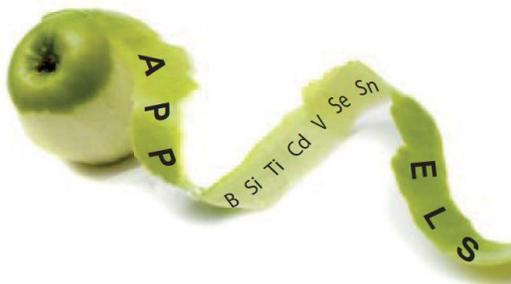


Project EARTH-16-RR2: Optimising elements for life: A probe of the elements for life in the sea (APPELS)

Supervisor: Prof. Ros Rickaby



Scientific project: You may think that all the elements needed for nutrition of eukaryotes are established and known from the usual candidates of the major elements CHONPS, and trace elements such as Fe, Zn and Cu. But have you ever pondered whether B is needed, or Li or Sr or Si? Less than half of all metalloproteins are characterised and the genome remains opaque to inference of metal binding and optimal concentrations for

growth. We know many elements have some biological purpose but are they essential? Similarly, are all elements that look like nutrients within the ocean, actually being used? Or being unavoidably taken into cells and then being managed by e.g. sequestration into non-toxic forms with the membrane or bound to phytochelatin hence the uptake parallels abundance of life and only “appears” to be a nutrient.

There are currently two fully funded 4-year studentships (from the ERC) available, to define comprehensively which elements are essential nutrients, and at what point they become toxins to selected model phytoplankton. The approach taken will involve culture of a range of phytoplankton across a broad concentration range of different elements to examine the impact on growth and photosynthetic ability. The next steps will provide a complete elemental fingerprint of the metalloproteome of these organisms by coupling liquid chromatographic (LC) separation techniques with protein quantification, protein identification and Quad-ICPMS elemental analysis

Training: The students will be trained in a combination of the following techniques depending on their interest: culture of algae, HPLC, ion trap identification of proteins, recombinant expression of proteins, molecular biological techniques, enzymatic characterization and metal and isotopic analysis.

Background: Successful candidates may have a BSc or equivalent in Biochemistry/Chemistry, Molecular Biology, Plant Sciences, Earth Sciences or other relevant disciplines. Candidates with a high degree of motivation and scientific curiosity are encouraged to apply, with an interest in crossing scientific disciplinary boundaries.

For further information, please do not hesitate to contact Ros Rickaby (rosalind.rickaby@earth.ox.ac.uk)

The closing date for applications to this project is March 18th.