ISN
International Society for Neurochemistry

Functional Foods and Nutraceuticals Unit

# ISN NEUROSCIENCE SCHOOL
## AKURE 2025

**THEME:**

**Building Research Capacity in the use of Alternative Experimental Models for Promoting the 3Rs in Neuroscience Research in Africa**

**VENUE:**

Federal University of Technology, Akure (FUTA), Nigeria

**DATE:**

Sunday 19th - Friday 24th, October 2025

**A**

**Report on**

**ISN Neuroscience School**

**Theme:** Building Research Capacity in the use of Alternative Experimental Models for Promoting the 3Rs in Neuroscience Research in Africa.

**Venue:** The Federal University of Technology Akure, Nigeria

**Date:** Sunday 19th to Friday 24th October 2025

**Hosts:**

**Name(s):** Dr. Opeyemi Babatunde Ogunsuyi

**Address(s):** Drosophila Research Lab, Functional Foods and Nutraceuticals Unit, The Federal University of Technology Akure, Nigeria

Department of Medical Biochemistry, School of Basic Medical Sciences, The Federal University of Technology Akure, Nigeria

**Tel No(s):** +234(0)8067619381

**Fax No(s):**

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**Name(s):** Dr Idowu Sunday Oyeleye

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**OUTLINE**

## 1.0 Introduction

The International Society for Neurochemistry (ISN) Neuroscience School, Akure 2025, was held from October 19 to 24, 2025, at the Centre for Entrepreneurship, Federal University of Technology, Akure (FUTA), Nigeria. The program, themed *"Building Research Capacity in the Use of Alternative Experimental Models for Promoting the 3Rs in Neuroscience Research in Africa,"* was designed to strengthen neuroscience education across the Africa continent especially as it relates to the use of alternative research models. The main objective of this school was to engage twenty-five (25) postgraduate students from Africa in up-to-date theoretical knowledge and practical skills in the use of alternative research models in neurochemistry research to promote the acceptability and integration of the principles of the 3Rs in neuroscience research in Africa. The school also evaluated the state of translations of these neuroscience research models for human use, provide adequate knowledge and skills for the scientific suitability of these alternative models, and provide formidable and strategic collaborations for prospects that will explore novel techniques and challenges aimed at improving neuroscience research and outcome in Africa.

## 1.1 Objectives of the School

The objectives of the ISN Neuroscience School, Akure 2025, were to:

1. Build research capacity among young and upcoming African scientist in neurochemistry.
2. Promote the principles of the **3Rs (Replacement, Reduction, and Refinement)** in neuroscience research.
3. Encourage the adoption and use of alternative experimental models such as fruit flies (*Drosophila melanogaster)*, roundworm (*Caenorhabditis elegans)*, lobster cockroaches (*Nauphoeta cinerea*) and cultured cell lines in Africa.
4. Provide practical exposure to modern research techniques in neurochemistry and neurotoxicology, particularly using the alternative experimental models, and,
5. Foster translational research, collaboration, mentorship, and innovation among neuroscientists in Africa.

## 2.0 Overview of Activities

Below was the schedule of activities (Table 1.0)

**Day 1: Sunday 19/10/2025**

Arrival, Registration and Welcome by LOC

**Day 2: Monday 20/10/2025**

| **Time** | **Activity** |
|---|---|
| | **Opening Ceremony** |
| 09:00 – 09:10 | Introduction of Guests |

| | | |
|---|---|---|
| 09:10 – 09:20 | Host Welcome Address | |
| 09:20 – 09:30 | Chief Host Speech<br><br>**Prof. A.T. Oladiji**<br>(Vice-Chancellor, The Federal University of Technology Akure, Nigeria) | |
| 09:30 – 10:15 | **Keynote Lecture:** Promoting 3Rs in Neurochemistry Research in Sub-Saharan Africa through Alternative Models: Past, Present and Future<br><br>**Prof. A. O. Abolaji**<br>Deputy Provost<br>College of Postgraduate Studies<br>University of Ibadan, Nigeria<br><br>Represented by:<br>**Prof. A. Adedeji**<br>Department of Pharmacology and Toxicology<br>University of Rwanda, Rwanda | |
| 10:15 – 10:20 | **Vote of thanks** | |
| 10:20 – 10:30 | **Group Photograph** | |
| | **Lectures and Practical** | |
| 10:30 – 11:20 | Lecture 1 | The Isolation of Erythrocytes as Early Step Model to Study the Neurotoxicity of Chemicals.<br><br>**Prof. J. B. T. Rocha**<br>Biochemical Toxicoloy Lab<br>Department of Biochemistry and Molecular Biology<br>Universidade Federal de Santa Maria, Brazil |
| 11:20 – 11:30 | **Tea Break** | |
| 11:30 – 12:00 | **ISN Educational Talk 1:** History of ISN, Mission & Vision, Membership | |

| | | |
|---|---|---|
| | **Prof. J. O. Olopade**<br>Department of Veterinary Anatomy<br>University of Ibadan, Nigeria | |
| 12:00 – 12:50 | Lecture 2 | Fruit fly (Drosophila melanogaster) as a veritable tool for Neuroscience Research: from bench to bedside and back<br><br>**Prof. A. Adedeji**<br>Department of Pharmacology and Toxicology<br>University of Rwanda, Rwanda |
| 12:50 – 13:30 | Lunch | |
| 13:30 – 18:00 | Practical Sessions 1-4 | |
| 18:00 – 19:00 | Dinner | |
| 19 :00-20 :00 | ISN School Alumni Meet and Greet/Networking<br><br>**Dr. O. M. Okeowo**<br>Department of Physiology<br>School of Basic Medical Sciences, Federal University of Technology Akure, Nigeria | |

**Day 3: Tuesday 21/10/2025**

| **Time** | **Activity** | |
|---|---|---|
| 09:00 – 09:50 | Lecture 3 | Selenoproteins in the Brain<br><br>**Prof J. B. T. Rocha**<br>Biochemical Toxicoloy Lab<br>Department of Biochemistry and Molecular Biology<br>Universidade Federal de Santa Maria, Brazil |

| | | |
|---|---|---|
| 09:50 – 10:40 | Lecture 4 | The Lobster Cockroach as an emerging tool for Neurotoxicology studies in Africa: Implications for Environmental and Human Health<br><br>**Prof. I. A. Adedara**<br>Drug Metabolism and Toxicology Lab<br>Department of Biochemistry<br>University of Ibadan, Nigeria |
| 10:40 – 10:50 | **Tea Break** | |
| 10:50 – 11:20 | **ISN Educational Talk 1:** History of ISN, Mission & Vision, Membership<br><br>**ISN Educational Talk 2:** ISN Funding Opportunities<br><br>**Prof J. O. Olopade**<br>Department of Veterinary Anatomy<br>University of Ibadan, Nigeria | |
| 11:20 – 12:10 | Lecture 5 | Investigating Therapeutic Potentials of Natural Products using the Roundworm (*Caenorhabditis elegans*) Model of Neurodegenerative Diseases<br><br>**Dr. I. S. Oyeleye**<br>Department of Medical Biochemistry<br>School of Basic Medical Sciences<br>The Federal University of Technology Akure, Nigeria |
| | | |
| 12:10 – 13:40 | Symposium 1 | Promoting Neuroscience Research in Africa: From Bench to Bedside<br><br>**Prof. B. V. Owoyele**<br>Department of Physiology<br>University of Ilorin, Nigeria |

| | | |
|---|---|---|
| | | **Prof. A. O. Ademiluyi**<br>Department of Biochemistry<br>School of Life Sciences<br>The Federal University of Technology Akure, Nigeria |
| 13:40 – 18:30 | **Lunch Break** | |
| 14:30 – 18:30 | Practical Session 5-8 | |
| 18:30 – 19:30 | Dinner | |
| 19 :30-20 :00 | Women in Neuroscience Mentoring Circle/Networking<br><br>**Dr. O. M. Okeowo**<br>Department of Physiology<br>School of Basic Medical Sciences, Federal University of Technology | |

**Day 4: Wednesday 22/10/2025**

| **Time** | **Activity** | |
|---|---|---|
| 09:00 – 09:50 | **ISN Educational Talk 2:** ISN Funding Opportunities<br><br>**Prof J. O. Olopade**<br>Department of Veterinary Anatomy<br>University of Ibadan, Nigeria | |
| 09:50 – 10:40 | Lecture 7 | The Human Cell Culture Models for Neurodegenerative Research<br><br>**Dr. T. A. Olasehinde**<br>AREF Research Fellow<br>Department of Bioactivity and Food Analysis,<br>Institute of Food Science Research, Madrid, Spain |
| 10:40 – 10:50 | Lecture 8 | Domesticating the use of Human Cell Culture Models for Neuroscience Research in Africa- Prospects and Challenges |

| | | |
|---|---|---|
| | | **Prof. S. A. Adefegha**<br>Department of Biochemistry<br>School of Life Sciences<br>The Federal University of Technology Akure, Nigeria |
| 10:50 – 11:20 | **Tea Break** | |
| 11:20 – 12:10 | Lecture 9 | Investigating Behavioral, Biochemical and Molecular Markers in Neurotoxicity and Neurodegeneration: What we have learnt from the Fruit fly (Drosophila melanogaster) models<br><br>**Dr O. B. Ogunsuyi**<br>Department of Medical Biochemistry<br>School of Basic Medical Sciences<br>The Federal University of Technology Akure, Nigeria |
| 13:40 – 14:30 | **Lunch Break** | |
| 14:30 – 18:30 | Practical Session 9-12 | |
| 18:30 – 19:30 | Dinner | |
| 19 :30-20 :00 | Networking | |

**Day 5: Thursday 23/10/2025**

| **Time** | **Activity** | |
|---|---|---|
| 09:00 – 09:50 | Symposium 2 | Work-Life Balance for an Early Career Researcher: Myth or Reality?<br><br>**Prof. (Mrs.) B. C. Adedayo**<br>Department of Biochemistry<br>School of Life Sciences<br>The Federal University of Technology Akure, Nigeria<br><br>**Dr. A. O. Ademosun**<br>Department of Biochemistry |

| | | |
|---|---|---|
| | | School of Life Sciences<br>The Federal University of Technology Akure, Nigeria |
| 09:50 – 10:50 | Symposium 3 | The Role of Artificial Intelligence in Neuroscience Research<br><br>**Prof S. A. Onasanwo**<br>Department of Physiology<br>University of Ibadan, Nigeria<br><br>**Prof A. C. Akinmoladun**<br>Department of Biochemistry<br>Federal University of Technology Akure, Nigeria |
| 10:50 – 11:00 | **Tea Break** | |
| 11:00 – 12:00 | Symposium 4 | Promoting Neuroscience Research in African through Adequate Mentoring and Grantsmanship<br><br>**Prof. G. Oboh**<br>Director, Center for Entrepreneurship<br>The Federal University of Technology Akure, Nigeria |
| 12:00-14:00 | Special Drylab | Computational Modelling and Rational Drug Design in Neuroscience<br><br>**Umar H.I.**<br>Department of Biochemistry<br>The Federal University of Technology Akure, Nigeria |
| 14:00 – 15:00 | **Lunch Break** | |
| 15:00 – 17:00 | Poster presentations of Research Papers by Participants | |
| 17:00 – 18:00 | University Tour | |
| 18 :00-20 :00 | Special Dinner/Award Ceremony | |

**Day 6: Friday 24/10/2025**

Departure

**Table 2.0. Practical Sessions**

**Venue: Drosophila Lab, Functional Foods and Nutraceuticals Unit, The Federal University of Technology Akure, Nigeria**

| | **Practical** | | **Time** | | | |
|---|---|---|---|---|---|---|
| **Session** | **Day 2** | **Moderators/Instructors** | **13:00- -14:00** | **14:00-15:00** | **15:00-16:00** | **16:00-17:00** |
| 1 | Fruit Fly Culture & Husbandry | Prof. A. Adedeji<br>Miss R.I Ajike | GROUP A | GROUP B | GROUP C | GROUP D |
| 2 | Lobster Cockroach Husbandry | Prof. I.A. Adedara<br>Miss M.E. Famutimi | GROUP B | GROUP A | GROUP D | GROUP C |
| 3 | Roundworm Husbandry | Dr I.S. Oyeleye<br>Dr. T.A. Olasehinde | GROUP C | GROUP D | GROUP B | GROUP A |
| 4 | Isolation of Human Erythrocytes | Prof. J.B.T Rocha<br>Dr. O.B. Ogunsuyi | GROUP D | GROUP C | GROUP A | GROUP B |
| **Session** | **Day 3** | **Moderators** | **13:00- -14:00** | **14:00-15:00** | **15:00-16:00** | **16:00-17:00** |
| 5 | Behavioural Analysis in Fruit Fly | Dr. O.B. Ogunsuyi<br>Miss P.B. Olugbade | GROUP A | GROUP B | GROUP C | GROUP D |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | Behavioural Analysis in Lobster Cockroach | Prof. I.A. Adedara<br>Mr. O.P. Aro | GROUP B | GROUP A | GROUP D | GROUP C |
| 7 | Behavioural Analysis in Roundworm | Dr I.S. Oyeleye<br>Dr. T.A. Olasehinde | GROUP C | GROUP D | GROUP B | GROUP A |
| 8 | Biochemical Assays for Neuromodulators | Dr (Mrs) T.I. Ologunagba<br>Mrs F.O. Bode-Olaleye | GROUP D | GROUP C | GROUP A | GROUP B |
| **Session** | **Day 4** | **Moderators** | **13:00- -14:00** | **14:00-15:00** | **15:00-16:00** | **16:00-17:00** |
| 9 | Nucleic acid Extraction and Quantification | Dr O.B. Ogunsuyi<br>Miss P.B. Olugbade | GROUP A | GROUP B | GROUP C | GROUP D |
| 10 | RT-qPCR Analysis 1 (cDNA Synthesis) | Mr. I.O. Umar<br>Mr A.Z Balogun | GROUP B | GROUP A | GROUP D | GROUP C |
| 11 | RT-qPCR Analysis 2 (Amplification and Quantification) | Dr I.S. Oyeleye<br>Mr. O,P, Aro | GROUP C | GROUP D | GROUP B | GROUP A |
| 12 | Histological Analysis | Dr. B. Ajayi<br>Mrs F.O. Bode-Olaleye | GROUP D | GROUP C | GROUP A | GROUP B |

