

Amgen Biotech Experience

Yvonne Higgins and Hilary Rimbi

Last September, I read a post on the ISTA website about the Amgen Biotech Experience, a programme that offers training in molecular biology experiments for secondary school teachers. The ISTA website is invaluable in keeping members abreast of current developments and educational opportunities in Science teaching in Ireland and it certainly pays to keep an eye on all the posts!

The Amgen Biotech experience is run in Ireland by Systems Biology Ireland (University College Dublin) and Biomedical Diagnostics Institute (Dublin City University) and is funded by Amgen, one of the world's leading biotechnology companies. The programme which is free and endorsed by both the ISTA and the PDST was set up in Ireland in 2013. Last year 19 teachers and more than 900 students benefited of the ABE programme. Having read all the details, I decided that this would be a wonderful opportunity for my students to experience cutting-edge research methods in the classroom that have real-life applications. I promptly applied for a place on one of the training workshops which was run in UCD on Saturday the 3rd October, of last year. Teachers who take part in a full day training workshop (10am–4pm) can access professional grade scientific equipment that they can borrow to teach their students in school.

Training Day

As an educator, I was highly impressed with the training day which was run in UCD by the project co-ordinator, Robert Schwamborn. The teachers present were provided with training in four different laboratory techniques;

Lab 1: Micro-pipetting

Lab 2: DNA profiling and DNA gel electrophoresis.

Lab 3: Restriction Digest and DNA electrophoresis.

Lab 4: Ligation

As this was my first year to participate in the programme; I could deliver Lab activities 1 and 2 to my own students. Teachers who were participating in the programme for the second year and who had previously undertaken these lab activities with their students could move on to deliver Lab 3 and Lab 4 to their students. It was wonderful to meet teachers on the training day who had taken part in the programme the previous year such as Hilary Rimbi from St. Andrew's College, Blackrock, who were able to testify to its value in the classroom. We were also provided with training on; how to integrate these techniques into the curriculum, set up and store all the equipment provided, health and safety, real world applications of molecular biology and ethics. The training day finished with a very engaging and informative presentation from Mr. Alan Pearson, Senior Manager Plant Support, Amgen, Dublin, on what is involved in the everyday operation of a biotechnology company and the career possibilities for STEM graduates.

The resources made available to the teachers were of a very high standard and extremely well produced; they consisted of a power-point presentation which provides background information on all the techniques involved and well-illustrated, concise, clear instructions on how to carry out each of the activities; a teacher laboratory manual, student exercises and links to informative videos on DNA fingerprinting e.g. <https://www.youtube.com/watch?v=ZxWXCT9wVol>

Equipment on Loan:

At the end of the training day, the teachers present booked a two week slot during which they would carry out these cutting edge activities with their own students at school. I teach in Magh Ene College in Bundoran, Co. Donegal and although the Amgen Biotech experience currently operates for schools in the Dublin region, I was in the lucky position to be able to arrange the collection and return of all the equipment to UCD. The programme loans schools with class-sets of all the equipment required to carry out each activity including; micropipettes, micro-pipette tips, micro-tube racks, electrophoresis gels, Bacterial DNA samples, buffer, gel electrophoresis kit, beakers for tip waste, bottles to collect waste in and even gloves!! The DNA samples and electrophoresis gels must be kept refrigerated. All pieces of equipment including waste are returned by the school following their two week loan period.

Back at school:

I carried out Labs 1 and 2 with five classes in my school over the two week period; a 3rd year Science class, a TY Science class, a 5th year Chemistry class and two 6th year Biology classes. Lab 1 which dealt with micro-pipetting was carried out with each class during a single class period. The students practiced using micropipettes to deliver different volumes of a red dye onto a filter-paper exercise. The students wrote their names on the back of these cards which I laminated after each lesson and returned to each student as evidence of their work.



Figures 1 & 2: Amgen Biotech Experience: micro-pipetting exercise on filter paper.

Lab 2 required the students to work in groups of eight to undertake a forensic analysis investigation where they analysed samples of DNA taken from a fictional crime scene of a burglary to determine who had carried out the illegal act! This investigation was carried out during a double lesson. The students loaded their DNA samples onto an electrophoresis gel in order to compare the DNA samples of all the suspects of the crime with the DNA sample collected from the crime scene. The students were excited to learn new techniques and to have the opportunity to use different laboratory equipment. All the students had heard of DNA testing and as a result were very enthusiastic to learn more about the scientific processes involved. For senior Biology students, it provides an invaluable opportunity to have hands-on experience of the technique which they study as part of their Leaving Certificate course.

