

Theme of School: IBRO-ARC/ISN School of Neuroscience on Neuroinflammation and Chronic Pain

Date: 20th March – 24th March 2019 (Wednesday to Sunday)

Venue: College of Medicine, University of Lagos Alumni Centre

Host/Convener : Dr O. O. Afolayan and Prof. B. V. Owoyele

Local Organizing Committee Members:

Dr. G. O. Afolayan

Dr. F. R. Aigbe

Dr. T. D. Popoola

Miss Tola Bada

Miss Zainab Sogbesan

Overview

Neuroinflammation is an important underlying pathophysiological occurrence in many neurological disorders. This IBRO School was designed to help young scientists/researchers gain proper understanding of the role of neuroinflammation in the pathophysiology of neurodegenerative diseases and chronic pain. The school comprised interactive lectures, in neuropharmacology, neuroanatomy and animal models of neuroinflammation and chronic pain. There were also hands-on practical sessions in neurobehavioral pain testing models, microscopy and immunohistochemistry. Chats and other interactive sessions aimed at further assisting the students to appreciate and achieve significant feats in this research areas were a major highlight of the School.

Participants

The school participants were selected by the School Organizing Committee. Twenty-eight students were selected from 99 applicants. Twenty-four students were selected from Nigeria, 2 from Cameroun, 1 from Ghana and 1 from Tanzania.

Name and Affiliation of Students

s/n	Surname	Name	Institute
1	Daodu	Serene	Ahmadu Bello University, Kaduna State
2	Pouadjeu manialeu	Judith	University of Dschang, Cameroon
3	Oyeleke	Esther Oluwadamilola	University of Lagos, Lagos State
4	Odubanjo	Oluwatoyin Veronica	Adekunle Ajasin University, Ondo State
5	Omorogbe	Osarume	University of Ibadan, Oyo State
6	Animashaun	Oyeronke	University of Lagos, Lagos State
7	Policy	Patricia	Ahmadu Bello University, Kaduna State
8	Henry	Rachael	Ahmadu Bello University, Kaduna State
9	Osei	Silas Acheampong	University of Cape Coast, Ghana
10	Bakare	Ahmed	University of Ilorin, Kwara State
11	Isa	Ahmed Sherif	Ahmadu Bello University, Kaduna State
12	Nduohosewo	Idongesit	University of Uyo, Akwa Ibom State
13	Adeniyi	Temidayo	Kwara State University, Kwara State
14	Lawal	Sodiq	St. Francis University College of Health and Applied Sciences, Tanzania
15	Odinukaeze	Francis Nkem	University of Uyo, Akwa Ibom State

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16	Tijani	Khadijat	University of Lagos, Lagos State
17	Ojo	Omotayo	University of Lagos, Lagos State
18	Salako	Olanrewaju	University of Lagos, Lagos State
19	Osundiya	Oladunni Caroline	University of Lagos, Lagos State
20	Akinshipo	Abdul-warith	University of Lagos, Lagos State
21	Eweka	Olutola	University of Lagos, Lagos State
22	Olasore	Stephen	University of Lagos, Lagos State
23	Muhammad	Nurudeen	Kwara State University, Kwara State
24	Ayanda	Oluwaseyi	Federal University of Technology, Akure Ondo State
25	Olaleye	Olubusayo	University of Lagos
26	Pieme	Constant Anatole	University of Yaounde, Cameroon

Names and Affiliations of School Faculty

S/N	Names	Address	Scientific interest	Email
1.	Dr. Anne Louise Oaklander (ALO)	Nerve Injury Institute, Department of Neurology, Massachusetts General Hospital and Harvard Medical School, Boston USA.	Peripheral nerve diseases, Sensory peripheral neuropathy, pediatric neuromuscular disorders.	aloaklander@mgh.harvard.edu
2	Prof. Sharon L. Juliano (SLJ)	Centre for Neuroscience & Regeneration, USUHS, Bethesda, MD, USA.	Neuroscience & Molecular Biology	sharon.juliano@usuhs.edu
3	Dr. Marie- Eve Tremblay (MET)*	Department of Molecular Medicine, Faculty of Medicine, University Laval, Quebec, Canada	Neuroimmunology, Microglia role in normal physiological condition and complex cognitive function	tremblay.marie- eve@crchudequebec.ulaval.ca
4	Dr. Max Klein (MKL)	Department of Neurology, Massachusetts General Hospital and Harvard Medical School, Boston USA.	Non-invasive brain stimulation diagnosis and instrumentation	mklein@mgh.harvard.edu
5	Prof. Njideka Okubadejo (NO)	Neurology Unit, Department of Medicine, College of Medicine, University of Lagos,	Movement disorders	njide_okubadejo@yahoo.com

