The Variability of Si/Ca Ratios in Ostracod Shells

Abstract
This project attempted to study the variability of Si/Ca in ostracod shells compared to other trace-elements like magnesium, strontium, sodium etc., which act as paleo-proxies to help understand past paleoenvironmental conditions (like temperatures and salinity).

Materials & Methods
I prepared and cleaned over 100 samples of ostracods collected from various areas and sites in Hong Kong. Two species of ostracods were used - *Sinocytheridea impressa* (SC) and *Neomoceratina delicata* (NM).

Methodology: Cleaning ostracods via Sonication
1. Prepare and clean petri dish with milli-Q water before placing ostracod shell on dish
2. Insert methanol on dish with cleaned pipette tips (clean these first)
3. Using a fine tiny brush, brush away any visible dirt (if unable, note down shells whose dirt weren’t removable)
4. After cleaning, put shells in micro-vials, then insert methanol in vial via pipette tip
5. Sonicate
6. Remove methanol from vial with new clean pipette tips after sonification

Methodology: Cleaning ostracods via Bleach
1. Following the sonication, insert bleach into micro-vials and leave the shells overnight
2. Next day, note down how long the shells were dissolving in bleach overnight
3. Remove bleach via more cleaned pipette tips
4. Rinse the shells using milli-Q Rinse twice
5. During the second rinse, use new set of pipette tips for each vial - 1 tip for 1 vial (to add and remove Milli-Q)

Introduction
Through analysing the shell chemistry as magnesium and strontium calcium ratios of ostracods, we can eventually reconstruct past environmental conditions like water temperature and salinity (Rodriguez et al. 2019). It is ideal to use ostracods for “long-term quantitative paleoenvironmental analyses” because of their high abundance and excellent fossil record (Hong 2016). Preservation, instars and inter-specifics variability seem to affect the element/calcium ratios (E/Ca) of ostracod shells.

Since we do not have data of concentration for Mg, Ca or Sr in Hong Kong waters (but we can make estimates considering the concentration of sea water and freshwater), the objective was to study how the water concentration of silica affects the shell concentration of Si. Using the relative change of Si in ostracod shells in comparison to the other elements – mostly Mg, Sr and Na, I aimed to explore if preservation, instars and inter-specifics affect Si/Ca and therefore its potential as paleoenvironmental proxy.

Analysis at the ICP-MS
After the cleaning methods were implemented on the shells, their chemistry needed to be analysed using inductively couple plasma mass spectrometer (ICP-MS). This was used for the chemical analysis and measurement of single shells. Before this was done, the ostracod shells were transferred from their micro-vials to test tubes filled with 2% nitric acid solution, where they dissolved. Consequently, the shells were weighed through a balance, with their weights all noted down (shown right on the table). Then finally, I could bring them over to the ICP-MS and measure with the administration of my supervisor. Unfortunately due to COVID-19 restrictions, I was only able to weigh out 24 samples of my cleaned shells.

References