

# West African Centre for Cell Biology of Infectious Pathogens (WACCBIP)

## University of Ghana

### First Annual Report to the WACCBIP International Advisory Board, July 2016

#### 1.0 INTRODUCTION

WACCBIP was established through the award of the World Bank African Centres of Excellence (ACE) grant in November 2013, and the Centre became operational in January 2014. However, this is the first meeting of the WACCBIP International Advisory Board (WIAB), therefore, this report serves as an update on the progress made in implementing the vision of the Centre, and covers the period January 2014 to June 2016.

##### 1) History and mandate

The ACE project is funded through a loan facility to the Government of Ghana, to support the establishment of Centres of Excellence for Higher Education, for the purpose of promoting Regional specialization in training and research under three main sectors: Health, STEM, and Agriculture. The University submitted three applications for funding under the ACE project, two of which were successful, including the proposal for the establishment of WACCBIP. The WACCBIP proposal was inspired by the success of five regional workshops on Modern Methods for teaching Cell Biology of Pathogens, that were jointly organized by the Department of Biochemistry, Cell and Molecular Biology (BCMB) and the American Society for Cell Biology (ASCB), with collaboration from the Noguchi Memorial Institute for Medical Research (NMIMR). The workshops drew participants from Ghana and several West African countries, and high rate of applications received each year and reported impact on the trainees underscored a great need for a more systematic and sustained programme for providing high quality training in Cell and Molecular Biology to young African scientists. Therefore, the WACCBIP proposal was selected for funding of up to \$8M over four years (2014-2018) with a mandate to do the following:

- i. Train high level health professionals and biomedical scientists on cell and molecular biology of infectious pathogens through Short courses, and Masters and PhD programmes.
- ii. Serve as a core facility with state-of-the art biomedical laboratories to support infectious diseases research in the sub-region.
- iii. Establish a Biomedical High Performance Computing Unit to provide cluster computing services to promote teaching, research, and dissemination of information among health professionals and academics in the sub-region.
- iv. Increase research output and innovation by serving as a focal point for enhancing collaboration among biomedical scientists and biotechnology companies in the sub-region.

In 2014, the Wellcome Trust launched a new capacity-building initiative known as the Developing Excellence in Leadership and Training in Science (DELTAS) Africa programme, and called for applications from research consortia across Africa to apply for funding to support training and health research. WACCBIP leveraged our vision and strong partner network to submit a proposal which was selected for funding after a rigorous and very competitive process. The WACCBIP DELTAS proposal therefore, was awarded a grant of \$7.8M over five years (2016-2020) to implement the following:

- i. Strengthen research in the areas of Human genetics and Host-pathogen interactions, leading to innovations in molecular diagnosis & drug development.
- ii. Expand our research to include non-communicable diseases.
- iii. Extend our regional network beyond West Africa, to include East and Southern Africa.

- iv. Develop a post-doctoral programme for leadership development and sustaining research momentum in newly qualified PhD graduates.
- v. Provide PhD fellowships for research in human genetics and host-pathogen interactions.
- vi. Increase quality of supervision and mentorship through a Student Visitor programme, where students spend 6-months in UK or US institutions for experiential learning.

## 2.0 IMPLEMENTATION UPDATES – GOVERNANCE

### 1) Establishment of WACCBIP International Advisory Board

In consultation with the Provost of the College of Basic and Applied Sciences (CBAS), and the Pro-VC for Research Innovation and Development (RID), the WACCBIP Director has invited 15 persons to serve as members of the WACCBIP International Advisory Board. The group includes distinguished academics and senior professionals from both the public and private sectors:

1. Prof Keith Gull, University of Oxford, UK (Chairman)
2. Prof. Ebenezer Owusu, Provost, CBAS, University of Ghana
3. Prof. John Gyapong, Pro-VC, RID, University of Ghana
4. Prof. Matilda Steiner-Asiedu, Dean, School of Biological Sciences, University of Ghana
5. Prof. Kwadwo Koram, Director, NMIMR, University of Ghana
6. Prof. Ama de-Graft Aikins, Centre for Social Policy Studies, University of Ghana
7. Mrs. Deborah Mawuse Agyemfra, Legal Practitioner
8. Dr. Abraham Hodgson, Director, Research and Development Division, Ghana Health Service
9. Mr. Alex Asiedu, Financial Investment Expert, Stanbic Bank
10. Prof Douglas J. Perkins, University of New Mexico, USA
11. Prof Mark Carrington, University of Cambridge, UK
12. Prof. Kirk Deitsch, Cornell University, USA
13. Prof. Kwadwo Ofori, Dean School of Graduate Studies, University of Ghana
14. Prof. Mahamadou Diakite, Malaria Research and Training Centre, Bamako, Mali
15. Dr. Patrick Arthur, Department of Biochemistry, Cell and Molecular Biology, University of Ghana

The Board's mandate will include: provision of sound and independent scientific advice on the scope of WACCBIP's scientific objectives; guidance and advice on the strategic planning and financial sustainability of the Centre; evaluation of WACCBIP's scientific and research outputs; and assessment of WACCBIP's contribution to public health both nationally and internationally. The first meeting of the Board has been scheduled for July 17<sup>th</sup>, 2016 in Accra.

### 2) DELTAS inception meeting

Following the award of the Wellcome Trust DELTAS Africa grant to WACCBIP, a 2-day inception meeting was held at Legon, from November 12-13, 2015 to bring all partners and collaborators together. The main objective of this meeting was to discuss the roles and aspirations of each partner institution under the DELTAS project and to review the funded proposal and the implementation arrangements. Representatives of partner institutions present at the meeting in attendance were Dr. Sam Alford – London School of Hygiene and Tropical Medicine (LSHTM), Prof. Ambroise Wonkam – University of Cape Town, Prof. Mahamadou Diakite – Malaria Research and Training Centre, Mali, Mr. Dembo Kanteh – Medical Research Council, The Gambia, and Prof. Solomon Ofori- Acquah – University of Pittsburgh. Topics covered included financial reporting, fellowship distribution across partner institutions, and student recruitment strategies and procedures. A committee was also set-up to design the curricula and teaching schedules for two new genetics courses to be introduced as electives at the department of BCMB for the benefit of DELTAS PhD fellows who would be enrolled.

## 3.0 IMPLEMENTATION UPDATES - ACADEMIC

Over the last two years, we have assembled a team and began implementing the mandate of WACCBIP according to the proposals that were funded through the ACE and DELTAS projects. For

greater efficiency, we have synchronized the activities of the two projects while maintaining separate financial books for the two grants.

### **1) Curriculum development**

Following the notification of award for the ACE project, we constituted a Curriculum Development Committee consisting of local, regional and international faculty, tasked with designing a specialized graduate programme for the Centre. The committee was chaired by Professor Keith Gull of the University of Oxford, and advised by Professor Richard McIntosh of the University of Colorado and founder of the ASCB workshops, both distinguished Cell Biologists, with extensive experience in curriculum design and track records of research in Africa. The Committee met in Legon from Jan 13-14, 2014 to finalize the curriculum for a graduate programme in Molecular Cell Biology of Infectious Diseases (MCBI), including a two-year MPhil degree programme and a four-year PhD degree programme. Thus, the MCBI programme was to be introduced at the department of BCMB in addition to the existing degree programmes in Biochemistry and Molecular Biology. The PhD programme had to conform to the new University schedule of one year course work and three years research, including experiential learning. The proposed MCBI curricula were therefore taken through the University of Ghana accreditation system and received Institutional approval in July 2014, eventually obtaining accreditation by the National Accreditation Board in September 2015.

In addition, as part of the strategy to promote research in Human genetics and host-pathogen interactions, which is a key component of the DELTAS project, WACCBIP has developed two new elective courses in Genetics. The courses were designed by another Curriculum committee, made of local faculty and collaborators with expertise in Genetics, and will be introduced as optional courses at the PhD level. Students enrolled through DELTAS PhD fellowships will be required to take these courses as electives, one in each semester during their first year. The proposal to introduce the courses is currently going through the Institutional approval process, and a copy is attached as *Appendix I* for the information and comments of the Board.

### **2) Student enrolment**

Our mandate of recruiting graduate students, both locally and regionally has been met with much enthusiasm and a high number of applicants. We have been particularly strict with the admission of qualified candidates who exhibit keen interest in quality research in infectious diseases. We have been particularly impressed with the number of qualified PhD applicants. We have also paid attention to the recruitment of female students and applicants from underprivileged areas, to ensure equity and gender balance in training programmes.

Following Institutional approval, the MCBI programme was rolled out for the 2014/2015 academic year, beginning in August 2014. The first cohort of students admitted into the MCBI programme included 21 MPhil students (4 females and 17 males) and 15 PhD students (7 females, 8 males). The second cohort was admitted in August 2015 and included 15 MPhil (7 females, 8 males) and 12 PhD students (5 females, 7 males). In addition, one Masters student from the first cohort was upgraded to the PhD programme, while a special January admission was used to enrol a Gambian student in January 2016, bringing the total number of PhD students in the second cohort to 14 (5 females, 9 males). The first cohort then reduced to 20 Masters students (4 females, 16 males).

### **3) Current status of enrolled students**

*MPhil Cohort 1*: All 20 Masters students completed their course work and passed their written exams in May 2015. They then developed and presented their proposals for approval in August 2015, and subsequently began their research projects. As at 30<sup>th</sup> June 2016, 18 out of the 20 students have defended their theses, and are preparing their theses for submission by July 31<sup>st</sup> 2016, with the remaining two scheduled for December submission this year. The statuses of the individual students are presented in *Appendix II* and their thesis areas and supervisors are provided as *Appendix III*.

*PhD Cohort 1:* All 15 PhD students took their Comprehensive/PhD qualifying exams in September 2015. The comprehensive exam consists of three parts: a 3-hour sit-down exam on knowledge gained from year 1 course work, submission of a research proposal on a topic different from their thesis area, and an oral exam including questions on the proposal submitted and general knowledge of molecular and cell biology. *A candidate who failed in any of the components was allowed a second chance and the score taken as the final score for that component. A candidate is considered to have passed the exam if he/she passes in all the three components of the exam with scores  $\geq 60\%$ . However, a candidate passing in 2 components of the exam but failing in the third with a minimum score of 50% is considered to have passed the exam if the mean score of the 3 components is  $\geq 60\%$ .* Fourteen students passed the exam and were thus admitted into PhD candidacy, however, one student failed the exam after two attempts and was dismissed from the programme. The full results of the comprehensive exams are presented as *Table 1*.

