

# COMMONS BIODIVERSITY PROJECT

## INTRODUCTION



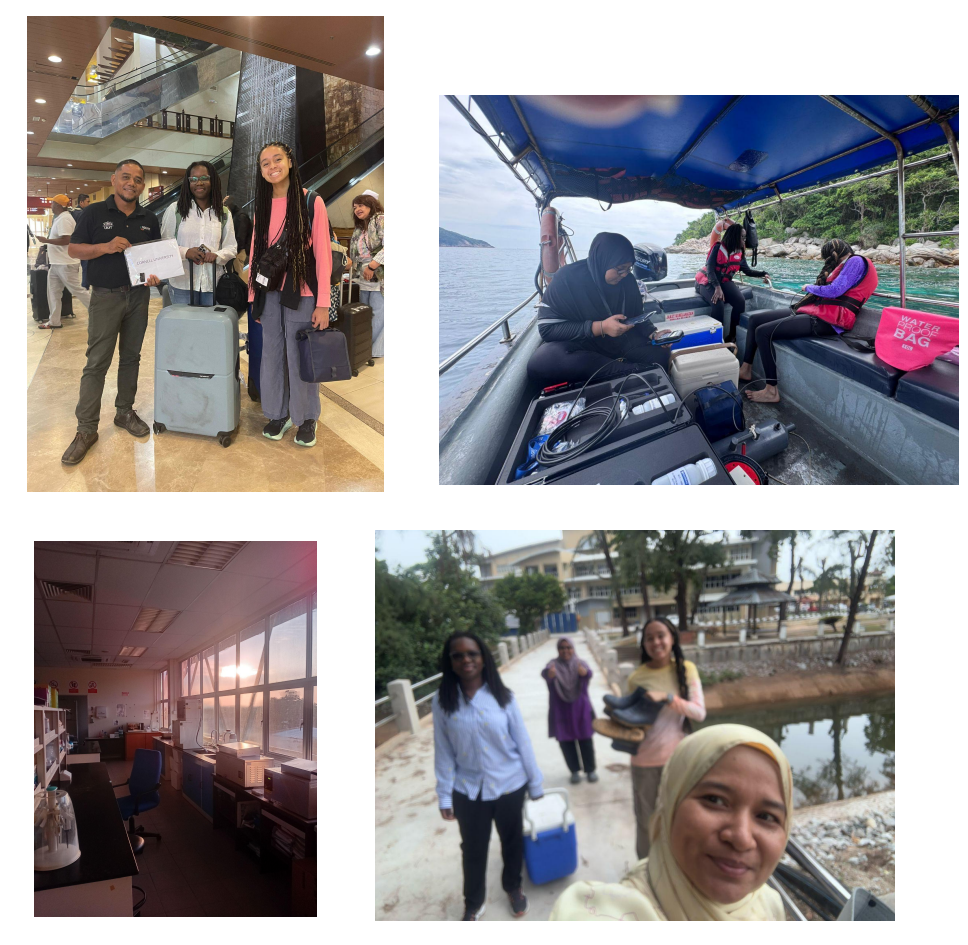
Hello! My name is **Marina Blackman** and I am a fourth year student at **Cornell University** in Ithaca, New York, studying **Biological Sciences** in the College of Arts & Sciences with a concentration in **Marine Biology**.

I have been passionate about studying marine organisms my entire life, so I am beyond ecstatic to share about my **Leadership in Action** experience through the **Laidlaw Leadership and Research Program**, through which I have been able to spend 6 weeks this summer participating in giant clam research at **Universiti Malaysia Terengganu (UMT)** in **Kuala Terengganu, Malaysia** as part of the **Commons Biodiversity Project**.

