trees reduced soil heavy metal concentrations tremendously, the soils on these decommissioned tailings dams and mined spoils may still be severely polluted. The remarkable accumulation of heavy metals, particularly As in the fruits can pollute the food chain and increase heavy metal related health risks among human populations. Rather than consume such contaminated palm oil as food, its utilization as biodiesel/biofuel should be encouraged.

Keywords: *phytosanitize, concentration, geoaccumulation index, contamination factor, and translocation*

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-79 COMPARATIVE NON-DESTRUCTIVE EVALUATION OF WELDS USING ACETYLENE GAS AND OXYHYDROGEN GAS PRODUCED FROM A HYDROGEN FUEL CELL

Paulina Donkor¹, Andrew Nyamful^{1,2}, Anita Asamoah², Latifatu Adjah³, Juliet Attah²

¹ *School of Nuclear and Allied Science, Department of Nuclear Engineering, University of Ghana*

² *Ghana Atomic Energy Commission*

³ *Council for Scientific and Industrial Research, Institute of Industrial Research*

ABSTRACT

Most of the mining and petroleum industries' production plants are made of welded metal, which may influence the plant's efficiency if welding was not properly done. Historically, gases derived from acetylene or LPG have been used for welding of plants in these industries. Acetylene gas has been widely used for welding despite its negative effects on both the environment and human health. Some examples of air pollutants coming from the use of acetylene gas include carbon dioxide and carbon monoxide. These gases contribute to the greenhouse effect, thus global warming. An alternative gas that is environmentally friendly, economically viable, and readily available is needed. Hydrogen gas has been employed in many different industries such as the automotive industry and is increasingly being considered as a potential primary fuel source of the future. In this study oxyhydrogen gas (HHO) also known as Brown's gas was generated from a hydrogen fuel cell and used as a replacement for acetylene gas in welding. Brown's gas was used to weld a randomly selected test piece, which was evaluated alongside an acetylene-welded test piece. The integrity characteristics of both welds were determined using dye-penetrant and radiography testing. The assessment showed that the welds from both gases were strong. Welding with HHO gas, followed by a non-destructive inspection, has proven to be efficient, thus most recommended due to its environmental friendliness, cost-effectiveness, health implications, and global economic benefits.

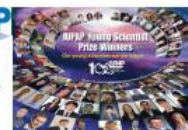
For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223  jkagbenorhevi@yahoo.com



Sponsor:  **International Union of Pure and Applied Physics**



P-80 MEASUREMENT OF RADON AND RADON EXHALATION RATES IN SOIL SAMPLES FROM THE TRADITIONAL MAIN HALLS IN THE UNIVERSITY OF GHANA CAMPUS USING THE SEALED-CAN TECHNIQUE

Irene Opoku-Ntim¹, Darkwa Charles Aboagye², Aba Bentil Andam³

¹Ghana Atomic Energy Commission, <mailto:ina82ma@gmail.com>

²University of Ghana

³School of Nuclear and Allied Sciences

ABSTRACT

Radon has been recognized as one of the health hazards for mankind because long-term exposure to radon increases the risk of developing lung cancer. This study aimed at determining the radon exhalation rates, the concentration levels of radon in soil samples, evaluating the contribution factors of radon concentration of soil samples and evaluating the health risks associated with soil radon concentration of the traditional main halls in the University of Ghana. In this study, the sealed-can technique was used to determine the radon exhalation rates in fifty (50) soil samples collected from different sites around the five (5) traditional main halls in the University of Ghana. The average soil radon concentration ranged from 166.26 - 222.20 Bqm⁻³ with a mean of (189.96 ± 23.12) Bqm⁻³. The average surface exhalation rate ranged from 10.94 -14.62 μBqm⁻²h⁻¹ with a mean of (12.50 ± 1.52) μBqm⁻²h⁻¹. The average mass exhalation rate was (3.17 ± 0.39) μBqkg⁻¹h⁻¹. A good positive correlation has been observed between the soil radon concentration and exhalation rates of soil samples.