## 3.0 Highlight of activities

### 3.1 Studentship

**Merits:** A total of 25 students out of 162 applicants were drawn across African countries for the school.

The breakdown of accepted students is:

| S/N | Name | Gender | Country | Level of Education | Institution | Email |
|---|---|---|---|---|---|---|
| 1 | Mr. Tchamba Tchana Jordas Casares | M | Cameroon | PhD Student | University of Yaounde 1, Camerron | tchanajordas@yahoo.com |
| 2 | Dr Pouadjeu Manialeu Judith | F | Cameroon | Postdoc | University of Dschang, Camerron | judithpouadjeu@yahoo.com |
| 3 | Mr Aruwa Ojodale Joshua | M | Uganda | PhD Student | Kampala International University, Uganda | aruwaj@gmail.com |
| 4 | Ms. Abigail Wortsi | F | Ghana | MSc Student | University of Cape Coast Ghana | abigailwortsi123@gmail.com |
| 5 | Miss Rebecca Kemi Oyeniyi | F | Ghana | MSc Student | University of Ghana | rebeccaoyeniyi.bo@gmail.com |
| 6 | Tenywa Mercy Gladys | F | Uganda | PhD Student | KAMPALA INTERNATIONAL UNIVERSITY, UGANDA | mercy.tenywa@kiu.ac.ug |
| 7 | Ingabire Claudine | F | Rwanda | MSc Student | University of Rwanda | ingabireclaudine010@gmail.com |
| 8 | Hakizimana 0livier | M | Rwanda | PhD Student | University of Rwanda | o.hakizimana@ur.ac.rw |
| 9 | Mr Jean Paul Tuyiseng | M | Rwanda | MSc Student | University of Rwanda | jpltuyisenge@gmail.com |
| 10 | Dr. Kolawole Ayodapo Olofinsan | M | South Africa | Postdoc | niversity of The Free State, Bloemfontein, South Africa | kollyck@gmail.com |
| 11 | Mr. Ayomide Victor Atoki | M | Uganda | PhD Student | KAMPALA INTERNATIONAL UNIVERSITY, UGANDA | atokiayomide@gmail.com |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | Miss Liesl Strydom | F | South Africa | MSc Student | University of the Witwatersrand | 2456668@students.wits.ac.za |
| 13 | Dr Ijeoma Onyeleonu | F | Nigeria | PhD Studenrt | Pamo University of Medical Sciences, Nigeria | ionyeleonu@pums.edu.ng |
| 14 | Mr. Iwhiwhu Prosper | M | Nigeria | MSc Student | Delta State University, Abraka, Nigeria | prosper-iwhiwhu@delsu.edu.ng |
| 15 | Mr. Ichie Kelechi Emmanuel | M | Nigeria | MSc Student | Nnamdi Azikiwe University, Nigeria | kelechiichie@gmail.com |
| 16 | Miss Precious Ezinne Ekwueme | F | Nigeria | PhD Student | University of Nigeria, Nigeria | Ekwuemep50@gmail.com |
| 17 | Mr. Oyeniran David Anuoluwapo | M | Nigeria | PhD Student | University of Medical Sciences, Nigeria | opetydave24@gmail.com |
| 18 | Mr. Joshua Ayodele Yusuf | M | Nigeria | MSc Student | University of Ibadan, Ibadan, Nigeria | yusufjoshuaayodele@gmail.com |
| 19 | Miss Ganiyu Kaosara Oyinola | F | Nigeria | MSc Student | Yobe State University, Damaturu, Nigeria | kaosaraganiyu@edu.biortc.com |
| 20 | Miss Oritsetimeyiin Blessing Ugemuge | F | Nigeria | MSc Student | Yobe State University, Damaturu, Nigeria | ugemuge2002@gmail.com |
| 21 | Mr. Tahir Muhammad Disina | M | Nigeria | MSc Student | Ahmadu Bello University Zaria, Nigeria | tahirdmuhammad@gmail.com |
| 22 | Khadijah Adam Rogo | F | Nigeria | MSc Student | Skyline University Kano, Nigeria | Khadijarogo212@gmail.com |
| 23 | Dr Moses Ibrahim Auza | M | Nigeria | Postdoc | Bingham University Karu, Nigeria | auza.moses@binghamuni.edu.ng |
| 24 | Adeshina Samuel Adebisi | M | Nigeria | MSc Student | Newgate University Minna, Nigeria | adeshinas458@gmail.com |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25. | Miss Akinola Oluwadamilola Dorcas | F | Nigeria | PhD Student | Federal University of Technology, Akure, Nigeria | |

**Studentship Statistics**

**a.** Total number of applicants = 162
**b.** Total number of students selected = 25
**c.** Total number of students from outside Nigeria = 12
**d.** Geographical Distribution of Students

North Africa = 0

East Africa = 4

South Africa = 4

Central Africa = 2

West Africa (other than Nigeria) = 2

Nigeria = 13

Total = 25 students

**e.** Gender distribution

Male = 13
Female =12
Total = 25 students

**Challenges:** Miss Liesl Strydom from South Africa was unfortunately not issued an entry visa to Nigeria. She, however, participated in the school lectures virtually. Ingabire Claudine from Rwanda missed her flight and had to be rescheduled. This was at an extra cost to the LOC. Khadijah Adam Rogo from Kano, Nigeria could not attend due to health challenges. All candidates shortlisted from the North Africa region voluntarily withdrew from the school due to varying reasons outlined below:

| S/N | Name | Gender | Email | Country | Reason for voluntary withdrawal |
|---|---|---|---|---|---|
| 1 | Muhammad Idris Abdulghaney | M | Muhammad.Idris@alexu.edu.eg | Egypt | Inability to process Visa |
| 2 | El Fatimi Hanane | F | helfatimi@um6ss.ma | Morrocco | Had another urgent engagement |
| 3 | El Hafedh El Mouhab | M | elhafedh.elmouhab@fst.utm.tn | Mauritania | Had another urgent engagement |
| 4 | Rayan Abubaker Musa Siddig | F | rayanabubaker@gmail.com | Sudan | Inability to process Visa |

The LOC made all efforts to replace these candidates with others suitably qualified from the region but could not find. Therefore, they were replaced with suitably qualified candidates from other regions of Africa

### 3.2 Lectures

**Merits:** There was a total of nine (9) lectures taken in the school including the keynote lecture. These lectures were delivered by seasoned faculties drawn from within and outside Africa as outlined above. The lectures were well engaging and covered all aspects of the objectives of the school as they pertain to all the alternative models outlined in the syllabus. All lectures were adequately covered by faculties, and the students were well engaged including times for questions and answers and post-lecture engagements with the faculties

**Challenges:** Prof Amos Abolaji was unavoidably absent due to health challenges, but he nominated Prof Ahmed Adedeji to represent him. Also, one of the confirmed faculties, Prof Micheal Aschner, could not attend the school due to other pressing engagements. He was substituted by Prof Ahmed Adedeji from University of Rwanda.

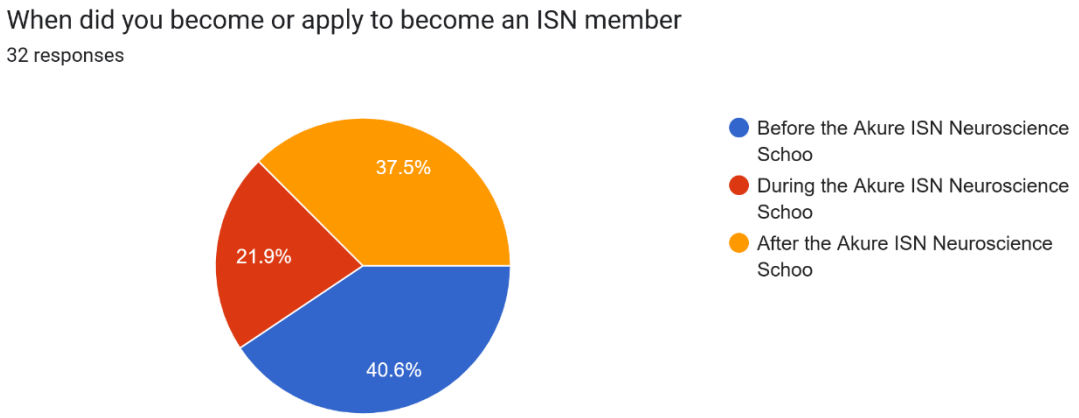
### 3.3. Symposia

**Merit**: The LOC came up with special symposia on relevant topical issues in neuroscience research as outlined in table 1.0 above. The LOC was fortunate to have additional seasoned members of the neuroscience community in Nigeria volunteered to lead these symposia and the students were well appreciative of the opportunities

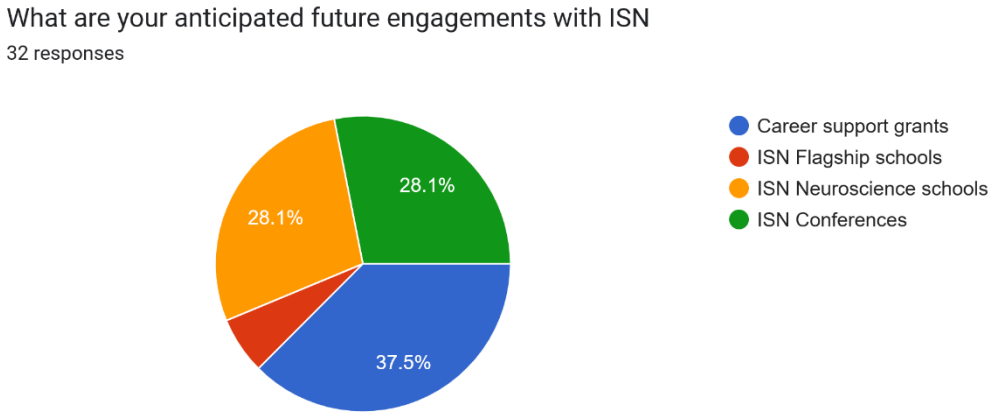
**Challenges**: None

### 3.4 Special Sessions

Merits: Four special seasons were held with two dedicated to ISN Membership awareness and opportunities, while one was dedicated to ISN School Alumni meet and greet. All these sessions were engaging and especially increased awareness about ISN. According to the survey conducted by all attendees (students, faculties and guests) after school, a total of 59.4% of all attendees submitted their application to become members of ISN during and after the Akure Neuroscience School. This shows that the specials sessions on ISN membership and opportunities were engaging and rewarding.



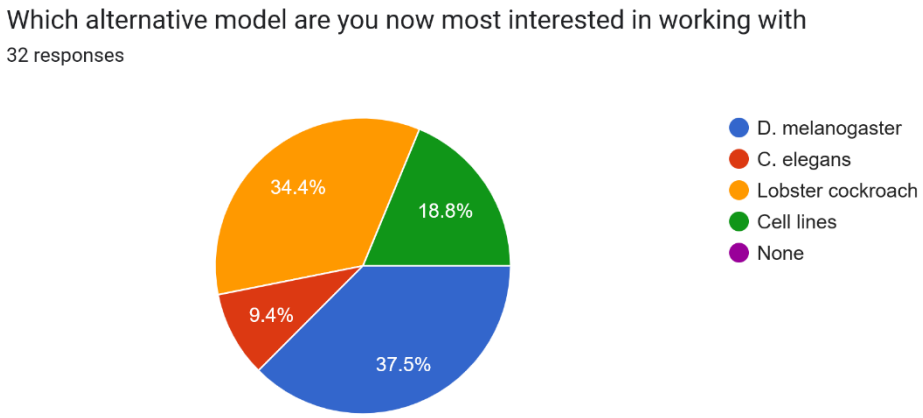

In addition, there were promising responses from participants about future engagements with ISN as shown below




**Challenges:** None

### 3.5 Hands-on Practical

**Merits**: Table 2.0 shows that a total of 12 practical sessions were conducted plus an addition Special DryLab Session on Computational Biology in Neuroscience. The students were divided into four groups and made to rotate across the practical sessions. The practical sessions were very engaging, and students showed positive responses. Survey showed their interest in continuing their exploration in neuroscience through one of the alternative models.




