Isolation of lipid-responsive regulators in microalgae

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Microalgae, *Nannochloropsis gaditana* (N.G) hyper accumulate lipids when subjected to stress which can be converted to bio (oil) diesel that makes them a suitable feed-stock for carbon-neutral fuel. Stress factors like Nitrogen starvation and high salinity severely impair cell division and photosynthesis that reduces lipid production. But, high light stress results in increased lipid yield without compromising growth. Further, it has been observed that sole overexpression of enzymes does not produce the desired amount of lipid i.e. there are additional regulatory mechanisms or *regulators* at work that affects lipid synthesis. Therefore, I plan to isolate light-responsive TFs (trans-factors)/regulators in N.G that can lead to stress-free lipid accumulation useful for commercial cultivation. Putative TFs would be identified by analyzing differential expression data through RNA-seq after lipid induction by light stress. Knock-out lines would be generated to create loss-of-function mutants for the down-regulated TFs identified (considered as -ve regulator for lipid). Mutants for down-regulated TFs would produce high lipid content and the mutant that is most responsible for affecting the lipid is the desired 'regulator'. Cell morphology, photosynthetic measurement, % of carbon sharing, TF-target binding site, and gene expression network analysis will be done to further characterize the identified TF. I would be presenting an overview of the ongoing work and future studies that will be carried out.