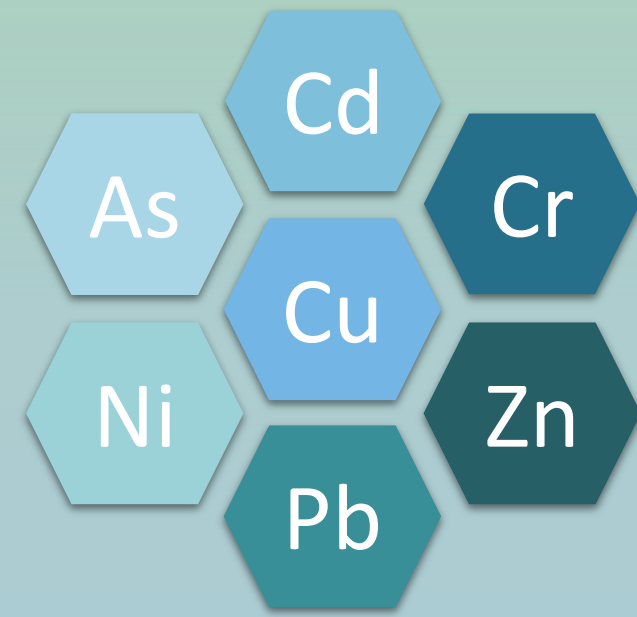# Utilizing macroalgae for heavy metal remediation of effluents from industrial wastewater

Team CYCLE

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UNIVERSITY OF MARYLAND
HONORS COLLEGE

