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DEGLI STUDI  
DI PADOVA



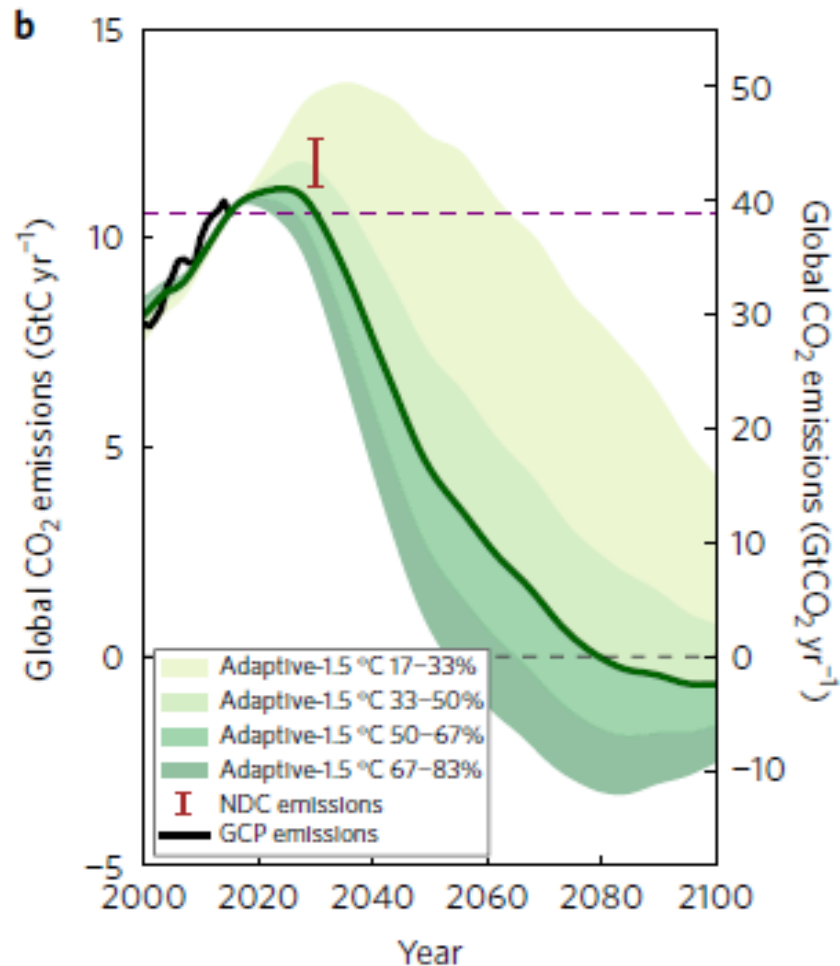
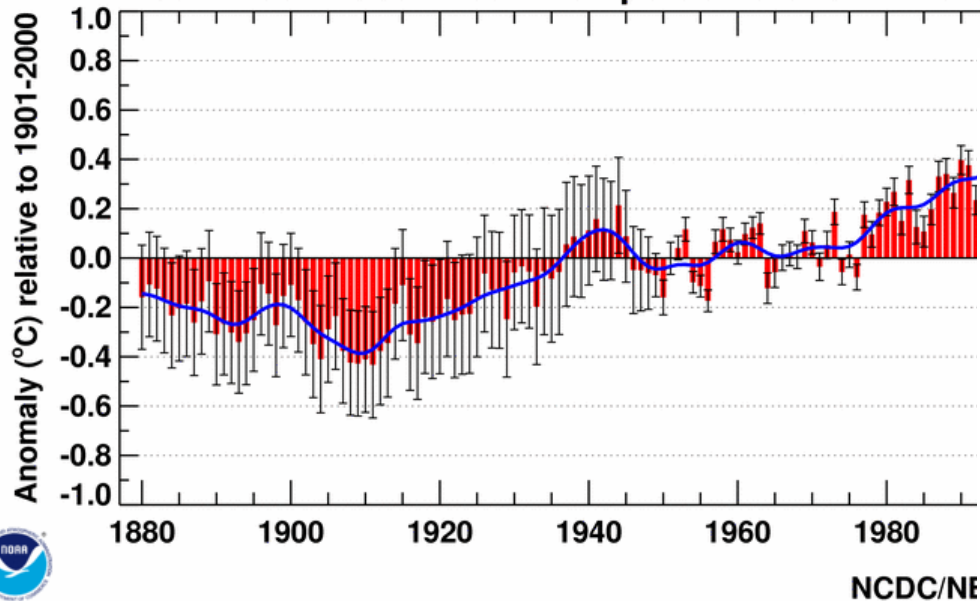
# Algae biotechnology

