

BioMystery: A Deadly Discovery in the Lab

An Outreach Project by BioSoc, University of
Warwick

a report by Ranudi Kudellage



Why we think events like this are important...

This event was our second annual outreach event, aimed at students in the Coventry, Birmingham and Leamington Spa areas, from low Ofsted rated schools who would be applying to university in the next two years. These students were from underrepresented backgrounds and the schools they attended fit at least some of the following criteria:

- Over 30% of students claiming Free School Meals
- Over 20% of Polar 4 Quintile Students
- Over 40% of IMD quintile students (Index of Multiple Deprivation)
- Less than 70% of students reaching expected standards in reading, writing and maths at the end of KS2.



We think events like this are crucial to foster the untapped potential seen in many of these students, and equip them with extra skill and experience so they may be successful at securing a degree in the biosciences at their dream university.

Where it all began...

Following the massive success of our outreach event in 2022, I successfully applied for a grant from the Biochemical society in late September, in order to fund the vision of a bigger, better outreach event, in terms of attendees numbers, experiment quality and additional talks.

The Outreach team, comprising of Outreach Officers Morgan Barr and Simran Sum came up with the amazing idea of murder mystery themed lab sessions. This event would have the perfect mix of taster lectures, engaging experiments, higher education applications advice and tips, and a wonderful opportunity to engage in networking with undergraduate students who have been in their position just a few years ago.

The experiments were designed to reinforce the A-level curriculum with whilst giving further insight into the topics and allowing the students to apply exciting techniques to reinforce their knowledge on these topics.

We invited 2 schools from the local area, West Coventry Academy and President Kennedy School, Coventry, totaling upto more than 60 students and 2 teachers. The day ran from 9am-3pm. Below is the agenda:

Agenda

BioMystery: A Deadly Discovery in the Lab



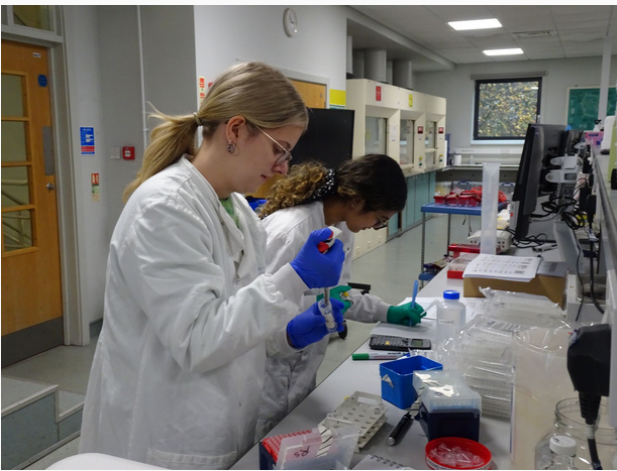
Arrival and welcome	9.30 am - 10.00 am
Lecture 1	10.00 am - 10.45 am
Lab 1	11.00 am-12.30 pm
Lunch	12.30 pm - 1.00 pm
Lab 2	1.00 pm - 2.00pm
Lecture 2	2.00 pm - 2.25 pm
Personal Statement Talk	2.25 pm - 2.45 pm



Lab Prep

Lab prep started a day prior to the event, where we poured agarose into gel tanks, prepared the DNA samples that students will be analysing, setting up ELISA plates and organising the lab benches with the necessary equipment and reagent volumes.

Our outreach officers also assigned shifts and specific tasks to our volunteers to ensure that all was set for the big day!