**Challenges**: None

### 3.6 Volunteering

**Merit**: The LOC engaged some students within and around the host institution as volunteers to help with the logistics of planning and executing the school program. Some of these students have shown interest in neurochemistry with many submitting their ISN membership during the school. In return, the LOC will recognize their efforts through a certificate of service

**Challenges**: None

### 3.7 Poster Presentation and Awards

Merits: All selected students were made to present their research as posters which were judged by our team of faculties. The three best poster presenters were recognized at the special dinner/award night on Thursday 23/10/2025.




## 4.0 Finance

**Merit:** The LOC appreciate the ISN School committee for the timely release of the fund. This significantly made the organisation of the school very timely and effective. Below is the breakdown of expenditure

**Expenditure Breakdown**

| Item | Number | Rate (USD) | Days | Amount (USD) |
|---|---|---|---|---|
| **Flight and accommodation** | | | | |
| Flight for foreign students (Most direct round trip, Economy Class) | 12 | - | - | 11,611 |
| Flight for foreign faculties (Most direct round trip, Economy Class) | 2 | Rwanda = 704<br>Brazil = 3,227 | - | 3,931 |
| Transport for local students | 12 | 49 | | 588 |
| Transport for local faculties | 6 | 90 | | 540 |

| | | | | |
|---|---|---|---|---|
| Accommodation for students | 25 | 30 | 6 | 4,500 |
| Accommodation for 8 faculties and 2 Lab Technical Assistants | 10 | 30 | 6 | 1,800 |
| **Feeding** | | | | |
| Feeding for 25 students, 8 faculties and 2 Lab Technical Assistants | 35 | 30 | 6 | 6,300 |
| **School materials** | | | | |
| Tags and notepads | 40 | 2.5 | - | 100 |
| **Others** | | | | |
| Local transport expenses | -- | - | - | 130 |
| Special Dinner/Award Ceremony | 40 | - | - | 500 |
| | | | **Total** | **30,000** |
| Total amount awarded by ISN | | | | 30,000 |
| Total amount released by ISN | | | | 24,000 |
| **Balance to be paid by ISN** | | | | **6,000** |

**Challenges:** The reduction in the approved budget from the proposed USD 34,985 to USD 30,000 was an immediate challenge for the LOC. Furthermore, the LOC was faced with challenges of budget variations in terms of inflations and new taxes particularly on air flight tickets in Nigeria. However, the LOC was able to make tough but meticulous decisions to be able to organize the school successfully, without undermining quality, despite these challenges. Therefore, the LOC appreciates the ISN School committee for graciously approving the fund to organize the school.

## 5.0 Organizing Committee

| #S/N | Title | Gender | Primary Affiliation | Role in the Committee |
|---|---|---|---|---|
| 1 | Dr. Opeyemi B. Ogunsuyi | M | Department of Medical Biochemistry, The Federal University of Technology Akure, Ondo State, Nigeria | Host<br><br>1. Coordination of Lectures and Practical Classes<br><br>2. Local and Foreign Transportation Logistics |
| 2 | Dr. Idowu Sunday Oyeleye | M | Department of Medical Biochemistry, The Federal University of | Co-Host<br><br>1. Coordination of application process |

| | | | | |
|---|---|---|---|---|
| | | | Technology Akure, Ondo State, Nigeria | 2. Selection of Local and foreign students<br><br>3. Venue arrangement and logistics |
| 3 | Dr. Oritoke M. Okeowo | F | Department of Physiology, The Federal University of Technology Akure, Ondo State, Nigeria | 1. School Event Anchor<br>2 Dinner/award night coordination<br><br>3 Protocol |
| 4 | Mr. Ayodeji S. Boboye | M | Department of Human Anatomy, The Federal University of Technology Akure, Ondo State, Nigeria | General Secretary to LOC |
| 5 | Miss Mayokun E. Famutimi | F | Department of Biochemistry, The Federal University of Technology Akure, Ondo State, Nigeria | 1. Ass. General Secretary/Financial Secretary to LOC<br>2. Lab Management |
| 6 | Dr. Opeyemi Ojueromi | F | Department of Life Science Precious Cornerstone University Ibadan, Nigeria | Poster Presentation and Awards |
| 7 | Dr. Tititlayo I. Ologunagba | F | Department of Medical Biochemistry, The Federal University of Technology Akure, Ondo State, Nigeria | 1. Feeding arrangements (Dinner)<br><br>2. Accommodation sub-section |
| 8 | Mrs Funmilayo Ojo | F | Department of Medical Biochemistry, The Federal University of Technology Akure, Ondo State, Nigeria | 1. Tea Break<br>2. Feeding arrangements (Lunch) |
| 9 | Mrs. Jumoke Bode-Olaleye | F | Department of Medical Biochemistry, The Federal University of Technology Akure, Ondo State, Nigeria | 1 Feeding arrangements (Breakfast)<br>2 Coordination of accommodation for students and faculties |
| 10 | Mr H. Umar | M | Department of Biochemistry, The Federal University of Technology Akure, Ondo State, Nigeria | Practical arrangements |
| 11 | Dr Olawande C. Olagoke | M | Department of Medicine, Division of Gastroenterology, | Editorial Officer and Review of Abstracts |

| | | | | |
|---|---|---|---|---|
| | | | Harvard Medical School, Boston, USA | |
| 12 | Mr. Philemon O. Aro | M | Department of Biochemistry and Molecular Biology, Federal University of Rio Grande de Sul, Brazil | 1. Editorial Officer and Review of Abstracts<br>2.Transport and Multimedia Management |
| 13 | Dr Adeola Adedara | F | Drosophila research and training center<br>Ibadan, Oyo state | Editorial Officer and Review of Abstracts |
| 14 | Dr (Mrs) Adefisayo | F | The Department of Physiology<br>The Federal University of Technology Akure, Nigeria | Medical Officer |
| 15 | Dr Busayo K. Akinola | M | Department of Human Anatomy, The Federal University of Technology Akure, Nigeria | Medical Officer |

**6.0 Conclusion**

The hosts would like to sincerely appreciate the ISN school committee for the opportunity to organize this school which has left indelible marks on the participants and birth new chapters in the scientific lives of the student. We are optimistic this school has fully achieved its objectives and will foster neuroscience research in Africa both now and in the future.

**Name(s) and Signature(s) of Organizer(s):**

**Dr Opeyemi B. Ogunsuyi** 

**Dr. Idowu S. Oyeleye** 

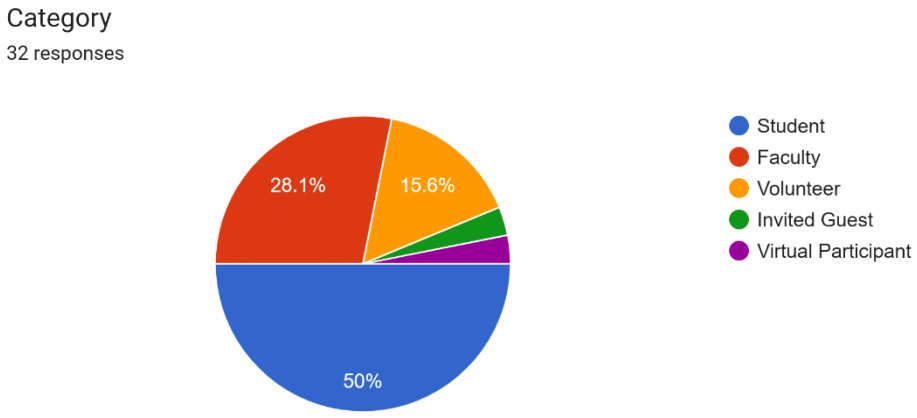
**Date: 3rd November 2025**

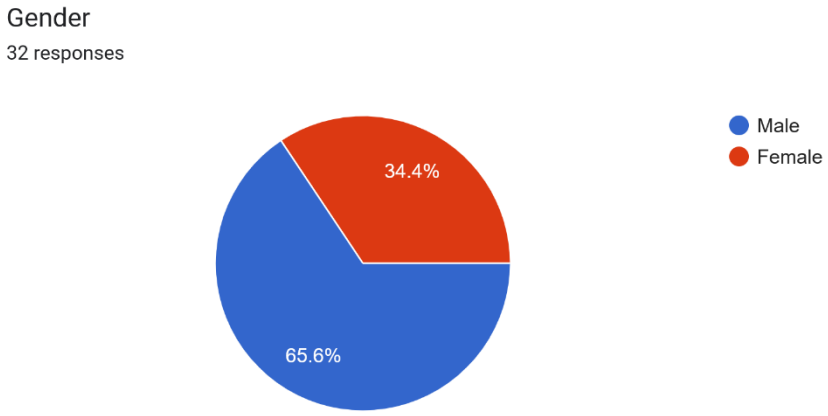
## 7.0 Appendix

### 7.1 School Materials

**ATTACHED** in pages 30-57

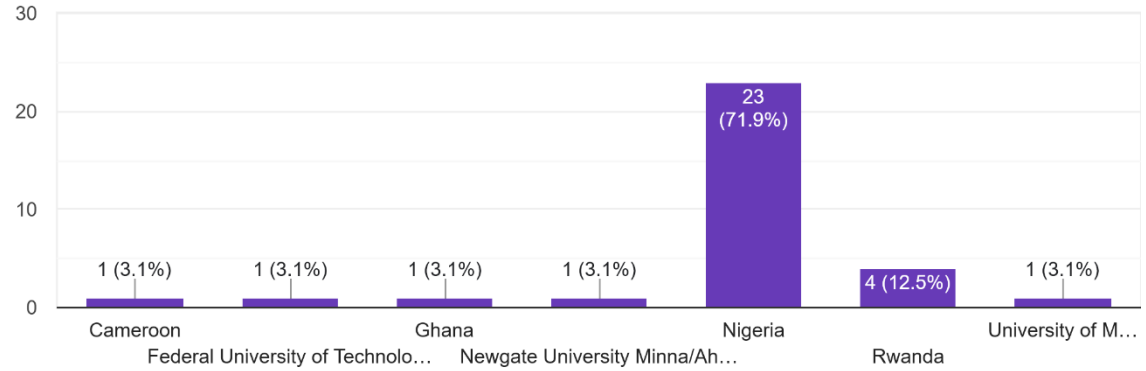
### 7.2 More Survey Results from all Participants