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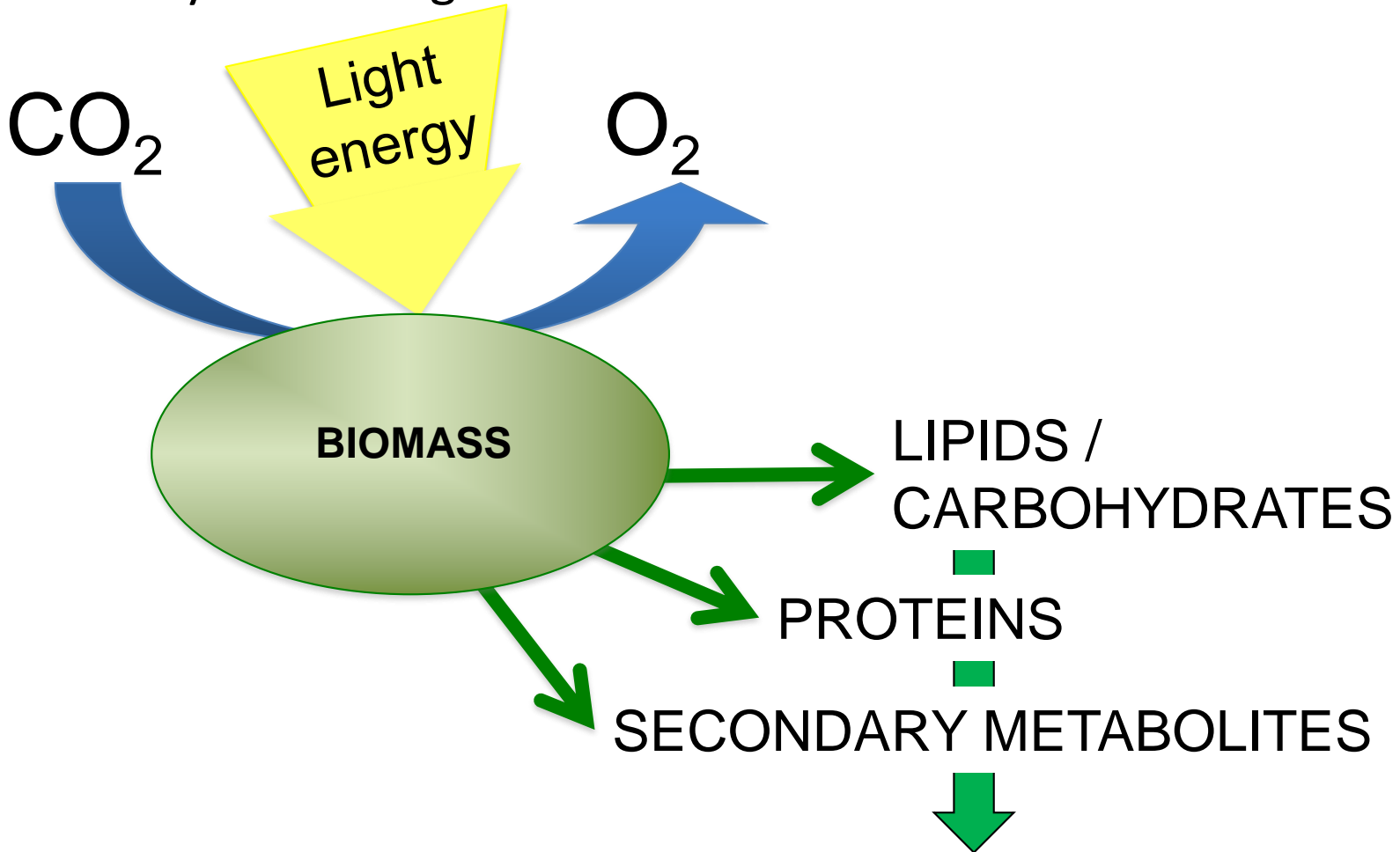
## Reduce CO<sub>2</sub> emissions is a pressing challenge