**Table 1: PhD MCBI (Cohort 1) – PhD Qualifying examination**

Name	Index Number	Written Exam (100%)	Research Proposal (100%)	Oral Exam (100%)	Average Mark (100%)	Comment
William van der Puije	10010232	68	74	74	<b>72</b>	<b>Pass</b>
Emmanuel A. Tagoe	10042507	53	69	65	<b>62</b>	<b>Pass</b>
Sena A. Matrevi	10215186	58	60	66	<b>61</b>	<b>Pass</b>
Ethel Blessie	10221445	71	67	70	<b>69</b>	<b>Pass</b>
Helena Chinbuah	10230578	61	68	77	<b>69</b>	<b>Pass</b>
Gladys Kaba	10290040	53	62	53	<b>56</b>	<b>Fail</b>
Augustina Frimpong	10357518	66	70	81	<b>72</b>	<b>Pass</b>
Dorothea Obiri	10358024	72	73	62	<b>69</b>	<b>Pass</b>
Henrietta Mensah-Brown	10363148	64	61	73	<b>66</b>	<b>Pass</b>
Alabira Iddrisu Alhassan	10396531	62	60	62	<b>61</b>	<b>Pass</b>
Aboagye Kwarteng Dofour	10507987	66	69	67	<b>67</b>	<b>Pass</b>
Ahmed Rufai Abdulrahman	10508317	76	68	61	<b>68</b>	<b>Pass</b>
Nicholas Amoako	10513065	75	71	68	<b>71</b>	<b>Pass</b>
Stephen L. Quaye	10513066	58	62	62	<b>61</b>	<b>Pass</b>
Reuben Ayivor-Djanie	10513071	71	62	67	<b>67</b>	<b>Pass</b>

Unfortunately, one female student lost her life during child birth in December 2015, bringing the cohort to 13 students currently. Eleven of the 13 have submitted their thesis proposals and successfully defended them, and are either currently undertaking experiential learning or began their research projects. The remaining two had initial challenges with their proposals and are currently revising them for re-consideration. The thesis research areas and supervisors for the students are provided in *Appendix III*, and details of the current status of each student are provided in *Appendix IV* attached.

*MPhil Cohort 2:* The 15 Masters students completed their course work and took their final written exams in May 2015. The results of the exam are yet to be determined. In the meantime, they have been assigned to supervisors who are currently working with them to develop their thesis research proposals. The proposals will be submitted and defended at the end of July 2016, after which they will proceed with their research if the proposals are approved.

*PhD Cohort 2:* Thirteen of the 14 PhD students completed their first year course work and are currently taking their comprehensive exams. They took the written exam on June 26<sup>th</sup> and have also submitted their proposals for review. The exams are being assessed and the proposals are also being scored, after which the students will take the oral exam at the end of July 2016. The remaining student who was enrolled in January 2015 has yet to complete the course work, which he should do by December 2016. He would then take his comprehensive exam in January 2016.

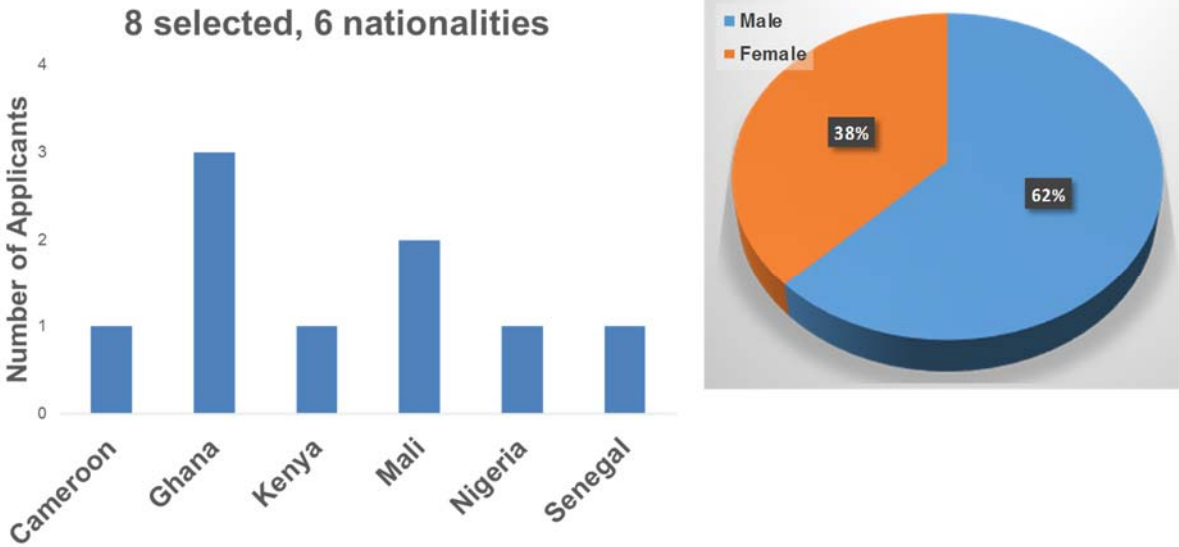
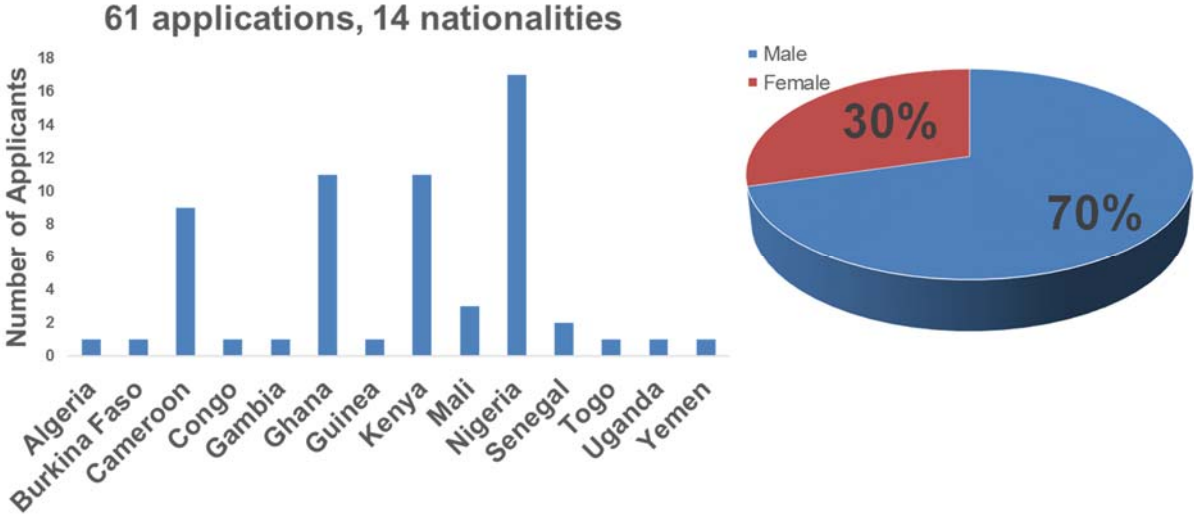
#### 4) Recruitment of DELTAS fellows

**Postdoctoral fellowships:** The call for applications was released on October 1<sup>st</sup> 2015, with a deadline for submission on November 30<sup>th</sup> 2015. After screening, a total of 61 complete applications were received with an average age of 38 years. After initial screening for age (<40 preferred), years post PhD (3 or less), and publications (at least one first author paper in a good journal), 32 were shortlisted while 29 were rejected at the first stage. The second stage of the review, the applications of the 32 shortlisted applicants were sent out to be reviewed by three WACCBIP faculty (local, regional and international) with expertise in the research area of the proposal submitted. The scoring criteria for the review included: the academic qualifications, evidence of research experience relevant to the proposed research, quality of research proposal, and alignment of research interest with WACCBIP research priority areas. In the third stage, 15 finalists were invited for interviews, which were conducted on 11-12, February 2016 at WACCBIP, Legon and at the KEMRI-Wellcome Trust, Kilifi, Kenya. At the end of interviews, nine were selected and awarded three-year fellowships, however, one candidate from Senegal declined the offer because he was not allowed to take-up the fellowship in Dakar. Three of them were to be based at Legon, while the remaining five were to be placed at partner institutions in Mali, The Gambia, Kenya and South Africa. All recipients of the DELTAS postdoctoral awards have now begun their fellowships at the various institutions. A breakdown of the postdoctoral applicants by Nationality and gender is presented in Figure 1, while additional details of the awardees are provided as Table 2.

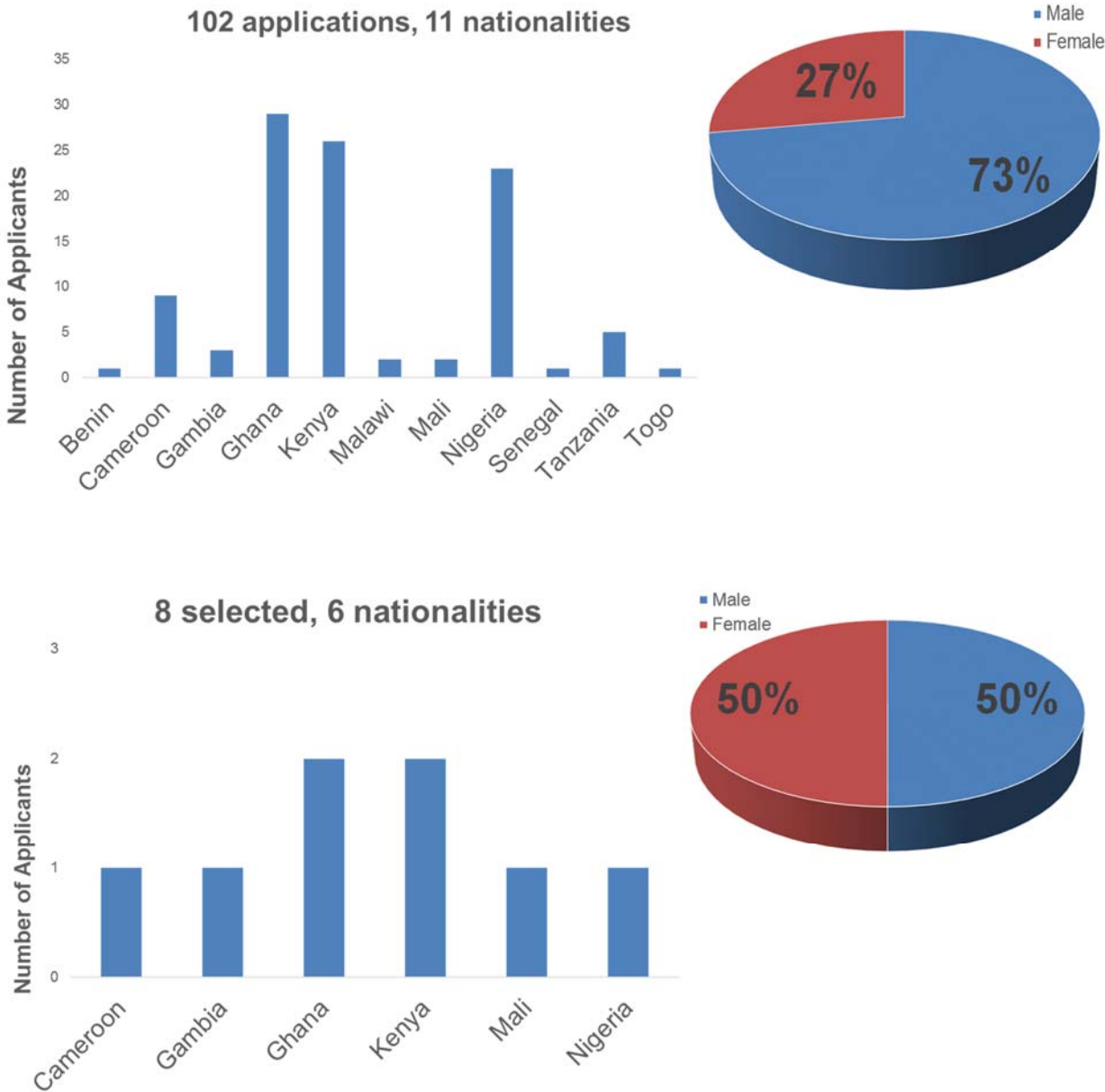
In addition to the eight recipients of the DELTAS fellowships, one candidate who performed very well in the interview but did not make the top eight, was awarded a six-month internship at WACCBIP to give him the opportunity to demonstrate his research competence. He will be re-assessed after the period and considered for the fellowship if he impresses during the internship.