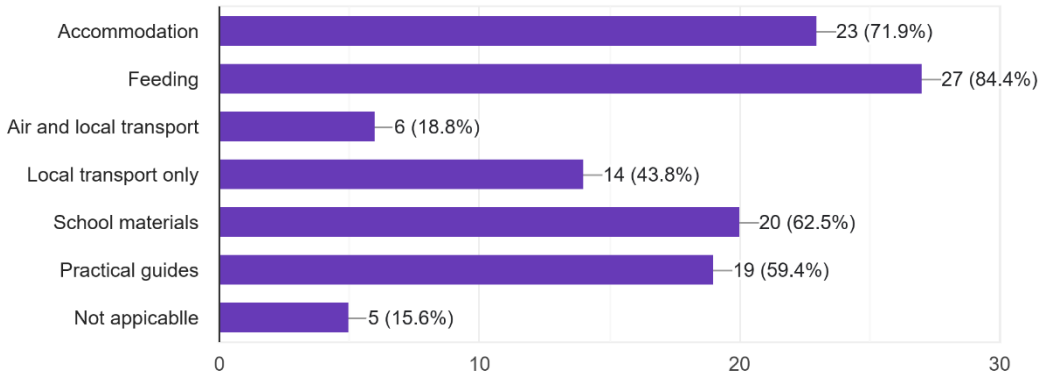
## Country of affiliation

32 responses

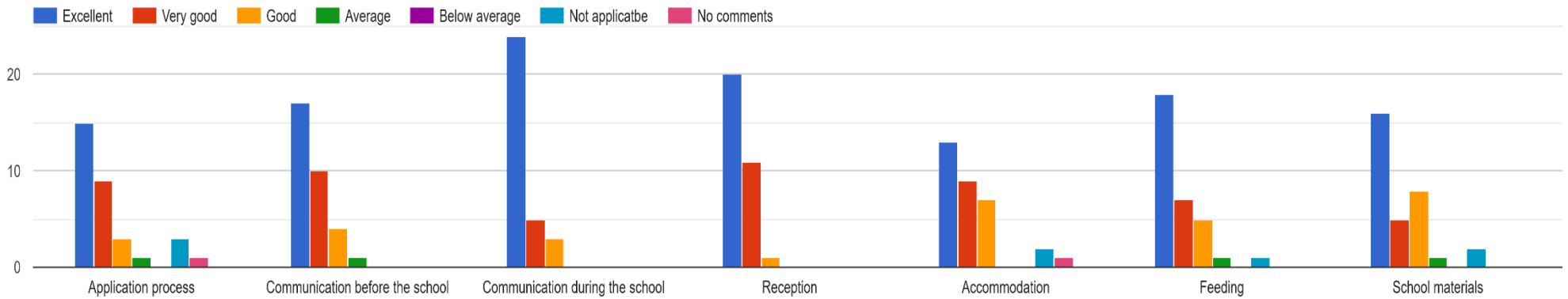


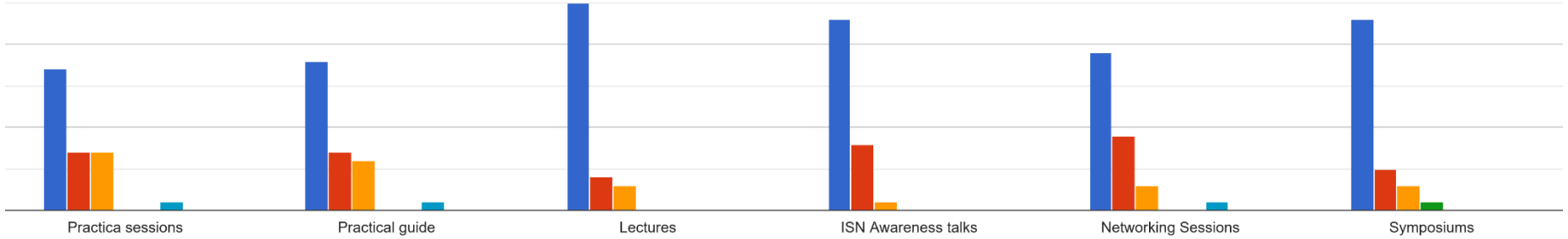

## What level of support did you receive towards this school from the LOC

32 responses



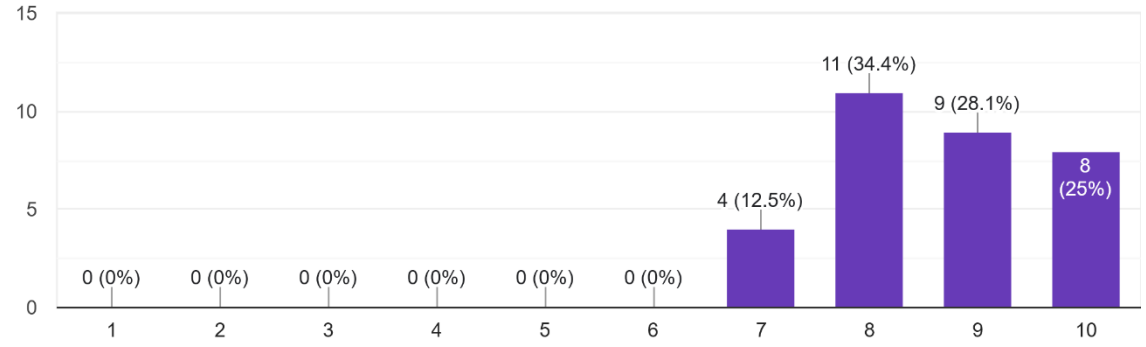
How will you rate these aspects school



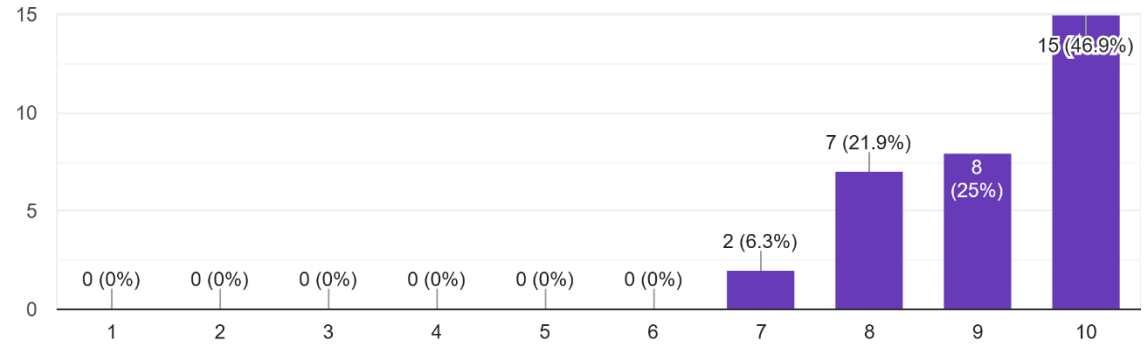
How will you  the overall organization of the school

32 responses

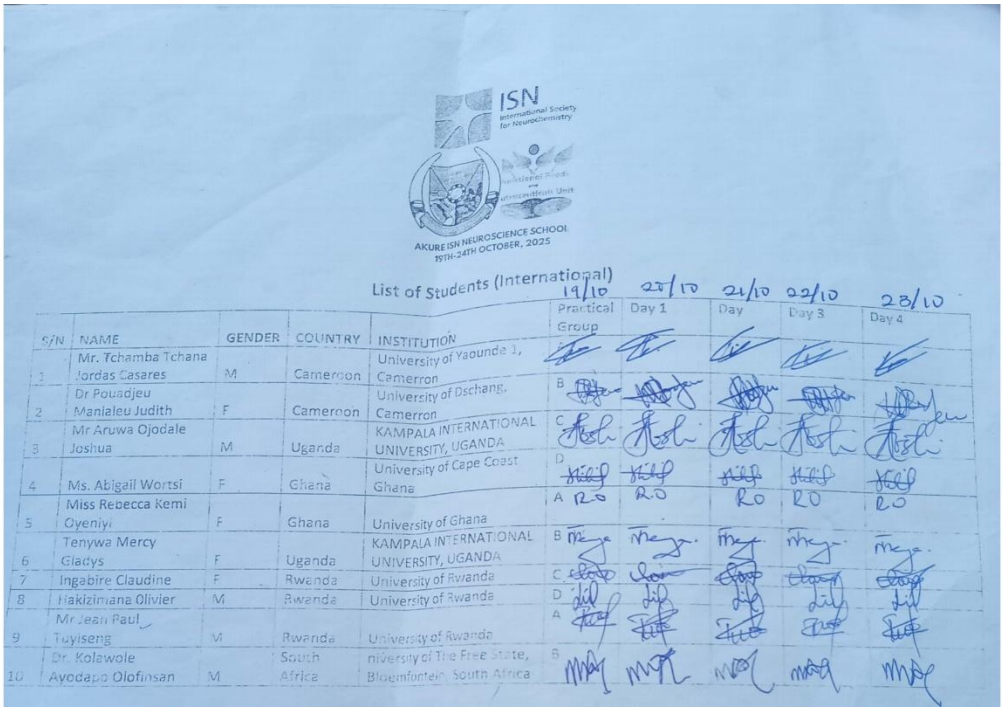



How has this school inspired your interest in neuroscience

32 responses



## 7.3 Student Attendance Register

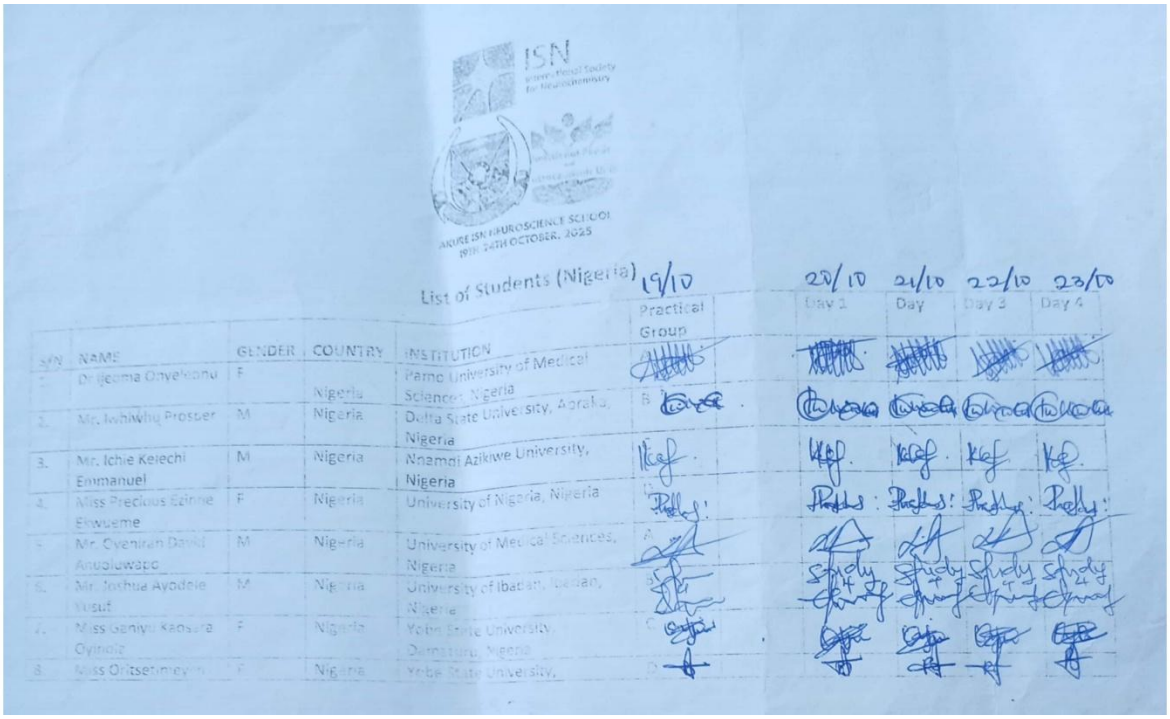


AKURE ISN NEUROSCIENCE SCHOOL
19TH-24TH OCTOBER, 2025

List of Students (International)

| S/N | NAME | GENDER | COUNTRY | INSTITUTION | Practical Group | Day 1 19/10 | Day 2 20/10 | Day 3 21/10 | Day 4 22/10 | Day 5 23/10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mr. Tchamba Tchana Jordas Casares | M | Cameroon | University of Yaounde 1, Camerron | A | | | | | |
| 2 | Dr Pouadjeu Manialeu Judith | F | Cameroon | University of Dschang, Camerron | B | | | | | |
| 3 | Mr Aruwa Ojodale Joshua | M | Uganda | KAMPALA INTERNATIONAL UNIVERSITY, UGANDA | C | | | | | |
| 4 | Ms. Abigail Wortsi | F | Ghana | University of Cape Coast Ghana | D | | | | | |
| 5 | Miss Rebecca Kemi Oyeniyi | F | Ghana | University of Ghana | A | R.O | R.O | R.O | R.O | R.O |
| 6 | Tenywa Mercy Gladys | F | Uganda | KAMPALA INTERNATIONAL UNIVERSITY, UGANDA | B | | | | | |
| 7 | Ingabire Claudine | F | Rwanda | University of Rwanda | C | | | | | |
| 8 | Hakizimana Olivier | M | Rwanda | University of Rwanda | D | | | | | |
| 9 | Mr Jean Paul Tuyiseng | M | Rwanda | University of Rwanda | A | | | | | |
| 10 | Dr. Kolawole Ayodapo Olofinsan | M | South Africa | niVersity of The Free State, Bloemfontein, South Africa | B | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 11 | Mr. Ayomide Victor Atoki | M | Uganda | KAMPALA INTERNATIONAL UNIVERSITY, UGANDA | C |
| 12 | Miss Liesl Strydom | F | South Africa | University of the Witwatersrand | D |

