JAMES RENNIE BEQUEST

REPORT ON EXPEDITION/PROJECT/CONFERENCE

Expedition/Project/ Conference Title: Chromosome loss in E.coli and B.subtilis

Travel Dates: 18.06.17 – 12.08.17

Location: Paulsson Lab, Department of Systems Biology, Harvard Medical School

Group member(s): Aleksandra Eremina

Aims: To observe chromosome loss events in healthy bacterial cells with the aid of fluorescent microscopy and high throughput microfluidics;

To create reporter strains for applications in abovementioned experiments

OUTCOME (not less than 300 words):

I spent 2 months of summer 2017 in Paulsson lab at the Department of Systems biology of Harvard Medical School (HMS) working on chromosome loss in E.coli and B.subtilis.

The aim of the project was to observe chromosome loss in wild type cells. Since chromosome loss is expected to be a very rare event, all of the studies in the field have been focusing on mutants with increased frequency of the loss as opposed to wild type or minimally modified reporter strains. However, as technology progresses, we can take advantage of modern high-throughput microfluidics devices in order to visualise extremely rare cases.
Using microscopy and microfluidics tools developed in the lab, I tried to visualise the event of expected frequency of 10^{-5}-10^{-7}. This estimate comes from predictions based on neutral selection action and, as of today, it is not yet supported by any experimental data. Therefore, once the experimental assays are developed, our lab hopes to quantify the frequency of chromosome loss and compare it with the expected number. Unfortunately, my project was too short to reach the quantitative stage, and, instead, I focused on developing experimental settings to observe the event.

During my time at HMS I became acquainted with microfluidics and learned the major experimental techniques in the flied: making chips, preparing bacterial cultures for loading, setting up fluorescent microscopes as well as analysing microscopy data in ImageJ. Furthermore, I spent a significant amount of my time on creating reporter strains of both E.coli and B.subtilis, which should be further used in the project. On this side of my experimental work, I got in-depth experience of cloning principles and techniques while working on introducing a fluorescent tag in E.coli chromosome.

I would like to thank James Rennie Bequest Fund for covering the expenses of my travels to and from Boston, and, thus, contributing to my summer experience at Harvard. Thanks to this internship, I got a unique chance to experience academic and social culture of the world-leading institution as well as to live in one of the most diverse and dynamic cities of America, Boston, and to meet its great community both inside and outside of academia.

Moreover, undergoing training in microfluidics will be very helpful for my 4th year Honours project, in which I plan to work on cellular information processing in Peter Swain lab. Finally,

after this summer placement, I am feeling much more prepared to make further decisions about my graduate education. Once again, I am very grateful to James Rennie Bequest for providing me with an opportunity to discover and live through all described above during summer 2017.