Taster Lecture and Pippetting Skills

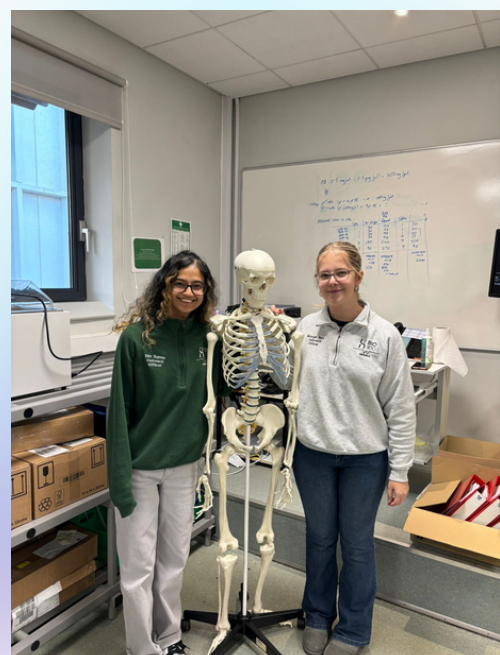


To start the day off, we had Dr. Robert Spooner, a professor at the University of Warwick, deliver an engaging presentation that covered the concepts of PCR, STR experiments and how these techniques play a role in forensic science. This allowed students to gain solid understanding of these analytical techniques before attempting them at the lab. It also allowed them to experience what attending a real lecture at university would be like, in order to demystify and ease the idea of being a university student.

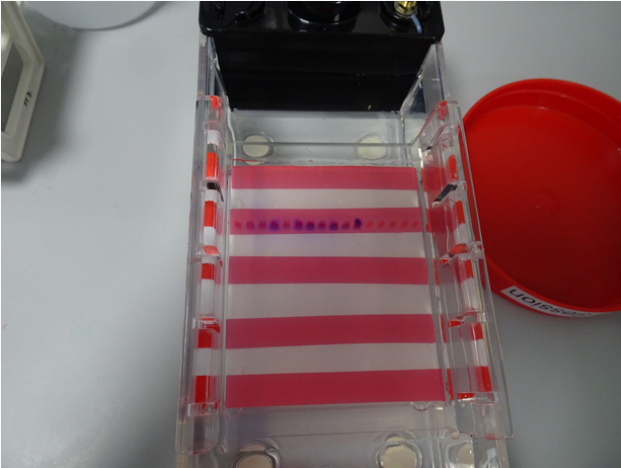
Next, the students were led to our state of the art teaching labs, where they donned lab coats and gloves. Morgan, one of our outreach officers, delivered a talk on basic lab etiquette such as using the correct bins for chemical waste and ways to minimise accidents in the lab.

She then introduced the students to their first lab skill of the day: micropipetting! This is a skill that all biochemists use often in their lab, so it was amazing that the students learnt this technique before even attending university.

Morgan taught the student to choose the right pipette for volumes, set the dial correctly and how to draw liquid up the pipette correctly. Students then practised their techniques and compared the uniformity of their droplets amongst their peers.



Gel Electrophoresis and Higher Education Application Advice

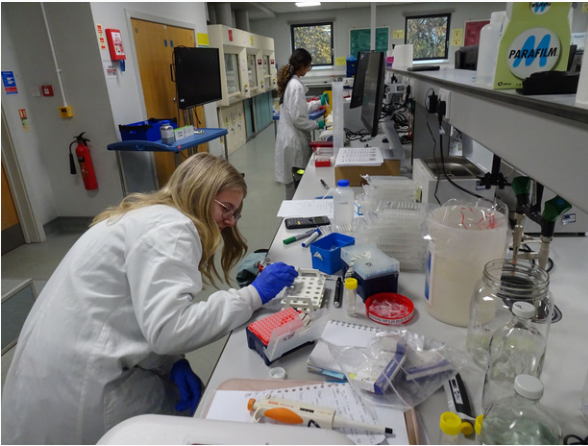


After this, it was time to prepare suspect samples using PCR amplification using help from demonstrators and then load the suspect samples into prepared agarose gel wells. Students took turns in their groups to load all 8 of the suspects into the wells. This allowed them to use their pipetting to practise. After all groups had successfully loaded each of the suspect samples onto their gels, they were set to run.