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		Lagos, Nigeria.		
6	Prof. Bamidele Victor Owoyele (BVO)	Department of Physiology, College of Health Sciences, University of Ilorin, Kwara, Nigeria.	Neuroscience and Inflammation	deleyele@gmail.com
7	Prof. Abraham A.A. Osinubi (AAA)	Department of Anatomy, College of Medicine, University of Lagos, Lagos, Nigeria.	Anatomy and Stereology	aaosinubi@cmul.edu.ng
8	Dr. Ayodele A. Oremosu (AAO)	Department of Anatomy, College of Medicine, University of Lagos, Lagos, Nigeria.	Neuroanatomy	aaoremosu@cmul.edu.ng
9	Dr. A.J. Akindele (AJA)	Department of Pharmacology, Therapeutics and Toxicology, College of Medicine, University of Lagos, Lagos, Nigeria.	Neuropharmacology	ajakindele@cmul.edu.ng
10	Dr. I.O. Ishola (IO)	Department of Pharmacology, Therapeutics and Toxicology, College of Medicine, University of Lagos, Lagos, Nigeria.	Neuropharmacology	oishola@cmul.edu.ng
11	Dr. Olasunmbo Afolayan (OA)	Department of Anatomy, College of Medicine, University of Lagos, Lagos, Nigeria.	Neurobiology and Neurochemistry of Psychiatric disorders	o.afolayan@unilag.edu.ng

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		Nigeria.		
12	Dr. Tunde James (TJ)	Department of Biochemistry, Nigerian Institute of Medical Research, Yaba, Lagos, Nigeria.	Molecular Biosignaling	ajames@unilag.edu.ng
13	Dr. O.R. Folarin (ORF)	Neuroscience Unit, Veterinary Anatomy, University of Ibadan, Nigeria.	Immunohistochemistry	oluwabusayorachael@gmail.com

*** Dr. Marie- Eve Tremblay (MET) was not able to attend. However, she sent a representative in the person of Fernado Ibianez Gonzalez who is a 3rd year Ph.D. Student in her Laboratory.**

School time table

Time	Wednesday 20 th	Thursday 21 st	Friday 22 nd	Saturday 23 rd	Sunday 24 th
6:00-7:30		Breakfast	Breakfast	Breakfast	Breakfast
7:45-8:00			Recap of Previous Days (OA)	Recap of Previous Days (OA)	
8:00-8:40		Blood Brain Barrier, Neurons And Immune Cells of the CNS, Neuronal Injury (AAA)	Spectrum of Inflammatory Neuropathies (NO)	The Brain's Adaptive Immunity and Microglial Cell Activation Pattern: Considering the Properties and The Dynamics of Microglia, Monocytes and Macrophages in	Departure

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				Neurodegenerative Diseases. (MET)	
8:40-9:20		Microglia And Astrocyte Biology: From Neurogenesis to Neurodegeneration (OA)	Neuroinflammatory Pathways, Glial Cell Activation and Dendritic Morphology in Neurodegenerative Diseases (IO)	Introduction to Neuroethics and Responsible Conduct of Research - (SLJ)	
9:20-10:00		Neuroinflammation: In CNS and PNS (AAO)	Neuroscience and Science Communication (AJA)	History and Important Principles for Modern Neuroethics (SLJ)	
10:00-10:30		Q/A	Opening Ceremony	Q/A	
10:30-11:00		Tea Break	Opening Ceremony	Tea Break	
11:00-11:40		Factors Regulating Neuroinflammation: Cellular and Molecular Mechanisms (MET)	Peripheral and Central Mechanisms of Pain Transmission (BVO)	Neuroethics Case/Theme-Based Journal Club and Open Discussion - (SLJ)	
11:40-12:20	Arrival	Effective Oral Presentation (AJA)	Small-fiber Neuropathy: A Role for Autoreactive B Cells (ALO)		
12:20-13:00		Q/A	Non-Invasive Brain Stimulation for the Treatment of Pain I (MKL)	Students Presentation	
13:00-13:30		Lunch	Q/A		
13:30-14:30	And		Lunch	Lunch	
14:30-15:10		Animal Model of	Non-Invasive Brain Stimulation for	Sightseeing/Social Night/Dinner	