## WHAT IS THE COMMONS BIODIVERSITY PROJECT?

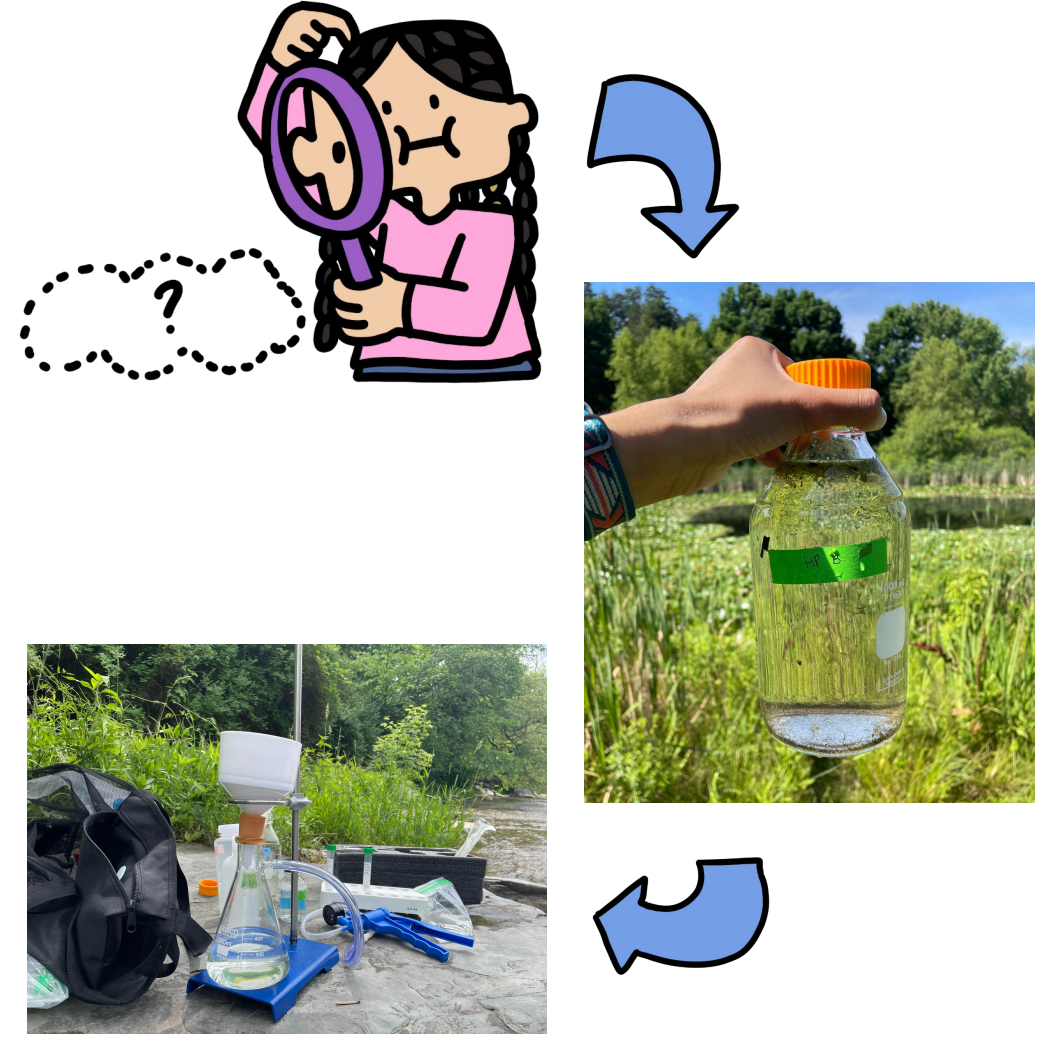
Driven by collaboration between Biologists at Cornell University and Universiti Malaysia Terengganu, the Commons Biodiversity Project aims to:

- Apply eDNA techniques to help **monitor** and **conserve** the **Crocus clams (*Tridacna crocea*)** native to the east coast of Peninsular Malaysia
- Foster and grow a **passion for marine wildlife** conservation in the local population of **Terengganu, Malaysia**
- Highlight the importance of **collaboration** between scientists for opportunities rich in learning and sharing different techniques, **asking questions** together, and furthering a foundation for the project based on **community involvement**