**PhD fellowships:** In all 102 applications were received at the close of applications on January 31, 2016. After initial review, 42 candidates were shortlisted for interviews based on: relevance of their master's degree to the proposed training, evidence of research experience at the molecular level, and relevance of research interest to WACCBIP research priority areas. The interviews were conducted by face-to-face interactions or skype calls, depending on the location of the candidate. At the end of the interviews, eight candidates were recommended for the DELTAS PhD fellowships, including two to be placed in Ghana for their research, and the remaining five assigned to their preferred partner institutions in The Gambia, Kenya and South Africa. A breakdown of the PhD applicants by nationality and gender is presented in Figure 2, while additional details of the awardees are provided as Table 3.

**Figure 1: Breakdown of nationalities and gender of DELTAS postdoctoral applicants**



**Figure 2: Breakdown of nationalities and gender of DELTAS PhD applicants**



**Table 2: Details of first cohort of WACCBIP-DELTAS postdoctoral fellows**

1. **Dr. Yaw Aniweh**  
**Nationality:** Ghanaian  
**Research Project Title:** Unravelling the molecular players during *Plasmodium falciparum* invasion of erythrocytes  
**Host Institution:** WACCBIP-BCMB, University of Ghana  
**Mentor:** Dr. Gordon Awandare
2. **Dr. Jewelna Akorli**  
**Nationality:** Ghanaian  
**Research Project Title:** The role of dominant midgut bacteria isolated from *Anopheles* mosquitoes in larval development and susceptibility to *Plasmodium* infection  
**Host Institution:** WACCBIP-BCMB/NMIMR, University of Ghana  
**Mentor:** Prof. Michael Wilson
3. **Dr. Adwoa Asante-Poku Wiredu**  
**Nationality:** Ghanaian  
**Research Project Title:** Host susceptibility to Tuberculosis (TB) in Ghana  
**Host Institution:** WACCBIP-BCMB/NMIMR, University of Ghana  
**Mentors:** Prof. Dorothy Yeboah-Manu & Prof. Ambroise Wonkam
4. **Dr. Kolapo Oyebola**  
**Nationality:** Nigerian  
**Research Project Title:** Genetic variations and differential immunological response to malaria chemotherapy in variably exposed West African populations  
**Host Institution:** Medical Research Unit, Fajara, the Gambia  
**Mentor:** Dr. Alfred Amambua Ngwa
5. **Dr. Modibo Sangare**  
**Nationality:** Malian  
**Research Project Title:** Epidemiology, clinical neurophysiology, and molecular genetic studies of Autism Spectrum Disorders in Mali.  
**Host Institution:** Malaria Research and Training Center at the University of Science, Techniques, and Technology, Bamako, Mali  
**Mentor:** Prof. Seydou Doumbia
6. **Dr. Seidina A. S. Diakite**  
**Nationality:** Malian  
**Research Project Title:** Genomic variation in *P. falciparum* and pharmacogenomics of antimalarial drugs in Mali  
**Host Institution:** Malaria Research and Training Center at the University of Science, Techniques, and Technology, Bamako, Mali  
**Mentor:** Prof. Mahamadou Diakite
7. **Dr. Valentina Josiane Ngo Bitoungui**  
**Nationality:** Cameroonian  
**Research Project Title:** Genetic factors associated with cardiovascular diseases in Cameroonian sickle cell disease patients  
**Host Institution:** University of Cape Town, South Africa  
**Mentor:** Prof. Ambroise Wonkam
8. **Dr. Daniel Muthui Kiboi**  
**Nationality:** Kenyan  
**Research Project Title:** Validation of candidate mutations in *Plasmodium* for resistance to the antimalarial drugs Piperaquine and Lumefantrine  
**Host Institution:** Kenya Medical Research Institute, Kilifi, Kenya  
**Mentor:** Prof. Faith Osier



Table 3: Details of first cohort of WACCBIP-DELTAS PhD fellows

<b>No.</b>	<b>Name</b>	<b>Age</b>	<b>Gender</b>	<b>Nationality</b>	<b>Host Institution</b>
1	Mbye Haddijatou	25	F	Gambian	MRC, Gambia
2	Majidah Hamid- Bukola Adiamoh	41	F	Nigerian	MRC, Gambia
3	Samuel Mawuli Adadey	29	M	Ghanaian	UCT, South Africa
4	Dominic Selorm Yao Amuzu	35	M	Ghanaian	WACCBIP, Ghana
5	Arnaud Jonas Kengne-Ouafo	33	M	Cameroonian	WACCBIP, Ghana
6	Nancy Kemuma Nyakoe	35	F	Kenyan	WACCBIP, Ghana
7	Beatrice Mukami Muriuki	33	F	Kenyan	KEMRI, Kisumu-Kenya
8	Karamoko Niaré	31	M	Malian	KEMRI, Killifi-Kenya

## 5) WACCBIP-ASCB cell biology workshop

With the inflow of funds from both the World Bank and the Wellcome Trust, the WACCBIP team and our friends at ASCB were very pleased to resume the popular annual Cell Biology workshops, after a two-year break. This year's workshop was held from January 18 – 30, 2016 at the department of BCMB, University of Ghana, and was supported with funds from the Wellcome Trust, the World Bank ACE project, and the Building Stronger Universities (BSU) project.

The objective of the workshop was to equip young scientists with both technical and theoretical knowledge of cell biology techniques and how they can be applied to their research work. For this year's workshop, we limited participants to only graduate students enrolled in the department of BCMB. Therefore, the workshop also served as a platform for students and faculty to interact and share ideas, as the students prepared to develop their proposals for thesis research.

Faculty were drawn from the department of BCMB, NMIMR and the College of Health Sciences, University of Ghana. There was a strong contingent from the ASCB including Prof John Richard McIntosh (University of Colorado), Prof. Kirk Deitsch (Cornell University), Prof Martha Cyert (Stanford University) and Dr. Joy Power (University of Colorado). The full list of faculty who contributed to the WACCBIP-ASCB workshop is shown in *Table 4*.

**Table 4: Faculty who contributed to the WACCBIP-ASCB Workshop on Modern Cell Biology - January 18-29, 2016**

<b>Faculty</b>	<b>Institution</b>
Richard McIntosh	<i>University of Colorado</i>
Kirk Deitsch	<i>Cornell Medical School</i>
Martha Cyert	<i>Stanford University</i>
Joy Power	<i>University of Colorado</i>
Lars Hviid	<i>University of Copenhagen</i>
Jørgen Kurtzhals	<i>University of Copenhagen</i>
Gordon Awandare	<i>BCMB-Univ. of Ghana</i>
Jonathan Adjimani	<i>BCMB-Univ. of Ghana</i>
Patrick Kobina Arthur	<i>BCMB-Univ. of Ghana</i>
Theresa Manful Gwira	<i>BCMB-Univ. of Ghana</i>
Lydia Mosi	<i>BCMB-Univ. of Ghana</i>
Michael Ofori	<i>NMIMR-Univ. of Ghana</i>
Nancy Quashie	<i>NMIMR-Univ. of Ghana</i>
Dorothy Yeboah-Manu	<i>NMIMR-Univ. of Ghana</i>
Adwoa Asante-Poku	<i>NMIMR-Univ. of Ghana</i>
Gloria Ivy Mensah	<i>NMIMR-Univ. of Ghana</i>
George Obeng-Adjei	<i>Sch of Med &amp; Dentistry-Univ of Ghana</i>

## 6) Workshops on Neglected Tropical Diseases

As part of a Royal Society Leverhulme grant to Dr. Theresa Manful Gwira and Prof Mark Carrington, three workshops were to be held on molecular biology, pathogenesis, and diagnostics of Neglected diseases. The first workshop was held in July 2014, followed by another in July 2015, and the final one scheduled for July 2016. These workshops have been deliberately targeted to extend opportunities to students from other institutions in Ghana, and West Africa. The first workshop enrolled 10 students, with the number increasing to 14 in the second workshop. The full details of the institutional affiliations of the students and faculty of the two workshops are presented in *Table 5 and Table 6*.

**Table 5: Students and faculty of the 1<sup>st</sup> WACCBIP-Royal Society workshop on molecular biology, pathogenesis, and diagnostics of neglected diseases - July 7 - 18, 2014**

<b>Students</b>	<b>Affiliation</b>
Abukari Zakaria	University of Development Studies
Harriet Abbey	University of Ghana
Joana Aggrey-Fynn	University of Ghana
Monica Ahiadorme	Kwame Nkrumah University of Science and Technology
Nana Efua Andoh	Noguchi Memorial Institute for Medical Research
Benjamin Afful	Kwame Nkrumah University of Science and Technology
Michael Amoa-Bosompem	Noguchi Memorial Institute for Medical Research
Richard Nortey-Mensah	University of Ghana
Theophilus Combey	University of Cape Coast
Nat Ato Yawson	Kwame Nkrumah University of Science & Technology (KNUST)

<b>Faculty</b>	<b>Affiliation</b>
Gordon Awandare	<i>BCMB-Univ. of Ghana</i>
Patrick Arthur	<i>BCMB-Univ. of Ghana</i>
Theresa Manful Gwira	<i>BCMB-Univ. of Ghana</i>
Lydia Mosi	<i>BCMB-Univ. of Ghana</i>
Osbourne Quaye	<i>BCMB-Univ. of Ghana</i>
Marian Nyako	<i>BCMB-Univ. of Ghana</i>
Rev. Dr. W.S.K. Gbewonyo	<i>BCMB-Univ. of Ghana</i>
Nana Yaw Asare Yeboah	<i>BCMB-Univ. of Ghana</i>
Mark Carrington	University of Cambridge
Angela Schwede	University of Cambridge
Jack Sunter	University of Oxford

**Table 6: Students and faculty of the 2<sup>nd</sup> WACCBIP-Royal Society workshop on molecular biology, pathogenesis, and diagnostics of neglected diseases - July 7 - 18, 2014**

