

BIOSCIENCE GIRLS DAY 2018



REPORT

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SUMMARY

Hephzi Tagoe was awarded an outreach grant of £1000 by the Biochemical society to run a girls in bioscience practical and mentoring day under GhScientific in Ghana.

The aim of the event was to provide senior high school girls a Bioscience experiential day which would involve engaging with professionals, considering career paths and trying out hands on practical Bioscience techniques.

The event took place on Saturday 10th March as part of international women's day celebrations and brought together 43 Senior High School girls from 4 different schools. The Animal laboratory at the Physiology department of the University of Ghana Medical School was used for the hands on practical experiment with support from some volunteers and research scientists based at the West African Centre of Cell Biology and Infectious Pathogens (WACCBIP).

Feedback after the event indicates that the girls enjoyed the experience and the learning opportunity that came along with it. The teachers who accompanied the students also took part in the activities and were pleased with the overall quality and content of materials shared on the day. New partnerships have been formed with the schools and many are eager to have their students partake in future events of like nature.

We will like to invite the biochemical society to consider a girls in bioscience partnership so we can continue to deliver this to many more girls across secondary schools in Ghana during international women's day.

KEY MILESTONES

SECURING MENTORS

The Chief Operations Officer of GhScientific, Dr. Thomas Tagoe is a founding member of the Ghana Neuroscience Society and also a lecturer at the University of Ghana Medical School. Leveraging on these two networks, we were able to secure 2 professionals and 13 research Scientists from the West African Centre of Cell Biology and Infectious Pathogens(WACCBIP) to partake in the day of which 14 were females and 1 was a male. The range of professions present are indicated below:

- **Neurologists**
- **Pharmacists**
- **Molecular Biologists**
- **Cell Biologists**

REGISTERING PARTICIPANTS

The Project Coordinator at GhScientific, Mr Salisu Silinba Nasiru delivered letters of invitation to some selected schools, many of which we have a history of engaging with. The event was also advertised via the GhScientific social media platforms as well as both online and offline networks of persons working to promote public engagement with science. In total 43 girls from 4 high different high schools took part in the event. A full list of schools in attendance and the number of girls from each school is detailed below:

SCHOOL	NUMBER OF GIRLS
Galaxy International School	12
St Mary's Girls Senior High School	10
Achimota Senior High School	10
Armed Forces Secondary Technical School	11

PLANNING AND PREPARATION

The venue of choice was an examination hall at the University of Ghana Medical School which was spacious and in close proximity to the Physiology laboratory allowing for a smooth transition between the mentoring sessions and the practical sessions.



Venue for the Bioscience Girl Day camp which was located at the University of Ghana Medical School Exam Hall. The seating of the hall was rearranged during the event.

Experiments were planned by Hephzi Tagoe in conjunction with Dr. Thomas Tagoe and the Lab technicians present. A total of 5 experimental stations were prepared.

A total of 6 volunteers were involved in implementing the Bioscience girl Camp, of which 3 are student members of GhScientific whereas the others were first time volunteers with GhScientific. Overall, the process was well organised and this reflected on the day as there was very little mishaps to report on.



Group picture showing participants along some mentors at the end of the day

PARTNERSHIPS

To increase the impact and effectiveness of the project, we established some new partnership. Some organisations such as the National Society of Black Engineers were unable to get on board this time round but expressed interest in coming on board for future installations of similar camps along different themes.

THE UNIVERSITY OF GHANA PHYSIOLOGY DEPARTMENT

The Head of Department, Dr. Charles Antwi-Boasiako made arrangements to have the laboratory available for our use. MPhil students from the department also volunteered to assist in guiding students during the hands on practical sessions. Following the success of the Bioscience Girls Day, the Department is considering partnering with GhScientific on future events.

SEVEN SEAS COD LIVER OIL (MERCK GHANA)

Seven Seas Cod liver oil (Merck Ghana) is a South African Pharmaceutical company with a branch in Ghana which also has keen interest in public engagement especially in female development which aligns with their corporate social responsibility programmes. Seven Seas Cod Liver Oil (Merk Ghana) provided both breakfast and lunch for the programme. The success of this event has led to conversations regarding future partnerships.

WEST AFRICAN CENTRE OF CELL BIOLOGY AND INFECTIOUS PATHOGENS(WACCBIP)

Dr. Patrick Kobina Arthur, board member of GhScientific also serves as the lead trainer at WACCBIP. Through his efforts endorsed by the center director (Prof. Gordon Awandare), we were able to secure 13 female Mentors. The mentors, many of which were experience such a role for the first time believed they also benefitted greatly from the experience and look forward to future opportunities of like nature.