Keywords: Radon, exhalation rate, University of Ghana, sealed-can, traditional

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)

+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-81 PLANETARY AND SPACE SCIENCE FOR SUSTAINABLE DEVELOPMENT

Marian Selorm Sapah

Department of Earth Science, University of Ghana, Legon-Accra, msapah@ug.edu.gh

ABSTRACT

Planetary and Space Science (PSS) is the branch of science that probes the origin and evolution of the Solar system through the physical, chemical, biological and geological processes that drive it. It is a highly interdisciplinary field that combines laboratory and space experiments, remote observations, environmental simulations, and modelling to study the surfaces and atmospheres of terrestrial planets, moons, asteroids, and comets. PSS research is important for global development, and its benefits to humanity are many and expanding. For many years, space science and technology has helped humanity solve Earth's problems, providing solutions that change the way we approach climate change, food security, global health, humanitarian aid, and more. Remote sensing and earth observations such as satellite data are essential to monitoring, modeling, and policymaking around the Sustainable Development Goals (SDGs). Characteristics of space such as microgravity and vacuum, offer new capabilities for manufacturing and energy generation. There are several terrestrial applications of spinoff technologies from space exploration activities with their associated social, cultural and economic implications. Some examples of ways PSS can influence SDGs directly include: (1) *SDG2-Ending Hunger*: Satellite images can give information on crop yield, helping farmers to make better decisions on irrigation, fertilization and harvesting (2) *SDG6-Clean Water*: Satellite imaging is used for spatial and temporal reservoir monitoring that provides early warning of shortages or flooding. (3) *SDG13-Climate Action*: Satellites enable global monitoring of deforestation, pollution, the ice caps and desertification. [2], (4) *SDGs 3 and 4-Good Health and Well-being; and Quality Education*: Increased access to internet connectivity for a larger majority of people, results in increased knowledge sharing, with benefits of health care, education, and communication.

Keywords: Space Science and Technology, Sustainable Development Goals

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-82 THE IMPACT OF ACID AND ALKALINE EXTRACTION ON THE USEFULNESS OF PLANTAIN PEEL PECTIN AS A SUSPENDING AGENT IN PHARMACEUTICAL FORMULATIONS.

Owusu Frederick William Akuffo¹, Acquah Prince George Jnr¹, Boakye-Gyasi Mariam EL¹, Johnson Raphael¹, Yeboah Naana Genevieve², Archer Mary-Ann³, Antwi Birago Mercy¹, Asare Sandra Obenewaa¹

¹ *Department of Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
frederickakuffo.owusu@knust.edu.gh*

² *Department of Pharmaceutics and Quality Control, Centre for Plant Medicine Research, Mampong, Ghana*

³ *Department of Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences, University of Cape Coast, Cape Coast, Ghana*

ABSTRACT

Natural polymers like pectin, have gained increased utilization in the pharmaceutical and biotechnology sectors. *Musa paradisiaca* (Plantain) peels make up 30-40 % of the overall weight of the fruit. The extraction of pectin from these residues can therefore be viewed as a possible waste to wealth. This study, therefore, focused on evaluating the suspending properties of pectin obtained from *M. paradisiaca* peels (through acid and alkaline extraction) and presents an alternative suspending agent in the pharmaceutical formulation of suspensions. Pectin was extracted from the peels using both acid and alkaline extraction processes respectively. Different concentrations of the acid and alkaline pectin extracts were employed as a suspending agent in paracetamol suspensions, using acacia gum as a standard. The alkaline pectin extract recorded higher equivalent weight, degree of esterification, ash content, and crude content than the acid pectin extract. The formulated suspensions reported significant differences ($p < 0.05$) in flow rates, ease of re-dispersion, sedimentation volumes, and rates compared with acacia gum. Moreover, when the acid and alkaline pectin extracts were compared, significant differences ($p < 0.05$) were observed in the sedimentation rates and the sedimentation volumes suggesting that the extraction method may affect suspending properties.

Keywords: Plantain peel, Pectin, Pharmaceutical suspensions, Natural polymers

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-83 THE POTENTIAL OF *MELIA AZEDARACH* GUM AS A RELEASE MODIFIER IN CONTROLLED-RELEASE MATRIX TABLETS

Frederick William Akuffo Owusu¹, Mariam El Boakye-Gyasi¹, Raphael Johnson¹, Yaa Asantewaa Osei¹, Desmond Asamoah Bruce Otu¹, Emmanuel Asante¹, Marcel Tunkumgnen Bayor¹, Prince George Acquah Jnr¹

*Department of Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.
frederickakuffo.owusu@knust.edu.gh*

ABSTRACT

Matrix tablets are effective because they stabilise the drug's concentration in the bloodstream, slow its release over time, and prolong its therapeutic effects. Formulations with a shorter half-life and high dosage frequency benefit significantly from extended-release. Pharmaceutical researchers are increasingly interested in using natural polymers as excipients to formulate matrix tablets due to their advantages over semisynthetic and synthetic alternatives. In the present study, sustained release tablets were prepared by wet granulation method containing lactose and talc as diluent and lubricant, respectively, metformin hydrochloride as a model drug, and using 20% and 40% of *Melia azedarach* gum as natural matrix forming agent. The formulated batches were evaluated for parameters such as tablet thickness, friability, hardness, weight variation, and in vitro drug release characteristics and were found to be satisfactory. The drug release data were fitted into different mathematical models to determine the release kinetics of the drug. The results showed that all formulated matrix tablets fit well with zero-order kinetics, suggesting that the drug's release rate depends on the polymer matrix. Finally, these results demonstrates that *M. azedarach* gum has the potential to be used as a drug-release modifier in the pharmaceutical manufacturing of controlled-release matrix tablets and the development of cost-effective medicines.

