

My desire to pursue a career in biochemistry

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Biochemistry is integral in many aspects of research, even the study of ancient DNA, which I discovered whilst volunteering with the Museum of Archaeology and Anthropology Cambridge; for example, alongside mass spectrometry, protein biochemistry techniques such as immunoassay are used to detect milk proteins on ceramic pots. With biochemistry, researchers gain better insight on unfamiliar topics about ancient civilizations like how viruses spread through migration.

Dundee University lecture by Helen Langstaff entitled “ 21st Century Forensics” I attended explored CT scans and DNA profiling; this made me explore the technique in depth, where I found that it is based on RFLPs where sequences varies in individuals which affects the sites Restriction Endonuclease recognizes and learnt about gel electrophoresis. “ Only 2% of our DNA is protein-coding.” This statement by Langstaff intrigued me in which I explored the significance of insignificant DNA in the book “ JUNK DNA” by Nessa Carey; Xist RNA sticks to inactive X gene which helps in X-inactivation process. SmallRNAs are used to reprogram human tissue cells to pluripotent stem cells. While junk DNA is beneficial, it also prompts various diseases such as myotonic dystrophy and Friedrich’s ataxia due to excessive repetition of amino acid sequences, causing it to be unstable. Small RNA such as siRNA triggers poor translation. Other concepts which intrigued me include polyadenylation to trigger mRNA enzyme, epigenetics modifications, apoptosis and frameshift mutations. Reading Kat Arney’s “ Herding Hemingway’s Cats” also further amplified my interest in mutations of DNA causing phenotypic variabilities.

With the AS Level biological molecules module and the organic chemistry module respectively, the linkage between biology and chemistry intrigued me to read ' Chemistry of Life' by Steven Rose; I learnt about how glyceraldehyde and dihydroacetone are isomeric sugars of each other, plant biological macromolecules such as arabans, electron transport chain and a detailed explanation of the cell membrane made of the phospholipid bilayer and glycoproteins called Cell Adhesion Molecules (CAMs). This interested me in the molecules that are impermeable such as colloids. Hence, my ongoing EPQ which is " To what extent are colloids beneficial as IV fluids?" where I explore the advantages and disadvantages of colloids in aspects of medical biochemistry- including coagulopathy. Curious about the future applications of biochemistry, I attended a " Building Biotech" event which introduced me to aspects of bionanotechnology such as point of care diagnostics. I also had the opportunity to discuss Dr. Alexandra Sakatos' Harvard dissertation with her about HupB proteins in mycobacterium which drives the formation of a drug resistant population that resists antibiotic treatment for tuberculosis. Whilst it was an enjoyable read, I also learnt briefly about post-translational modifications such as lysine acetylation and methylation. Given advice about biochemistry/bioinformatics from PhD student Yaa Opong, I took an introductory online course for coding via Codecademy to briefly understand the applications of computing technology on genetics. Seeing as Mathematics is vital in this degree, I have joined numerous Math Olympiads which I gained bronze and silver awards for; these problem-solving questions posed in MASMO, ASMO and Kangaroo Maths Olympiad improved my analytical and critical thinking skills- useful for biostatistics.

Furthermore, I completed the KUMON Advanced Level Maths program 5 years ahead of my year group, expanding my mathematical knowledge above the A Level curriculum. Aside from this, I have joined the local Science Olympiad, which I won and represented my state for national level (Iken Scientifica); this competition tested my basic knowledge of the 3 sciences. Volunteering and fundraising for the Sarawak's Hospice Society and Sarawak Children's Cancer Society annually, I grew fond of the concept behind cancer which led me to complete an online course on the introduction of cancer by Johns Hopkin's University.

Regarding my brief work experience with a private pharmaceutical clinic which I'm continuing for June 2019, I was exposed to various penicillins used in the clinic and to the world of pharmacology! The doctor taught me the mechanisms of antimicrobial drugs and how they inhibit growth of microbes. As well as the experience of responsibility and fulfilling my curiosity, I learnt that biochemistry has a broad spectrum which impacts life infinitely: past, as shown in ancient DNA, present, with the ongoing drug industry, and the future, when technology is fully integrated into microbiological industry.