<b>Students</b>	<b>Affiliation</b>
Georgina Awuah-Mensah	University of Ghana
Georgina Isabella Djameh	Noguchi Memorial Institute for Medical Research
Julian Okine	Korle Bu Teaching Hospital
Jamfaru Ibrahim	University of Health and Allied Sciences
Jeffery Agyapong	Noguchi Memorial Institute for Medical Research
Patience Baah	Navrongo Health Research Centre
Musah Osei	Kintampo Health Research Centre
Nathaniel Lartey Lartey	University of Ghana
Ranee Aflakpui	University of Ghana
Imoro Nfayem	Kwame Nkrumah University of Science & Technology (KNUST)
Abdul Latif Adams	University of Cape Coast
Abiodun Adebimpe Adegoke	Olabisi Onabanjo University, Nigeria
Samuel Adeyinka Adedokun	Ladoke Akintola University of Technology, Nigeria
Emilie Thérèse Hanson Dama	Polytechnical University of Bobo Dioulasso, Burkina Faso

<b>Faculty</b>	<b>Affiliation</b>
Gordon Awandare	<i>BCMB-Univ. of Ghana</i>
Patrick Arthur	<i>BCMB-Univ. of Ghana</i>
James Abugri	<i>BCMB-Univ. of Ghana</i>
Theresa Manful Gwira	<i>BCMB-Univ. of Ghana</i>
Osbourne Quaye	<i>BCMB-Univ. of Ghana</i>
Lydia Mosi	<i>BCMB-Univ. of Ghana</i>
Nana Yaw Asare Yeboah	<i>BCMB-Univ. of Ghana</i>
Mark Carrington	University of Cambridge
Simone Weyand	University of Cambridge
Monica Mugnier	Rockefeller University
Jack Sunter	University of Oxford
Jayne Raper	Hunter College, City University of New York
Neil Stahl	Regeneron Pharmaceuticals. USA

## 7) WACCBIP-DELTAS Graduate Internship programme

As part of the WACCBIP-DELTAS programme, a Graduate Internship programme was to be established to identify and promote young students with an interest in research. The programme aims to support newly graduated students at the Bachelors level, who show a keen interest in science research. The interns will work as research assistants at WACCBIP, where they will be mentored to choose suitable career paths. This programme is a mechanism for attracting and mentoring the best students and recruiting them into our graduate programmes or encouraging them to contribute to research in their chosen fields.

The first call for applications under the graduate internship programme was opened on March 15, 2016. Applications were open to all candidates who were due to complete their Bachelor's degrees by July 2016. At the close of applications on March 24, 2016, a total of 35 applications had been received, from which 14 applicants were selected for the Internship programme. The programme will provide a stipend and incentives such as travel awards to attend national workshops and conferences. A list of the selected Interns and their disciplines is provided in *Table 7*.

**Table 7: List of WACCBIP-DELTAS Graduate Interns for 2016/2017**

	<b>Names</b>	<b>Gender</b>	<b>Degree</b>	<b>CGPA</b>
1	Ayee Richmond	M	BSc Biochemistry, Cell and Molecular biology	3.07
2	David Ammah-Tagoe	M	BSc Biochemistry, Cell and Molecular biology	3.12
3	Grace Opoku	F	BSc Biochemistry, Cell and Molecular biology	3.14
4	Kwadwo Oworae	M	BSc Biochemistry, Cell and Molecular biology	3.47
5	Evelyn Quansah	F	BSc Biochemistry, Cell and Molecular biology	2.95
6	Magdalene Dogbe	F	BSc Biochemistry, Cell and Molecular biology	2.58
7	Rita Owusu Adjei	F	BSc Biochemistry, Cell and Molecular biology	3.12
8	Emmanuel Adade	M	BSc Biochemistry, Cell and Molecular biology	3.13
9	Latifatu Mohammed	F	BSc Engineering (Biomedical option)	2.37
10	Osborn Boadi Attakora	M	BSc Engineering (Biomedical option)	3.17
11	Kennedy Senyo Agbeko	M	Computer Science	2.53
12	Marian Nanor	F	Accounting	3.72
13	Pernell Amaning	M	BA Economics & Mathematics	3.42
14	Kyerewaa Akuamoah Boateng	F	BA Political Science and English	3.14

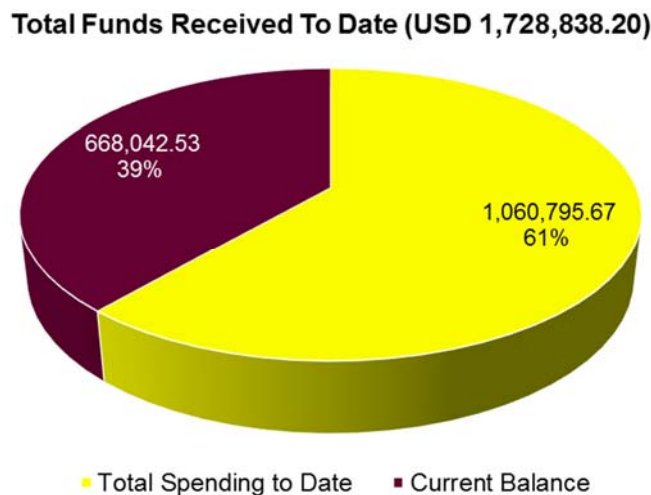
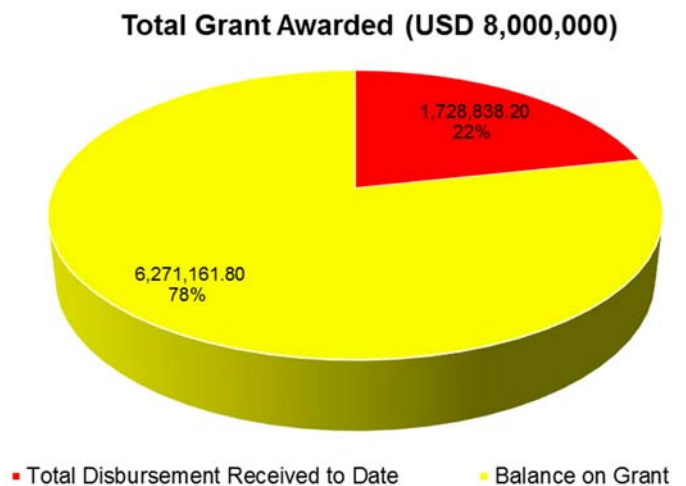
#### 4.0 DISBURSEMENTS RECEIVED AND EXPENDITURE

Although the Centre began operating in January 2014, the first disbursement of funds was not received until September 2015. Therefore, there was a long period of financial strain, which had to be managed with the support of the Office of Research Innovation and Development (ORID). The Pro-VC RID kindly approved a credit line for WACCBIP, which was accessed mainly for travel to ACE project meetings. Other operational costs had to be covered using the Director’s existing grants from the National Institutes of Health (NIH) and Royal Society.

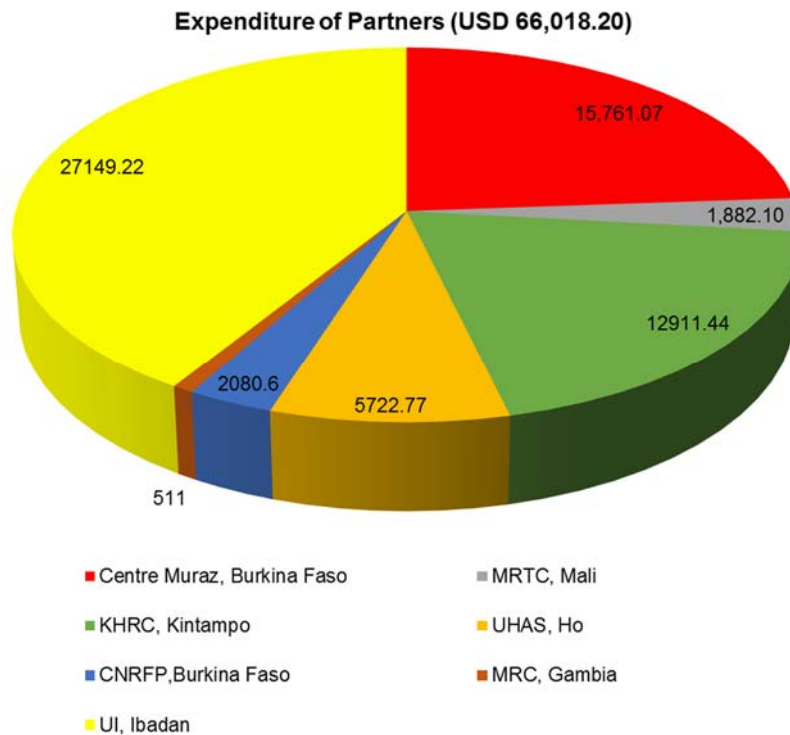
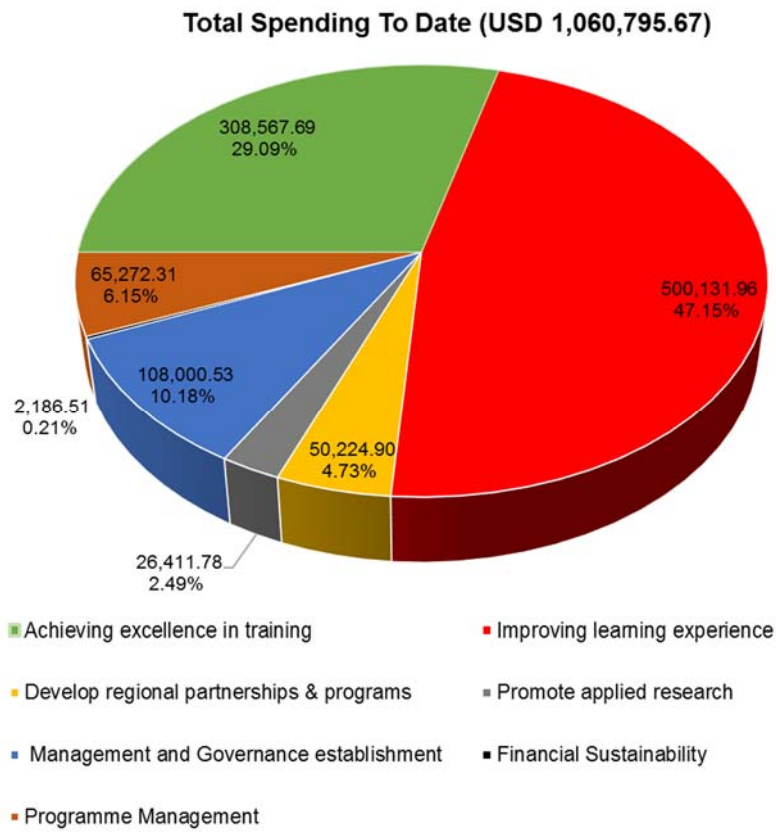
##### 1) ACE Project funds

The funding under the ACE project is based on performance using Disbursement-Linked Indicators (DLIs), which include student enrolment numbers (including regional and gender equity), accreditation of programmes, external funds raised, and milestones achieved on improving the teaching and research environment. The instalments of funds received so far were based on achievement of Project Effectiveness, and an advance payment against achieving certain DLIs. A summary of the disbursements received and the corresponding expenditure incurred so far under the ACE project are presented in *Figure 3* and *Figure 4*.

