

LIYSF 2018- A Life Changing Experience

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The London International Youth Science Forum (LIYSF) was created just after the second world war in 1959- 60 years ago, in an attempt to eradicate the divide between all nations. It was an attempt made by the founder Prince Philip, The Duke of Edinburgh to unite all nations through a common love of science. The forum's current chairperson Clare Elwell is who was a former attendee and now a medical physicist in University College London. She is also the founder of the 'Bright (Brain Imaging For Global Health) Project', which is partly funded by the 'Bill & Melinda Gates Foundation'. This organisation focuses on the effects of poverty and malnutrition on children living in areas of extreme poverty.

LIYSF was definitely an unforgettable experience for me, from the very beginning till the very end, it was full of laughter, surprise and excitement. Everyday was completely different to the next, there was never a dull moment at the forum. There were abundant insightful lectures, visits and activities. An open mind was definitely encouraged at the forum and I am glad that I entered without any expectation.

There were many lectures that truly impacted and surprised me. Topics that I initially assumed would be boring and did not align with what I am currently studying but some of these lectures proved to be the most interesting. From topics like the 'science of laughter' to 'materials for the 21st century'. However the lecture that completely stood out to me was 'the physics of cancer research', which was given by Dr David Robert Grimes, an Irish physicist and cancer researcher from Queen's University Belfast. Before attending this lecture, I was completely bewildered by the combination of words. 'Physics and cancer research?', I thought to myself. I was totally ignorant to the fact that physics played a large role in medical research.

Dr Grimes started off the lecture by giving us a brief recount on the history of medical physics, speaking about pioneers in radioactivity like Marie Curie, Henri Becquerel and William Roentgen. He also spoke about pioneers of biophysics like Johannes Peter Muller. He went into the applications of physics in cancer research; firstly discussing how Roentgen accidentally discovered X-rays. He was studying the path taken by electrical currents when being passed through a induction coil in a glass covered by black paper, while in a dark room yet he noticed a fluorescent glow. Later he discovered that X-rays could penetrate many substances, including skin. By 1896 the first radiography centre was opened and X-rays were used commonly, even though Roentgen had only discovered the X-ray the previous year. Dr Grimes

comically chipped in how after the discovery of X-rays it was excessively used. People carried around radium in their pockets unaware of the harmful effects. X-rays are used for imaging and also penetrate through many substances, however they are stopped by lead. X rays are high energy light rays and ionisation knock out electrons from molecules like DNA and other biomolecules (Causes harm to cells). However, this property allows them to be used in cancer research as they destroy the DNA in cancerous cells, rendering them ineffective. This is the basis of radiotherapy in cancer treatment, the X rays damage the DNA of the tumour cells. The cancer cells build their own blood vessel system and causes oxygen depletion in the body and leaves some cancer cells devoid of oxygen (anoxic). Oxygenated cancer cells respond better to radiation treatment.

Dr Grimes also gave us a brief outline of how physics (imaging) is used in cancer treatment and research. He spoke about computer tomography, magnetic resonance imaging (MRI) and positron emission tomography. Computer tomography is created by rotated X rays and then the image is constructed on a computer using mathematics. MRI on the other hand do not require any radiation and therefore is done using magnets. It is overall safer for the body in general but has some safety concerns as it involved magnets. There having been some horrifying cases, for example a decapitation due to metal speedingly striking someone on the end. However positron emission tomography is the most detailed and creates images down to the metabolic level.

Physicists are responsible for several things when it comes to cancer research/treatment. They monitor imaging, dosage, dosage distribution, radiation repair, radiation research and mathematical modeling. Overall I found this lecture very insightful and completely surprising. It really educated me on a field I never really thought about. Another thing that made this lecture enjoyable for me was the fact that Dr Grimes added an element of his personality to it. He added personal anecdotes and these really resonated with me.

During my time at LIYSF I was fortunate to have the opportunity to visit some world renowned institutions of science. I visited places like The Liverpool School of Tropical Medicine, University College London Hospital, The Babraham Institute Cambridge and The National Science Museum London. All the sites I visited truly impacted me in some way however the institution that made the most impact for me was The Liverpool School of Tropical Medicine. I was a bit apprehensive before going there, as I heard we would see snakes and I had never seen a snake before in real life but I knew they were dangerous (so I was obviously terrified). Immediately the speaker began, I knew that it was going to be an enjoyable visit but I never anticipated how amazing it would be. The speaker first introduced himself and explained the concept of tropical medicine to us. Tropical Medicine is a branch of medicine that solely focuses on disease that affect regions in the tropics like South America, Asia and Africa. Some of these diseases include malaria, yellow fever and

ebola. Tropical medicine was always something I had a strong attraction to due to the fact that I am originally from Nigeria, I just never knew it had a title but it was always something I aspired to do.

Firstly we were given a tour of the mosquito research department in the facility. The first thing I noticed was the distinct temperature difference between the corridor and the first testing room we entered. The room was also humid and these conditions were manually created to mimic the familiar temperatures of the tropics, thus allowing the mosquitoes to perform optimally. This room was used to test the effects of different insecticides on the mosquitoes and these tested were also performed on surfaces created to imitate the walls typically found in the homes in these tropical areas. The surfaces that we were shown included mud, brick and tiles. The insecticides were developed in a different institutions but tested there and these insecticides would be sprayed on the surface and the mosquitoes would be introduced to an enclosed area with the surface at close range. The aim of this test was for the mosquitoes to land on the sprayed surface and then be monitored to detect the effectiveness of the insecticides.