## ENVIRONMENTAL DNA (eDNA)

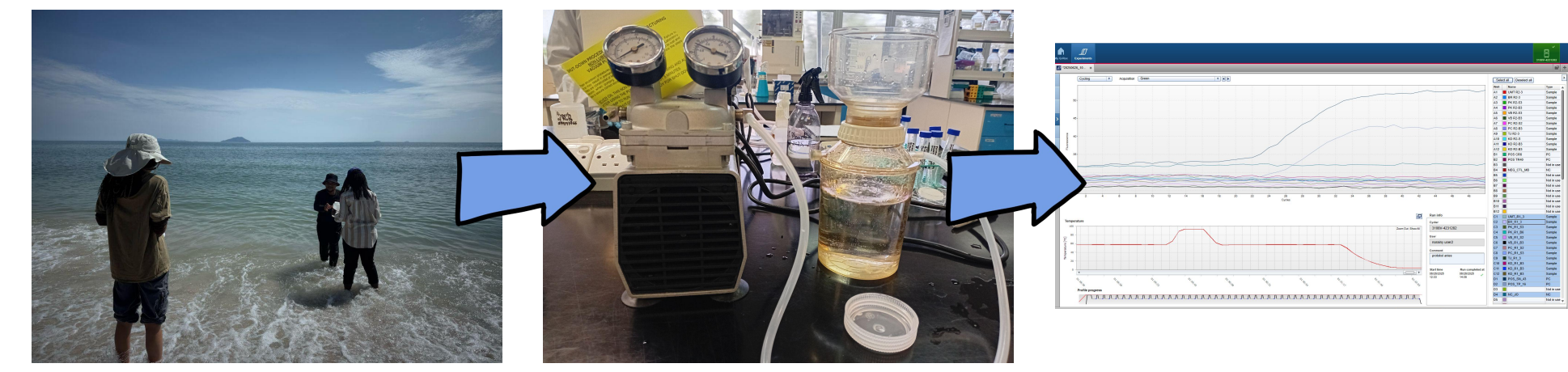
- **Environmental DNA (eDNA)** describes the presence of **small fragments of an organism's genetic material** left behind in their environment
  - These traces animals leave behind in their environment provide an effective way to **monitor their presence in different environments**, whether in the air, terrestrial or aquatic
- In both marine and freshwater ecosystems, these fragments of their eDNA can be **released into the water column** through shed skin cells, waste, and mucus
- This is a **highly sensitive, non-invasive** technique to monitor organism **abundance**, and is especially useful when looking for animals whose **populations are of great concern**, such as endangered, elusive, or invasive species



## OUR eDNA PROCESS

Our eDNA process can be split into **three** major steps:

1. **Seawater/Freshwater Sample Collection**
2. **DNA Extraction** from water sample
3. **Quantitative Polymerase Chain Reaction (qPCR)**