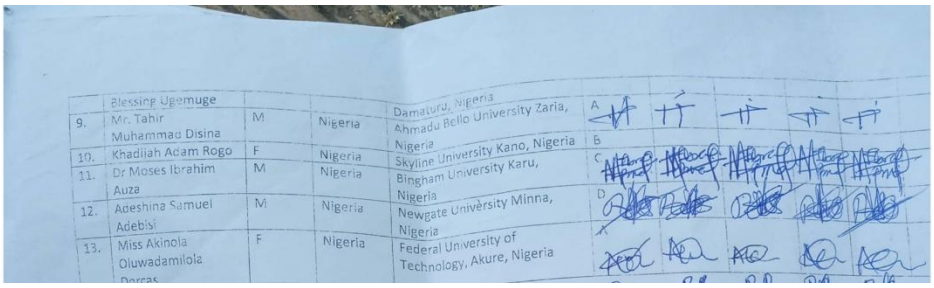


ISN
West-African Society for Neurochemistry

AKIRE ISN NEUROSCIENCE SCHOOL
19TH-24TH OCTOBER, 2025

List of Students (Nigeria)

| S/N | NAME | GENDER | COUNTRY | INSTITUTION | Practical Group | 19/10 Day 1 | 20/10 Day 2 | 21/10 Day 3 | 22/10 Day 4 | 23/10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Dr Ijeoma Onyekonu | F | Nigeria | Pamo University of Medical Sciences, Nigeria | A | | | | | |
| 2. | Mr. Ivhiwhu Prosper | M | Nigeria | Delta State University, Abraka, Nigeria | B | | | | | |
| 3. | Mr. Ichie Kelechi Emmanuel | M | Nigeria | Nnamdi Azikiwe University, Nigeria | C | | | | | |
| 4. | Miss Precious Ezinne Ekwueme | F | Nigeria | University of Nigeria, Nigeria | D | | | | | |
| 5. | Mr. Oyeniran David Anuoluwapo | M | Nigeria | University of Medical Sciences, Nigeria | A | | | | | |
| 6. | Mr. Joshua Ayodele Yusuf | M | Nigeria | University of Ibadan, Ibadan, Nigeria | B | | | | | |
| 7. | Miss Deniyu Kaosara Oyinola | F | Nigeria | Yobe State University, Damaturu, Nigeria | C | | | | | |
| 8. | Miss Oritsetimeyin | F | Nigeria | Yobe State University, | D | | | | | |



| | | | | | |
|---|---|---|---|---|---|
| | Blessing Ugemuge | | | Damaturu, Nigeria | |
| 9. | Mr. Tahir Muhammad Disina | M | Nigeria | Ahmadu Bello University Zaria, Nigeria | A |
| 10. | Khadijah Adam Rogo | F | Nigeria | Skyline University Kano, Nigeria | B |
| 11. | Dr Moses Ibrahim Auza | M | Nigeria | Bingham University Karu, Nigeria | C |
| 12. | Adeshina Samuel Adebisi | M | Nigeria | Newgate University Minna, Nigeria | D |
| 13. | Miss Akinola Oluwadamilola Dorcas | F | Nigeria | Federal University of Technology, Akure, Nigeria | A |

### 7.3 Comments from Students

ATTACHED in pages 58-71

### 7.3 Photo Gallery

ATTACHED in pages 72-102


# PRACTICAL SESSION GUIDE

## 1. Fruit Fly Culture & Husbandry

**INTRODUCTION:** Why *Drosophila melanogaster*?

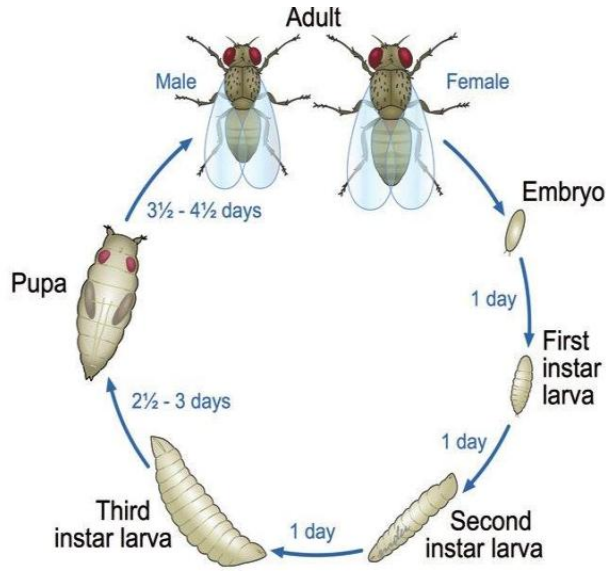
• *D. melanogaster* has been widely used as a model organism for research in the fields of biochemistry, cell biology, genetics and molecular biology; specifically, more than 65-70% of human disease-causing genes have been found in these flies (Reiter *et al.,* 2001; Pandey and Nichols, 2011; Poddighe *et al.,* 2013) hence, have become a useful tool for studying human disease conditions.

• Well known for its high sensitivity to toxic substances and is being considered as a useful model for toxicity studies as well as evaluating the biological action of pharmacological agents (Adedara *et al*., 2015).

• A useful model for studying diseases related to metabolic functions in humans, because it has unique features similar to most of the basic metabolic functions found in vertebrates (Baker and Thummel, 2007).

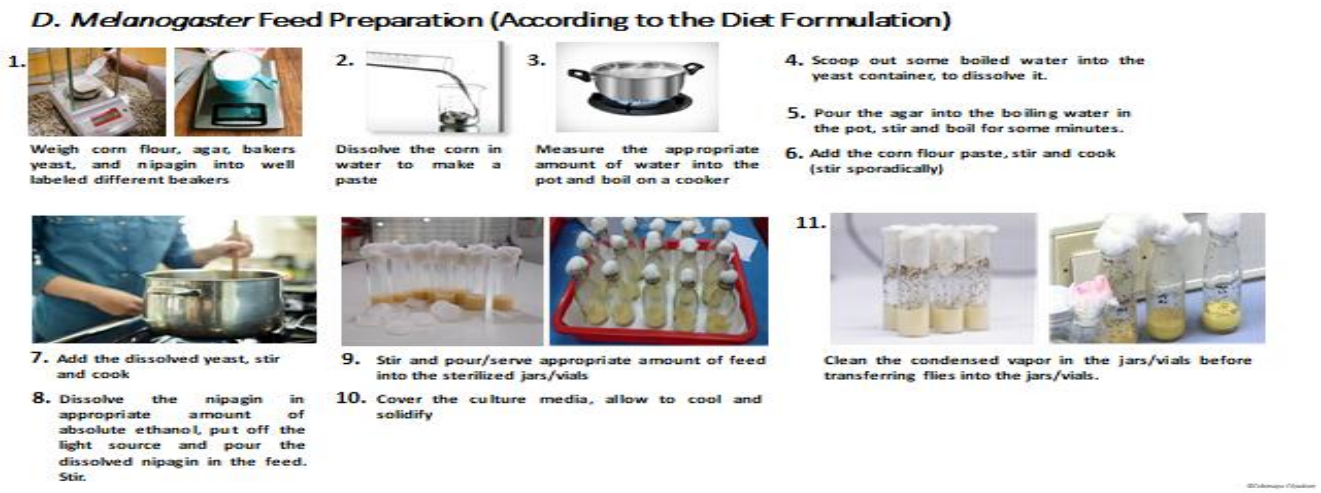
• *R*ecommended by the European Centre for the Validation of Alternative Methods (ECVAM) for promoting the 3Rs (reduction, refinement and replacement) of laboratory animal usage in toxicity studies (Benford *et al*., 2000).

## *D. melanogaster* Life Cycle




## *D. MELANOGASTER* CULTURING: Collection of materials

a) Corn Meal
b) Agar
c) Brewer's Yeast
d) Nipagin
e) Cooking Pot
f) Stirrer
g) Measuring Cylinder
h) Glass Jars
i) Analytical Balance
j) Water
k) Ethanol




1. Weigh corn flour, agar, bakers yeast, and nipagin into well labeled different beakers
2. Dissolve the corn in water to make a paste
3. Measure the appropriate amount of water into the pot and boil on a cooker
4. Scoop out some boiled water into the yeast container, to dissolve it.
5. Pour the agar into the boiling water in the pot, stir and boil for some minutes.
6. Add the corn flour paste, stir and cook (stir sporadically)
7. Add the dissolved yeast, stir and cook
8. Dissolve the nipagin in appropriate amount of absolute ethanol, put off the light source and pour the dissolved nipagin in the feed. Stir.
9. Stir and pour/serve appropriate amount of feed into the sterilized jars/vials
10. Cover the culture media, allow to cool and solidify
11. Clean the condensed vapour in the jars/vials before transferring flies into the jars/vials.

**Preventing Contamination**

• Ensure all apparatus (including the glass jars/vials and working bench area) are sterilized with 75 % ethanol and jars are completely dry before use.

• Dissolve nipagin in appropriate amount of absolute ethanol.

• Do not overcook the feed while preparing it.

• Use clean cotton wool to clean the condensed vapour in the jar.

• Lookout for strange strains of fly in the culture media before transferring them into new culture and properly discard jars/culture media contaminated by them.

- Ensure the culture medium (with/without the flies) is properly covered to avoid contamination.
- Ensure the flies in the culture room are trapped and properly discarded.
- Ensure the old culture media are properly discarded.

## 2. Lobster Cockroach Husbandry

Why Lobster Cockroach (*Nauphoeta cinerea*)?

• Lobster cockroach has small size (3.0 cm in length with wings - adults)

• Low maintenance cost

• Easy handling

• Large progeny size and long life span

• Food digestion, absorption and biochemical processing occur in the midgut analogous to mammalian intestine

• Stores energy in form of glycogen and triglycerides

**Behavioural Analysis In Lobster Cockroach**

• Carefully transfer the cockroaches into a white plastic box (a new environment) 19 cm in length, 12.5 cm in width and 5 cm in height and film their behavior during a 10 minute trial period using an overhead mounted webcam.

• Behavioral endpoints of locomotor activity such as total distance travelled, average speed, total time immobile, and total time in periphery would be analyzed from the video files using video-tracking software (ANY-maze 6.0, Steolting, CO, USA).

A. Total Distance Travelled

• Usually determined by selecting nymphs at random per group and observing the total distance moved in the novel environment for 10 minutes.

B. Average Speed

Determined by selecting nymphs at random per group and observing the speed at which they moved in the novel environment during a period of 10 minutes.

C. Total Time Immobile

The cockroaches would also be observed carefully to note the amount of time of stagnancy per group so as to determine the total time of immobility.

D. Total Time in Periphery

In this instance, periphery simply refers to the edges of the novel environment. To determine the total time spent in periphery, an unfamiliar object is usually introduced into the middle of the novel environment, and the cockroaches are closely monitored to determine how long they spent in periphery.

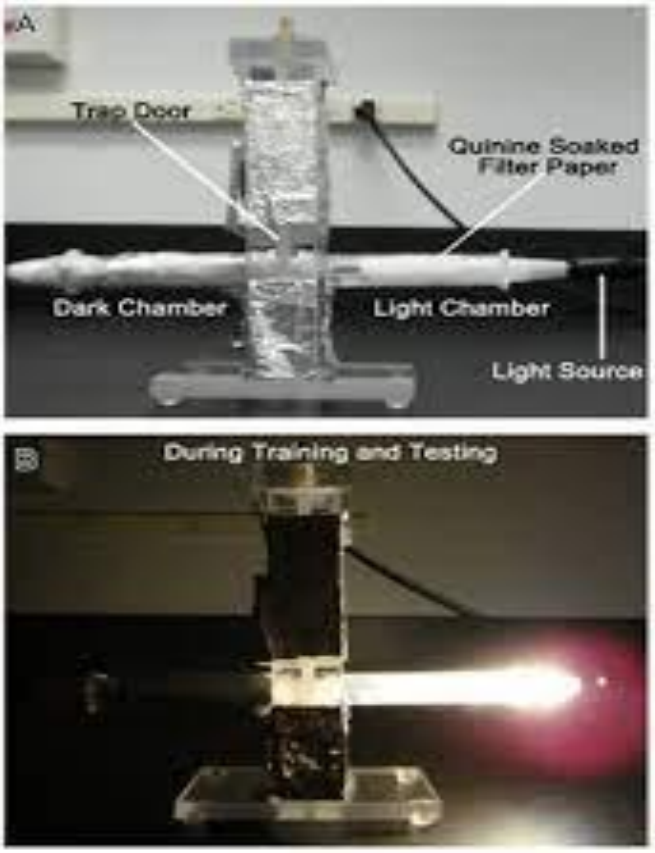
**3. Behavioral Studies on D. *melanogaster***

A. Measurement of Locomotor Performance by Negative Geotaxis

1. Transfer flies into a labeled empty sterilized tube (11 cm in length 3.5 cm in diameter) marked at 6 cm from the bottom.
2. After 10 min of recovery, tap the flies to the bottom of the tube and record the number of flies that crossed the 6 cm line within 15 seconds.
3. Allow the vial to stand for 1 minute, then repeat step 2.
4. Repeat steps 2 and 3.
5. The climbing scores denote the average percentage of flies that crossed the 6 cm line among the total number of flies per experiment.
6. The results will be expressed as percentage of flies that escaped beyond a minimum distance of 6 cm in 6 s during three independent experiments**.**

**B. Evaluation of Memory Index by Aversive Positive Phototaxis Analysis**

1. Expose the flies to source of light in which there is a bitter substance (Quinine) in the light path
2. Count and record the number of flies along the white path within 15 seconds
3. Allow to stand 1 minute.
4. Tap flies into the dark chamber and repeat steps 1 to 3 twice.
5. Return the flies into the vial and allow stand for 6 hours.
6. After 6 hours, repeat steps 1 to 4. (This evaluate ability of the flies to remember the bitter substance in the light path and their withdrawal from light chamber within 15 seconds).
7. The data will be expressed as percentage of flies withdrawal at 0 and 6 hours.