As a way of enhancing interest for Science subjects, I found the Amgen Biotech experience to be unique and I would highly

recommend it as a method of bringing cutting-edge research techniques into your own classroom. A particular advantage of this programme is that it can be carried out in your own school laboratories without having to bring the students to a 3rd level laboratory. As a result, larger numbers of second level students can benefit from the programme. I eagerly hope that I will be able to offer the experience to more students in my school in coming years.



Figure 3: Some of the class-sets of equipment ready to distribute to students.



Figure 4: Students pipetting DNA samples onto Electrophoresis gel.

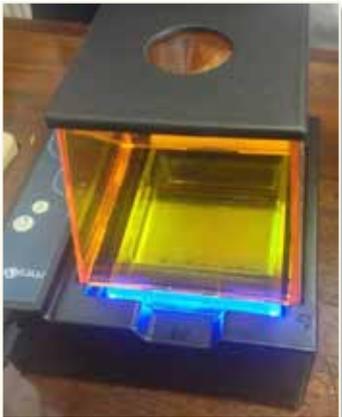


Figure 5: Mini Gel Electrophoresis kit

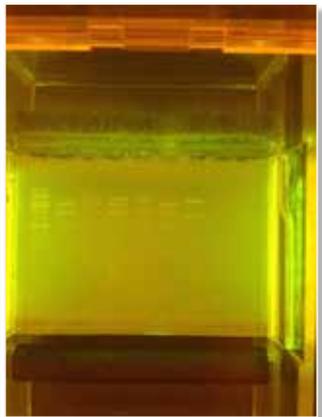


Figure 6: DNA profile of DNA samples from Forensic Science 'Crime Scene'



Figure 7: Leaving Certificate Biology students in Magh Ene College, Bundoran, taking part in the Amgen Biotech experience.

Yvonne Higgins, Magh Ene College, Bundoran

Perspectives from another school: St. Andrew's College, Blackrock. Co Dublin

Like Yvonne, I keep an eye on the ISTA website – it really is a great place to read about courses and opportunities. Having done two training days with Robert at UCD, I was eligible to offer all four labs to students at my school, and have booked the kits for three weeks following the February mid-term break. The kits are so well organised, and the instructions so clear, that it is a real pleasure to run the labs in school. Wendy Gilmore and I both did the initial training in January 2015 and were able to offer labs 1 and 2 in our school last February. We ran the session with all of our 5th year biology students, some 6th year students, and demonstrated it to one 1st year class. As only teachers who have attended the training days can use the equipment in school, other science teachers in school covered our classes while we ran the labs with their classes – this enabled more of our students, not just our own classes, to participate in the ABE.

I was a bit apprehensive about how some of our students might handle the unfamiliar and high-tech equipment, but I need not have worried. The practice session micropipetting dye onto filter paper and into agarose gel allowed all students to familiarise themselves with the equipment and techniques before having to load DNA into the wells in the gel in lab 2. The practice filter papers, once named, dated and laminated, made excellent souvenir bookmarks for the students. The labs were easy to run with the students. Students approached the labs with enthusiasm, and all students, regardless of gender or academic ability, stayed focused and showed a keen desire to perform the skills well. It was one of the most rewarding labs I have run with leaving cert. biology students.

In terms of organisation, if it is possible, it is better to block off one laboratory for the labs – work stations can then be set out once for all the practical activities over the two week block. There is then very little organisation to do between labs, as students can be instructed to fill up disposable tip boxes after use, reset the micropipettes to 20.0, throw out used agarose practice gels and lay out the apparatus neatly in each station after use – this can be done while waiting for the gel electrophoresis to run. The teacher then only has to put out new gels in buffer and new eppendorfs with DNA for the next class.



Figs. 8 & 9 Students at St. Andrew's College practising loading the agarose gel

We are looking forward to repeating the experience with our students again this year and would encourage others to enrol in any further training days.

Hilary Rimbi, St. Andrew's College