Jan-Dec Global Mean Temperature over Land & Ocean

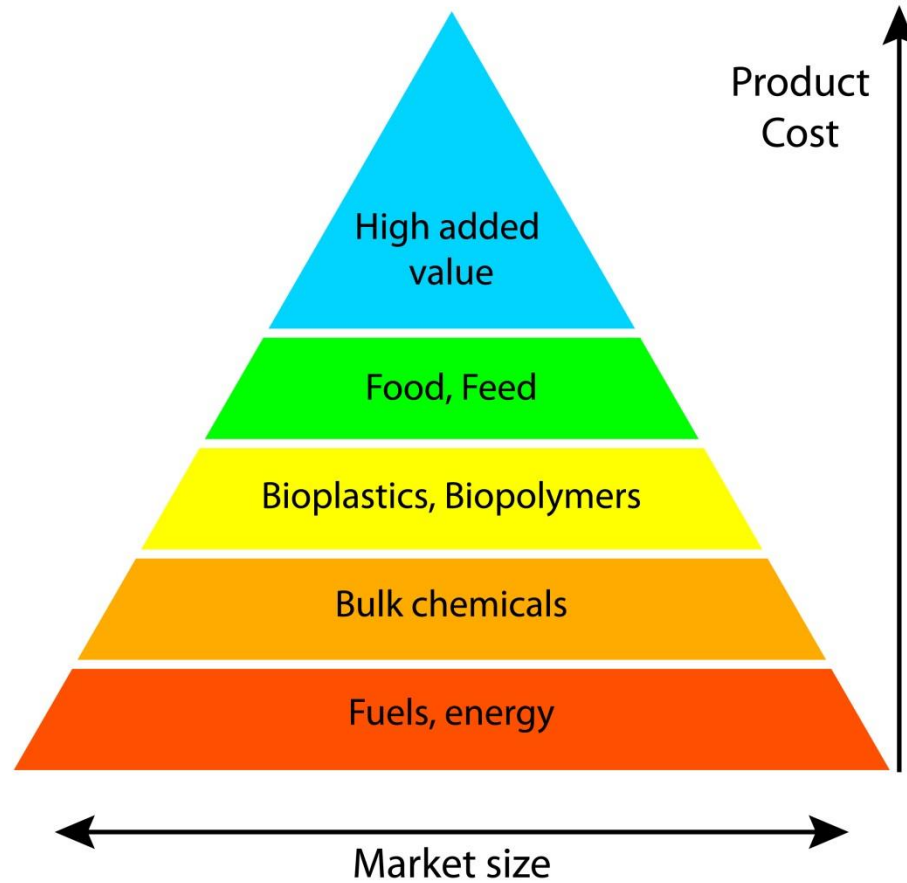


# The challenge of reducing CO<sub>2</sub> emissions

Photosynthetic organisms can contribute to this reduction



Can be used to produce FUELS, CHEMICALS, PLASTICS ...