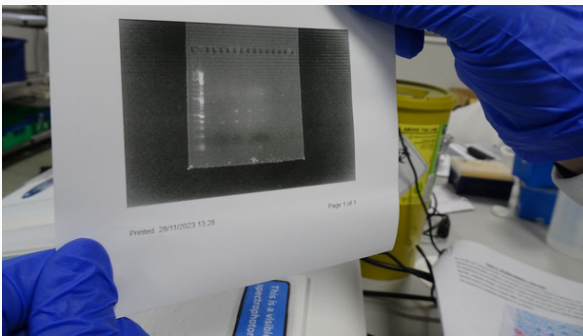
While the gels were running, students attended a talk on applying to university and producing competitive personal statements on UCAS by Lucy Brookes from the Widening Participation team. Lucy showed them a list of potential degree streams they could apply to if they currently undertake chemistry and biology at school. It was great to see that they have already started thinking about higher education, and some even had a list of their top 5 universities!



Gel Analysis



After those truly useful tips and advice from Lucy, it was time for lunch! Students received a well deserved break and were able to relax and chat to their peers over a slice of pizza. Particularly owing to the cost of living crisis, we wanted to make sure there was no financial barrier to attending this event, which is why we provided the attendees with refreshments.



While the students were having lunch, our team was busy visualising their gels and printing out clear images of the gels so they could analyse them. Prior to this, students were given a demonstration of how we would be imaging their gels while they were away.

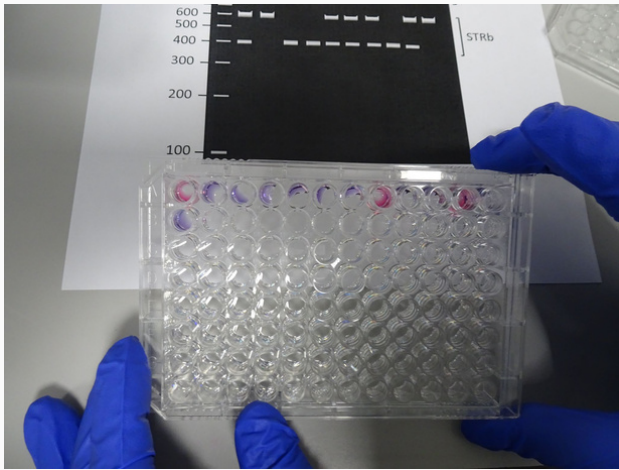
Once back in the lab, the students discussed among themselves and the demonstrators what the results meant. They also recognised what could have gone wrong if their gels didn't look great!



Nanodrop and ELISA Testing + Experiment Recap



After this, Dr. Lockey gave a short presentation about analysing the toxin responsible for Stuart's death, and using Nanodrop analysis we determined the culprit to be ricin. She explained different absorbance measurements for different compounds, and how this provides useful in forensic science. Students then proceeded with ELISA testing, which tested positive for two of the culprits, Rob and Beatriz.



For the final talk of the day, Dr. Lockey did a recap of all results, and asked students to make an informed guess on the murderer. Majority got it right, it was Robert Spooner! He dramatically rushed away from the room saying 'campus security will never catch me!' which gave all of us a good laugh.