A
Trap Door
Quinine Soaked
Filter Paper
Dark Chamber
Light Chamber
Light Source
B
During Training and Testing

## C. Evaluation of Memory Index by Adult Drosophila Olfactory Shock Memory Test


**Shock Chamber**

**T-Maze**

1. Place and train the flies in the chamber for 4 minutes to associate the 3- octanol (OCT - 1:100) odour with 75 V electrical shock, while the methyl cyclohexane (MCH - 1:25) odour will be linked to no shock.
2. Return the flies into the original diet.
3. Allow to stand for 10 minutes. After that, put them through the memory test.
4. Place the flies at a T-point, where the two odour converge, and allow the flies to move to either the OCT or MCH chamber.
5. record the njumber of flies in each chamber.
6. The number of flies in the OCT will be used to calculate the performance index, which will be presented as percentage of the total number of flies.

**4. Protocol for Synchronization**

Pan modified 10/2016

1. Observe plates under microscope to see if the plates have lots of adults.
2. Wash plates 2 times with M9 using a plastic pipette and put the M9 into a 15mL centrifuge tube
3. Vortex and centrifuge tubes at 1800/2500 rpm for 1 minute.

Washing

4. Suck out M9, fill tube to top (15mL) with new M9, vortex and centrifuge until water is clean and clear

Bleaching

Bleaching misxture (in 50mL tube covered in aluminum foil):
(1) 5mL bleach
(2) 1.25mL 10M NaOH
(3) 18.75mL distilled water (final volume = 25mL)

5. Suck out M9 from the tube and put 5mL of chlorine bleach mixture (per 1mL of worms (pellet)). (Bleaching)
6. Vortex
7. Leave the worms for 5 minutes on shakers, vortex once every minutes.
8. After 5 minutes, observe worms under microscope and make sure all the eggs are released from the worms.
9. Add M9 to dilute bleach (fill up the tube), vortex and centrifuge at 2800 rpm for 1 minutes.
10. Suck out liquid and fill M9 to top with STERILE pipette, vortex and centrifuge at 1800/2500 rpm/ 1 min for 2 times.
    *Always use STERILE pipette after bleaching step.

Sucrose Step

11. Add 10mL of 30% sucrose solution, vortex and mix well.
12. Centrifuge at **700rpm for 8 minutes, decelerating @ 7.**
13. Carefully remove the eggs (top layer) with a plastic pipette, (no more than 3mL for 15mL tube), and place the eggs in a new 15mL tube. Dilute with sterilized water (to the top).
14. Vortex and centrifuge at 1800/2500 rpm for 1 minute. If necessary, dilute with $dH_2O$, vortex and centrifuge to get all the eggs (2× for large pellet).
15. Fill tube halfway with 0.31 – 1mL of M9, mix well.
16. Pipette eggs using glass pipette into each 60mm unseeded (with no bacteria) NGM plate.
17. Allow plates to dry at RT and store them at 21ºC for 12 – 18 hours depending on the growth of the strain.

**M9 Buffer (2L)**

| | |
|---|---|
| $KH_2PO_4$ | 6.0g |
| $Na_2HPO_4$ | 12.0g |
| NaCl | 10.0g |
| $dH_2O$ | 2L |

Autoclave (Liquid 45 min)

**1M CaCl2 (500mL)**

| | |
|---|---|
| $CaCl_2 \cdot 2H_2O$ | 73.5g |
| $dH_2O$ | 500mL |

Autoclave (Liquid 45 min)

**1M MgSO4 (500mL)**

| | |
|---|---|
| $MgSO_4 \cdot 2H_2O$ | 123.24g |
| $dH_2O$ | 500mL |

Autoclave (Liquid 45 min)

**30% Sucrose (800mL)**

| | |
|---|---|
| Sucrose | 240g |
| $dH_2O$ | Fill to 800mL |

Autoclave (Liquid 45 min)

**5mg/mL Cholesterol (400mL)**

| | |
|---|---|
| Cholesterol | 2.0g |
| 95% EtOH | 400mL |

***Use Autoclaved bottle***

**Freezing Solution (500mL)**

5M NaCl:

| | |
|---|---|
| NaCl | 2.92g |
| $dH_2O$ | 10mL |

| | |
|---|---|
| 5M NaCl | 10mL |
| Glycerol | 150mL |
| 0.5M $KPO_4$ (pH 6.0) | 50mL |
| $dH_2O$ | 290mL |

Autoclave (Liquid 45 min)
After cool, add 150µL of 1M $MgSO_4$ (60µL per 200mL)

**85nM NaCl (2L)**

| | |
|---|---|
| NaCl | 10.0g |

**10M NaOH**

| | |
|---|---|
| NaCl | 20.0g |
| $dH_2O$ | Fill to 50mL |

Stir to cool

**2XYT Media for NA22 (500mL)**

| | |
|---|---|
| Tryptone | 8.0g |
| Yeast Extract | 5.0g |
| NaCl | 2.5g |
| $dH_2O$ | 500mL |

Autoclave (Liquid 45 min)

**LB/Strep Media for OP50 (500mL)**

| | |
|---|---|
| Luria Broth | 12.5g |
| Streptomycin sulfate | 0.1g |
| $dH_2O$ | 500mL |

Autoclave (Liquid 45 min)
***Add Streptomycin sulfate after autoclave.***

**1M KPO4**

| | |
|---|---|
| $KH_2PO_4$ | 108.3g |
| $K_2HPO_4$ | 35.6g |
| $dH_2O$ | 1000mL |

Calibrate pH meter until pH reaches 6.0
Filter mixture into a new 2L **autoclaved** bottle using sterile filter.

**S-Medium**

S-basal

| | | |
|---|---|---|
| NaCl | 5.85g | |
| $K_2HPO_4$ | 1g | |
| $KH_2PO_4$ | 6g | |
| Cholesterol (5mg/mL ethanol) | | 1mL |
| $dH_2O$ | 1L | |

Autoclave (Liquid 45 minutes)

1M Potassium Citrate (pH 6.0)

| | | |
|---|---|---|
| Citric acid monohydrate | | 20g |
| Tri-potassium citrate monohydrate | 293.5g | |
| $dH_2O$ | 1L | |

check pH before autoclave
Autoclave (Liquid 45 minutes)

Trace metals solution

| | |
|---|---|
| Disodium EDTA | 1.86g |
| $FeSO_4 \cdot 7H_2O$ | 0.69g |
| $MnCl_2 \cdot 4H_2O$ | 0.2g |
| $ZnSO_4 \cdot 7H_2O$ | 0.29g |
| $CuSO_4 \cdot 5H_2O$ | 0.025g |
| $dH_2O$ | 1L |

Autoclave (Liquid 45 minutes)
** Store in dark or wrap in aluminum foil

S-Medium

| | | |
|---|---|---|
| S basal | | 1L |
| 1M Potassium citrate (pH 6.0) | | 10mL |
| Trace metals solution | 10Ml | |
| 1M $CaCl_2$ | 3mL | |
| 1M $MgSO_4$ | 3mL | |

DO NOT autoclave, sterilize S-Medium using sterile filter

**NGM / 8P Plates**
**Pan**

**Standard Worm (NGM / 8P Agar) Plates**

| | 1L | 2L | 3L |
|---|---|---|---|
| NaCl | 3g | 6g | 9g |
| Agar | 17 / 25g | 34 / 50g | 51 / 75g |
| Peptone | 2.5 / 20g | 5 / 40g | 7.5 / 60g |
| dd$H_2O$ | ~975 ml | ~1950 ml | ~2925 ml |

Make up 3 litres (no more than 4L) in a 6 litre Erlenmeyer flask. **If using Pourboy, also autoclave one 350ml and two 1L of $H_2O$ to sterilise tube and pump before pouring and clean left media after pouring.** If bacteria grow very thin on NGM plates, may double the peptone amount.
Autoclave **45 min** on liquid cycle. After cooling down, using **sterile** technique to add the following:

| | | | |
|---|---|---|---|
| Cholesterol (5mg/ml) | 1ml | 2ml | 3ml |
| $CaCl_2$ (1 M) | 1ml | 2ml | 3ml |
| $MgSO_4$ (1 M) | 1ml | 2ml | 3ml |
| $KPO_4$ (1 M pH 6) | 25ml | 50ml | 75ml |
| Nystatin (-20C) | 1.25ml | 2.5ml | 3.75ml |
| Streptomycin sulfate (100mg/ml, -20C) | 0.5ml | 1ml | 1.5ml |

Swirl to mix thoroughly after each addition; after all additions done, pour plates.
Notes:
The bacteria strain OP50 grows on NGM plates, while NA22 on 8P plates. OP50 grows in LB broth with with 50 ug/ml streptomycin, while NA22 in 2XYT without antibiotics. The bacteria culture can be made by inoculating 6 drops of bacteria in 40ml of LB media or scrapping with a pipette tip some bacteria from existing seeded NGM plates and store overnight at 37℃. The remaining culture can be store at 4℃ for up to 2-3 months.

<u>LB Broth (500 ml)</u>
Luria Broth 12.5g
dd$H_2O$ to 500mL

Autoclave for 30 min.

Add streptomycin (final conc. 50ug/ml) before use

2XYT Broth (500ml)

| | | |
|---|---|---|
| Tryptone | | 8g |
| Yeast Extract | | 5g |
| NaCl | | 2.5g |
| $ddH_2O$ | to | 500mL |

Autoclave for 45 minutes.

LB Plates with Kanamycin/Ampicillin (1000ml)

| | |
|---|---|
| Tryptone | 20g |
| Yeast extract | 5g |
| NaCl | 10g |
| Agar | 15g |

Add $ddH_2O$ to 1000ml. Autoclave for 30 min.
Add Kan/Amp to a final concentration of 20/100 ug/ml, when the medium is at 50°C

## 5. Biochemical Assays for Neuromodulators

1. After the completion of the experiment, the flies and cockroach heads will be anesthetized on ice or with $CO_2$.
2. The process of homogenizing will involve placing the required number of flies and cockroach heads into clean autoclaved Eppendorf tubes. The procedure is as follows:
    a) The Eppendorf tubes to be used for biochemical analysis will be weighed when empty ($W_0$). Thereafter it will be weighed again when the number of flies or cockroach head has been placed inside ($W_1$).
    b) The final weight of the Eppendorf will be subtracted from the initial weight to give the final weight of heads in the Eppendorf tubes i.e. $W_1 - W_0$.
    c) The final calculated weight will then be homogenized in 0.1 M phosphate buffer (pH 7.4) at a 1:10 (flies/volume (ml)).

The resulting homogenates will then be centrifuged at 10,000 x g, $4^0$C for 10 min. Subsequently; the supernatant will be carefully removed from the pellet into labelled Eppendorf tubes and used for biochemical assays, or stored at -$80^0$C for later analysis.
A range of biochemical assays will be performed on the homogenized tissues. Some of these assays are: total protein, total thiol, AchE

### 1. Total protein

The total protein content of fly and cockroach homogenates will be measured by the Coomassie blue method according to Bradford (1976) using bovine serum albumin (BSA) as standard. The procedure is as follows:

a) 20 microliters of the tissue will be pipetted into a 96-well microplate.
b) 10 microlitres of distilled water will also be pipetted into the same well to make a final volume of 30 microlitres.
c) For blank wells, 30 microlitres of distilled water will be added to the wells.
d) 250 microlitres of Coomassie blue will be added to all the wells.

e) The plate will then be incubated for 30 mins.

f) After incubation, the plate will be read using a microplate reader at a wavelength of 630 nm.

g) The protein concentration will be determined from the BSA curve.

**2. Total Thiol**

The determination of the level of total thiol content in tissue homogenate will be carried out using the method of Ellman (1959). The procedure is as follows:

a) The reaction mixture will be made up of 200 µL of 0.1 M potassium phosphate buffer (pH 7.4).

b) To the reaction mixture, 20 µL of homogenate will be added,

c) Thereafter, 10 µL of 10 mM DTNB will also be added.

d) This will be incubated for 30 min incubation at room temperature.

e) The absorbance will be measured at 412 nm using a spectrophotometer.

The total thiol content will be expressed as µmol/mg protein (use total protein data for normalization).

**3. AChE Activity Assay**

The Acetylcholinesterase (AChE) activity will be assayed according to the method of Ellman (1961) as previously reported by Perry et al. (2000). The procedure is as follows:

a) The reaction mixture will be made up of 180 uL of distilled water.

b) 20 uL of 100 mM sodium phosphate buffer (pH 7.4) will be added to the reaction mixture.

c) 30 uL of 8 mM DTNB will also be added to the reaction mixture.

d) Thereafter, 15 uL of homogenate will also be added, and

e) 30 uL of 8 mM acetylthiocholine iodide will be added as the substrate.

f) The reaction will be monitored for 5 mins (30-second intervals) at an absorbance of 412 nm.