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15:10-15:50		Neuroinflammation	the Treatment of Pain II		
15:50-16:20	Registration	Immunohistochemistry	(Demonstration) (MKL/ALO)		
16:20-17:00		(OA/MET/ORF)	Animal Models of Chronic Pain.		
17:00-17:30			(BVO/OA)		
17:30-18:10					
18:10-18:50		Break	Break		
18:50-19:20	Pursuing A Career in Neuroscience: Steps Needed and the Benefits (IO)	PCR in Neuroscience Research: <i>In-Silico</i> Demonstration (AJ)	Meeting With Mentors		
19:20-20:00		Q/A	Q/A		
20:00		Dinner	Dinner	Dinner	

Accommodation and Transportation

The students and Faculty were accommodated at the GEI8 hotel located at no. 34, Fasoro Street, Idi-Oro, Lagos, about 1.8 km from the Alumni Centre of the College of Medicine, University of Lagos (Venue of the IBRO School). Vehicles were available to convey the students and Faculty between the hotel and the workshop venue. The practical sessions were held in laboratories within short walking distances from the Alumni Centre.

Short Descriptions of Practical Sessions

Animal Model of Neuroinflammation with Immunohistochemistry: This featured demonstration of ethical procedures for euthanasia and perfusion in rats and immunohistochemistry of proteins relevant to neuroinflammation. Students were exposed to appropriate methodologies as well as the rationale for the various steps in the procedures.

Microscopy: Students were exposed to relevant microscopy methods, including slide mounting, coarse and fine adjustments, and viewing for proper microscopic evaluations.

Animal Models of Chronic Pain: Demonstration of acetic acid-induced mouse writhing, hot plate-, and von Frey filaments- induced behavioural pain models were carried out.

Non-invasive Brain Stimulation for the Treatment of Pain II (Demonstration): Hands-on demonstration of non-invasive stimulation of the human brain for treatment of central nervous system disorders was carried out.

Short Descriptions of Lectures

Day 1- 20th March 2019 -

Arrival

Students and Faculty of the School arrived from their various destinations. They were warmly received and accommodated at GEI8 hotel, Idi-Oro, Lagos.

Welcome Chat on Pursuing a Career in Neuroscience: Steps Needed and the Benefits

Opening Session, which began at 6:00 pm started with a welcome charge by the Host Dr. O.O. Afolayan where she welcomed everyone to the school and stated the purpose of the school. After this, the evening continued with a series of short talks delivered by members of Faculty. These talks began with a chat by Dr. I.O. Ishola, who encouraged the students on the benefits of focusing their research and learning on Neuroscience, highlighting the vast opportunities in the field. He also shared some of his personal experience on the bench and beyond.

Dr. I.O. Ishola's talk was closely followed with a chat by Dr. O.R. Folarin who also shared from her own personal experience and the benefits of research in the field of neuroscience.

Likewise, Fernando Ibanez Gonzalez shared his own experience as an international student with the participants.

This session ended with a closing remark by Dr. O.O. Afolayan.

DAY 2 - 21st March 2019

Lecture on Blood Brain Barrier, Neurons and Immune Cells of the CNS, Neuronal Injury

Prof. Abraham A.A. Osinubi described the structure and protective function of the blood brain barrier; how it regulates passage of substances into the brain. He also highlighted relevant aspects of the structure and

functions of neurons and CNS immune cells in the absence and presence of inflammation-inducing noxious stimuli. He gave an overview of characteristic features of neuronal injury and how they may be properly identified.

Lecture on Microglia and Astrocyte Biology: From Neurogenesis to Neurodegeneration

Dr. Olasunmbo Afolayan highlighted the structure and function of the important immune neuroglia cells, microglia and astrocytes. She discussed the significance of understanding that activated microglia and astrocytes are present in nearly all neurodegenerative diseases including Alzheimer's and Parkinson's diseases. She also discussed their role in neurogenesis, neuroinflammation and neurodegenerative disorders, stressing that brain macrophages, and microglia markers can be employed as useful indicators of neuroinflammation. The efficacy of potential novel agents for managing neurodegenerative disorders may be thus monitored by proper sampling and assaying for these markers in rodents treated with such agents.