**Figure 3: WACCBIP-World Bank ACE project disbursement details**



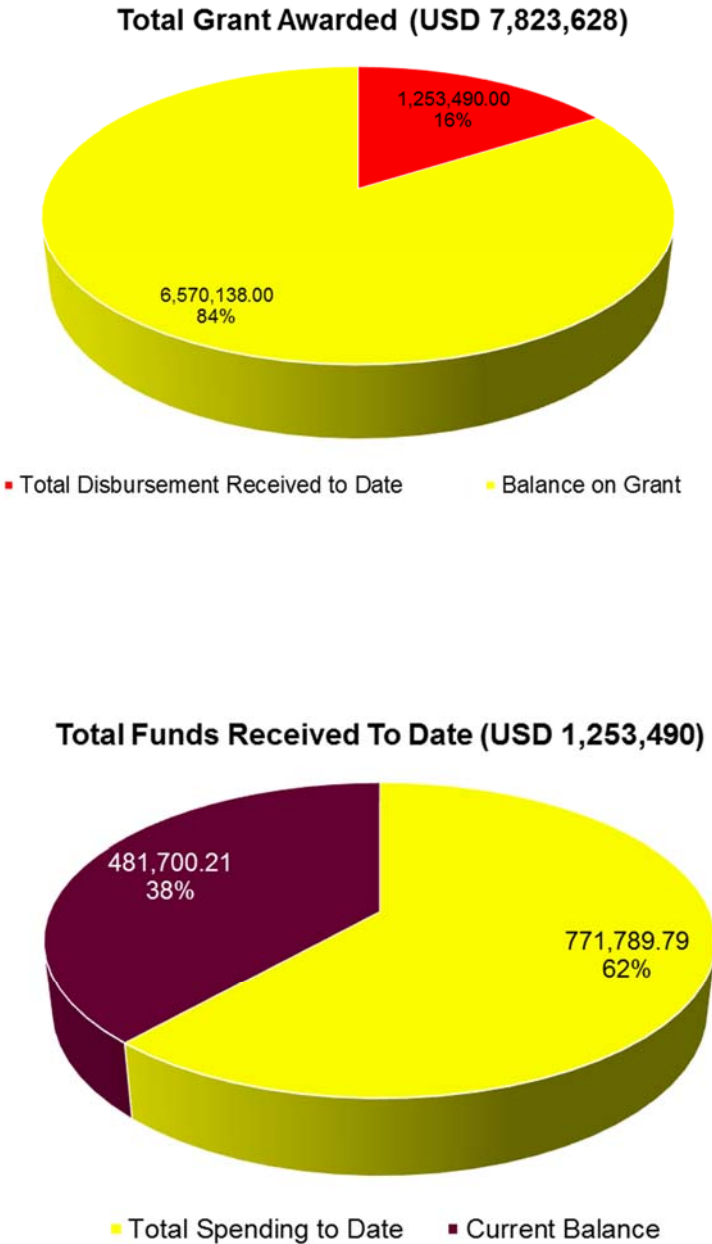
**Figure 4: WACCBIP-World Bank ACE project expenditure**



2) DELTAS Project funds

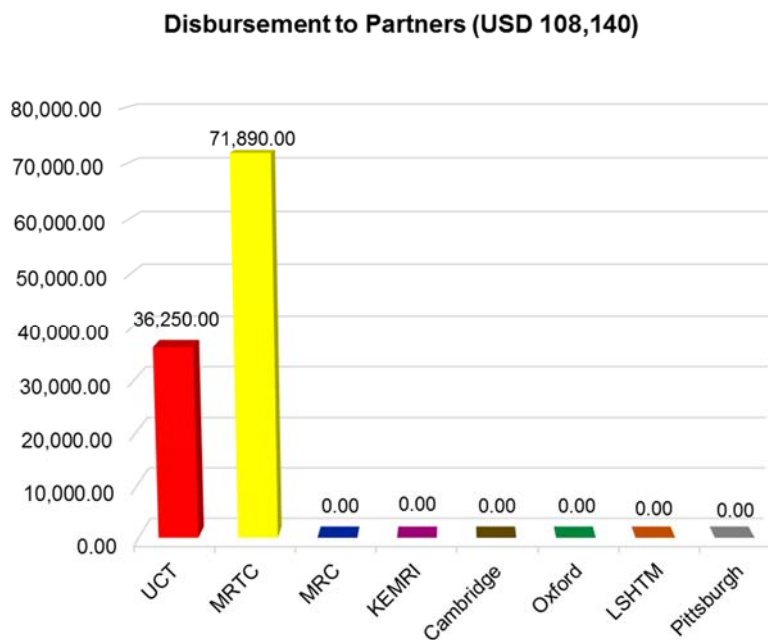
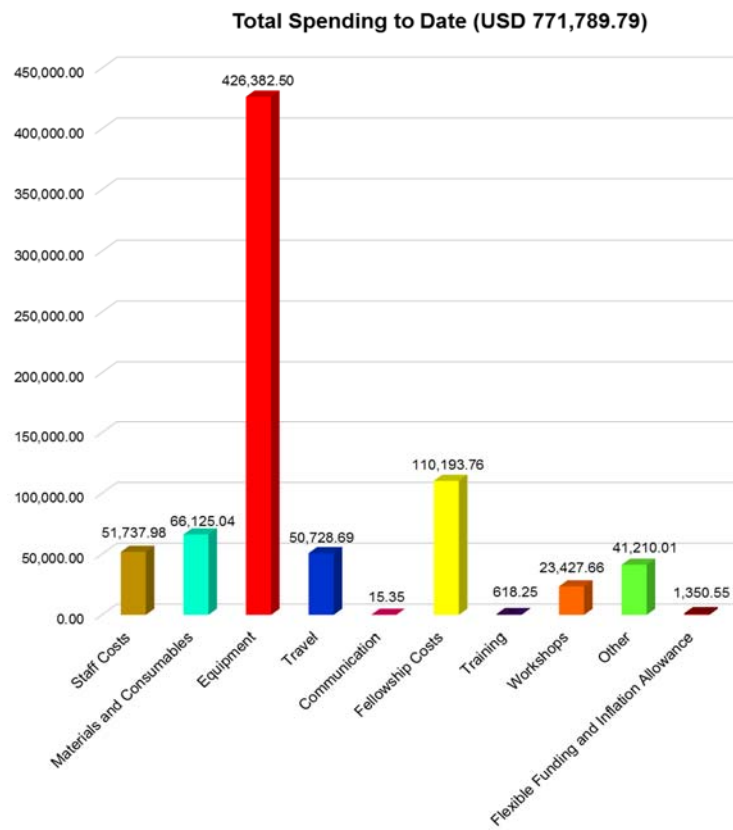
Unlike the ACE project, disbursement of funds from the Wellcome Trust for the DELTAS project has been prompt and regular. The funding mechanism is disbursement in advance, with funds released on a quarterly basis and always with two quarters in advance. This has ensured a very efficient flow of funds and a very smooth take-off of the DELTAS project, compared to the very turbulent implementation of the ACE project. Disbursement began in September 2015 and so far three instalments have been received. A summary of the disbursements received and the corresponding expenditure incurred so far under the DELTAS project are presented in *Figure 5* and *Figure 6*.

Figure 5: WACCBIP-DELTAS project disbursement details





**Figure 6: WACCBIP-DELTAS project expenditure**



### 3) Other funds received

WACCBIP submitted a proposal to provide educational services in the training of health professionals to The Gambia Government under the World Bank ACE Project. After evaluations of the technical and financial aspects of proposal, the Centre negotiated a contract with the Gambian Government to train their students at a total cost of \$ 214,000.00 including:

- 2 PhDs= \$146,000.00
- 2 Masters= \$68,000.00

So far only one student has been enrolled under the contract, and WACCBIP has received \$24,000 as the first instalment of payment under the training contract.

## 5.0 IMPROVING THE TEACHING AND RESEARCH ENVIRONMENT

To improve the teaching and learning experience and increase the quality of research at the Centre, specific facilities and infrastructure are being upgraded or acquired. Dedicated spaces have been created for use as PhD and Master's lecture rooms, and these have been equipped with modern furniture, air conditioners, and projectors and screens. In addition, a bioinformatics teaching laboratory has been created by demarcating off part of the department of BCMB library. Ten high specification desktop computers have been acquired and loaded with the necessary software for analysis of genome sequence data. The laboratories at the department of BCMB have also been upgraded and various basic and advanced scientific equipment have also been purchased. Additional research space has also been created converting some teaching laboratories to research laboratories, including the creation of a Virology laboratory and a Protein expression laboratory. Pictures of some of the new facilities and equipment are shown in *Figures 7 and 8*.

**Figure 7: Pictures of some new equipment acquired and laboratories upgraded**



Real Time PCR Machine



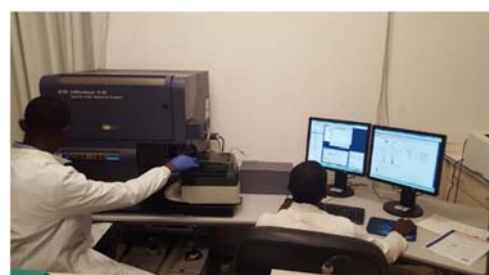
Biosafety cabinet



Gel imager



Centrifuge



**Figure 8: Pictures of new spaces developed to improve teaching and research**



Postdoctoral fellows office



Bioinformatics laboratory

**Table 8: List of new laboratory equipment purchased under WACCBIP projects**

Description	Quantity	Value (USD)
Centrifuge 5804, 230V/50-60Hz, incl. rotor A-4-44 and 15/50ml adapters	1	10,236.91
Biofuge Stratos 230V (Bench top centrifuges) and accessories	2	39,637.59
Protein analysis system (Blitz system)	1	31,760.00
Inverted microscope with axiocam camera and accessories	1	24,607.70
Magpix xponent 4.2 system and accessories	1	29,529.00
OHAUS PH meter - ST2100-F	2	1,132.50
Eppendorf thermo mixer C with smartblock 1.5ml for 24 tubes	1	4,207.75
Eppendorf electroporator	1	4,893.91
Quant studio 5 real time PCR system	1	74,625.22
Nano drop spectrophotometer with accessories	1	22,181.97
Gel Documentation System (Amersham imager 600 and accessories)	1	37,168.00
Protein purification system	1	49,339.00
BD LSRFortessa X-20 and accessories (2 monitors, 1 CPU, 1 Keyboard, 1 HP Printer, 1 stepdown transformer)	1	330,970.00
Safefast Elite Class II Micro Biological Safety Cabinets	2	26,021.33
<b>Total</b>		<b>686,310.88</b>

## 6.0 SCHOLARSHIPS AWARDED

For the first two cohorts of students enrolled under the ACE project, a total of \$ 1,053,800.00 was awarded to 44 students, comprising 20 Masters and 24 PhDs. The scholarships were awarded to cover one or more of three training costs, namely: tuition, research costs and stipend. Students had to apply for the scholarships, and awards were made strictly based on merit and need. The amounts expended so far under the three expenditure categories are shown in *Table 9* and the list of beneficiaries and details of their awards are presented in *Table 10* for PhD and *Table 11* for Masters.