Keywords: *Melia azedarach*, Natural polymer, Gums and mucilage, sustained-release tablets.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure and Applied Physics



P-84 RECYCLING OF PLASTIC WASTE INTO AN AGRICULTURAL FERTILIZER FOR GHANA'S SOCIO-ECONOMIC DEVELOPMENT

Yakubu A. Emmanuel, Gyamfi Janet, Hud Suleiman, Patrick Kyei, David B. Puzer

Department of Science, Ghana Armed Forces Senior High Technical School – Kumasi

ABSTRACT

Plastics have become a crucial part of lifestyle, and the global plastic production has increased immensely over the past few years. However, levels of their usage and disposal generates several environmental problems. Its effect on the environment has led scientists to search for alternative new and improved ways of recycling it with no incineration to reduce these impacts. Investigation into the components of the most common forms of polythene has revealed the presence of ethylene molecules as a basic monomer. The process of catalytic-thermal cracking was employed to break down polythene into its monomers. Aluminum oxide (a catalyst) and plastic waste was put into a test tube in a ratio of 3:5. A tube was connected to the open end of the tube run to an inverted syringe with a gas head. As the junction was heated the plastic melted and the gas produced passed through the aluminum oxide, breaking it down into ethylene. The gas burned with yellow smoking flame, confirming the presence of a hydrocarbon. It also changed bromine water from its usual reddish-brown color to colorless and decolorized potassium tetraoxomanganate(VII). A home test revealed a nice smell proving the presence of ethylene gas. The EHF proves effective when used as a fruit ripener by ripening a 2-week-old tomato in three days. The EHF has the potential of reducing global plastic waste disposal and solving world hunger issues if properly adopted and invested in.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics



P-85 PIEZOELECTRIC ENERGY HARVESTING FOR CLEAN COOKING AND FOOD PROCESSING USING RENEWABLE SOURCES OF ENERGY

Yakubu Emmanuel, Gyebi Dennis, Frimpong Louis, David B. Puzer, Hud Suleiman

Department of Science, Ghana Armed Forces Senior High Technical School – Kumasi

ABSTRACT

The supply of uncontaminated and sustainable energy to cater for our constantly increasing energy demands is one of the crucial hindrances presently challenging mankind. Currently, the energy challenge is to replace fossil fuel with renewable energy sources. In the wake of depleting fossil fuels and the damage it inflicts on planet earth, makes it necessary for further research on piezoelectricity harvesting. The method makes use of high-strain piezoelectric transducers to capture mechanical stress and convert it into electric current. The electric current across the transducers is transferred to an integrated circuit board. From our laboratory test, one step on a piezoelectric tile can generate 1.0V. This means when ten steps are applied on the piezoelectric tile, 10 volts will be produced. The current is then transmitted to the homemade electric stove made up of a tin filled with plaster of Paris and water. When the paste hardens, coil-like intrusions are made at the surface lined with nichrome spring as a heating element. When this heating element is exposed to the electricity generated by the transducers, heat is generated through the principle of Joule's law.

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
☎ +233 208954223 ✉ jkagbenorhevi@yahoo.com



Sponsor: 
International Union of Pure
and Applied Physics

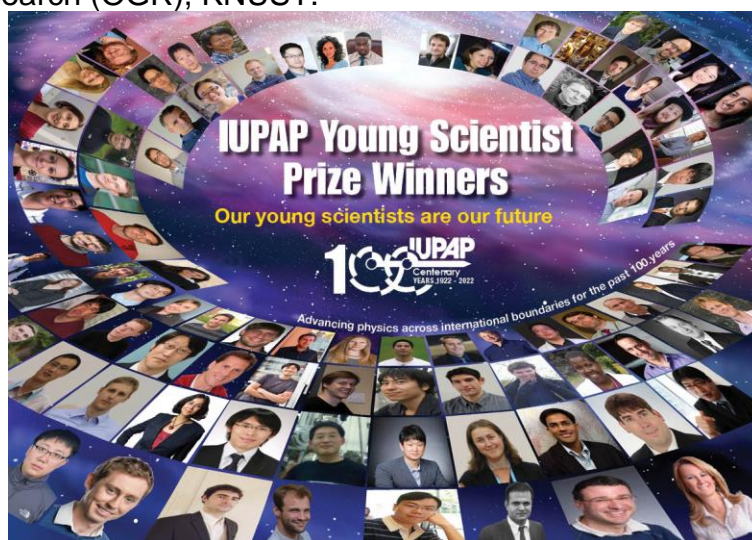


The Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD-2023)