Next we were taken into a room where subjects partook in physical tests, for example some of the Phd students did tests were they were bitten by mosquitoes before and after they had been exposed to the insecticides. While other post grad students participated in mosquito net testing, which consisted of sleeping with mosquito nets that were manufactured with or without insecticides. Using a specialised camera the path of the mosquito was tracked, leading to the conclusion on the effectiveness of the mosquito net. We then taken to a lab where they were cultivating transgenic mosquitoes. Female mosquitoes are the carriers of the the malaria virus. These female mosquitoes genes were altered so that they no longer carried the virus and a special genetic marker was placed in their DNA allowing them to glow in the dark when seen under the microscope.

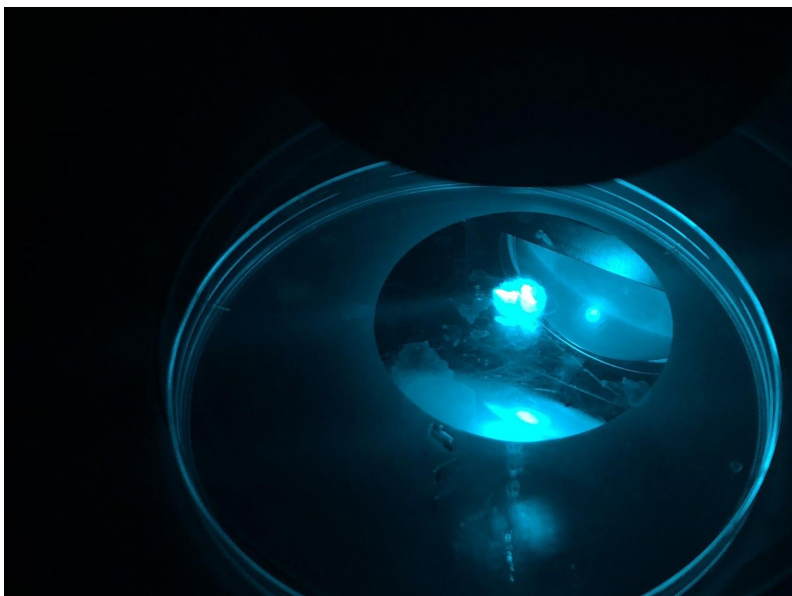


Figure 1: Transgenic mosquitoes glowing under a microscope.

Professor Janet Hemingway (director of the LSTM) then came to give us a tour of the hospital unit of the institution and the actual institution. We were also shown the very first nobel prize, which was awarded to Henry Dunant and he was also a lecturer at the institution.



Figure 2: First Nobel Prize.

We were also shown some labs where students were trained when going into the field (a tropical country). These labs were equipped with some of the most basic scientific tools e.g a portable microscope. The professor then explained that in these tropic countries there is a lack of electricity and other resources that would be needed to power high tech equipment and the students needed to be trained for any possible hurdle to be faced.

After anticipation we were finally taken to the snake ward of the facility, which when we entered were greeted by a 'DANGER VENOMOUS SNAKES' sign, just what I needed to heighten my anxiety. We were equipped with safety glasses and hand sanitiser as the air contained traces of venom which could have caused irritation to the skin or eyes. Then we were taken to a room where I was placed face to face with one of my greatest fears, we were surrounded by tens of snakes from different regions around the world. To my surprise a lot of them were from Nigeria and that was the day I conquered my fear of snakes. Not that I would like them free to crawl near me but now I know I can be in the same vicinity with them without fainting. We spoke about antivenom and how costly it was and the inequality in accessibility of drugs between western society and the developing world.

My trip to the Liverpool School of Tropical Medicine was one of the highlights of my trip and a trip that I believe has altered the direction of my life. It was very insightful and has heightened my passion in the eradication of medical inequality and curable diseases in the developing world. It was quite incredible to see the work being done

and very overwhelming to be surrounded by people who dedicate their lives to making a difference in the world. It is something that I hope to be a part of in the future.

Lastly and probably the main thing that contributed to my experience at LIYSF was the incredible people I met at the trip. I was really shown the true power of human connection. Before embarking on the trip I had previously thought to myself, 'what if I am not smart enough to connect with the people at this forum' but in actuality that was not the case at all. Within the first 10 mins of our arrival, Emily and I had already established a friend group comprised of a kiwi, a romanian and a british. I truly enjoyed being surrounded by such diversity as there were 70 countries represented at the forum, at least two from each continent. It was refreshing to learn about the different cultures around the world and by the end of the forum I had adapted something from each person I spoke to. It made leaving the forum very heart breaking but I know that some of the friendships I made over the few weeks are life long and we are currently planning a to meet in cyprus next summer.

Lastly I would just like to take this opportunity to thank Dublin City University and the department of Science and Health at the university for a truly amazing experience. It would not have been possible without the generosity of the university. It has without doubt been the highlight of my summer and will be something I carry with me for the rest of my life. I am overwhelmed by all the support I was given throughout the entire experience. Before coming to university I made a promise to myself to put myself in situations out of my comfort zone and to maximise my experience at university and this has definitely allowed me to stay true to that promise. As I continue my journey through university, this experience has helped me build my confidence and self believe and I owe it all to you. Thank You.