Bringing Genetics to the Masses: The Development of a Low Cost DNA Extraction and Profiling Kit

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Arising from discussions in school that strawberries grow on trees, I discovered that the Arbutus unedo (Strawberry Tree) grew natively in Ireland and mainland Europe but not in the United Kingdom. I hypothesised that the genetic origins of the disjunct Irish population were to be found on the Iberian Peninsula and the Irish population was based on a long range dispersal event over 4,000bp years ago. As our school did not have the necessary equipment for DNA profiling, nor I access to a university or research institution to test my hypothesis I decided to build the necessary equipment to carry out the process. Extensive research was carried out on specifications of existing technologies in order to overcome design and construction problems. After a series of prototypes were built and tested, a vortex, centrifuge, thermal cycler(PCR), transilluminator, gel tank with power supply and gel camera were completed. Basic coding was embedded in the centrifuge, PCR and Electrophoresis power supply. All equipment was constructed (for less than $150) using cheap and recycled materials. The functionality of the equipment was validated following sequencing using BLAST, which confirmed that the psbA–trnH intergenic sequence of the Irish tree was phylogenetically identical to that of the European tree thus supporting my hypothesis. This level of insight into the DNA profile of the Arbutus unedo would not have been possible without the constructed equipment. The development of this low cost apparatus opens up the field of study and research to a global population of junior students.

Awards Won:

Fondazione Bruno Kessler: Second Award of $1,000