# Algae Biotechnology



Plants biomass is already exploited for food and feed

## Unconventional biomass sources

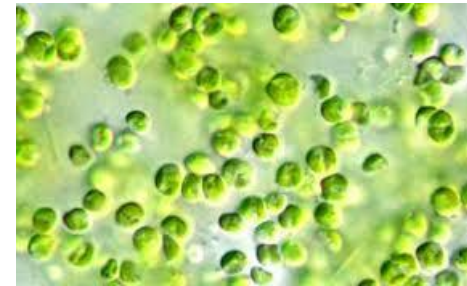
High Sustainability

Waste CO<sub>2</sub>

Waste Waters

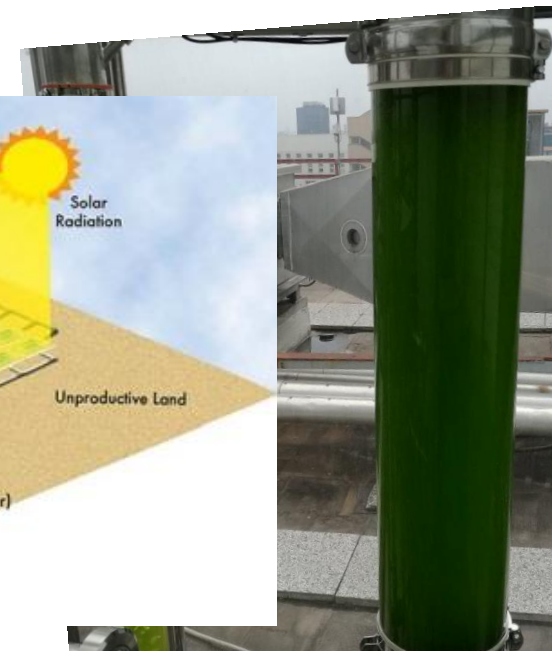


Algae Biomass

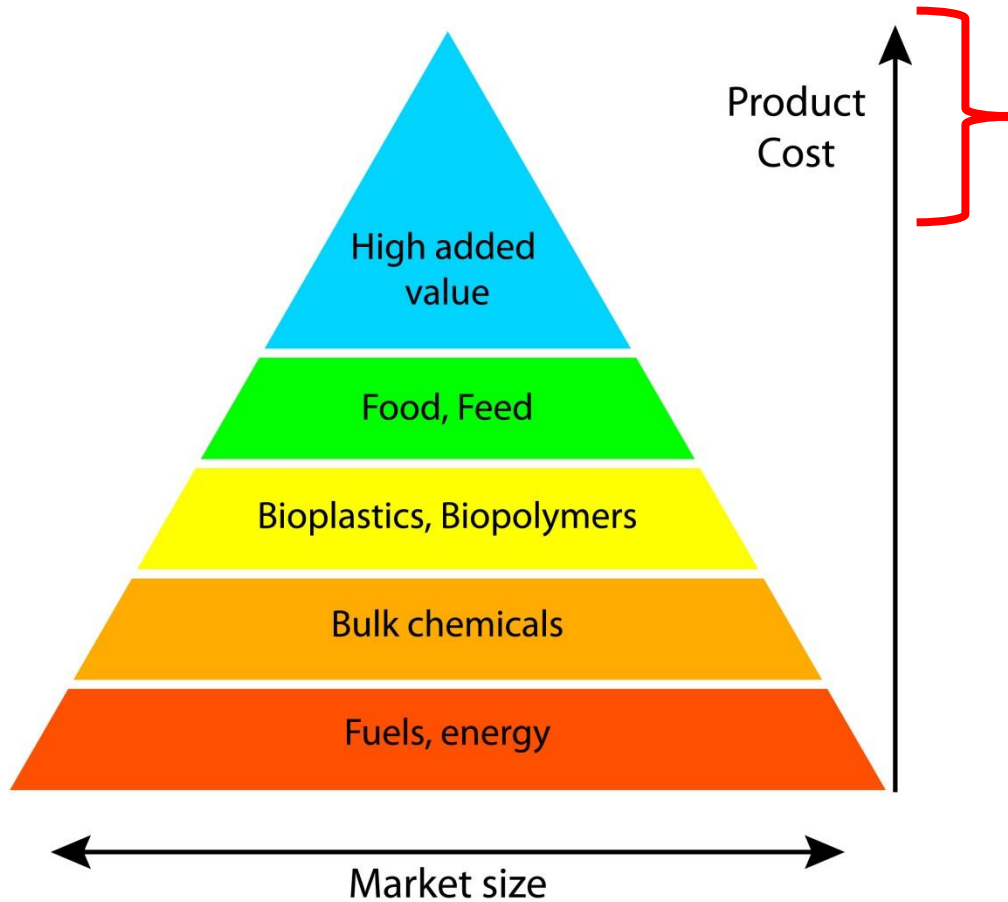


## Algae Biotechnology

- Algae do not need arable land for growth  
no competition with FOOD production
- Algae do not need freshwater  
(they can grow on seawater or wastewater)



## Bio-products



Algae-based products on the market are presently only in the highest value

■  
Need to improve productivity to reach sustainable production of other molecules