Feedback

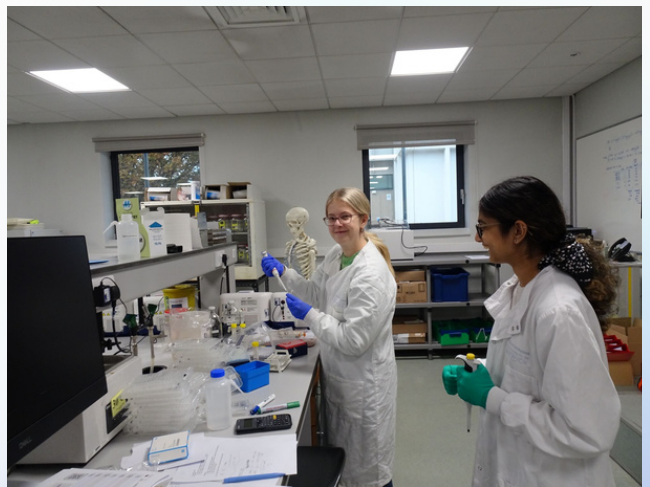
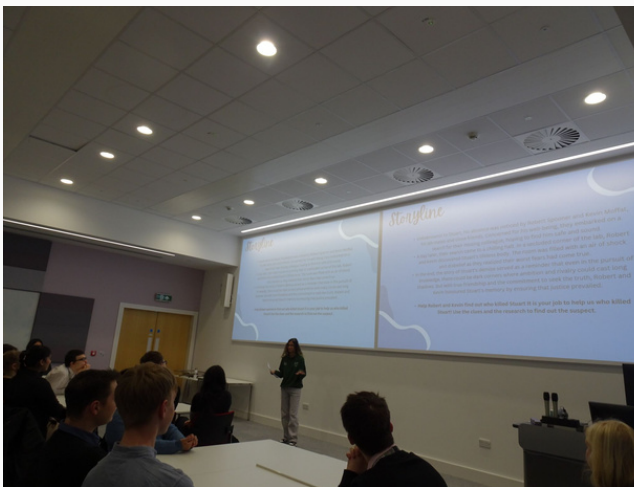
Feedback forms were collected with highly positive reviews.

I cannot express how grateful I am and amazed by the event today. The mix of practical, lecture and personal statement gems provided an outstanding and useful experience for my students. All staff were extremely helpful, friendly and professional. Thank you so much

-Mr John Green, Biology Teacher, President Kennedy School

We also got some tips to improve for next year, such as simplifying our STR experiments, and doing a collaborative quiz so students can make new friends from other schools.

Overall, BioMystery 2023 was hailed to be great success by all those who were a part of it!



Thinking Ahead..

We are immensely proud of the milestone we've reached. We had more than a 50% increase in attendees from last year, more collaborations within the Life Sciences and external departments and got to meet new amazing people along the way. We were able to provide certification for the lab skills the students received, which would prove to be highly valuable when applying for higher education and early careers. We also aim to track the students' progress in applying to higher education institutions in connection with their teachers, so we may analyse if this event had a significant impact on their attitudes and skills towards tertiary education.

As we are lucky to have a large cohort of trained volunteers, an event of this caliber, or even larger, is most certainly achievable with sufficient funding. The skills and knowledge our team gathered will be passed on to the future outreach team, as well as important contacts and connections we've built along the way. We are aiming to expand to a larger geographical area, outside of Coventry and Leamington Spa, and join hands with schemes that promote free summer internships in the biosciences for high school students.

We will also continue our Topic in a Box scheme, where we host fun and interactive activities for school pupils in groups of 30 using everyday supermarket items. Some of our most popular activities in the past year have been on extracting DNA from strawberries and the digestive system.

Our cohort of volunteers also host talks on a wide range of topics for local school students, such as urban farming and immuno-cancer therapy to give insight into new and upcoming areas of interest in the research world.

Acknowledgements

We would like to thank Dr.Christine Lockey, Dr. Robert Spooner and Dr. Kevin Moffat for their unwavering support with designing and running some of the experiments.

We would also like to thank Gerrie Keene, Georgia Lavender and Estelle Leitao for aiding us with lab prep when we were tight on our schedule. And to our BioSoc volunteers who took time off their busy schedules to act as lab demonstrators on the day - you were amazing!

A massive thank you to Lucy Brooks from the Widening Participation team for giving useful insight on higher education application to all attendees.

Thank you to Dr. Rob Huckstepp, Dr. Kevin Purdy, Dr. Miriam Gifford, Dr. Beatriz Lagunas and Samantha Wilson-Thain, for their portrayal of the suspects in order to create an engaging storyline.

And most importantly, thank you to the generous sponsorship made by the Biochemical Society without which this event would not have been made possible.

We at Warwick BioSoc cannot wait to host an even greater outreach event next year!

With lots of BioSoc love from Morgan Barr (Outreach Officer), Simran Suman (Outreach Officer) and Ranudi Kudellage (Vice President of Academics).

For any inquiries please contact:
warwickbiosoc@gmail.com