Lecture on Neuroinflammation: In CNS and PNS

Lecture on neuroinflammation in the central nervous system (CNS) and in the peripheral nervous system (PNS) by Dr. Ayodele Oremosu exposed participants to the meaning of neuroinflammation as a cascade of responses of the CNS to disturbances to homeostasis. He also highlighted the stages involved in neuroinflammation both in the CNS and in the PNS.

Lecture on Factors Regulating Neuroinflammation: Cellular and Molecular Mechanisms

Dr. Marie- Eve Tremblay (represented by Fernando Ibanez Gonzalez) described cellular and molecular mechanisms that characterize neuroinflammatory processes and conditions. He described how CNS disorders such as traumatic brain injury, ischemic stroke, brain tumor, and neurodegenerative diseases trigger a cascade of events broadly defined as neuroinflammation characterized by the activation of the microglia and astrocyte, T lymphocyte infiltration, and overproduction of inflammatory cytokines. He also discussed how the innate immune system might activate endothelial cells of the blood-brain barrier, which

would result in unregulated neuroinflammatory processes. The role of BBB as well as damaged associated-molecular pattern (DAMPs) and coagulation factors in the onset and progression of neurodegenerative disorders were also highlighted.

Lecture on Effective Oral Presentation

Lecture on effective oral presentation by Dr. Abidemi Akindele exposed participants to the “dos and don’ts” of different types of talks and styles of oral presentation. He also shared tips for gaining and maintaining audience attention from start to finish.

Lecture on PCR in Neuroscience Research: In-Silico Demonstration

Lecture on PCR by Dr. James Ayorinde in neuroscience research opened the eyes of the participants to the application of PCR in neuroscience research. He explained the components of a master mix i.e. DNA bases, forward and reverse primers etc. necessary for the reaction to occur. He also demonstrated the procedure of PCR using In-silico model.

DAY 3 - 22nd March 2019

Opening Ceremony

Attendance from the University Community

The Opening ceremony which began at about 11:00 am was graced by the presence of the following eminent members of the College of Medicine, University of Lagos.

Prof. F.E.A. Lesi- Provost, College of Medicine, University of Lagos

Prof. O.A Magbagbeola, Dean, Faculty of Basic Medical Sciences

Prof. O.O. Adeyemi, Former Dean, Faculty of Basic Medical Sciences

Welcome Address

Following their invitation to the high table, the ceremony was declared open by the Provost, Prof F.E.A. Lesi who gave an address. In his opening address he welcomed the students and Faculty of the School, commended the programme's conveners, Dr O. O. Afolayan and Prof. B. V. Owoyele as well as the entire members of the organizing committee. He also encouraged the students to make the most of the opportunities offered by the School and wished them a pleasant stay in the College of Medicine of the University of Lagos.

Prof. O.A. Magbagbeola, the Dean of the Faculty of Basic Medical Sciences also gave a brief address, in which she welcomed the participants and Faculty encouraging the students to optimize their time in the College of Medicine of the University of Lagos.

One of the conveners, Dr O.O. Afolayan delivered a briefing on the purpose of the School, the various components of the programme planned by the School and all that the conveners and organizers hoped to achieve by putting the workshop together. The ceremony ended at 12 noon.

Lecture on Spectrum of Inflammatory Neuropathies

The first lecture for the day was on spectrum of inflammatory neuropathies by Prof. Njideka Okubadejo defined inflammatory neuropathy as an autoimmune disorder affecting the peripheral nervous system. She also talked about the subtypes treatment and research gaps of inflammatory neuropathy.

Lecture on Neuroinflammatory Pathways, Glial Cell Activation and Dendritic Morphology in Neurodegenerative Diseases

Dr. Ismail Ishola's lecture on Neuroinflammatory pathways, glial cell activation and dendritic morphology in neurodegenerative diseases revealed to participants the role of microglia and astrocytes to the process of neuroinflammation and the characteristic morphological changes that occur in neurodegenerative diseases

Lecture on Neuroscience and Science Communication

Dr Abidemi Akindele's lecture on neuroscience and science communication emphasized the need for participants to disseminate research findings to the general public on neuroscience in such a manner that a lay-man can understand. He also stressed that the impact of our research must be felt by the community around us and the world at large.

Lecture on Peripheral and Central Mechanisms of Pain Transmission

Lecture delivered by Prof. Victor Owoyele on peripheral and central mechanisms of pain transmission described to participants the overview of the nervous system and pain. He also explained the peripheral process in the generation of pain, pain transmission and the processes involved in spinal and supraspinal mechanisms.

