

## Physiological ecology of phytoplankton

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### Introduction

Take a long, deep breath. Now slowly let it out and take another. That second breath was brought to you by phytoplankton, the microscopic photosynthesizers found in almost all open water on Earth. In addition to producing nearly half of the oxygen you breathe, phytoplankton are the foundation of most open ocean food webs; they are the trees of the seas.

In the Litchman lab, we focus a great deal on the physiological traits of phytoplankton that affect their ecology: temperature and nutrient dependence of per-capita population growth rates, nutrient uptake rates, cell stoichiometry, and the interactions among these and other traits are all crucial to the ecological success of phytoplankton. A great deal of theoretical and experimental work has been done in this area, but there remain gaps in our knowledge. In particular, the development and testing of mathematical models describing the interaction between resource availability and temperature are ongoing. I hope to test one such model next summer by conducting nutrient-dependent growth and nutrient uptake experiments across a large temperature gradient. We will likely use the freshwater green alga *Chlamydomonas reinhardtii* as our study organism.

A URA in our lab can expect to gain experience in technical lab skills (e.g. nutrient analysis, spectroscopy, algal culture), and (optionally) some experimental design, math, and programming skills as well! This project in particular may require some engineering/technical ingenuity, so a creative mind is key! The successful applicant should demonstrate focus, responsibility, self-motivation, an ability to work independently, and enthusiasm for learning new things. Depending on the success of the project, we encourage students to maintain collaborations with our lab after the summer is over. We look forward to reading your application!