APPRECIATION

Special appreciation to:

- The Conference Chair, Prof. Leonard K. Amekudzi
- The Special Guest of Honour, the Vice-Chancellor of KNUST, Prof. (Mrs.) Rita Akosua Dickson,
- Special Guests, Provosts Directors and Deans
- Patrons, National Officers and GSA Executives
- Keynote Speakers
- All Authors, Oral and Poster presenters
- Ghana National Commission for UNESCO
- WiSTEMGh
- RSA-CSIR
- Participants
- Media
- **Our Proud Sponsors:** International Union of Pure and Applied Physics (IUPAP), College of Science (CoS)-KNUST, Young Researcher's Forum of the Office of Grants & Research (OGR), KNUST.



For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor: IUPAP
International Union of Pure and Applied Physics





INTERNATIONAL UNION OF PURE AND APPLIED PHYSICS

Advancing physics across international boundaries for the past 100 years

INTERNATIONAL COMMISSIONS

- C1: Commission on Policy and Finance
- C2: Commission on Symbols, Units, Nomenclature, Atomic Masses and Fundamental Constants
- C3: Statistical Physics
- C4: Astroparticle Physics
- C5: Low Temperature Physics
- C6: Biological Physics
- C8: Semiconductors
- C9: Magnetism
- C10: Structure and Dynamics of Condensed Matter
- C11: Particles and Fields
- C12: Nuclear Physics
- C13: Physics for Development
- C14: Physics Education
- C15: Atomic, Molecular, and Optical Physics
- C16: Plasma Physics
- C17: Laser Physics and Photonics
- C18: Mathematical Physics
- C19: Astrophysics
- C20: Computational Physics

AFFILIATED COMMISSIONS

- AC1: International Commission for Optics
- AC2: International Commission on General Relativity and Gravitation
- AC3: International Commission for Acoustics
- AC4: International Commission on Medical Physics

WORKING GROUPS

- WG1: International Committee for Future Accelerators (ICFA)
- WG2: Communication in Physics
- WG5: Women in Physics
- WG7: International Committee on Ultrahigh Intensity Lasers (ICUIL)
- WG9: International Cooperation in Nuclear Physics (ICNP)
- WG10: Astroparticle Physics International Committee (APIC)
- WG11: Gravitational Wave International Committee (GWIC)
- WG12: Energy
- WG13: Newtonian constant of Gravitation
- WG14: Accelerator Science
- WG15: Soft Matter
- WG16: Industry
- WG17: Centenary

AIMS

- To stimulate and promote international cooperation, communication, research and education in physics;
- To foster inclusiveness and diversity in physics;
- To uphold openness, honesty and integrity in the practice, application and promotion of physics;
- To support the free circulation of scientists;
- To promote international agreements on symbols, units and nomenclature; and cooperating with other organizations on disciplinary and interdisciplinary problems.
- To help in the application of physics toward solving problems of concern to humanity.

2022

The yearlong CENTENARY celebrations will:

- Increase awareness of physics discoveries and the close ties among physicists at research centres globally.
- Stimulate worldwide interest in physics and science, as a tool for education and a motor of innovation, technology & economic development.
- Reach out to the global physics community, national science organisations, policy-makers, societies, students, families and the general public.



Conference Sponsorship

Each year, IUPAP sponsors and endorses ~ 50 conferences annually with special attention given to those held in developing countries.



Inter Union Relations



Young Scientist Awards & Commission Awards

~200 prizes have been awarded in the last 10 years



Contact Us

IUPAP Singapore Nanyang Technological University, Nanyang Executive Centre #04-09, 80 Nanyang View, Singapore 639673
Tel: +65 6592 7784 • Email: IUPAPAdmin@ntu.edu.sg • Website: www.iupap.org

For enquiries, please contact:

Prof. Jacob K. Agbenorhevi (Hon. President - GSA Kumasi Branch)
+233 208954223 | jkagbenorhevi@yahoo.com



Sponsor:

International Union of Pure and Applied Physics

