Whose GENES are these?

By Dr Ben Goult

The event we ran was a two-day workshop entitled "Whose GENES are these?" 54 Year 12 students from a number of local schools visited the University of Kent on 10th and 11th June 2015, to take part in an exciting lab based experiment to uncover the genetic basis of life.

The aim of the workshop was to provide an exciting event, giving A-Level students the opportunity to work within a University environment alongside trained researchers to perform a real scientific experiment looking at their own genes. The project was selected as it directly complimented the A-Level Biology course providing hands on experience of some of the core curriculum concepts, namely Polymerase Chain Reaction (PCR) and DNA fingerprinting.

Our two day event began with an introductory lecture, setting the scene about forensic biology and the basics of PCR and DNA analysis. We used lots of popular culture examples (CSI, Jurassic Park etc.) to link the experiments to what they already knew. In this talk we also outlined the events health and safety; how to stay safe in a laboratory.

Following the talk, the students donned their lab coats and entered the laboratory to begin their experiments (see photos in attached poster). The students worked in small groups in our undergraduate practical laboratories. Within the event students purified their own DNA (from cheek cells extracted using a salty mouth rinse) and used a polymerase chain reaction (PCR) to amplify a region that can exist in one of two forms (the experiment is described in the Flowchart on the attached poster).

The second day began with another short lecture, revisiting the previous day's work and setting the scene for the second half of the experiment. Following another session in the laboratory we regrouped to analyse the results and discuss what we had discovered. As a class, we explored how such information can be used to calculate allelic frequency within a population and directly relate this to human disease. PCR forms part of the Biology A-Level curriculum and so this was of special interest to the attending students who were all studying A-Level Biology. The students were given the opportunity to present and discuss the outcomes of their experiments.

As well as providing an opportunity for the students to get inspired about science, a longer term aim of this event was to develop closer links to these schools to enhance the science training and opportunities they receive. The ultimate aim of the event is to inspire a new generation of scientists. By giving these students the opportunity to carry out a real scientific experiment, and analyse/interpret real data, we hope it gave them a desire to pursue research and a career in science.

It is a real ambition of ours to expand our Outreach program such that Outreach becomes recognised as a major strength of the School of Biosciences with high impact. As well as being a fantastic opportunity for the 54 pupils who took part, we are pushing to use the event as the launchpad to us achieving this longer term goal.

The workshop was very successful, and everyone, including the students, the demonstrators and the academics had a lot of fun. We obtained very positive feedback from the students who attended the workshop on the day, and compliments from the schools saying how pleased they were with the event and how the students had benefitted hugely from it. Better yet, evidence of the success of the event was that all of the schools involved asked to be notified as and when we run similar events, which will lead to stronger links with these schools.

All in all, we had a great couple of days running this workshop and based on the feedback from the students and teachers we definitely plan to run this activity again, and to roll it out to additional schools. As well as inspiring the students we also got some of our postgraduate demonstrators enthused about helping with Outreach and so we now have enhanced capabilities, which are enabling us to plan and develop further events and strengthen our links to local schools.

Whose genes are these?

A two day outreach workshop in DNA isolation and analysis

Photos above: Christopher Miller takes the students and shows them how the PCR amplification works Figure (left): Flowchart summarizing the whole event. In this activity students hunt for a specific Alu repeat (a 300 base pair repetitive sequence of DNA) within a specific region called PV92 on chromosome 16. Over evolutionary time, up to 1 million copies of the Alu repeat have become randomly inserted throughout the

human genome. Some of us carry an Alu insertion and some of us do not. Such variations among individuals' genotypes are inherited — and are the raw material of

genetic diversity and evolution. These subtle variations in our DNA are evidence of our ancestry and form the basis of personal identification via DNA fingerprinting.



ubate at 100°C for 6 minu

Centril sample 5 minut Incubate at 66°C for 10 minutes, then agitate vigorous

es th

se PCR samples in agarose gels at 100 V for 30 minutes. Stain with Fast Blast* DNA stain

ne student genotypes for Alu insertion and perform

Within this outreach event students purify their own DNA and use a polymerase chain reaction (PCR) to amplify a region that can exist in one of two forms. As a class they then demonstrate how such information can be used to calculate allelic frequency within a population and relate this to human disease.

The event is funded by the Biochemical Society and the School of Biosciences, and all training, supervision, lab reagents and equipment are provided by staff and postgraduate students.













Outreach officers (2015): Dr. Anastasios Tsaousis and Dr. Ben Goult Special thanks to Dr. Campbell Gourlay for introducing the first event in 2014 and Dr. Rosalyn Masterton for assisting with the organisation of the event Photos were captured by Dr. Wei-Feng Xue

The 2015 event was financially supported by the Biochemical Society