HAPPENINGS ON EVENT DAY

The Morning Session

Students arrived between 8 – 10am as such some of the students missed out on the early parts of the event. Students from different schools were randomly split into 4 groups. There was an introductory address outlining the purpose of the camp and a presentation was made by one of our sponsors (Seven seas Cod Liver Oil), the speed mentoring began soon after the presentation. Mentors were divided into groups of 7 with each comprising of a minimum of 2.



A selection of ongoing sessions between girls and mentors

Groups were rotated between the mentors and each group had 15 minutes to engage with each mentor. The mentoring session lasted until lunch time with just enough time allowed for common themes and lessons to be shared by some of the students.

Lunch

During lunchtime, a playlist of Bioscience themed Ted Talks and other videos were on play in the background. Students also engaged with some of the mentors who remained for lunch.

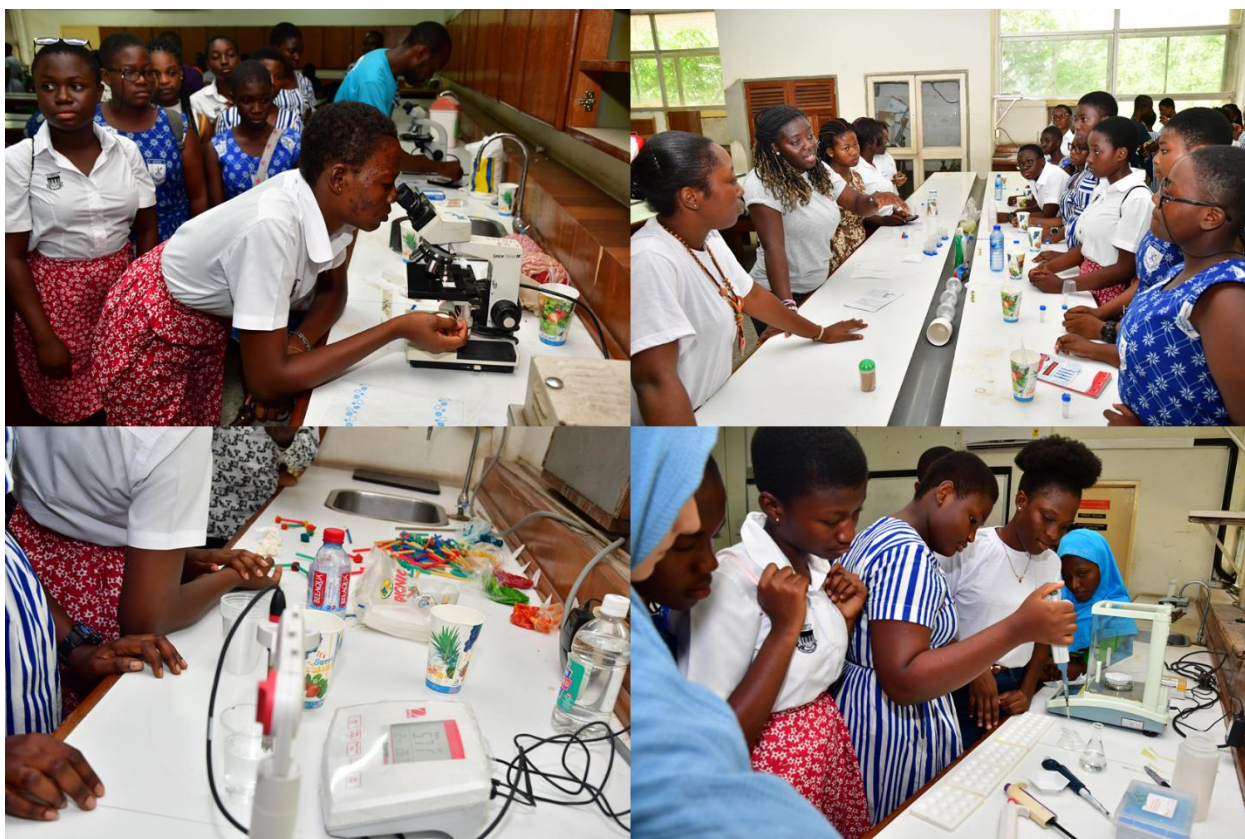


Students and mentors being served lunch at the break

The Afternoon Session

The afternoon session had students work through various stations which were set up with behavioural experiments. Each group spent 15-20 minutes at each of the stations indicated below:

- DNA Extraction
- How to use a pipette to measure small volumes
- Microscopy techniques
- Chromatography
- Making molecular models



Girls engaging in various activities such as microscopy (top left), Chromatography (top right), molecular modelling (bottom left) and Pipetting (bottom right).

Publicity

Both pre- and post-event publicity took place on all GhScientific social media platforms, namely Facebook, Twitter and Instagram. Information about the event was also circulated within email networks and also as part of the monthly GhScientific newsletter.