**Table 9: Breakdown of expenditure on scholarships awarded under the ACE project**

Student	Tuition (USD)	Research costs (USD)	Stipend (USD)	Total
Masters (20)	43,000	75,000	28,800	146,800
PhDs (24)	243,500	550,000	113,500	907,000
<b>Total</b>	<b>286,500</b>	<b>625,000</b>	<b>767,300</b>	<b>1,053,800</b>

**Table 10: PhD student scholarships****Cohort 1**

<b>Surname</b>	<b>Other Names</b>	<b>Index No.</b>	<b>Source of Scholarship Funds</b>
Blessie	Ethel Juliet	10221445	WACCBIP: fees stipend research cost
Tagoe	Emmanuel A.	10042507	WACCBIP: fees  research cost
Quaye	Stephen Laryea	10513066	WACCBIP: fees stipend research cost
Dofour	Aboagye Kwarteng	10307987	WACCBIP: fees stipend research cost
Amoako	Nicholas	10513065	WACCBIP: fees  research cost
Van Der Puije	William	10010232	MAVARICA Grant
Mensah-Brown	Henrietta E.	10363145	Leverhulme Royal Society Grant
Alhassan	Alabira Iddrisu	10396531	WACCBIP: fees  research cost
Obiri	Dorotheah	10358024	WACCBIP: fees stipend research cost
Matrevi	Sena	10215186	WACCBIP: fees  research cost
Frimpong	Augustina	10357518	WACCBIP: fees   AIMS Grant
Abdul Rahman	Ahmed Rufai	10508317	WACCBIP: fees  research cost
Ayivor-Djane	Reuben	10513071	WACCBIP: fees  research cost

**Cohort 2**

<b>Surname</b>	<b>Other Names</b>	<b>Index No.</b>	<b>Source of Scholarship Funds</b>
Hagan	Charles Oheneba K.	10552818	WACCBIP: fees
Nunoo	Harriet	10105616	WACCBIP: fees stipend
Lartey	Belinda	10551338	WACCBIP: fees
Krampa	Francis D.	10363861	WACCBIP: fees stipend
Mawuli	Bernice A.	10357510	WACCBIP: fees
Smith	Cecilia	10552806	BSU Grant
Mensah	Wilhelmina Annie	10554799	WACCBIP: fees
Ahorhorlu	Samuel Yao	10363287	BSU Grant
Thiam	Laty Gaye	10556633	WACCBIP: fees stipend
Luuse	Arnold Togiwe	10357504	WACCBIP: fees
Isawumi	Abiola	10552983	WACCBIP: fees stipend
Abdul-Rahman	Mubarak	10357501	WACCBIP: fees
Asare	Prince	10250691	WACCBIP: fees stipend
Jagne	Sheriffo		ACE Gambia: fees stipend research cost

*BSU – Building Stronger Universities (Denmark)*

**Table 11: Masters student scholarships****Cohort 1**

<b>Surname</b>	<b>Other Names</b>	<b>Index No.</b>	<b>Source of Scholarship Funds</b>
Onwona	Christiana Ofori	10507542	WACCBIP: fees  research cost
Myers-Hansen	James L.	10513076	WACCBIP: fees stipend research cost
Bakari	Soale Majeed	10277352	WACCBIP: fees stipend research cost
Abass	Adiza	10308032	WACCBIP: fees stipend research cost
Deletsu	Dennis Selase	10573087	WACCBIP: fees stipend research cost
Cramer	Precious	10301390	WACCBIP: fees stipend research cost
Amekudzi	Deladem K.	10311264	WACCBIP: fees stipend research cost
Osei-Wusu	Stephen	10252660	WACCBIP: fees  research cost
Abana	David	10513090	WACCBIP: fees  research cost
Addo	Samuel Ofori	10507562	WACCBIP: fees
King	Sandra Adelaide	10507709	WACCBIP: fees stipend
Tshibangu	Patrick Tsibangu A	10512723	WACCBIP: fees  research cost
Addo-Gyan	Daniel	10508246	WACCBIP: fees stipend
Kuleape	Joshua	10296210	WACCBIP: fees stipend research cost
Seidu	Zakaria	10513069	WACCBIP: fees stipend research cost
Manu	Emmanuel Ayisi	10312449	WACCBIP: fees stipend research cost
Chirawurah	Jersley D.	10278348	WACCBIP: fees stipend research cost
Ademolue	Temitope	10512725	WACCBIP: fees stipend research cost
Atindaana	Edmund	10513084	WACCBIP: fees
Letsa	Victor	10281491	WACCBIP: fees  research cost

## 7.0 OTHER GRANTS WON BY WACCBIP FACULTY AND STUDENTS

In addition to the major WACCBIP grants from the World Bank and Wellcome Trust, some faculty and students have received other grants and fellowships which have brought in additional resources for the Centre's activities. Some of these grants have relieved the Centre of some student costs, such as tuition fees, stipend, and research costs. A list of the other grants won by students and faculty that supported the Centre's activities since 2014 is provided in Table 12.

**Table 12: Grants won by WACCBIP students since 2014**

NO.	NAME	PROGRAMME	AWARDING BODY	AMOUNT
1.	Selase Deletso	MPhil MCBI	NMIMR Graduate Research Scheme	USD 4,000
2.	Seidu Zakaria	MPhil MCBI	NMIMR Graduate Research Scheme	USD 4,000
3.	Adiza Abass	MPhil MCBI	NMIMR Graduate Research Scheme	USD 4,000
4.	Joshua Kuleape	MPhil MCBI	NMIMR Graduate Research Scheme	USD 4,000
5.	Victor Letsa	MPhil MCBI	NMIMR Graduate Research Scheme	USD 4,000
6.	Emmanuel Ayisi Manu	MPhil MCBI	NMIMR Graduate Research Scheme	USD 4,000
7.	Samuel Ahorhorlu	PhD MCBI	Building Stronger Universities Phase II PhD Scholarship	DKK 443,093 (USD 65, 825.00)
8.	Cecilia Smith	PhD MCBI	Building Stronger Universities Phase II PhD Scholarship	DKK 443,093 (USD 65, 825.00)

**Table 13: Other grants won by WACCBIP faculty since 2014**

No	Name	Project Name/Title	Awarding Body	Amount	Grant Period
1	Patrick K. Arthur	Isolation of New Antimycobacterial Compounds from MEF	IFS	USD 15,000	2014-2015
2	Gordon A. Awandare and David Conway	Targets and patterns of erythrocyte invasion inhibitory antibody responses in malaria	Leverhulme-Royal Society, UK	GBP 179,200	2014 – 2017
3	Osbourne Quaye	Gastroenteric viral agents: detecting and characterising group A rotavirus strains in animals and comparison to strains reported in humans pathogens	Allborada - CAPREx	GBP 10,000	2014-2015
4	Lydia Mosi	Assessing the efficacy of kombucha, and fungal extracts on inactivation of mycolactone produced by <i>Mycobacterium ulcerans</i> .	IFS	USD 15,000	2014-2015
5	Lydia Mosi	Functional classification of selected oxidate stress response pseudogenes in <i>Mycobacterium ulcerans</i> with respect to acquisition of mycolactone producing plasmid.	TWAS	USD 16,900	2014-2015
6	Lydia Mosi	Identification of specific metabolites in <i>Mycobacterium ulcerans</i> infection: exploring potential diagnostic biomarkers	Allborada - CAPREx	GBP 10,000	2015-2016
7	Linda Eva Amoah	Identification of human host receptors for <i>Plasmodium falciparum</i> gametocytes	Allborada - CAPREx	GBP 10,000	2015-2016
8	Neils Quashie	Mechanisms of drug resistance in Malaria and identify new drug targets/novel anti-plasmodia compounds	Allborada - CAPREx	GBP 10,000	2015-2016



## 8.0 WACCBIP STUDENT PUBLICATIONS

1. Iqbal SA, Botchway F, Badu K, Wilson NO, Dei-Adomakoh Y, Dickinson-Copeland CM, **Chinbuah H**, Adjei AA, Wilson M, Stiles JK, Driss A. (2016); Hematological Differences among Malaria Patients in Rural and Urban Ghana. *J Trop Pediatr*. 2016 Jun 17
2. **Mensah-Brown, H. E., Amoako, N.**, Abugri, J., Stewart, L. B., Agongo, G., Dickson, E. K., Ofori, M. F., Stoute, J. A., Conway, D. J., & Awandare, G. A. (2015). Analysis of erythrocyte invasion mechanisms of *Plasmodium falciparum* clinical isolates across three endemic areas within one country. *J Infect Dis pii: jiv207*.
3. Bowyer, P. W., Stewart, L. B., Aspeling-Jones, H., **Mensah-Brown, H. E.**, Ahouidi, A. D., Amambua-Ngwa, A., Awandare, G. A., & Conway, D. J. (2015). Variation in *Plasmodium falciparum* Erythrocyte Invasion Phenotypes and Merozoite Ligand Gene Expression across Different Populations in Areas of Malaria Endemicity. *Infect Immun*. 83(6):2575-82.
4. Adjimani, J. P. & **Asare, P.** (2015). Antioxidant and free radical scavenging activity of iron chelators. *Toxicology reports*. 721-728.
5. Duffy, C. W., Assefa, S. A., MacInnis, B., Abugri, J., **Amoako, N.**, Owusu-Agyei, S., Anyorigiya, T., Kwiatkowski, D. P., Conway, D. J. & Awandare, G. A. (2015). Comparison of genomic signatures of selection on *Plasmodium falciparum* between different regions of a country with high malaria endemicity. *BMC Genomics*. 16:527.
6. Abugri J., Tetteh J.K., Oseni L.A., **Mensah-Brown H.E.**, Delimini RK, Obuobi DO, Akanmori BD (2014); Age-related pattern and monocyte-acquired haemozoin associated production of erythropoietin in children with severe malarial anaemia in Ghana. *BMC Res Notes*. 2014 Aug 20;7:551.
7. **Amoako N**, Asante KP, Adjei G, Awandare GA, Bimi L, Owusu-Agyei S. (2014); Associations between red cell polymorphisms and *Plasmodium falciparum* infection in the middle belt of Ghana. *PLoS One*. 2014 Dec 3;9(12)

Gordon A. Awandare

Director, WACCBIP

11<sup>th</sup> July, 2016

# **WACCBIP Annual Report to Advisor Board – 2016 – Appendix I**

## **PROPOSAL TO INTRODUCE TWO NEW COURSES AS ELECTIVES FOR PHD BIOCHEMISTRY PROGRAMME**

The proposal seeks approval for the introduction of two new courses as electives for students enrolled in the PhD Biochemistry programme. The two proposed courses are:

1. BCMB 711: Molecular mechanisms of human genetic diseases (3 credits)
2. BCMB 712: Population genetics and genetic epidemiology (3 credits)

### **Background**

The department currently has a significant research programme on Infectious Diseases, which is under the West African Centre for Cell Biology of Infectious Diseases (WACCBIP) project. However, recent research evidence demonstrate that the pathogenesis of both infectious and non-communicable diseases is influenced by genetic variation in the human population. As such susceptibility to various diseases have been linked to specific genetic factors which are thought to facilitate the molecular mechanisms of disease. Therefore, to complement the various research projects at the department that are focused on pathogen biology, we propose to develop a human genetics research platform. We believe a robust research programme that combines pathogen biology with human genetics will provide a better understanding of disease pathogenesis and lead to the development of new therapies and vaccines. As such the proposed new courses in Human Genetics are necessary to catalyze new research in this area by providing student with a deeper understanding of the relationships and mechanisms that link genes to disease.

