LAIDLAW SCHOLARS

Laidlaw Scholars Undergraduate Leadership and Research Programme
Record of Reflection

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I started this summer excited and a bit nervous. New lab, new people, new expectations. On day one I was trying to remember where the tips were, how the biosafety rules worked, and who everyone was. Pretty quickly, the lab felt familiar. I learned the flow of my days: set up RNA extractions, make cDNA, run TaqMan qPCR, look at Ct values, and write everything down properly for everyone else but in my personal notebook in hieroglyphics (that's what others tell me about my handwriting). The main question was clear though: what happens to nearby genes and synaptic signals when the long non-coding RNA PTCHD1-AS goes down?

Most of my time was spent helping with CRISPR interference (CRISPRi) on PTCHD1-AS. I supported Amberlee on the knockdown side and learned a lot from her. I also worked closely with Dr. Carole Shum, who asked good questions that made me plan better controls. I got more comfortable speaking with Dr. Scherer, including short updates in person and by email. I practiced making my updates clear and short: what we did, what we saw, what we plan next.

Technically, I leveled up like in a video game but it definitely was not as smooth. I ran TaqMan qPCRs for DDX53, PTCHD1, and PTCHD1-AS3 exon 1, and I learned how to avoid small mistakes that waste a whole day and even my week at one point when I realized SDS water was contaminated thus making everything I work on that week invalid. My pipetting got steadier, my plate maps got cleaner, and my notebook got more useful. One result stood out. In the 1134 iPSC line and the neurons made from the same line, we saw higher ASH1L expression in neurons at two exon sets (1–2 and 3–4). We expected the opposite. That was a good lesson: biology does not always match our prediction. Instead of forcing a story, I noted the result, checked the data quality, and asked what to test next. I talked it through with Carole. That helped me switch from "why is this wrong?" to "what could explain this?" and "how do we test it?"

Working with others was a highlight. Amberlee shared tips that do not show up in methods sections, like how to judge cell health at a glance or when to extend selection by a day. Carole pushed me to be specific about controls and sample numbers. Talking with Dr. Scherer helped me practice being concise and respectful of time. I had to be clear about the ask, offer context, and propose next steps. It worked, and it taught me to take ownership of logistics, not only experiments.

Communication was another skill I practiced. The same result needs different versions for different people. A one-line lab update is not the same as a figure caption. I tried to write the "headline" first ("PTCHD1-AS knockdown confirmed; no change in DDX53 yet"), then add the key numbers, and then any caveats. When I was unsure, I said so and suggested the next test. That built trust and kept the team aligned.

I also built better habits, which saved me a lot of time in the future. I drew plate maps before I pipetted. I named files with dates and versions. I wrote down why I made a change, not just that I made one. I started each week by picking one question I must answer by Friday. These small things helped me finish work on time and made my data easier to review.

Not everything went smoothly though. Some steps took longer than I expected. Even simple tasks can pile up: RNA quality checks, primer checks, and cell health look-ins. All on top of having the contamination issue I spent a good week investigating, trying to figure out its

source. I learned to be realistic with time. I also learned to validate controls early. Housekeeping gene stability matters. Primer efficiency matters. If those are shaky, the rest of the data probably wont convince anyone.

This work set up my plan for next year. For HMB496, I will build the mirror image: CRISPRa overexpression of PTCHD1-AS using dCas9-VPR and BPK1520 guides. I will confirm overexpression by qPCR/ddPCR, then look at PTCHD1 and DDX53 again, then run the same synaptic panel. If the signal is strong, I will extend the read-out to SHANK2, DLG4/PSD95, ARC, and EGR1 to see if upstream changes reach synaptic scaffolding programs. I like that the plan is balanced: this summer gave us the loss-of-function side; next year gives us the gain-of-function side. Together, they should map how dosage at this locus links to gene expression and, possibly, excitatory/inhibitory balance.

What did I learn about leadership? Initiative: set timelines early and keep them visible. Adaptability: treat unexpected data (like the ASH1L result) as a signal to improve the plan, not as a failure. Project management: pick the one experiment that moves the main question, not three side quests. Integrity: write methods clearly, avoid cherry-picking, and document changes. Mentorship and teamwork: help the person next to you do their best work, because their success is tied to yours.

If I could redo the summer, I would be careful with my pipetting to avoid any contamination. Having my week's work of setup and experiments go down the drain on top of testing to find where the contamination is was a major setback in my research time.

In short, this summer made me more confident with my hands at the bench and clearer with my words. It also showed me what it means to own a small part of a big question. To me, that is leadership in a lab: turn uncertainty into a plan, turn the plan into experiments, and turn the experiments into knowledge that helps the whole group. I'm grateful for Amberlee's guidance, Carole's feedback, Jill's pointers, Natalia's life lore and Dr. Scherer's support. I'm excited to carry this into the school year and flip the switch from CRISPRi to CRISPRa to see the other half of the picture.