POST EVENT EVALUATION

Based on the outcome of the monitoring and evaluation, the following conclusions were drawn and steps for future engagement taken.

Successes

- The students enjoyed the opportunity to engage in candid conversations with diverse professionals working in fields that they were curious about and did not know where to get much information on.
- The students were excited about the possibilities what a future career in research holds
- The teachers expressed pleasure at an event which was outside the normal extra-curricular activities available to the students.
- The mentors were pleased with the opportunity to share their experiences and passions with a younger audience full of ambition.
- The mentors for whom this was a first experience, welcome the opportunity to mentor again at a given opportunity
- Laboratory reagents/ equipments were available.
- Event organization was well structured

Lessons Learnt

- Redesigning activities to be more fun in addition to educative
- There was a low turnout due to cancellations.
- A faulty microphone due to the inability to check on it prior to the event meant it could not be used.
- A delayed start to the event meant the full experience was curtailed


Future plans

- Seeking additional funds to be able to make practical experience days such as this a quarterly event held in different parts of the country to reach more girls.

APPENDIX 1: ADVERT/PROMO BANNER

International Women's Day 2018

BIOSCIENCE GIRL- CAMP




= (10 senior high schools) +
100 girls + Bioscientists)




^Mentoring
/ Practical techniques

@University of Ghana
Medical School

10th March 2018
9am - 4pm
#PressforProgress (of girls in STEM)



This event is organised by GhScientific with support from
Biochemical Society and Merck



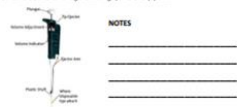
APPENDIX 2: HANDOUTS

GIRLS IN BIOCHEMISTRY

NAME: _____



How to use a Gilson pipette
Measuring accurately is a vital scientific technique. A pipette is used to transfer accurate volumes of liquid. They can go as low as 0.1 µL – very small! Below is an image detailing parts of a pipette.



Pipetting exercises
To help you learn how to pipette, we will be doing two different tests. These will help you to see how accurate your pipetting skills are!
Exercise 1: Weighing volumes of water. First we will pipette set volumes of water into a tube on a balance. 1 mL of water weighs 1g, so we will be able to see how accurate your pipetting is.

- 1) Place an Eppendorf tube on the balance and tare the balance so it reads 0.
- 2) Set the pipette volume to 1.0mL. What is the setting on the Gilson pipette. Write this below.
- 3) Pipette 1 mL of water into the Eppendorf and weigh on the balance. Record the reading below.
- 4) Repeat for volumes of 800µL, 500µL, 200µL, and 100µL. Record the readings on the Gilsons and the reading on the scales below.
- 5) Which Gilson pipettes did you use?

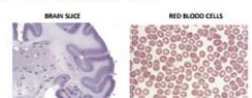
DNA Summary
DNA or deoxyribonucleic acid is a long molecule that contains your unique genetic code. Like a recipe book it holds the instructions for making all the proteins in our bodies. DNA contains four basic building blocks: adenine (A), cytosine (C), guanine (G) and thymine (T). The order, or sequence, of these bases forms the instructions in the genome.
DNA is a two-stranded molecule with a unique 'double helix' shape, like a twisted ladder. The bases always pair together in the same way. A with T, C with G. The two strands run in the opposite direction (antiparallel) to each other so that one runs 5' to 3' and one runs 3' to 5'.
In this activity, you will extract your own DNA from saliva.

1. Put a small amount of water in a plastic cup. It shouldn't even cover the bottom of the cup.
2. Rinse your mouth with the water, chewing your cheeks if you want extra DNA.
3. Spit out into the cup. Try to avoid too many bubbles.
4. Add a small pinch of salt.
5. Add 1 drop of detergent.
6. Swirl around – don't shake too much, we don't want too many bubbles.
7. Transfer to the Unobreakable tube.
8. Gently pour in the alcohol/isopropanol (about the same quantity as water) to form a layer on top of the water.
9. Leave a few minutes. DNA will look like white clumps, opaque string.
10. When finished, unscrew tube, and tip everything into the waste point provided.

Microscopy
Microscopy is the science that allows us to see the fine details in samples that we cannot see with the naked eye. The information gathered helps scientists to diagnose at the cell and molecular level.
In this activity you will look at some slides prepared and make notes of what you see. You will also prepare your own slides with either blood or epithelial (skin) cells which you can view under the microscope and take home.

- BLOOD SAMPLE:**
1. Use the lancet provided to make a pin prick.
 2. Squeeze out a drop of blood onto the glass slide.
 3. At an angle, place one side of the cover slip against the slide making contact with outer edge of the blood drop.
 4. Lower the cover slowly, avoiding air bubbles.