### **Funding**

The proposal to introduce human genetics research in the department was submitted to the Wellcome Trust for funding as part of the 'WACCBIP-Wellcome Trust DELTAS programme'. This idea was well-received and a grant of about \$8.3M was awarded to support training at both PhD and postdoctoral levels. As such, the proposed new courses will be effectively supported with adequate resources for teaching and research.

### **Course Structure**

The courses are designed in modules and will be taught by experts from BCMB, NMIMR and collaborating institutions. As such the courses will be delivered in an intensive 6-week format consisting of four hours of lectures and six hours of practical each week. Course delivery will include interactive learning and student presentations on seminal papers that have transformed our understanding of human genetics and disease.

### **BCMB 711 Molecular Mechanisms of Human Genetic Disease 3 credits**

This course will encompass classical and contemporary topics in molecular genetics and human genetic diseases. Students will acquire advanced knowledge on genetic and multiple epigenetic mechanisms in health and in disease. Principles of genetic medicine and the understanding of penetrance in developing genetic tests such as gene mapping and characterization of Mendelian disorders will be discussed. The course will also focus on specific mechanisms of mutagenesis, including chromosomal rearrangements and the associated phenotypes. Animal models of genetic diseases, and how they advanced understanding of the molecular pathology, pathophysiology and variable treatment outcomes of human diseases including cancer will be covered.

# WACCBIP Annual Report to Advisor Board – 2016 – Appendix I

## Reading list

1. Alekseyenko, A. A., Walsh, E. M., Wang, X., Grayson, A. R., Hsi, P. T., Kharchenko, P. V., . . . French, C. A. (2015). The oncogenic BRD4-NUT chromatin regulator drives aberrant transcription within large topological domains. *Genes Dev*, 29(14), 1507-1523. doi: 10.1101/gad.267583.115
2. James D. Watson, T. A. B., Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick. (2013). *Molecular Biology of the Gene*: Benjamin Cummings; 7<sup>th</sup> edition (March 2, 2013).
3. Knoppers, B. M., Zawati, M. H., & Senecal, K. (2015). Return of genetic testing results in the era of whole-genome sequencing. *Nat Rev Genet*, 16(9), 553-559. doi: 10.1038/nrg3960
4. Kornberg, R. D. (2007). The molecular basis of eukaryotic transcription. *Proc Natl Acad Sci U S A*, 104(32), 12955-12961. doi: 10.1073/pnas.0704138104
5. Smith-White, S. (1975). Symposium no. 13; Population genetics. Introduction by the chairman. *Genetics*, 79 Suppl, 85-90.
6. Weatherall, D. J. (2001). Phenotype-genotype relationships in monogenic disease: lessons from the thalassaemias. *Nat Rev Genet*, 2(4), 245-255. doi: 10.1038/35066048
7. Wittrup, A., & Lieberman, J. (2015). Knocking down disease: a progress report on siRNA therapeutics. *Nat Rev Genet*, 16(9), 543-552. doi: 10.1038/nrg3978

## BCMB 712 Population genetics and genetic epidemiology 3 Credits

This course focuses on tools for genetic dissection of complex human diseases with emphasis on deciphering the molecular mechanisms underlying communicable and non-communicable diseases. Techniques for gene identification and risk estimation will be demonstrated, together with conventional epidemiologic study designs. Study designs and statistical approaches used in genetic epidemiology will be discussed. Including assessment of heritability, segregation analysis, population genetics, linkage analysis and association analysis of genetic polymorphisms, the interaction of genes and the environment. And also the applications of genetic approaches for improving diagnosis, management and prevention of diseases such as malaria, tuberculosis, sickle cell disease, diabetes and cancer.

## Reading list

1. Hartl DL, C. A. *Principles of population genetics* (4<sup>th</sup> Edition ed.) (2007): Sinauer Associates.
2. Mark A. Jobling, M. H., Chris Tyler-Smith. (2003). *Human Evolutionary Genetics: Origins, Peoples and Disease 1<sup>st</sup> Edition*: Garland Science; 1 edition (December 9, 2003).
3. Palmer LJ, B. P., Smith GD, (Edited by ). (2011). 1. *An Introduction to Genetic Epidemiology (2011)*: Policy Press, University of Bristol.
4. Rasmus N, M. S. (2013). *An introduction to population genetics: Theory and applications*: Sinauer Associates, Inc.; 1<sup>st</sup> edition (March 1, 2013).
5. Tom Strachan, A. R. (2010). *Human Molecular Genetics* Garland Science; 4<sup>th</sup> edition (22 April 2010).

## WACCBIP Annual Report to Advisor Board – 2016 – Appendix I

- Ziegler A, K. I., Pahlke F. (2010). *A Statistical Approach to Genetic Epidemiology: Concepts and Applications*: Wiley VCH; 2<sup>nd</sup> Edition edition (24 Mar. 2010).

### Teaching faculty

Dr. Gordon Awandare (BCMB) (full time)

Dr. Anita Ghansah (NMIMR) (full time)

Prof. Dorothy Yeboah-Manu (NMIMR) (full time)

Dr. Olayemi Edeghonghon – Department of Hematology, SMD, UG (full time)

Dr. Lucas Amenga-Etego – Navrongo Health Research Centre, Navrongo (part time)

Dr. Mohammed Mutocheluh, Department of Microbiology, SMS, KNUST (part time)

Prof. Ambroise Wonkam, Faculty of Human Genetics, University of Cape Town, (part time)

Prof. Mahamadou Diakite – Malaria Research and Training Centre, Mali (part time)

Prof. Solomon Ofori-Acquah, University of Pittsburgh, Pennsylvania, USA (part time)

# WACCBIP Annual Report to Advisor Board – 2016 – Appendix I

## REVISED PhD BIOCHEMISTRY PROGRAMME STRUCTURE

### YEAR 1

#### SEMESTER 1

##### **CORE**

##### **CREDITS**

FASC 701	Science and Society	3
BCMB 630	Research Methodology & Scientific Communication	3
BCMB 701	Advance Topics in Bioinformatics	3

##### **Electives**

*BCMB 711	<i>Molecular mechanisms of human genetic diseases</i>	3
FASC 700	Special Topics in Science	3
FASC 710	Teaching Science at Tertiary Level	3

**Total** **18**

#### SEMESTER 2

##### **CORE**

##### **CREDITS**

FASC 702	Advanced Quantitative Research Methods	3
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##### **Candidates should select at least 3 credits based on your proposed thesis area**

BCMB 702	Advances in Biochemical Pharmacology and Toxicology	3
BCMB 704	Advances in Molecular Biology and Applications	3
BCMB 706	Advances in Natural Product Research	3
BCMB 708	Advances in Biomedical and Infectious Diseases Research	3
*BCMB 712	<i>Population genetics and genetic epidemiology</i>	3

**Total** **18**

### YEAR 2

BCMB 710	Seminar I	3
BCMB 720	Seminar II	3
BCMB 700	Thesis	

### YEAR 3 & 4

BCMB 730	Seminar III	3
BCMB 740	Seminar IV	3
BCMB700	Thesis	45

## WACCBIP Annual Report to Advisory Board – 2016 – Appendix II

### Updated status of MPhil Cohort I students

Surname	Other Names	Index No.	Source of Scholarship Funds
Onwona	Christiana Ofori	10507542	Thesis Defence Done: Submission July 2016
Myers-Hansen	James L.	10513076	Thesis Defence Done: Submission July 2016
Bakari	Soale Majeed	10277352	Thesis Defence Done: Submission July 2016
Abass	Adiza	10308032	Thesis Defence Done: Submission July 2016
Deletsu	Selase	10573087	Thesis Defence Done: Submission July 2016
Cramer	Precious	10301390	Thesis Defence Done: Submission July 2016
Amekudzi	Deladem K.	10311264	Thesis Defence Oct. 2016: Submission Nov. 2016
Osei-Wusu	Stephen	10252660	Thesis Defence Done: Submission July 2016
Abana	David	10513090	Thesis Defence Done: Submission July 2016
Addo	Samuel Ofori	10507562	Thesis Defence Done: Submission July 2016
King	Sandra Adelaide	10507709	Thesis Defence Done: Submission July 2016
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Seidu	Zakaria	10513069	Thesis Defence Done: Submission July 2016
Manu	Emmanuel Ayisi	10312449	Thesis Defence Done: Submission July 2016
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Ademolue	Temitope	10512725	Thesis Defence Done: Submission July 2016
Atindaana	Edmund	10513084	Thesis Defence Done: Submission July 2016
Letsa	Victor	10281491	Thesis Defence Oct. 2016: Submission Nov. 2016

## WACCBIP Annual Report to Advisory Board – 2016 – Appendix III

### Thesis research areas and supervisors for MCBI Masters Cohort I students

Name of Candidate (SID Number)	Degree Sought	Date of First Registration	Date of Passing Written Examination	Thesis area	Internal Supervisor(s)	External Supervisor(s)
Amekudzi Deladem Kofi (10311264)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Molecular Characterization of Rotaviruses from a Sub-urban Community in the Central Region of Ghana	Dr. Osbourne Quaye* (DBCMB, UG) Dr. Winfred-Peck Dorleku (DBCMB, UG)	
Deletsu Selase Dennis (10513087)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	HIV Subtype and Drug Resistance	Dr. Evelyn Yayra Bonney* (NMIMR, UG) Dr. Osbourne Quaye (DBCMB, UG)	
Stephen Osei-Wusu (10252660)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Resistance of clinical tuberculosis isolates to second-line anti-tuberculosis drugs	Prof. Dorothy Yeboah-Manu* (NMIMR, UG) Dr. Adwoa Asante-Poku Wiredu (NMIMR, UG)	
Seidu Zakaria (10513069)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Malaria Immunology and transmission studies	Dr. Michael F. Ofori* (NMIMR, UG) Dr. Nicaise Ndam (NMIMR, UG)	
Sandra Adelaide King (10507709)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Malaria vector control, insecticide resistance studies	Dr. Dziejdom De Souza* (NMIMR, UG) Dr. Theresa Manful Gwira (DBCMB, UG)	
Cramer Precious (10301390)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Association of adenovirus with Acute Gastroenteritis	Dr. Osbourne Quaye* (DBCMB, UG) Harry Asmah (CHS,UG)	
Patrick Tshibangu (10512723)	MPhil Molecular Cell Biology Of	August, 2014	August, 2015	<i>Plasmodium falciparum</i> drug resistance genes and population genetics	Dr. Anita Ghansah* (NMIMR, UG)	