## SUMMER 2024: eDNA TRAINING

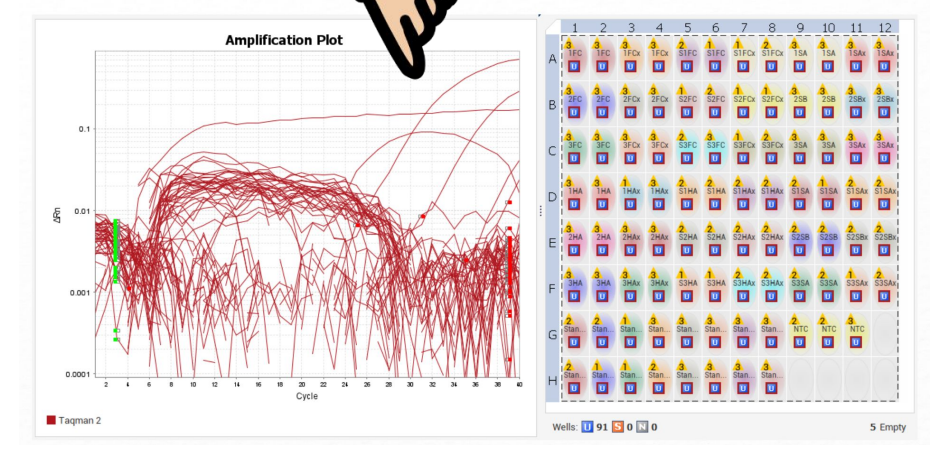
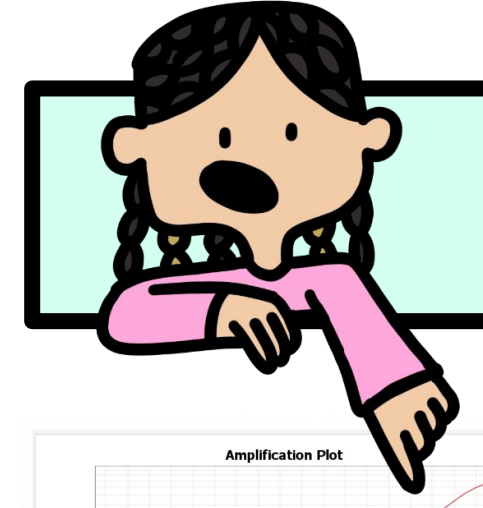
- Six weeks of research (from **June 1 - July 15, 2024**) at **Cornell University in Ithaca, New York, USA** as part of the Laidlaw Leadership and Research Program
- Working alongside Laidlaw Scholars **Jennifer Owiyo and Paige Yun** as research assistants in the **Cheong Lab** working under the guidance of **Lee Yoke Lee and Cheong Soon Hon** as part of the Commons Biodiversity Project
- **OBJECTIVE:** Verification of eDNA methods through completion of three mini-projects investigating different factors that may impact the detection of the **Rusty Crayfish (*Faxonius rusticus*)** in freshwater bodies on Cornell University campus in Ithaca, New York
- **MY RESEARCH QUESTION:** How do detections of the invasive Rusty Crayfish (*Faxonius rusticus*) compare between **Fall Creek** and **Houston Pond**?



## SUMMER 2025: APPLYING eDNA FOR GIANT CLAMS IN PENINSULAR MALAYSIA

- Six weeks of research (from **May 29 to July 4, 2025**) at **Universiti Malaysia Terengganu, in Kuala Terengganu, Malaysia** as part of the Leadership in Action (LiA) component of the Laidlaw Leadership and Research Program
- Working alongside Laidlaw Scholar **Jennifer Owiyo** as research assistants under the guidance of **Mdm. Norainy Mohd Husin and Rabi Atun Adawiah Abdullah** to aid in research for the Commons Biodiversity Project
- **OBJECTIVE:** Use of environmental DNA (eDNA) for more accurate **identification and tracking** of giant clams endemic to the east coast of Peninsular Malaysia, ***Tridacna crocea*** and ***T. squamosa***, by using their genetic information already present in the water column to differentiate between these similar-looking species.
- **OUR RESEARCH QUESTION:** What is the effect of the **depth** (and thus temperature) at which seawater samples are taken and **active vs. passive sampling** on the detection of *T. crocea* and *T. squamosa* in Terengganu waters?