- SKIN SWAP:**
1. Take a tooth pick and blunt off both edges.
 2. Use the blunt edge to rub the inside of your cheek.
 3. Put a drop of water on the slide.
 4. Smear the swap you took from inside your mouth into the drop of water.
 5. At an angle, place one side of the cover slip against the slide making contact with outer edge of the blood drop.
 6. Lower the cover slowly, avoiding air bubbles.



Biochemistry is the study of the building blocks of life. This includes the chemical processes within and relating to living organisms and as such Biochemists have to know about the chemistry of molecules and how they make and affect living things.
With this knowledge, Biochemists can determine what molecule is good for making soap and creams, what molecule is best as a preservative, what the basic composition of a mixture is or produce new drugs.

PROGRAMME FOR THE BIOSCIENCE GIRL CAMP

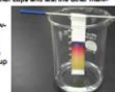
- 9am – Welcome, introductions and icebreakers
9.30am – Famous discoveries and techniques in Biochemistry
10am – Speed mentoring sessions
11.30am – Presentation from Merck
12noon – Lunch
1pm – Practical sessions
- DNA Extraction
 - How to use a pipette to measure small volumes
 - Antibiotic sensitivity tests
 - Microscopy techniques
 - Chromatography
 - Making Molecular models
- 3.30pm – Reflections and Open Forum Q&A
4pm – Close

Antibiotic resistance
Antibiotic resistance is one of the biggest problems facing the world today. This is because scientists have been unable to discover new stronger drugs that can kill bacteria. The old drugs are no longer effective as the bacteria have become resistant because patients don't always take all their medication.
In this activity you will test urine samples for bacterial infections. How can we investigate whether a patient has an infection? What samples can we take from a patient?
You are a scientist in a hospital lab and have to work out if your patient has a bacterial infection. You will use a spot test to check whether your patient has an infection.

1. Add one drop of Patient X's 'urine' onto a piece of filter paper.
2. Add one drop of the Bacteria Test reagent.
3. Look for a colour change. This means the patient has an infection in their urine. Use the infection reference chart to work out what infection the patient has, and what antibiotic will treat it.
4. The patient was then given a 10 day course of antibiotics (he was told to take two tablets every day for 10 days). He provided urine samples during that time. Now test the samples, labelled Day 2, Day 4, Day 6 and Day 10 following the steps below.

Chromatography
Chromatography is a method used by chemists to separate mixtures into their individual forms so they can be analysed. Paper chromatography is just one of the methods that scientists can use to separate different mixtures. Paper chromatography can be used to separate mixtures like ink, blood and food.
In this activity you will be using paper chromatography to separate out the components of ink to help solve a crime.
Alicia Kunt got to her office to discover her laptop was missing. A note was left on her desk asking for money in return for her laptop. The police have 4 suspects and their pens have been tested for testing. Can you help the detectives identify which pen was used to write the note?

1. Fill a glass / cup with about 10mL of water.
2. Cut a strip of filter paper about 10cm width and 15cm length.
3. Use your pencil and ruler to draw a line about 2cm away from the bottom of the filter paper.
4. Draw a dot using each pen along the line at about 2cm intervals.
5. Make a note of which pen makes which dot.
6. Lower the paper into the solvent BUT make sure the color dot stays above the solvent level. Carefully push a stick through the top of the paper to hold the strip at just the right level in the cup.
7. The solvent should immediately start moving up the paper strip, carrying the ink pigments with it. While waiting for the solvent to rise toward the top of the paper, set up your other cups and test the other markers, recording information.
8. When the solvent has finished moving up the paper strip, you can remove the paper from the cup and immediately mark with a pencil the highest point the solvent travelled up the paper strip.



Molecular models
The most common of the natural elements in our world are Carbon, Hydrogen, Oxygen and Nitrogen. These elements also make up the largest percentage of our body weight.
Use the play dough and tooth pick/sticks to make your own molecular models of the following:
Use the colour key below:

Blue (Carbon)	Red (Oxygen)	Orange (Hydrogen)
Yellow (Nitrogen)	Green (Sodium)	

Carbon dioxide (CO₂)
Water
Common Salt
Hydrogen peroxide
Carbon dioxide
Sodium Hydroxide
Carbon Monoxide
Ammonium

Gene mutation ice breaker activity
Form groups of 10 and line up.
The first person should memorise the information on the sheet and whisper to the next person. Whisper to the next person along until the last person. The last person should write down what the information they heard. Is this the same as the information on the first person's sheet? When and how did the information change from start to finish?

Welcome to the study of molecular behaviour. This activity mimics how our genes get mutated and causes diseases such as cancer. The information passed on from our DNA to make proteins can go wrong sometimes and cause a mutation which can lead to a gene defect.