

Experimental evolution of Photosymbiosis

Keywords: Photosymbiosis, Algae, Protist, Genetics, Evolution

Summary

Oxygenic photosynthesis evolved in cyanobacteria around 2.8 Byr ago. Eukaryotic photosymbiosis is thought to date to about 1.8 Byr ago, when a protoeukaryote, already possessing mitochondria, underwent a stable interaction with a cyanobacteria establishing the foundation of the green lineage (green algae and plants). Subsequently, a myriad of independent secondary and tertiary photosymbiosis events where heterotrophic eucaryotes engulfed photosynthetic unicellular eucaryotes occurred. Those photosymbiotic associations exists in key protists ecological groups (ciliates, brown algae, diatoms, dinoflagellates, apicomplexa, euglenids, foraminifera etc...) and even in some metazoans. Cnidarians (hydra, corals), platelminths (symsagittifera) and even vertebrates (salamander) can transiently or permanently host various photosynthetic unicellular eucaryotes and benefit from their photosynthetic activity. Now, photosymbiosis, under its highly diverse forms, structure the living world by providing reduced carbon to most life forms. However, the molecular and cellular basis of photosymbiosis establishment are still unknown. In this project, forward genetic screens and experimental evolution will be used to identify cellular and molecular events underlying the association between photosynthetic and non-photosynthetic eukaryotic cells. This will allow to test new hypothesis concerning the selective pressures underlying the establishment of photosymbiosis in a new genetically tractable synthetic photoecosystem.

Ref: The number, speed, and impact of plastid endosymbioses in eukaryotic evolution. Keeling PJ. Annu Rev Plant Biol. 2013; 64:583-607.

The co-supervisors

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Location

LGBP BIAM, Luminy Campus, Marseille, France

LCB, 31 chemin Joseph Aiguier, Marseille, France

Doctoral school

Life and Health Sciences (ED 62), Aix-Marseille Université

Expected profile of the candidate

Potential candidates must hold a master degree or equivalent, have a proven and excellent background in cell biology and genetics, be interested in evolution and able of creative and independent thinking.