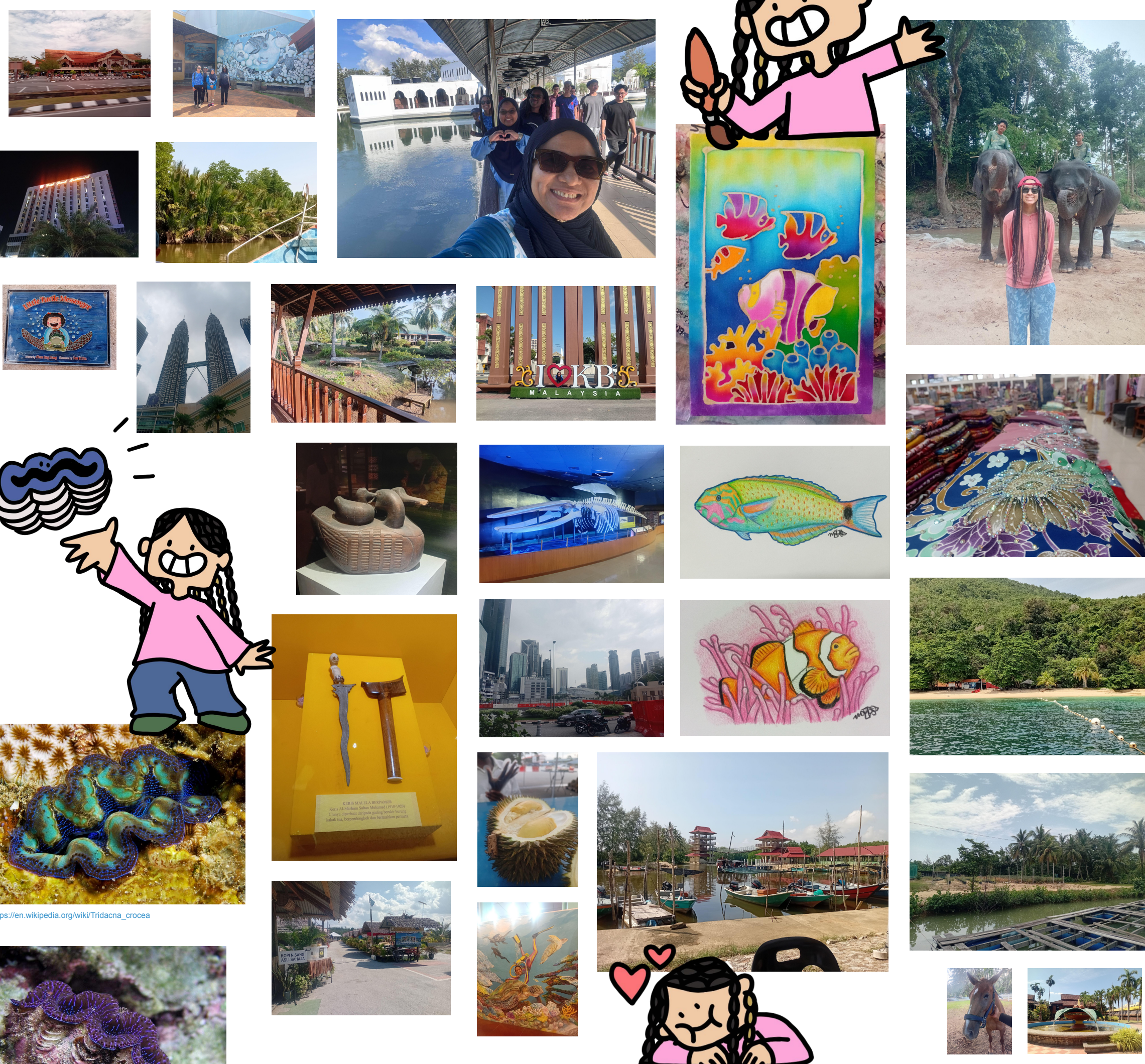
## OUR RESULTS



**SUMMER 2024:** Our technique was successful in **confirming the presence of the Rusty Crayfish in Fall Creek**, where we have seen it before. Given the **contamination** of field blanks and No Template Controls (NTC's) in most recent pond sampling, it is difficult to be confident that detections in **Houston Pond** samples indicate their presence in this system.

**SUMMER 2025:** Although our positive controls for *Tridacna crocea* (previously collected tissue samples) did amplify during qPCR, we observed **no amplification in our sample wells** for the species, despite trying different techniques to help prevent any eDNA degradation, such as washing the filter paper in 95% Ethanol.

## CULTURAL IMMERSION: EXPLORING MALAYSIA!



Thank you so much to the Laidlaw Program, all of my mentors, fellow Laidlaw Scholars, and everyone else I have met during this incredible journey! These unforgettable experiences would not have been possible without you, and for that, I am forever grateful. Terima kasih.