Lecture on Small-fiber Neuropathy: A Role for Autoreactive B Cells

Dr. Anne Louise Oaklander discussed small fiber neuropathy, a condition characterized by severe pain attacks that typically begin in the feet or hands and eventually affect other regions with age. She described studies aimed at better understanding the disease process particularly those that demonstrate the role of autoreactive B cells, which may be activated or decreased by toll like receptor signaling pathways. She

described various hospital cases of this form of neuropathy stressing that it is actually more common than earlier thought. She encouraged clinicians among the students to be more observant as to identify and report such cases in their respective African countries since data from this part of the world is lacking.

Lecture on Non-Invasive Brain Stimulation for the Treatment of Pain

Lecture on non-invasive brain stimulation for the treatment of pain by Dr. Max Klein exposed participants to methods of stimulating the brain such as transcranial magnetic stimulation (TMS). He pointed out the pros and cons of various methods especially the high cost of obtaining and operating some of the gadgets.

DAY 4 – 23rd March 2019

Lecture on The Brain's Adaptive Immunity and Microglial Cell Activation Pattern

Dr. Marie- Eve Tremblay described the adaptive immunity of the brain, highlighting microglial cell activation pattern and how they might be identified. She considered the properties and the dynamics of microglia, monocytes and macrophages in neurodegenerative diseases delving into significant details on how appropriate understanding of these aspects would largely impact neuroinflammatory research.

Lecture on Neuroethics and Responsible Conduct of Research

Prof. Sharon L. Juliano introduced participants to issues of neuroethics, the interdisciplinary research field that focuses on ethical issues raised by the increased and constantly improving appreciation of the brain as well as our ability to monitor and influence it. She also discussed ethical matters arising from the concomitant deepening of understanding regarding the biological bases of agency and ethical decision-in neurological research. She also explained responsible conduct of research, what entails how the students might ensure that they are engaged in the practice of responsible conduct of neurological research.

Lecture on History and Important Principles for Modern Neuroethics

In her second lecture, Prof. Sharon L. Juliano described the history and important principles that are the bases of modern neuroethics. She described the era when there was not much of ethics guiding neurological research and management of CNS disorders. She highlighted efforts that were made by various stakeholders including neuroscientists and ethicists, who held several meetings to deliberate and draw up guidelines and principles that should guide research and practice in the field of neuroscience.

Lecture on Neuroethics Case/Theme-Based Journal Club and Open Discussion

Prof. Sharon Juliano shared some selected cases in neuroethics and analyzed the unethical issues in those cases. She also advocated for establishment of journal clubs stating the immense benefits to improving knowledge and quality of research. She gave some time to entertain questions and further discussion.

Social Event/Tour

On the evening of the 23rd, we had a guided tour of the Lagos Island where both students and facilitators saw the aquatic splendor of the city of Lagos. We drove by the famous Lagos Atlantic city and had a stop at the renowned, multiple award winning Nike art gallery where everyone was amazed at the abundance of talent embedded therein. Moving from the gallery, we had an end of school dinner at the Cubana Fish and Grill on the Island. Facilitators and students were treated to a tip of nightlife in Lagos. They were entertained with both local and international music while enjoying the different delicacies the joint had to offer.

We all retired back to the hotel at about 11:00pm

DAY 5 – 24th March 2019

End of school and departure of students and Faculty members.

Students and Faculty were admonished by the organizers that they should please continue to interact with school's website (www.neurosciencecommons.com) as the lecture materials of all the facilitators would be made available as well as pictures and laboratory protocols from the school. Also, they could learn more about the sponsors (International Brain Research Organisation IBRO, International Society for Neurochemistry ISN, and The Company of Biologist) of the school by interacting with their websites.

The students elected Sodiq Lawal (Tanzania) and Veronica Odubanjo (Nigeria) as their Class President and Vice President respectively.

