As a first-year biochemistry student, I had my fair-share of laboratory practicals, which I found fascinating. This interest in laboratory work encouraged me on a decision to seek a career as a research scientist. Due to my goal, I wanted to visit a research laboratory to learn more about the field of epigenetics and the research methods used in this area. Also, my wish was to see how a laboratory functions and to get some insight on a researcher’s life. With the help from the University of Leicester and professor Shaun Cowley, I managed to set a visit to Bracken laboratory in Trinity College Dublin, Ireland, from 9th July to 13th July.

**Day 1.**

I got to Dublin at around 8 am. The first things to take care of were accommodation and finding my way to the laboratory. After getting to my room in the campus of Trinity college, I went to the laboratory, stationed in the Smurfit institute of genetics (1).

There I met with one of the laboratory’s scientists, Gerard, and a PhD student, David, both of whom I would work-shadow during my stay. We discussed briefly the plan of working on an experiment including ChIP (chromatin immuno precipitation) technique.

To put simply, this experimental technique is a way to investigate how proteins and DNA interact in the cell. This experiment is important to find out if a certain protein is associated with specific genomic regions, such as transcription factors or other DNA binding sites. ChIP is also used to define where exactly in the genome there are locations associated with histone modifications, thus indicating histone modifiers.

After a quick catch-up we separated until the next day, leaving me with a lot of free time on my hands. As it was my first time in Dublin, I decided to use my free half day to get to know the city better. Thus, I visited the Dublin Castle (2), St. Patrick’s park (3), St. Stephen’s Green park (4), Iveagh gardens (5), and was amazed by how beautiful the city of Dublin is.
(2) Dublin Castle.

(3) St. Patrick’s park.

(4) St. Stephen’s Green park.

(5) Iveagh gardens.
Day II.

In the morning I joined Gerard and David at the laboratory. The experiment that we were to conduct was for finding specific locations in the genome where histone modification occurs. The whole experiment would take about two and a half days.

The first part of the experiment included three steps: fixation, sonication and immunoprecipitation. Fixation was used for crosslinking DNA and associated proteins on chromatin in living cells, creating DNA-protein complexes. When these complexes were formed the following step- sonication- was taken. Sonication is necessary for breaking the cell membranes and shearing DNA into smaller fragments (of ~500 bp) by utilizing soundwaves (6).

![Sonication](image)

(6) Sonicator used in the sonication step.

After ending up with DNA fragments of the required size, the third step was immunoprecipitation. This process consists of using specific antibodies for binding to the targeted antigens of required proteins. After putting the antibodies into the ChIP samples, the mixtures were placed onto a rotator in a fridge at a temperature of 4 centigrade to incubate overnight. By putting the samples away to incubate we settled for the day.

I spent the afternoon walking around the city center without any specific plan. During my walk I got my eyes on several sights worth visiting in the following days.

Day III.

We picked up from the previous day by taking the incubated samples out of the fridge. This day’s task was to collect the required DNA-protein complexes using magnetic protein beads. The beads were put into the ChIP reaction mixtures, but prior to that they had to be washed with a ChIP buffer. An incubation of 2-4 hours at 4 centigrade followed.

Then, several wash steps took place utilizing different solutions and buffers. A magnet during those steps was used to collect the beads to one side of the Eppendorf tube. Utilizing a magnet makes it easier to remove the liquid part of the mixture without disturbing the beads. After all the washes had been done it was necessary to resuspend the beads with a
ChIP elution buffer and incubate the mixtures on a thermomixer (7) at a controlled temperature of 65 centigrade for 15-60 minutes.

(7) Thermomixer.

After an hour of waiting, NaCl was put into all samples, which were then put to incubate on a thermomixer overnight at 65 centigrade to reverse crosslinks between DNA and proteins. With this step we finished the day’s work.

The rest of the day went by as I spent my free time visiting the National museum of Ireland of Natural history (8), as well as, the National museum of Ireland of Archeological history (9).

(8) National museum of Ireland of Natural history. Irish Elk.

(9) National museum of Ireland of Archeological history. Swords and other objects uncovered during archeological diggings.
Day IV.

Thursday was the last day of the experiment. To go any further with our samples from the previous day, we had to purify the DNA. To achieve “cleaner” DNA fragments, two different steps were taken. First phase was degrading RNA by utilizing RNase A. The next step was to cleanse the samples of unnecessary proteins with the use of Proteinase K along with CaCl.

Each of the purification steps included incubation of 2 hours. After about 4 hours had gone by, we additionally cleansed the DNA in the samples using Qiagen PCR purification kit.

We continued with the produced purified samples towards generating a library using Rubicon genomics kit. When the library was generated, PCR amplification followed, after which AMPure bead clean-up took place.

After that, the last thing to do was a ChIP-RX experiment, which concluded in the necessary data, used for finding how specific affected/modified genome parts were different from the ones in a non-affected/normal genome. This allows to see where exactly in the genome are the histone modification locations, as well as, further study what effects those changes have for gene expression. This is a staple method in epigenetics.

After finishing up with the experiment, I went to a Riverdance show as I got a recommendation from several of my friends. I must say, the performance was spectacular, and the evening was wonderful. I would surely come and see it again.

Day V.

In the morning I still had some time before the flight. First, I went to the laboratory to say my farewells. After that, with a few hours that I had left, I decided to spend it as best as possible.

During my wandering around the city on the afternoon of Day II, I had spotted that there was a World War I exhibition in the National Library of Ireland (10). Being quite the “person of history”, I took the chance to see the display. Thus, I made my way towards the National Library of Ireland. Though, not big of an exhibition, it was truly interesting and informative, as it was based specifically around the events and situation which took place in Ireland.

(10) National Library of Ireland.
(10) Map showing the territories on the sides of either Entente Powers (darker blue) or Triple Alliance (deep red).

(10) A public warning on different aircrafts used by Germans and the British.

(10) A recruiting poster.
After taking my time in the exhibition, I went to see one more place that had picked my interest- the Freemason Grand Lodge of Ireland (11). I had found that in the Grand Lodge there was a museum dedicated to freemasons, which I was looking forward to visit. However, to my surprise, the museum was closed for refurbishments.

And so, with the last sightsee-worthy place crossed out from my bucket-list and the time pressing on, I gathered my belongings and went to the airport…

Thus, my trip was over.

Summarizing my write-up, I want to thank the University of Leicester for providing me with the Traveling Scholarship, making my journey possible. I, as well, am grateful to my personal tutor, professor Shaun Cowley, who was very supportive and helped with setting everything up with my trip. Due to the help received, I was able to embark on a journey of growth in an academic, as well as, personal sense. I had a chance of observing and learning the ChIP method for studying epigenetics- a field I have interest in and in which I might specialize, following graduation. On the concern of personal growth, the trip was very enlightening, as I received some insight on the daily life of a research scientist- a life that might be mine own one day. Moreover, I believe that traveling is essential to improve oneself and gain new perspectives by meeting new people, seeing new places and learning about
previously unknown traditions and cultures. Traveling to a research laboratory in Dublin has been perfect for carrying out all my intentions.

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