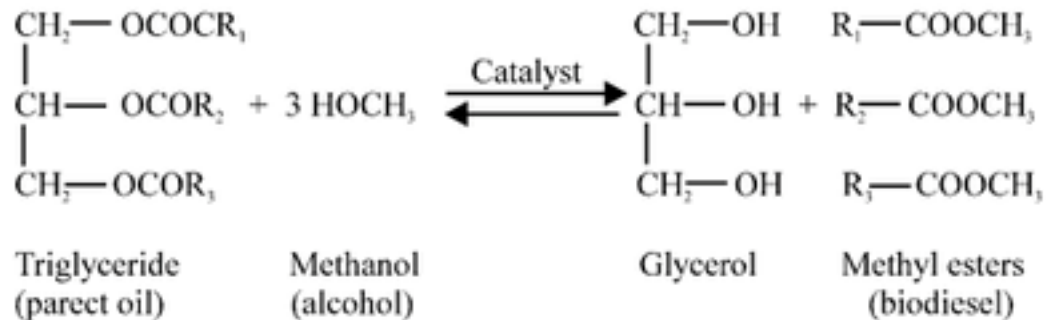
## 1. Algae for Biofuels production



Figure Lipid bodies imaging in *Nannochloropsis gaditana* cells. Red fluorescence corresponds to the chloroplast while the yellow one originates from lipid bodies stained with Nile Red.

*Nannochloropsis* species is a good natural producer of lipids

Project supported  
by



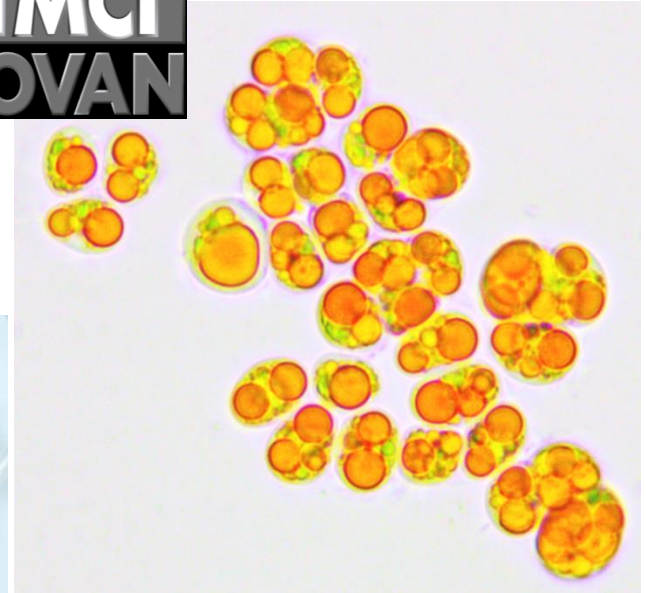
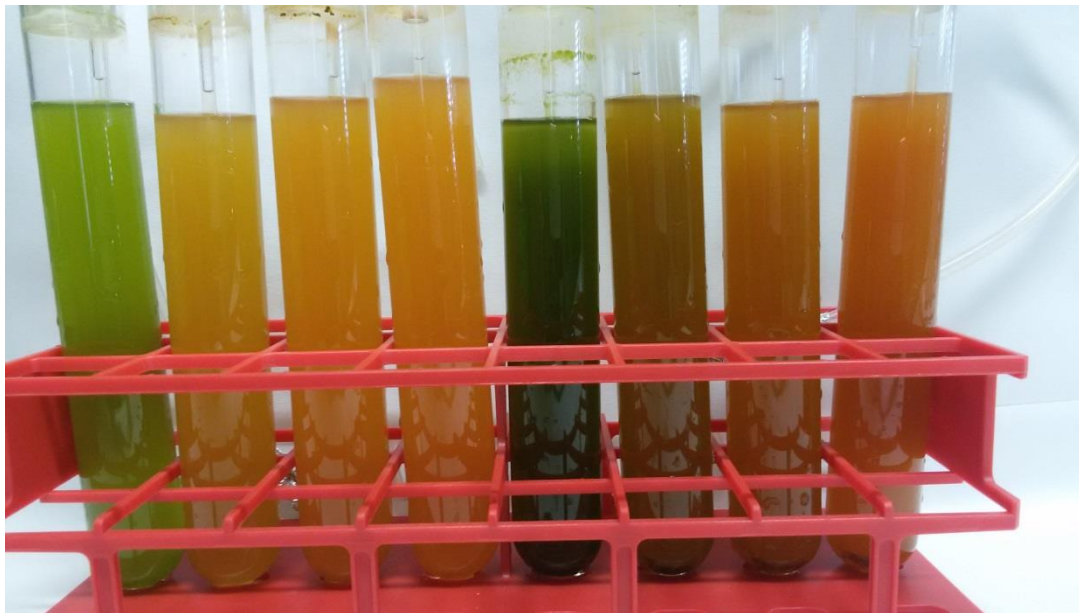


