

JAMES RENNIE BEQUEST

REPORT ON EXPEDITION / PROJECT / CONFERENCE

Expedition/Project/

Conference Title: 8 - Week Internship at Yemaachi Biotech

Travel Dates: 11/05/2026 – 04/08/2026

Location: Accra, Ghana

Group member(s): Maaya Motsieloa Ayawere

Aims: Firstly, to gain hands on experience in both wet and dry lab settings. Secondly to learn about inclusive science, specifically regarding genetics. Finally, to experience the reality of being a researcher outside of a student environment.

Photography consent form attached:
(please refer to your award letter)

☐ Yes
☒ No

OUTCOME (a minimum of 500 words):-

The purpose of my Internship

Yemaachi Biotech is a start-up focused on African oncogenomics, working to make oncology more inclusive through whole genome sequencing, which is particularly critical in the age of precision medicine. Africa is the most genetically diverse continent on Earth, meaning that a deeper understanding of African genetics would not only benefit populations locally but also advance therapies and treatments globally.

Currently, only 3% of genetic data held in global gene banks represents African ancestry. This is a striking and troubling figure, one that exposes a significant data gap undermining the generalisability and scientific credibility of research conducted on a largely non-representative dataset. To think known therapies and treatments might not work as effectively on a very large population is frightening.

Over the course of my studies, lecture after lecture and slide after slide, I began to notice this same pattern of underrepresentation recurring. Africa featured prominently in the literature on infectious disease, but rarely beyond it. Addressing this gap requires deliberate, sustained action, and it is precisely this challenge that drew me to the company.

Developed Competencies

Wet Lab

My time in the wet lab gave me a grounding in the realities of working with human samples in a precision oncology setting. From the very first day, watching liquid biopsy samples from breast cancer patients being processed, I understood that good science depends on far more than technical skill. Confidentiality and consent were treated as foundational rather than procedural, and I came to see how much ethical groundwork sits underneath tumour biopsy or even a single blood draw.

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Precision mattered in a way that surprised me. Exact volumes, temperatures, centrifuge speeds and timing were all non-negotiable, and every step had to be documented digitally as it happened, not afterwards.

I was introduced to instruments such as the EZ2 Connect MDx, which automates DNA and RNA extraction using magnetic bead technology. Having previously done a similar extraction manually during a university genomics course, I appreciated how much labour and error the machine removed, though I also learned that automation is not always superior. A technical meeting update later revealed that manually extracted buffy coat produced a higher DNA yield than the automated version, which challenged my assumption that newer technology is always the better option. Therefore, critical thinking and evaluating protocols are crucial; no matter how long the procedure might have worked in the past, constant improvement is ideal.

Flow cytometry introduced me to hierarchical gating logic, immunophenotyping and the practical reality that a sample can look poor on paper yet still tell a useful scientific story once investigated further. Hands on library preparation taught me the mechanics of fragmentation, beadbased size selection and the difference in handling required for tissue versus blood samples. I also began to think critically about the science itself, questioning why higher bead-to-sample ratios recover smaller DNA fragments rather than simply reinforcing the binding of larger ones, a question I have not yet fully resolved but intend to keep investigating. Additionally, there was the NGS department that consisted of Illumina for short read at PacBio for long reads.

Dry Lab

The dry lab component shifted my thinking from the physical handling of samples to the interpretation of the data those samples generate. I was given the opportunity to work with data from a Dragen Array, tasked with writing a Python script to visualise pharmacogenomic star allele trends within African populations. This felt like the most direct application of the internship's core purpose, since so many existing variant databases are built on predominantly European genomic data. Handling this task required me to think carefully about how to distinguish a genuine population-specific variant from a sequencing artefact when there is little reference data available for comparison, a problem I had actually asked about before the internship began and was now facing in practice. This gave me a much clearer sense of how bioinformatics is not simply about coding but about asking the right question of the data in the first place.

Extra Curriculars

Beyond the core laboratory and analytical work, several additional experiences shaped how I understood science as a broader practice. A two hour biosafety and biosecurity training session, delivered by a professor associated with the University of Ghana and Noguchi, was one of the most structured sessions of the internship. I learned to distinguish biosafety, which concerns unintentional exposure or release of pathogens, from biosecurity, which concerns intentional exposure or release. Concepts such as the chain of infection, biosafety levels and the principle of graded protection gave me a framework I had not previously encountered in such formal terms, and my improved score on the post training test suggested the session genuinely changed my understanding rather than simply reinforcing what I already knew.

Sitting in on the onboarding meeting also helped me understand how a research study actually comes into being, from concept note to feasibility study to finalised protocol. Learning about active studies in the company showed me the breadth of cancer and genomic research being conducted across African populations, and how each study is designed to answer a distinct biological or clinical question.

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Journal club offered a different kind of learning, requiring me to critically engage with a published paper alongside an experienced team rather than simply reading it alone. Discussing the paper on direct RNA sequencing pushed me to question the assumptions built into standard sequencing methods, which is a habit of mind I want to continue developing.

I also had the chance to present twice during the internship. At a lunch and learn session I spoke about debunking the misconception that Africans cannot swim, alongside water safety, which let me bring a personal interest into a professional space. I then also had a presentation to the company leaders on what I have learnt from this internship. This allowed me to practice my public speaking skills. I was also permitted to presenting a poster at The University of Edinburgh's African Research Day on what I learned during the internship, which would allow me to reflect on and communicate this experience to a wider academic audience.

"Personal" Lab

If the wet and dry lab work taught me technical skills, the personal side of this internship taught me just as much about how to function within a scientific team. Early on, a conversation with the lab team made clear that a genuine love for the work is what sustains a person through the inevitable repetitive or frustrating periods, and that staying in the same role for too long without new challenges can itself become a risk to growth. That distinction, between loving the work and simply tolerating it, is something I want to keep in mind as I think about my own career path.

Persistence became a recurring theme throughout the internship. I was initially intimidated by one of the senior scientists, yet I made a point of asking her one question each day, and eventually built a comfortable enough rapport to ask about the skill gaps she notices in undergraduate students entering genomics. Her answer, that being persistent even when a door does not seem open is essential, has stayed with me. Her closing advice to a young female scientist, to hold onto passion and persistence in equal measure, felt like something worth carrying forward.

I also learned a great deal about teamwork through the biobank visit, where I saw how strictly responsibility is divided between the person registering a sample and the team requesting it, and how a single misplaced tube can create real difficulty for someone else further down the chain. This experience underlined the importance of respecting every stage of a process, not only the parts that are most visible or interesting. Perseverance also came through repeated failed Qubit standards during DNA quantification, which taught me that redoing an experiment correctly matters more than finishing it quickly. Altogether, this internship shaped not just what I know, but how I want to work.

Conclusion

Overall, this internship gave me invaluable professional and personal skills that I will carry with me throughout my life and career. It taught me to always look for gaps in knowledge and representation within science, and to take action in response to them.

Thank you to the James Rennie Bequest for this wonderful and unforgettable experience. Without this funding, I would not have been able to afford this opportunity.