GEMSTONE
Honors College
University of Maryland

Background
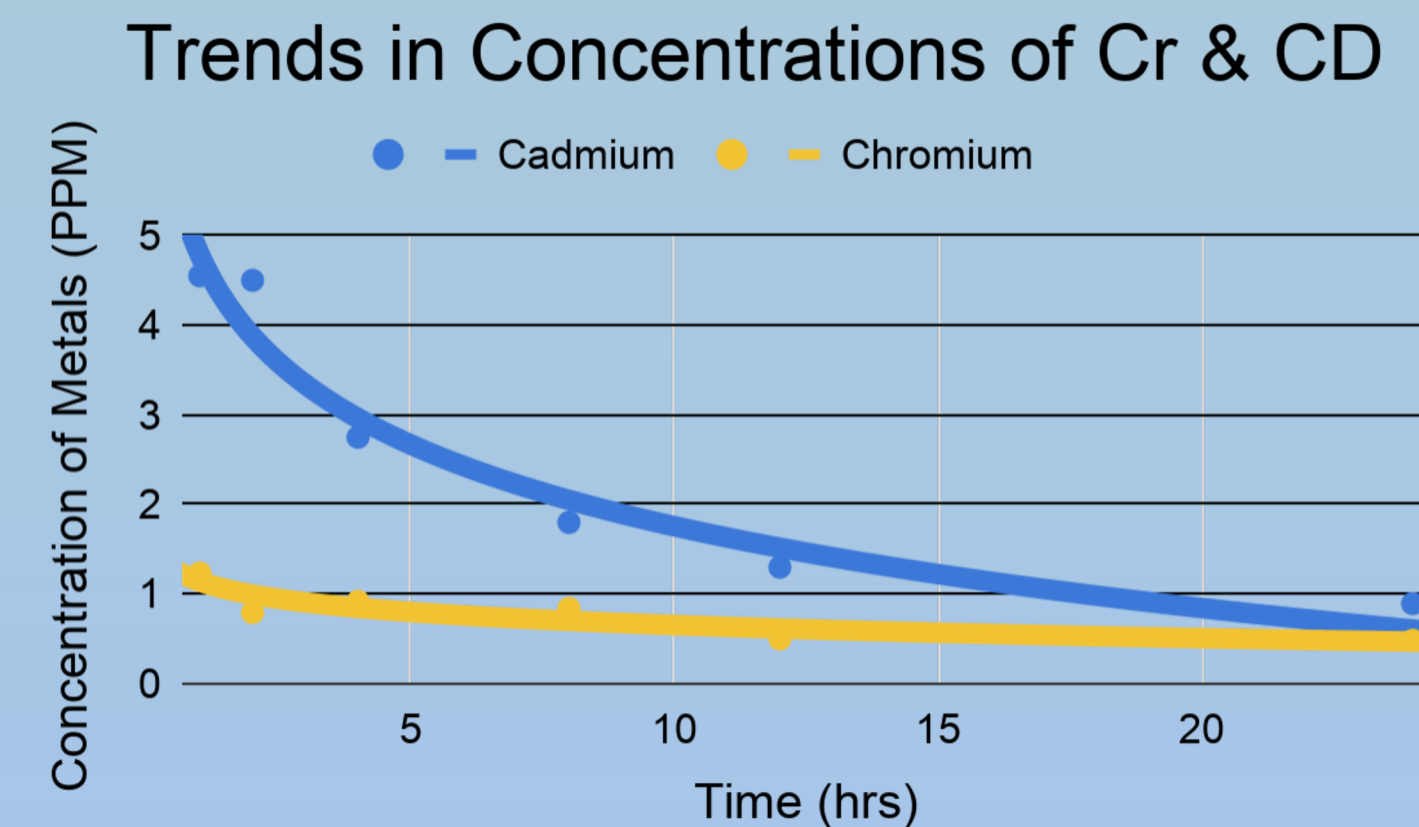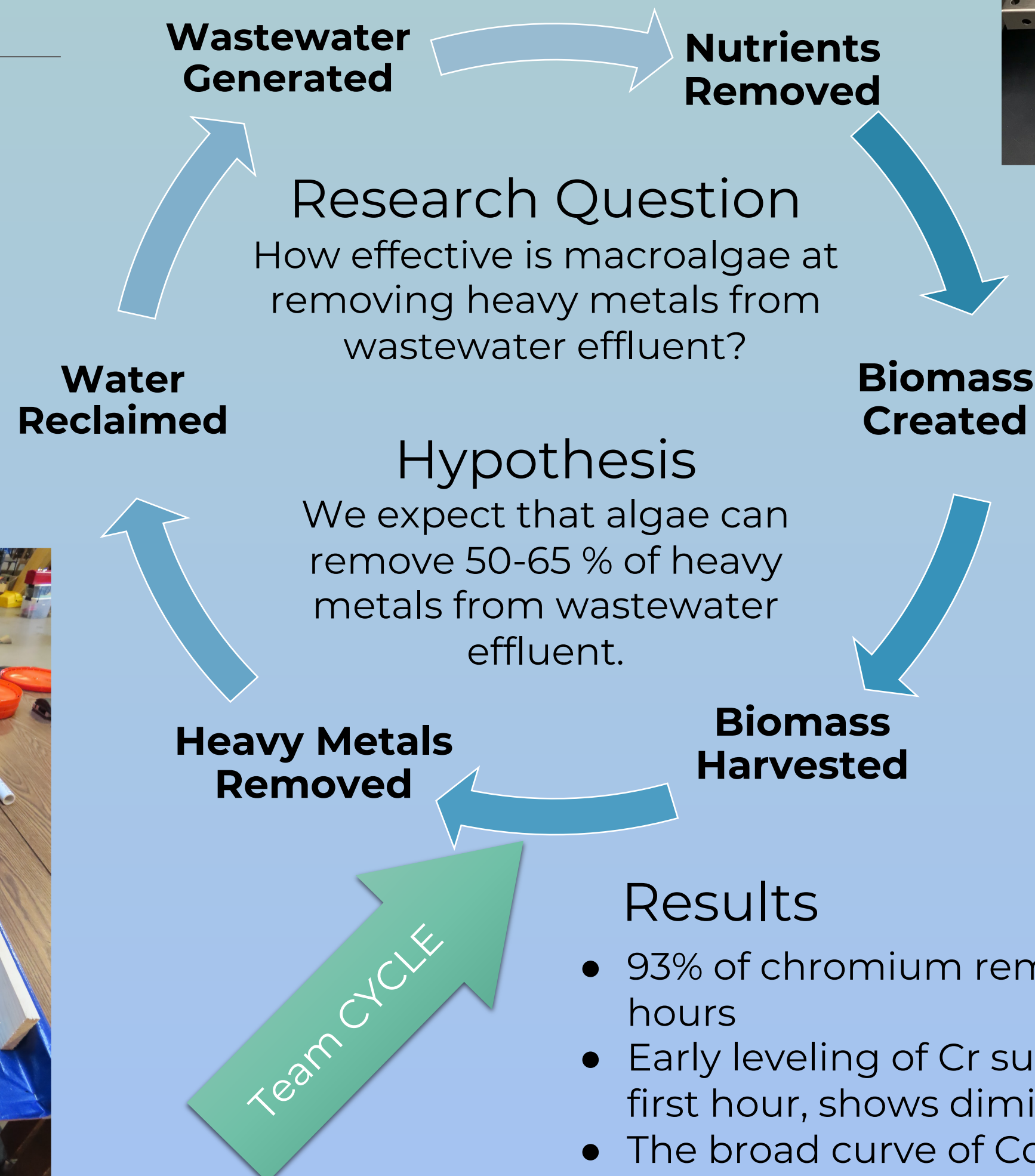
As Cd Cr Cu Ni Zn Pb