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	Infectious Diseases				Dr. Gordon Awandare (DBCMB, UG)	
Emmanuel Manu Ayisi (10312449)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Production Of Parasite-Specific Monoclonal Antibodies From Immortalized B Cells From <i>Plasmodium falciparum</i> -Exposed Individuals	Dr. Kwadwo Asamoah Kusi* (NMIMR, UG) Dr. Theresa Manful Gwira (DBCMB, UG)	
Edmond Atindaana (10513084)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	High-throughput analysis of HIV-1 zipcoded proviruses	Dr. Gordon Awandare* (DBCMB, UG)	Prof. Alice Telesnitsky (University of Michigan, USA)
Daniel Addo-Gyan (10508246)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Mechanisms of Transmission of <i>Plasmodium falciparum</i> Malaria	Prof. Michael. D. Wilson* (NMIMR, UG) Dr. Michael. F. Ofori (NMIMR, UG)	
Christiana Ofori Onwona (10507542)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	<i>Plasmodium falciparum</i> drug resistant alleles and clonal diversity in asymptomatic carriers in Northern Ghana	Dr. Anita Ghansah* (NMIMR, UG) Dr. Gordon Awandare (DBCMB, UG)	
Chirawurah Jersley (10278348)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Mechanism of invasion of erythrocytes by malaria parasites	Dr. Gordon Awandare* (DBCMB,UG) Rev. Dr. W. S. K. Gbewonyo (DBCMB, UG)	
Adiza Abass (10308032)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Efficacy of kombucha and <i>Mycobacterium ulcerans</i> research	Dr. Lydia Mosi* (DBCMB, UG) Rev. Dr. W. S. K. Gbewonyo (DBCMB, UG)	
Abana David (10513090)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Investigation Of Environmental Reservoirs Of <i>V. cholerae</i> In Accra And Determination Of Clonal Relation Between Clinical And Environmental Isolates.	Dr. Lydia Mosi* (DBCMB, UG) Dr. Theresa Manful Gwira (DBCMB, UG)	
Samuel Ofori Addo (10507562)	MPhil Molecular Cell Biology Of	August, 2014	August, 2015	Species diversity and drug resistance patterns of tuberculosis and non-tuberculous mycobacteria	Prof. Kwasi Addo* (NMIMR, UG)	



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	Infectious Diseases				Dr. Lydia Mosi (DBCMB, UG)	
Bakari Soale Majeed (10277352)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Molecular biology, pathology and immunology of african animal trypanosomiasis.	Dr. Theresa Manful Gwira* (DBCMB, UG) Dr. Asamoah K. Kusi (NMIMR, UG)	
Joshua Kuleape (10296210)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Molecular analysis of association between Glutathione S Transferase polymorphism and oxidative stress in HIV patients	Dr. Osbourne Quaye* (DBCMB, UG) Dr. Evelyn Yayra Bonney (NMIMR, UG)	
James Leslie Myers-Hansen (10513076)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Impact of vector control interventions on the population structure of <i>P. falciparum</i> in Ghana	Dr. Anita Ghansah* (NMIMR, UG) Dr. Gordon Awandare (DBCMB, UG)	
Victor Letsa (10281491)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Gastro-Viral Agents	Dr. Osbourne* Quaye (DBCMB, UG) Prof George Armah (NMIMR, UG)	
Temitope Wilson Ademolue (10512725)	MPhil Molecular Cell Biology Of Infectious Diseases	August, 2014	August, 2015	Investigation of how the Sickle Cell trait condition protects against severe forms of Malaria disease	Dr. Gordon Awandare* (DBCMB, UG)	Dr. Olukemi. K. Amodu (University College Hospital Ibadan, Nigeria)

### Thesis research areas and supervisors for MCBI PhD Cohort I students

Name of Candidate (SID Number)	Degree Sought	Date of First Registration	Date of Passing Written Examination	Thesis area	Internal Supervisor(s)	External Supervisor(s)
Dorotheah Obiri (10358024)	PhD Molecular Cell Biology of Infectious Diseases	August, 2014	August, 2015	Immunology and Pathogenesis of Pregnancy Associated Malaria	Prof. Ben Gyan* (NMIMR, UG) Dr. Kwadwo Asamoah Kusi (NMIMR, UG) Dr. Michael Fokuo Ofori (NMIMR, UG)	

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					Dr. Theresa Manful Gwira (DBCMB, UG)	
Ethel Juliet Blessie (10221445)	PhD Molecular Cell Biology of Infectious Diseases	September, 2014	August, 2015	Anti- Fungal Drug Discovery and Development	Dr. Bernard Amegadzie* (DBCMB, UG) Dr. Patrick Kobina Arthur (DBCMB, UG) Dr. Dorcas Osei-Safo (Dept of Chemistry, UG)	
Nicholas Amoako (10513065)	PhD Molecular Cell Biology of Infectious Diseases	September, 2014	August, 2015	Characterization of etiology of febrile illnesses in Ghana	Dr. Gordon Awandare* (DBCMB, UG)	Dr. Kwaku Poku Asante (KHRC) Prof. Justin Stoler (University of Miami, USA)
Ahmed Rufai Abdulrahman (10508317)	PhD Molecular Cell Biology of Infectious Diseases	August, 2014	August, 2015		Dr. Jonathan Adjimani* (DBCMB, UG) Dr. Kwadwo Asamoah Kusi (NMIMR, UG) Dr. Michael Fokuo Ofori (NMIMR, UG)	
Reuben Ayivor-Djanie (10513071)	PhD Molecular Cell Biology of Infectious Diseases	August, 2014	August, 2015	Regulation of Acitvation Induced Cytidine Deaminase (AID) in response to <i>P. falciparum</i> infection.	Dr. Gordon Awandare* (DBCMB, UG) Dr. Kwadwo Asamoah Kusi (NMIMR, UG) Dr. Bernard Amegadzie (DBCMB, UG)	
Augustina Frimpong 10357518	PhD Molecular Cell Biology of Infectious Diseases	September, 2014	August, 2015	Computational Malaria Immunology	Dr. Michael Fokuo Ofori* (NMIMR, UG) Dr. Kwadwo Asamoah Kusi (NMIMR, UG)	Dr. Wilfred Ndifon (AIMS, SA)
Alabira Iddrisu Alhassan (10396531)	PhD Molecular Cell Biology of Infectious Diseases	August, 2014	August, 2015	Human papillomaviruses and the oncoproteins as potential biomarkers for diagnosis and prognosis of cervical cancer.	Prof. L.K.N. Okine* (DBCMB, UG) Dr. Osbourne Quaye (DBCMB, UG) Dr. Lydia Mosi (DBCMB, UG)	
Aboagye Kwarteng Dofuor (10507987)	PhD Molecular Cell Biology of Infectious Diseases	August, 2014	August, 2015	Regulation of gene expression in <i>Trypanosoma brucei</i>	Prof. L.K.N. Okine* (DBCMB, UG) Dr. Theresa Manful Gwira (DBCMB, UG)	Dr. Sam Alsford (LSHTM, UK)

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Sena Adzoa Matrevi (10215186)	PhD Molecular Cell Biology of Infectious Diseases	August, 2014	August ,2015	Antimalarial Drug Resistance	Dr. Nancy O Quashie* (NMIMR, UG) Dr. Neils B Quashie (NMIMR, UG) Dr. Gordon A Awandare (DBCMB, UG)	
William van der Puije (10010232)	PhD Molecular Cell Biology of Infectious Diseases	August, 2014	August, 2015	<i>Plasmodium falciparum</i> parasite molecules involved in severe malarial anemia	Dr. Gordon Awandare* (DBCMB, UG) Dr. Michael F. Ofori (NMIMR, UG)	Prof. Jørgen Kurtzals (University of Copenhagen)
Emmanuel Ayitey Tagee (10042507)	PhD Molecular Cell Biology of Infectious Diseases	March, 2015	August, 2015	<i>Helicobacter pylori</i> infection and manipulation of host system to induce gastric cancer	Dr. Charles A. Brown* (UG) Dr. Gordon Awandare (DBCMB, UG)	Dr. Mahasin Osman (Brown University, USA)
Stephen Laryea Quaye (10513066)	PhD Molecular Cell Biology of Infectious Diseases	August 2014	August, 2015	Study of the Antiplasmodial activity of the leaves and stem bark of <i>Polyalthia longifoli</i>	Prof. L.K.N. Okine * (DBCMB, UG) Dr. Dorcas Sarfo (NMIMR, UG) Dr. Michael Ofori (NMIMR, UG) Dr. Linda Amoah (NMIMR, UG)	
Henrietta E. Mensah- Brown (10363148)	PhD Molecular Cell Biology of Infectious Diseases	September, 2014	August, 2015	Targets and patterns of erythrocyte invasion inhibitory antibody responses in malaria	Dr. Gordon Awandare* (DBCMB, UG) Dr. Ben Gyan (NMIMR, UG)	Prof. David Conway (LSHTM, UK)

\*Principal Supervisor

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### Updated status of MCBI PhD Cohort I students

Surname	Other Names	Index No.	Progress of PhD Research Work
Blessie	Ethel Juliet	10221445	Proposal defence complete: with 20 % research results obtained
Tagoe	Emmanuel A.	10042507	Proposal defence complete: now under experiential learning
Quaye	Stephen Laryea	10513066	Proposal defence complete: now under experiential learning
Dofour	Aboagye Kwarteng	10307987	Proposal defence complete: with 15 % research results
Amoako	Nicholas	10513065	Proposal defence complete: now under experiential learning
<a href="#">Van Der Puije</a>	<a href="#">William</a>	<a href="#">10010232</a>	<a href="#">Proposal being modified</a>
Mensah-Brown	Herrietta E.	10363145	Proposal defence complete: experiential learning complete, with 25 % research results
Alhassan	Alabira Iddrisu	10396531	Proposal defence complete: with 5 % research results
Obiri	Dorotheah	10358024	Proposal defence complete: with 10 % research results
Matrevi	Sena	10215186	Proposal defence complete: with 20% research results
Frimpong	Augustina	10357518	Proposal defence complete: now under experiential learning
<a href="#">Abdul Rahman</a>	<a href="#">Ahmed Rufai</a>	<a href="#">10508317</a>	<a href="#">Changed supervisors, proposal being modified</a>
Ayivor-Djane	Reuben	10513071	Proposal defence complete: now under experiential learning