## 2. Algae for food applications

Project supported by



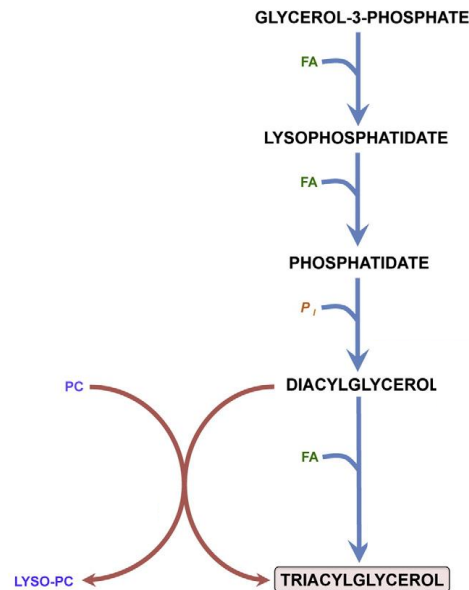
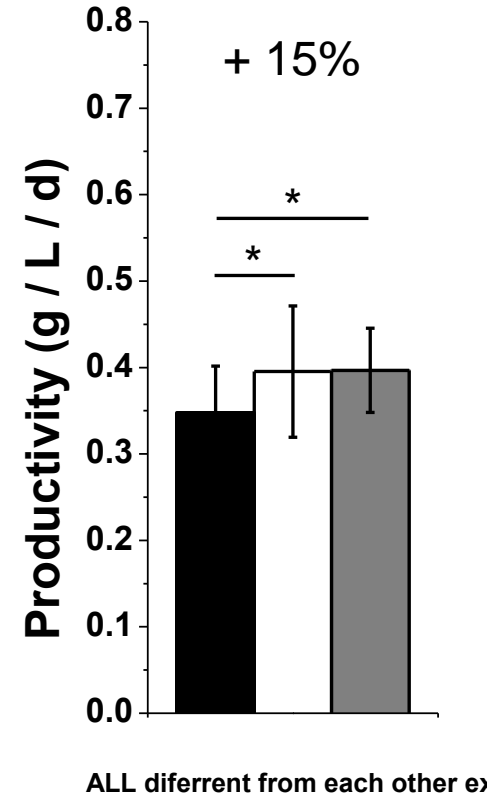
e.g. Selection of algae species capable of high carotenoids accumulation



# Master Projects

## 1a to improve Biomass Productivity

## 1b to improve lipids content



to improve Biomass  
Productivity

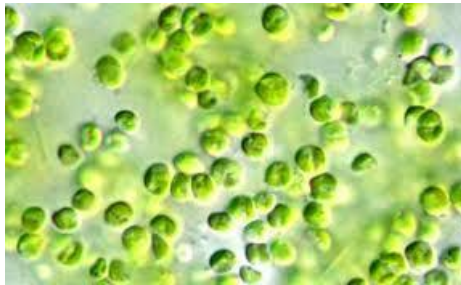
to improve lipids content

Investigation of  
metabolism regulation  
(Photosynthesis, lipids  
biosynthesis)



Generation of new  
strains with improved  
properties

to optimize lipids profile for the specific application



Vs.





## Algae for food applications

Development of new PBR v1.0



v1.0

How can we optimize productivity?