- Heavy metals are toxic to the environment and humans
- Industrial effluents often contain high concentrations of metals
- Algae offers a more sustainable method of heavy metal removal than traditional methods, through the binding of metals to the algae's surface
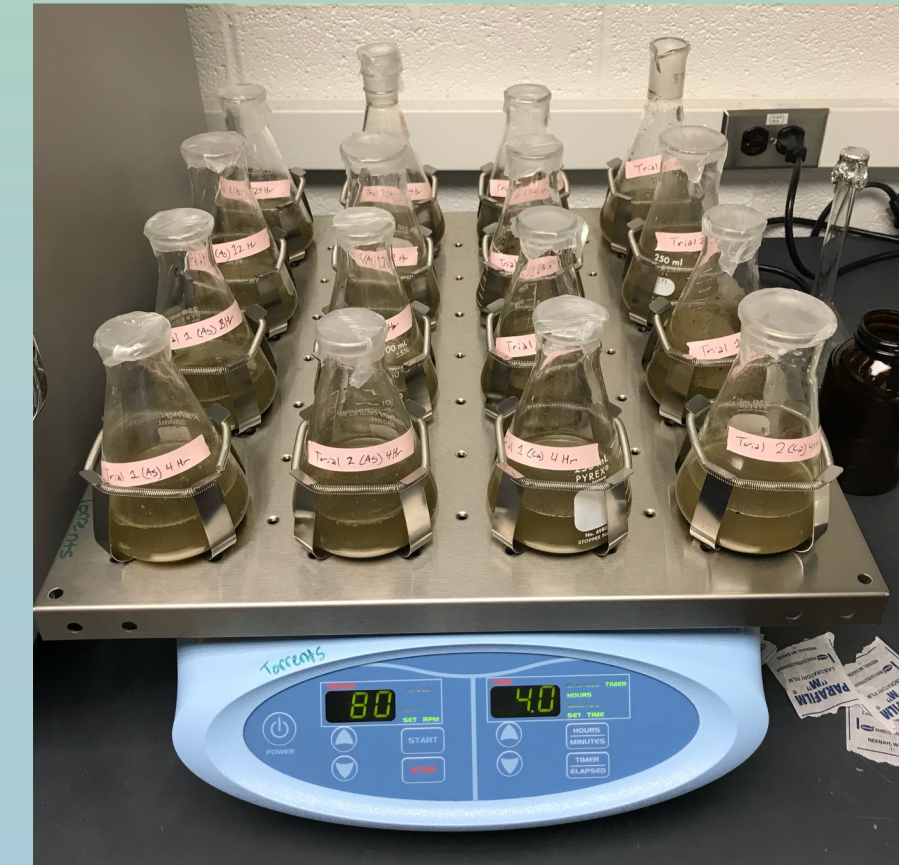
Locally-grown algae from the American Ecological Engineering Society being used in lab tests to assess metal adsorption capability.

Lessons Learned

- Algae must be pre-treated prior to use to avoid metal leaching
- Future prototypes require more precise construction
- Identify backup plans for testing in case of unexpected roadblocks

Wastewater Generated → **Nutrients Removed**

Research Question
How effective is macroalgae at removing heavy metals from wastewater effluent?

Water Reclaimed

Biomass Created

Hypothesis
We expect that algae can remove 50-65 % of heavy metals from wastewater effluent.

A pilot scale system was designed to handle a volume of 5 gallons. This design allows water to flow through stainless steel baffles and into a collection basin. Algae was placed within the baffles.

Heavy Metals Removed

Biomass Harvested

Team CYCLE

Trends in Concentrations of Cr & CD

- Cadmium
- Chromium

Concentration of Metals (PPM) vs Time (hrs)

Data collected during laboratory experiments.

Results

- 93% of chromium removed, 88% of cadmium removed after 24 hours
- Early leveling of Cr suggests most adsorbtion occurs within the first hour, shows diminishing returns after 2 hours
- The broad curve of Cd suggests that it requires a longer period of time to be adsorbed by algae