IBRO-ARC/ISN/ Company of Biologist 2019 Expenses

Activity	Total Income (\$)	Expenditure (\$) from Funding
	Company of Biologist: (£2000 = \$2423.2)	
Travel of One Facilitator from the United States		1,486.11
Travel of two (2) International Students		957.97
Total Expenditure from Company of Biologist Funds		2,444.08
	ISN: 4,720.00	
Accommodation-Faculty		2,500

Travel Expenses- International and Nigerian Students		1,763.53
Practical Session		472.22
Faculty Travels		1, 247.78
Total Expenditure from ISN Funds		5,983.53
	Other Sources of Income	
	IBRO: (€10,000 = \$11,102.30)	
Secretariat, printing, school Materials		1451.25
Accommodation of Students		2,711.11
Social Events		425
Venue Expenses		1,644.44
Feeding		2,859.72
Honorarium		1,000
Website Design, Hosting and Maintance		500
Internal transport/Security		333.34
Bank Charges		50
Global Pay Charges		19.07
Total Expenditure from IBRO Funds		10,874.86
	Total Income: (IBRO + ISN + Company of Biologist) = 18,245.50	
Total Expenditure of the School		19,420.54



Cross section of the participants of the IBRO-ARC/ISN School of Neuroscience on neuroinflammation and chronic pain, Unilag, Nigeria. From left –right, Dr. A.A.Oremosu, Prof. B.V. Owoyele, Dr. Olasunmbo Afolayan (standing behind Prof Owoyele), Dr. Max Klein, Provost of the College of Medicine of University of Lagos: Prof. F.E.A. Lesi, Dr Anne Oaklander, Dean Faculty of Basic Medical sciences: Prof. Olubunmi Magbagbeola, Fernando Gonzalez(representing Dr. Marie eve), Prof. O.O. Adeyemi.



Participants with the Secretary-General of SONA, Prof Amadi Ihunwo and the representative of IBRO Neuroethics Task force, Prof Sharon Juliano.

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Organizers' and Faculty's visit to the Provost of the College of Medicine, University of Lagos, Nigeria.



Opening ceremony of the IBRO-ARC/ISN Neuroscience school on Neuroinflammation and chronic pain at CMUL, Lagos, Nigeria. March 20th -24th, 2019.





Demonstration of non-invasive deep brain stimulation by Dr. Max Klein.



Practical session: Demonstration of inflammation and pain in mice.



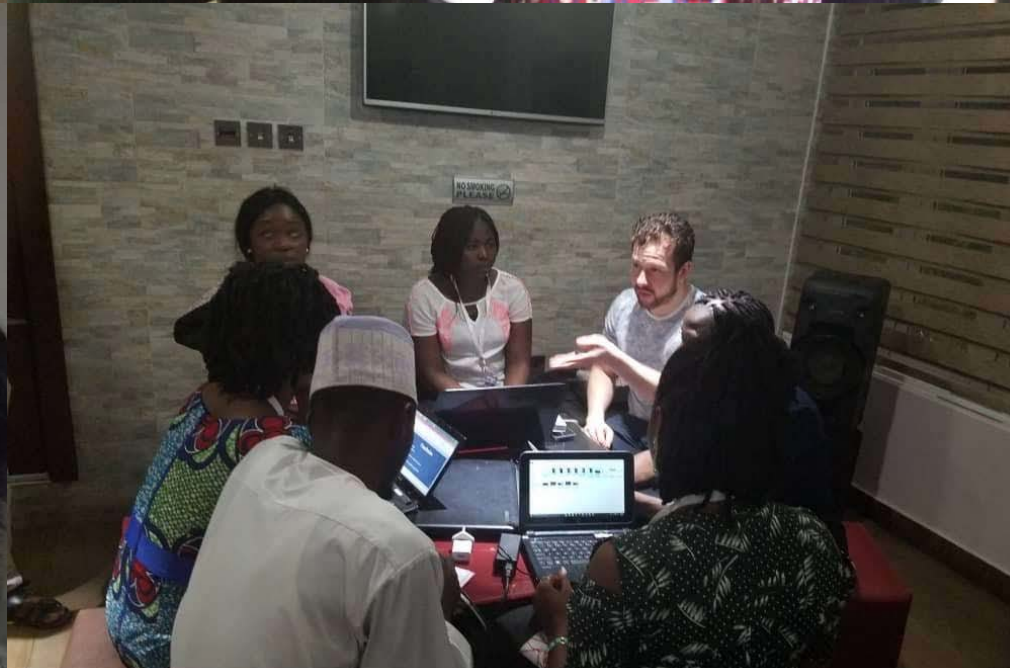
Organizers presenting the book donated by Dr. Anne-Louis Oaklander to Ahmed Issa of Ahmadu Bello University, Zaria, Nigeria for being the best during the students' presentations.



Participants' visit to the Nike Art Gallery, Lekki, Lagos



Participants' visit to the Nike Art Gallery, Lekki, Lagos



Mentoring Session

