

2023

Natural Sciences Tripos – Biological (Biochemistry)

The universe operates by strict physical and chemical rules and biological systems are no exception. It captivates me how even the most complicated organisms can be explained by underlying logical processes. For example, the unique patched fur pattern of tortoiseshell female cats is not a product of magic, but a gene regulatory process. In females, two X chromosomes would provide excess mRNA if not compensated. Therefore, one of these chromosomes gets inactivated randomly in all 10-20 cells present at an early stage of embryonic development. From these parental cells, different cell populations differentiate, resulting in fur patches with opposing active X chromosomes and thus alleles on heterozygous cats.

I first read about X chromosome inactivation in Campbell Biology and was hooked by the innumerable phenomena that are formed by unseen genetic processes. Molecular biology quickly became my passion and eager to solve problems, I decided to challenge myself in competitions. I take great pride in placing overall 6th in the National Secondary School Biology competition and 12th in the national IBO qualifier. While preparing for these, I faced the challenge of applying multidisciplinary approaches involving mathematics and informatics to biological questions about enzyme kinetics, biostatistics, and spectrophotometry. Hence, I also decided to learn mathematics besides biology and chemistry at an advanced level and later started to programme in Python. I became enthusiastic about using coding to solve problems on The Rosalind Project website and developing a basic understanding of functions helpful in bioinformatics.

In 2022 I gained admission to the Milestone Institute, an extracurricular English language academic programme offering advanced modules beyond the high school curriculum. I attended Academic Writing and Omics, the latter offering an insight into the data-centric systems biology approach of cellular systems, involving the principles of assembly methods, genomic-, transcriptomic-, and metagenomic sequencing techniques, and methods for determining protein structure. As a final assignment, I made a mock crowdfunding proposal and the plans for a project aiming to study the connection between environment-driven differences in the cutaneous microbiome of individuals and their wound healing capabilities. Prompted by the learnt research concepts, I sought out an opportunity to intern at Semmelweis University in the In vitro biology research group. This September I started working on a small project aiming to determine whether the kinase IREH1, which plays a role in plant root skewing and microtubule development, is phosphorylated by Map kinase 9. While developing the project, performing PCRs, blotting, and designing plasmids, I am becoming increasingly more confident in wanting to work in a research lab in the future.

Besides academics, I also participate in multiple student organizations at my high school. Having been a member of the audiovisual team for three years, last year I also took up leadership responsibilities, including training incoming members. In 2020 I was elected to represent my class in the student council, later giving me the opportunity to play a role in digitalizing the school cafeteria ticket system. I developed the project with four fellow students as the prototype for an eco-conscious platform that would allow communities to raise money for green projects by auctioning hoarded items in their households. Pitching the project secured first place for us in the Solve for Tomorrow competition of Edison Kids.

Learning in English will grant me the tools to integrate into the international scientific community and pursue becoming a researcher. I believe in the UK, I would get an unprecedented opportunity to interact with this community while developing the thinking skills that will help me understand the rules by which the universe operates.