The exciting quest of bringing science to young students

Daniela Quaglia (University of Montreal, Canada)

Our teenage years are critical in that they are the moment in which we make career decisions that will decide what we will do in life. When my moment came, I had no doubt that I wanted to enrol in a chemistry degree at university. What struck me the most, however, was to discover that chemistry was not what I expected. I realized it soon after having started my undergraduate studies. In retrospect, how could I know what chemistry was since nobody had ever brought me to a laboratory?! I was one of the lucky ones that decided that chemistry was, in fact, exciting, and I was able to adapt and choose a path that would bring me towards multidisciplinarity because of my deep love for the molecular biosciences. But not everyone was as lucky and I have seen many talented people dropping out or changing their career halfway through their studies: a very stressful life decision to go through. This is the reason I am so actively involved in outreach activities: to help young students understand what a job as a laboratory scientist looks like.

Our activity is made possible by a collaboration between the groups of Professor Joelle Pelletier and Professor Alexis Vallée-Bélisle in Université de Montréal, the “École des Protéines” (the Protein School) and PROTEO, the Québec Network for Research on Protein Function, Engineering and Applications. It consists of an interactive workshop (“Technology Goes Bio: Enzymes to the Rescue!”) to be delivered to an audience of upper secondary school students. The idea behind it is to give the students the means to develop a new passion for molecular biosciences and to ultimately show them future career possibilities that they might not have been aware of.

In our workshops, students are taught the concepts of enzymatic digestion, optimal conditions for enzymatic action, electrophoretic migration and gel staining, all while studying a practical example (detergents used to break down a fictional meatball stain on a T-shirt) in a fun and welcoming environment.

A Biochemical Society Outreach Grant allowed us to gather the necessary materials to carry out three of the six workshops scheduled for the 2015/2016 school year. Two of the workshops have already taken place respectively on 10 and 16 December, with the last session scheduled for March.

A typical workshop day in the laboratory

Setting up a workshop session requires real teamwork and the definition of specific roles for every participant.

After Jean-Daniel Doucet, full-time project manager of the Protein School, makes the first contact with the schools and the teachers, a date is set, he sends out the full programme to the teacher and we start to get ready to welcome our guests.

Our demonstrators are an invaluable element in our workshops. In fact, not only do they help out the students during the activity, but they are also in charge of ordering and preparing the material and setting up of the laboratories before the students’ arrival.

The event is scheduled to last approximately four hours. During the day, the students (in groups of between seven and 16) participate in two PowerPoint presentations: the first gives them a heads-up on the activity and the second is centred on career prospects in science.

In the laboratory, we study the effect of the enzymes contained in a commercial laundry detergent on a fictional meatball stain, which is represented by a solution of the protein bovine serum albumin (BSA). Geared up with the proper protective lab wear, the students are familiarized with the use of the micropipettes, so that they can perform their tasks themselves, as a professional bioscientist would do. During the experiment, they study the effect of different temperatures (such as 4°C, room temperature and 100°C) on enzymatic digestion. They also learn the
Learning Curve

concept of a negative control (a sample containing BSA only, but no enzyme).

While the protein gets digested, the students – with the guidance of the demonstrators – also set up the apparatus to run polyacrylamide gels (pre-cast by the demonstrators). When the samples are ready, they add the loading dye and, under supervision, they load the samples in the gel, together with a molecular marker.

It is fascinating to see how readily engaged the students are during the activity and how many pertinent questions they ask. They know little about careers in science, and they want to know more: this is exactly the purpose of our workshop.

During the event, I am in charge of the communication and promotion of the workshops through the use of social networks (such as Twitter, Facebook and LinkedIn), pictures and blog posts, when relevant. Our international network allows us to reach a wider overseas audience.

**How did we do and what does the future hold?**

The first two workshops welcomed groups of 16 and seven students from the school Pensionnat Saint-Nomde-Marie and the Collège d’Anjou (Montréal) respectively. The first is an all-girls high school, which is in line with our goal to try encourage diversity in our programme. The experiences were very satisfactory, with the second workshop showing a significant improvement (i.e. the first experience was a bit too long, and the students did not have sufficient time to analyse the gel after de-staining).

During the activity, the students had a lot of fun discovering the micropipette and the gel apparatus, as the following feedback demonstrates:

“I loved the fact that we were able to use technologies that are not available at school. I found that the activity gave me a better idea of what biotechnology is.”

Our survey reports that more than 88% of the participants enjoyed our workshops and almost 95% felt they acquired new scientific knowledge after participating. For at least 80% of the students, the workshop changed at some level the perception they had of laboratory-based research.

The second teacher asked us to “please let me come back next year with a further group of students!”.

We are proud to have been able to engage many young women, and we are targeting to reach an audience coming from public and ‘further afield’ schools in Québec, to be able to include hard-to-reach groups of students, which are less likely to come in contact with professionals in the biosciences.

The fact that we were able to give a glimpse of what a career in the biosciences looks like to our young audience is source of great pride for us. To set up a workshop requires time and effort, but the experience is extremely rewarding for all. I believe that, as scientists, we should feel a certain obligation to engage with young people and to give them the opportunity to maybe discover a new passion. We are very lucky to be working in such a unique and intellectually stimulating environment, and we should nurture our potential peers of tomorrow. Science is often seen as scary and unapproachable. I am confident that an activity such as ours can positively contribute to turning the fear into excitement!

**References**