The AChE activity will thereafter be calculated and expressed as mmolAcSch/h/mg protein.

## 6. Nucleic Acid Isolation, Quantification and PCR Analysis

### Experiment 1 : RNA Preparation

### Materials

Brain tissue, TRIzol reagent, Chloroform, Isopropanol, 75 % ethanol (prepared with RNase-free water), Microcentrifuge tubes (RNase-free), Water bath, Vortex mixer, Refrigerated centrifuge, Micropipettes and sterile RNase-free tips, Hand gloves and Nose mask.

### Procedure

1. Place 100 mg of brain tissue in a clean, sterile RNase-free microcentrifuge tube.
2. Lyse the tissue with 1 ml TRIzol reagent, pipetting up and down several times until homogenized.
3. Incubate the homogenized samples for 5 minutes at 15-30°C to permit complete dissociation of nucleoprotein complexes.
4. Add 0.2 ml of chloroform per 1 ml of TRIzol and cap the sample tubes securely.
5. Shake tubes vigorously by hand for 15 seconds and incubate them at 15-30°C for 2-3 minutes.
6. Centrifuge the samples at 12,000 x *g* for 15 minutes at 2- 8°C.
7. Carefully transfer the colorless upper aqueous phase to a fresh RNase-free tube.
8. Precipitate RNA from the aqueous phase by adding 0.5 ml isopropyl alcohol per 1 ml TRIzol used. Mix and incubate samples at 15-30°C for 10 minutes.
9. Centrifuge at 12,000 x *g* for 10 minutes at 2-8°C. The RNA precipitate often invisible before centrifugation forms a gel-like pellet on the side and bottom of the tube.
10. Discard the supernatant. Wash the RNA pellet once with 1 ml of 75% ethanol. Vortex briefly (to mix the sample) and centrifuge at 7,500 x *g* for 5 minutes at 2-8°C.
10. Remove ethanol and dry the RNA pellet (air-dry or vacuum-dry for 5-10 minutes). Do not dry the RNA by centrifugation under vacuum. It is important not to let the RNA pellet over-dry, as this reduces its solubility.
11. Dissolve RNA pellet in 50 µl RNase-free water by pipetting gently, and vortexing briefly.

**Experiment 2 : Gel Electrophoresis**

**A. TAE BUFFER 4× (TRIS – ACETATE – EDTA)**

- 4.84g of Tris hydroxymethyl amino methane
- 4ml of 0.25 EDTA (disodium)
- 1.15ml of glacial acetic acid
- Complete the buffer to 1L with distilled water

**B. BROMOPHENOL BLUE SOLUTION (LOADIG BUFFER)**

- 0.012g of bromophenol blue
- 5ml of 50% glycerol
- Add NAOH gradually until it turns blue
- Complete the buffer to 10 ml with distilled water

**C. AGAROSE GEL**

- 0.3g of agarose powder
- 30ml of TAE buffer
- Heat this solution at 80°c until it becomes transparent
- Add 3µl of 10mg/ml ethidium bromide
- Gently swirl
- Place this mixture in the mold (base and side rubbers) with the electrophoresis well comb and the side rubbers.
- Place the gel inside the electrophoresis tank without the mold base (until the reading is performed) and place the electrophoresis lid.

**D. RNA VERIFICATION**

**In the first well:**

- 2µl of RNA ladder
- 3µl of bromophenol blue solution
- Mix with the micropipette – 10 times
- Place this mixture in the first well of the gel

**Other wells:**

- 2µl of RNA sample
- 3µl of bromophenol blue solution
- Mix with micropipette – 10 times
- Place the mixture in the well of the gel

**NOTE:** Perform the mixing of each well on the platform covered with aluminum foil (be careful not to pierce the foil, so as not to lose your sample).

**E. ELECTROPHORESIS**

- Plug the electrophoresis cable into the socket
- Turn on the electrophoresis back button and then the start button (blue) at the front of the equipment

- Make sure the gel is positioned on the electrophoresis staining platform, and that the gel is covered with the TAE buffer
- Plug the back cable (right side of electrophoresis) and the black cable (left side of electrophoresis) into the corresponding input
- For reading use: 60 volts / 100mA / 007 wats for 45 mins, according to your experiment.

**Experiment 3: Quantification And Purity Determination of Prepared RNA**

**Materials**

Nanodrop Spectrophotometer, Micropipettes and sterile RNase-free tips, RNA samples, Nuclease-free water and Hand gloves.

**Procedure**

1. Power on the NanoDrop spectrophotometer and allow it to boot/initialize.
2. Select the options for RNA quantification mode as displayed on the screen.
3. Clean the pedestal, pipette 2 µl of nuclease-free water for blanking. Press the blank option on the screen and allow to return the values displayed on the screen as zero.
4. Using fresh pipette tips, add 2 µl of RNA sample and select sample option. Wait for the display to give the absorbance at 260 nm and 280 nm, the ratio of 260/280 and concentration.
5. Record the read-out.

## Experiment 4: First Strand cDNA Synthesis

### Materials

Diluted RNA template (1 µg), ProtoScript II First Strand cDNA synthesis kit, Nuclease-free water, PCR machine, Micropipettes and tips, 0.2 mL PCR tubes, and Hand gloves.

### Procedure

1. Before performing the RT reaction, dilute the RNA sample to a desired concentration, e.g. 1 µg.
2. In a 0.2 ml PCR tube, prepare the following mix:

| Components | Volume |
|---|---|
| Oligo $(dT)_{23}$ VN (50 µM)/random primer | 2.0 µl |
| ProtoScript II reaction mix (2X) | 10.0 µl |
| ProtoScript II enzyme mix (10X) | 2.0 µl |
| Nuclease-free water | 4.0 µl water |
| RNA sample | 2 µl (up to 1 µg) |
| **Total Mix** | **20 µl** |

3. Set up the thermal cycling conditions as follows:
    - 25°C for 5 minutes (primer annealing)
    - 42°C for 1 hour (cDNA synthesis reaction) and;
    - Final step at 80°C for 5 minutes (enzyme inactivation).
3. Store cDNA at -20°C until use.

## Experiment 5: Real-time qPCR (RT-qPCR)

### Materials

Applied Biosystem StepOnePlus qPCR System, Luna SYBR Green qRT-PCR Master Mix (BioLabs, New England), cDNA samples, Gene-specific primer sets (β-actin, IGF-1 and TGF-β), PCR tubes, Micropipettes and tips, Hand gloves, nuclease-free water and laminar flow hood.

### Procedure

1. Thaw all the reagents on ice, mix by vortex and centrifuge briefly to collect all the solutions at the bottom.
2. Prepare your qPCR super master mix in a clean and sterile microcentrifuge tube by mixing the following components:

| Components | volumes (1reaction) | x reactions |
|---|---|---|
| Luna qPCR master mix | 10 µl | |
| Forward primer (10 µM) | 0.5 µl | |
| Reverse primer (10 µM) | 0.5 µl | |
| Nuclease-free water | 7 µl | |
| **Total Mix** | **18 µl** | |

3. Aliquot 18 µl of the super master mix into each qPCR tubes carefully.
4. Add 2 µl cDNA to the qPCR tubes (final reaction volume 20 µl) and cover the tubes. Make sure there are no bubbles in the tubes.
5. Program the real-time instrument with the provided thermocycling protocol:

| Cycle Step | Temperature | Time | Cycles |
|---|---|---|---|
| Initial denaturation | 95 ºC | 60 seconds | 1 |
| Denaturation | 95 ºC | 15 seconds | 40 – 45 |
| Anealing/Extension | 60 ºC | 30 seconds | |
| Melt curve | 60 – 95 ºC | | 1 |

## 6. Histological Procedure for Cockroach and Drosophila Head

### A. Dissection

1. Anesthetize with ice.
2. Under a dissecting microscope, remove heads using fine forceps.

### B. Fixation

Immerse tissue in 4% freshly paraformaldehyde (PFA)

For Cockroach heads: Fix for 24–48 hours at 4°C.

For Drosophila heads: Fix for 2–4 hours at 4°C.

### C. Dehydration

Transfer the tissue sequentially through graded ethanol solutions:

I. 70% ethanol for 30 minutes

II. 80% ethanol for 30 minutes

III. 90% ethanol for 30 minutes

IV. 95% ethanol for 30 minutes

V. 100% ethanol for 2 changes, 30 minutes each

VI. Xylene for 2 changes, 30 minutes each (note this procedure must be carried out in the fume hood)

### D. Paraffin Infiltration and Embedding

I. Transfer samples into histological grade paraffin wax at 58–60°C:

3 changes, 30 min each

II. Orient heads for desired sectioning plane (sagittal, transverse, or coronal) and embed samples in paraffin blocks using embedding molds.

III. Allow paraffin blocks to solidify at room temperature

### E. Sectioning

I. Trim paraffin blocks with a microtome to expose tissue and section at 5 µm

II. Float sections on a 45–50°C water bath and mount onto clean glass slides.

III. Dry slides overnight at 37°C or for 1 hour at 60°C.

**F. Deparaffinization and Rehydration**

1. Place slides in:

I. Xylene: 2 × 5 min

II. 100% ethanol: 2 × 2 min

III. 95%, 70%, 50% ethanol: 2 min each

2. Rinse in distilled water for 2 min.

**8. Hematoxylin and Eosin (H&E) Staining**

I. Stain in hematoxylin: 5 min

II. Rinse in running tap water: 5 min

III. Differentiate in 0.3% acid alcohol (1% HCl in 70% EtOH): 10–15 sec

IV. Rinse briefly in tap water

V. Blue in alkaline water (e.g., tap water or 0.1% ammonia water): 2–5 min

VI. Stain in eosin: 1–2 min

VII. Rinse in distilled water

**9. Dehydration and Mounting**

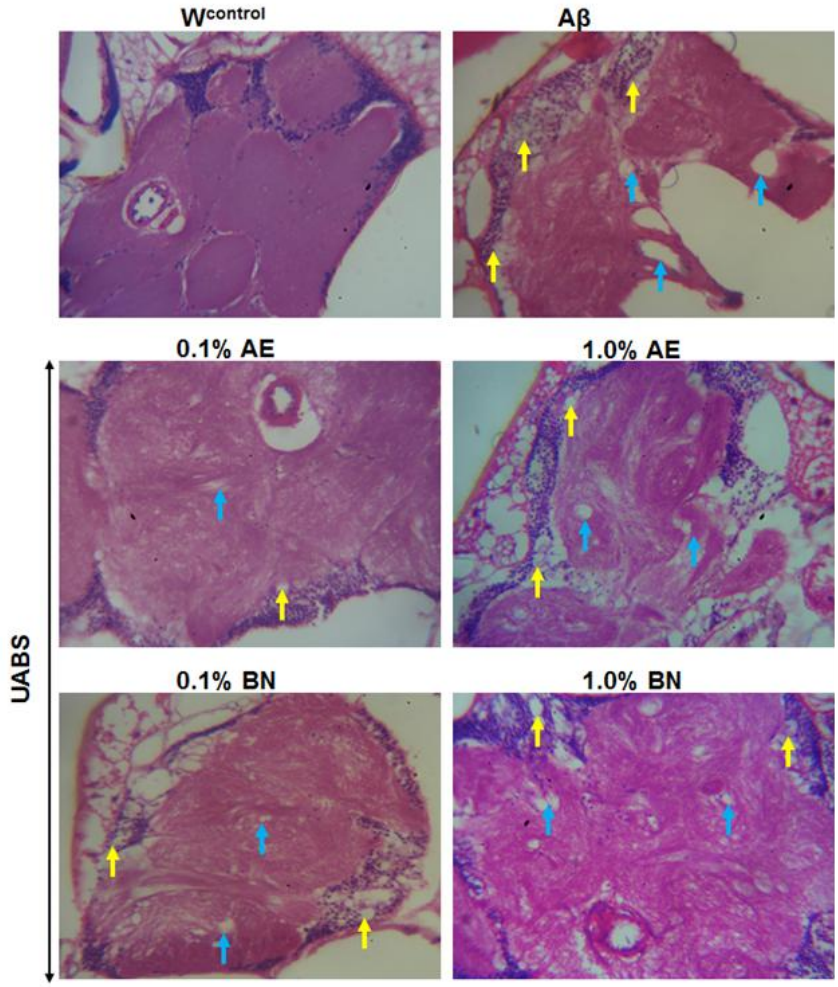
1. Dehydrate through ethanol series:

o 70%, 95%, 100%: 2 min each

2. Clear in xylene: 2 × 5 min

3. Mount with DPX (Distrene + Plasticizer + Xylene)

4. Allow to dry completely and Image under the microscope




**Sample Drosophila H&E Head Histological Stain**

## 7. Special DryLab

### Protocol on Computational Modelling and Rational Drug Design in Neuroscience

Software and Servers
PyMOL
Python Prescription
Biovia's Discovery Studio
UCSF-Chimera
AI Drug Lab
PubChem
RCSB PDB

Experiment 1: Ligand selection

1. Download the 3D Structures of the interested Ligands from the PubChem database.
2. Create a folder, Name (Ligand library/special name), and transfer all ligands' structures into it.