v 2.0



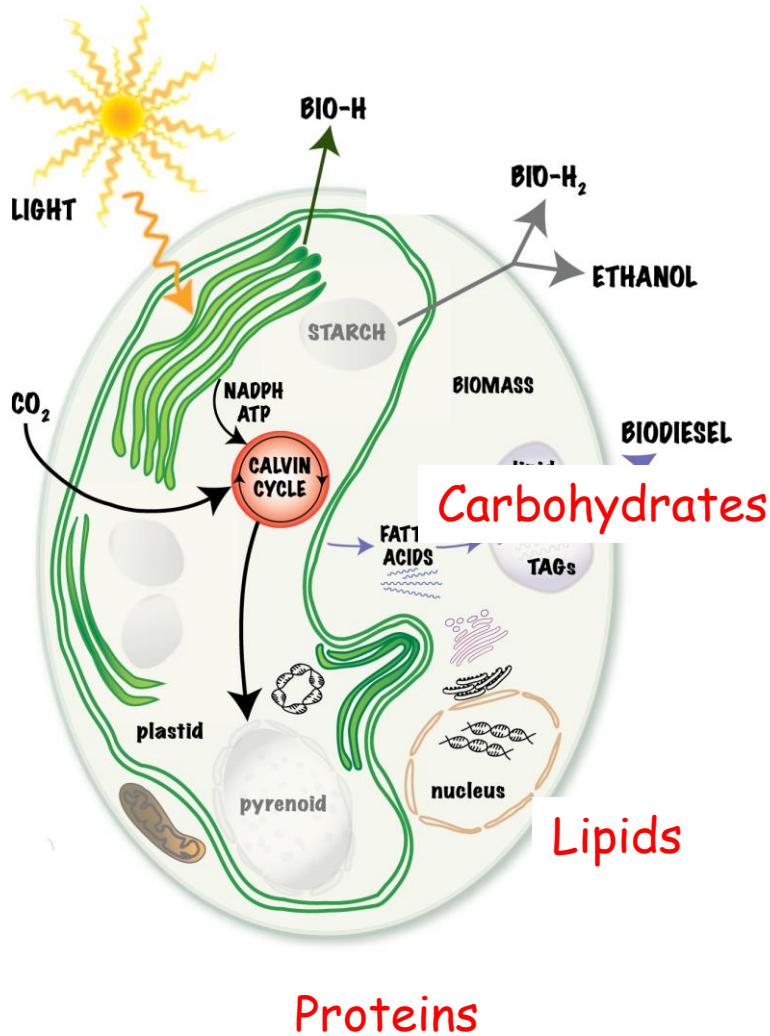
## Algae for food applications

How is algae metabolic response to cultivation in industrial conditions?





# 4. metabolic regulation in algae



Investigation of  
metabolism  
regulation  
(Photosynthesis,  
lipids  
biosynthesis)

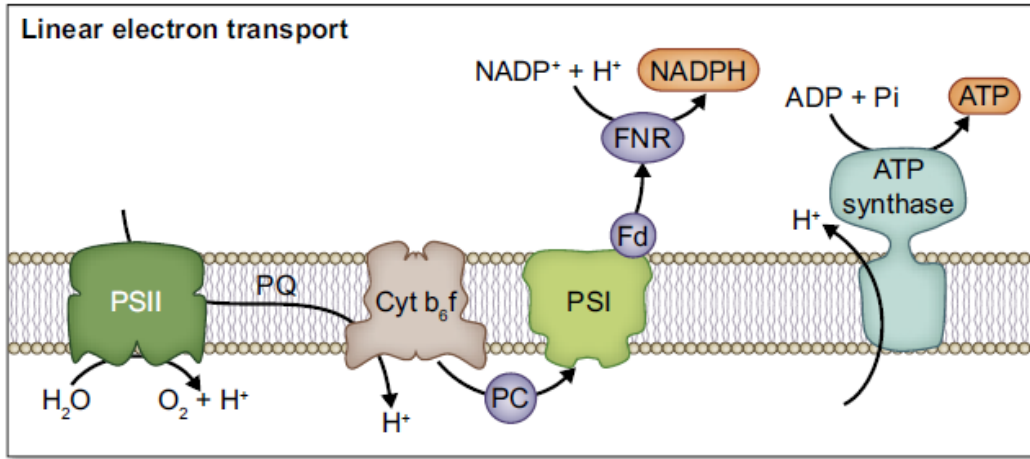


Generation of  
new strains with  
improved  
properties

Identification of  
genes influencing  
algae productivity

Methods:  
Biochemistry, Physiology, “omics”  
approaches (RNAseq,  
metabolomics, lipidomics)

# 5. Regulation of photosynthesis



Dynamic Environmental conditions



Better understanding of photosynthesis

Identification of genes for improving biomass productivity