Project Title: Understanding the molecular basis of protein targeting to the chloroplast using the model microalga *Chlamydomonas reinhardtii*

Supervisor: AR Dr. Oliver Caspari
Institute/group: RG Caspari
Webpage: https://www.ifmb.uni-bonn.de/en/research/rg-caspari

Requirements: Independence, diligence, motivation, basic lab aptitude. Some prior knowledge of photosynthesis would be a plus, but is not essential.

Skills to be learned (max 50 words):

Lab skills: Golden gate cloning, handling of bacteria and microalgae, bacterial and algal transformation, high-throughput screening, data analysis, fluorescence microscopy Desk skills: time management, finding and handling relevant literature, scientific writing

Project Description (max. 150 words):

In this project, we aim to crack the code of chloroplast transit peptides (cTP). These peptides are present at the N-terminus of proteins encoded in the nuclear genome and imported into plastids. Enigmatic cTP do not share clear sequence similarities, but instead are characterized by an elusive set of physico-chemical properties that have resisted a clear-cut definition despite decades of research. Using a systematic high-throughput screen, we aim to finally pin down the molecular determinants underlying the process of chloroplast targeting. To do so, we will use mutants of the green algae *Chlamydomonas reinhardtii* that lack the small subunit of Rubisco, a nuclear-encoded chloroplast-localized protein necessary for photosynthesis. By complementing the mutant with constructs incorporating cTP variants, successful chloroplast import will be screened for through restoration of photo-autotrophic growth. Fluorescence microscopy will be used for a subset of transformants to check for dual targeting.

Support concept (max. 75 words):

The student helper will be responsible for conducting aspects of the screen, including cloning a salient subset of cTP variants, transforming the constructs into the algae and extracting the information through statistical treatment of the resulting data. The student will receive support to develop not just the lab skills involved, but also project management skills, and be involved in the eventual write-up of the project for publication.