Experiment 2: Protein Selection and Preparation

1. Identify a key protein target implicated in any given neurodegenerative disease and note its role in the pathophysiology of the ailment.
2. Search the Research Collaboratory for Structural Biology's Protein Databank (RCSB PDB: https://www.rcsb.org/) for the 3D structure of the Protein identified in 1.
3. Click on the download Tab and select the Legacy PDB format to download the 3D structure.
4. Create a folder, Name (target_name/special name), and transfer the protein's structures into it.
5. Launch the UCSF-Chimera software from the desktop and import the protein's structure using the scheme: File → open →target_name folder.
6. Select a chain and other heteroatoms, such as a cognate ligand, solvents, ions not needed, etc.
7. Go to the actions tab, select atoms/bonds, and scroll down to delete. This step is to clean the protein from unwanted contents
8. Go to the Tools Tab, scroll to Structure editing, and select the DockPrep option.
9. Uncheck the "write Mol2 file" and click okay for the coming dialogue boxes.
10. Save the cleaned and prepared protein as PDB inside the folder.

Experiment 3: Ligand Preparation and Molecular Docking

1. Launch Python Prescription (PyRx) Suite 0.8 and adjust the force-fields and other useful parameters for ligand preparation.
2. Import the ligands from the Ligand library/special name folder, right-click on a ligand, and select the option: ***minimize all.*** Then, right-click again and choose the option: ***convert all to AutoDock Ligand (pdbqt).***
3. Import the prepared protein structure via the file Tab and select **load molecule.**
4. Right-click the protein and select AutoDock, and then click on the Make macromolecule's option.

5. Under the control panel below, choose the Vina wizard tab and click on the start button below.
6. Select the ligands and the protein from the Navigator panel. Click on the forward button under the control panel.
7. Adjust the Grid box by selecting the appropriate amino acid residues (Binding site) of the protein from the navigator panel.
8. Adjust the number of exhaustiveness (by default, it is 8) to suit your work, then click on Run Vina.
9. After the completion of the Docking run, extract the Binding energy results. Close PyRx.

Experiment 4: Complexing and Visualisation of Protein-Ligand Complexes

1. Launch **PyMOL** software and import the docked proteins and ligands (one ligand at a time).
2. Under the command line interface, type "select all", export the selected structure, and save it in the folder target_name.
3. Launch Biovia's Discovery Studio viewer and import the saved protein-ligand complex to visualize the molecular interactions between the ligand's atoms and the side chains of the amino acid residues in the binding site of the protein target.

Experiment 5: ADMET and Druglikeness

1. Log on to the AI drug Lab server (https://ai-druglab.smu.edu/), harvest the SMILES of the compounds of interest, and upload one by one into the interface of the server for ADMET prediction.
2. Copy results into an Excel sheet and arrange properly.

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# Impression Form

**Country:** Nigeria

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

Satisfactory, Great job
Good environment

**What are your impressions about ISN?**

ISN, a great organization
that offers good opportunities
for LMIC

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# Impression Form

**Country:**

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

The school was/is very impactful and significant to my career pursuit. I think the combination of courses, topics and seminars were/are all holistic for they one with interest in the different areas implicated in Neuroscience research & career.

**What are your impressions about ISN?**

Very helpful and supportive of Neuroscience education in Nigeria and Africa as a whole.
Kudos to them.

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# Impression Form

**Country:** Ghana

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

ISN Neuroscience School Akure has been very eye opening. I have received ideas and networked with people. I am thankful for this School

**What are your impressions about ISN?**

This is my first exposure to ISN and it is just unbelievable what good they have been doing. I am so impressed and look forward to benefiting more from ISN.

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# Impression Form

**Country:** NIGERIA

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

The School is loaded, enriching and Impacting. The ISN School Akure has entirely changed my Perspective about Neuroscience and Research.

**What are your impressions about ISN?**

ISN is doing well in trying to see that young Scientist emerging not only from Africa but from all around the World. There Impact is far reaching and the Outcome from Africa in particular is helping to yeild result in Funding schools like ISN Akure Neuroscience School Akure.

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# Impression Form

**Country:** Nigeria

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

Very insightful and educational. Every session was on point.
I do have a petition for the committee to look at for the next session of the school and its about the service of the breakfast in particular. Bread should not be handled with no plastic. Depicted some level of unhygiene.

**What are your impressions about ISN?**

Great and work to attend more and more.

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# Impression Form

**Country:** Nigeria

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

It has been an amazing time for me. I have learnt a whole lot. The sessions (lectures and practicals) have been insightful, inspiring and motivating

**What are your impressions about ISN?**

ISN is doing a fantastic job in the science world and they should keep up the good work.

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# Impression Form

**Country:** NIGERIA

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

It is a great school for me as a first-timer.

**What are your impressions about ISN?**

ISN is great.

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# Impression Form

**Country:** Nigeria

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

The School was very impactful. I learned various aspects of the theoretical and practical use of alternate research models and insilico analysis. Coming from the eastern part of Nigeria, I had no practical experience with these models. I learned a lot which I will use in my future research endeavors.

**What are your impressions about ISN?**

~~ISN~~ I am particularly impressed about how ISN supports young scientists to pursue innovative neuroscience research.

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# Impression Form

**Country:** NIGERIA

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

The Neuroscience School is a well articulated ~~as~~ one that is orchestrated in awakening the Consciousness of the younger researchers to the reality concerning, resilience, determination and passion as concerns growing in their research Carreex.

**What are your impressions about ISN?**

~~ISN~~ The ISN organization is really doing a great job in ensuring that young Scientist (Neuroscientist from across African Countries are being trained through their sponsorships.

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# Impression Form

**Country:** Nigeria

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

It has been a wonderful experience, and definitely I have learnt alot from the integration of the 3Rs. The organisation is close to perfect and it was truly centered around learning and training.

**What are your impressions about ISN?**

Its one of the leading Neurochemistry / Neuroscience body. I appreciate them for this opportunity.

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# Impression Form

**Country:** Nigeria.

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

The speakers & the Experience they shared. Which was very impactful

**What are your impressions about ISN?**

The best Society to grow with for both academic & Professional development.

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# Impression Form

**Country:** Nigeria

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

This training school is intellectually stimulating, blending theoretical insight with hands-on laboratory exposure. The training environment was welcoming, as well as challenging.

**What are your impressions about ISN?**

Attending the conference has been a source of enlightenment on the activities of ISN, and the supports they offer early career researchers.

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# Impression Form

**Country:**

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

It has been a great program. I have learned so much and it has helped me already and I know that it will aid my career greatly.

**What are your impressions about ISN?**

It is a great organisational body that is very interested in the growth of early career researchers and research in Africa

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# Impression Form

**Country:**

**What are your impressions about the ISN Neuroscience School Akure, 2025?**

It was been a wonderful experience so far. It is really interesting learning about the alternative models, grant writing and meeting people (students & facilitators) I have met. And most important the opportunity to present poster & practical session, which have given us real life experiences.

**What are your impressions about ISN?**

ISN is the scientific community that is here to support us in this resource limited country, I am happy to learn more about it, and ready to harness all the opportunities they have to offer.

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# Welcome to ISN Neuroscience School's Digital Gallery!

October, 2025

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# ISN NEUROSCIENCE SCHOOL AKURE, NIGERIA

THEME:

## Building Research Capacity in the use of Alternative Experimental Models for Promoting the 3Rs in Neuroscience Research in Africa

SUNDAY 19TH- FRIDAY 24TH OCTOBER, 2025

The Federal University of Technology Akure, Nigeria

Supported by:


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JNC
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Watch out for the next ISN Biennial Conference, @ Kyoto, Japan August, 2027


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The Federal University of Tec
025
Selenoproteins are not universal in
but are essential to vertebrates
Plantae
(Eukaryotic, multicellular)
Animalia
Drosophila willistoni
(eukaryotic, multicellular)
Fungi
(eukaryotic, multicellular)
Protista
(eukaryotic, uni or multicellular)
Eubacteria
(Prokaryotic,unicellular)
Archaebacteria
(Prokaryotic,unicellular)
Primitive cells
(Common ancestor)
2022/2023/2024 TETFUND
ENTREPRENEURSHIP
INTERVENTION


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TECHNOLOGY FOR SELF RELIANCE
Prof. Isaac A. Adedara
RESOURCE PERSON
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Prof. James O. Olopade
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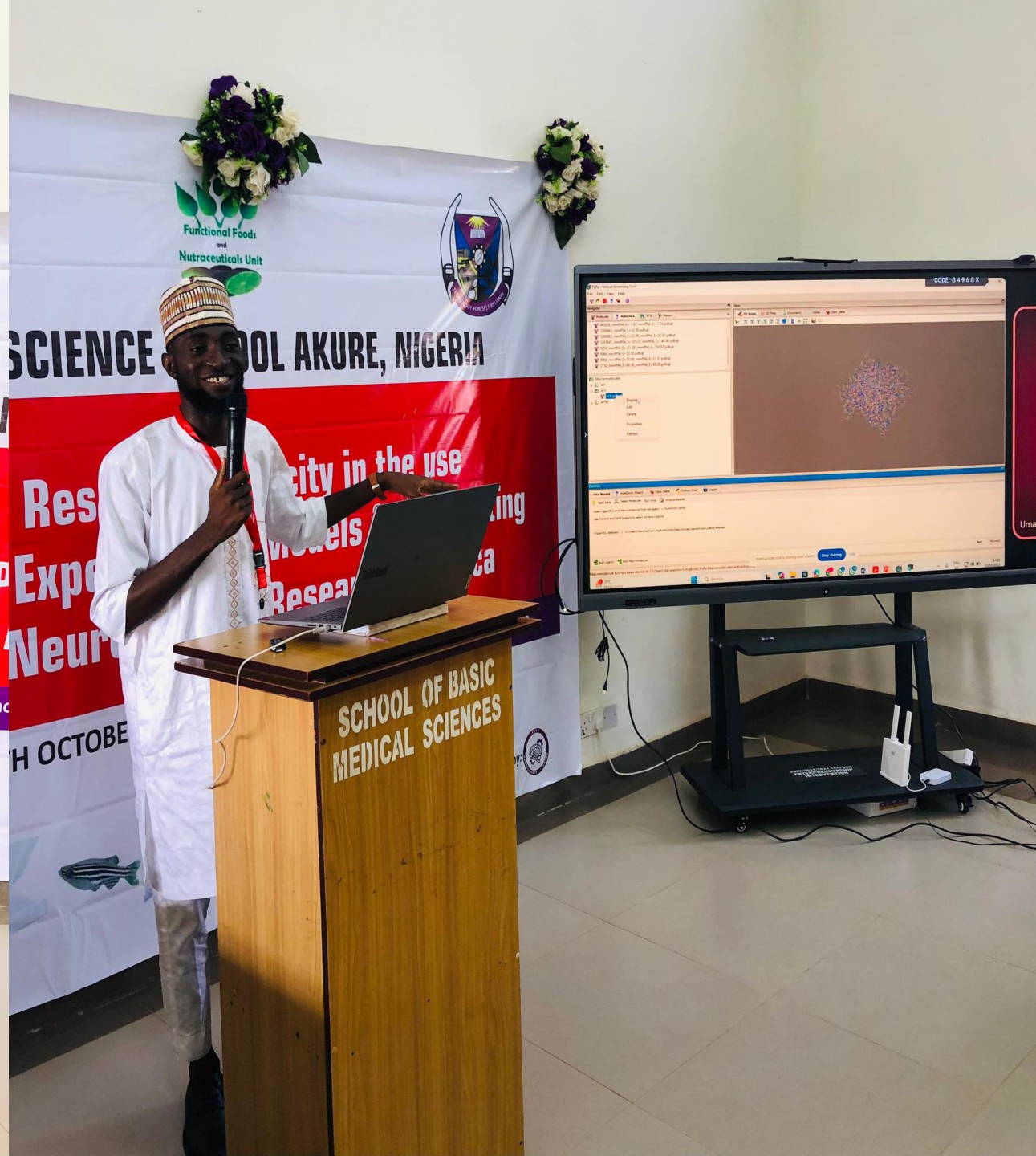
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THEME:
Building Research Capacity in the use
Models
Promoting
Nigeria


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VICE - CHANCELLOR
PROF. AYO OLAJUYIGBE
PROF. AYO AJAYI


Myth
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THEME:
The Federal University o

*Thank you!*