

# Using Microalgae as a Platform to Study

## Culture Techniques

Isolation of an Intracellular Product (oil)

Conversion of Extracted Oil to Biodiesel

BIOMAN 2013

Intermediate Track

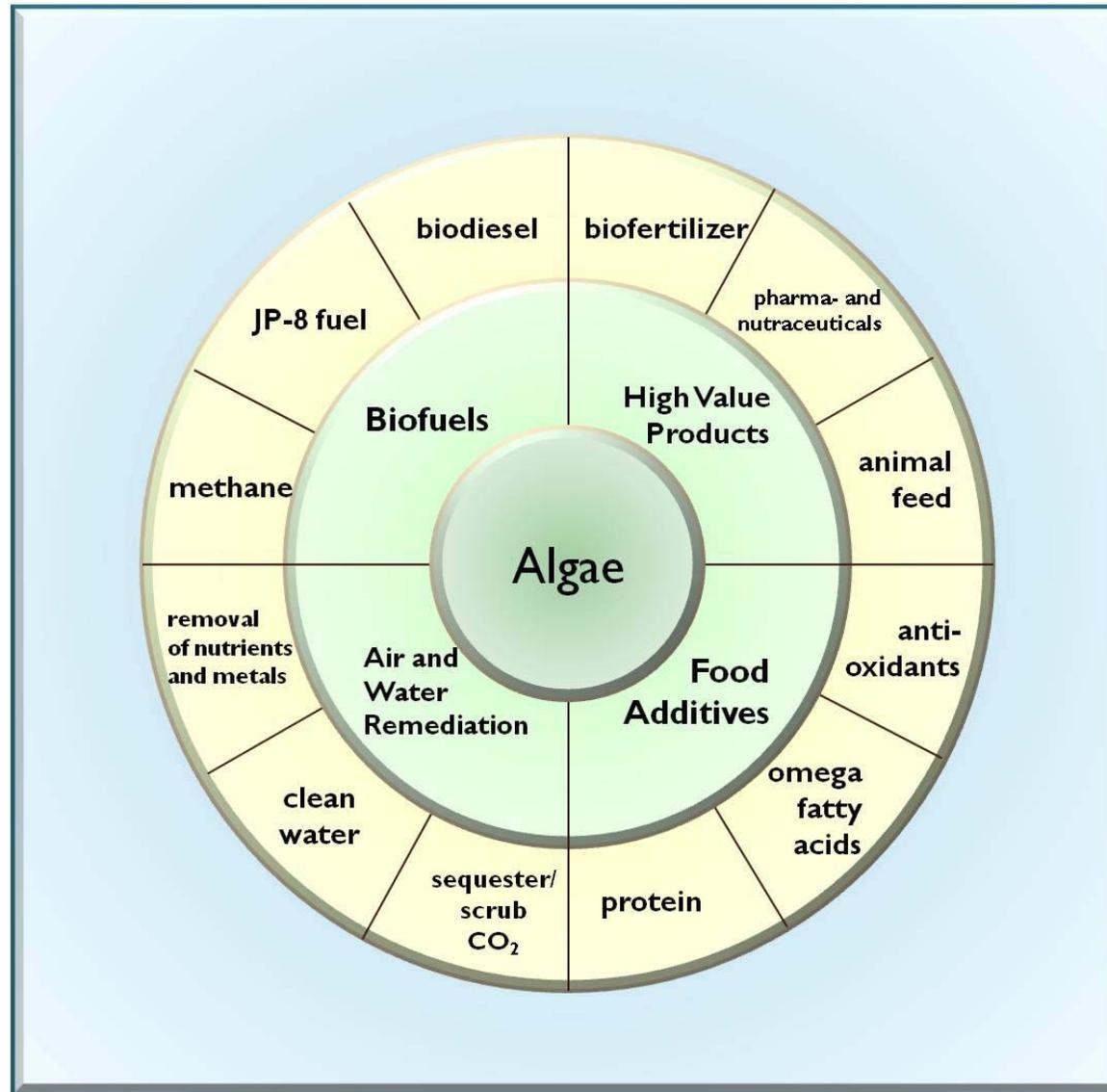
Rhykka Connelly

Program Manager

University of Texas Algae Program (UTAP)

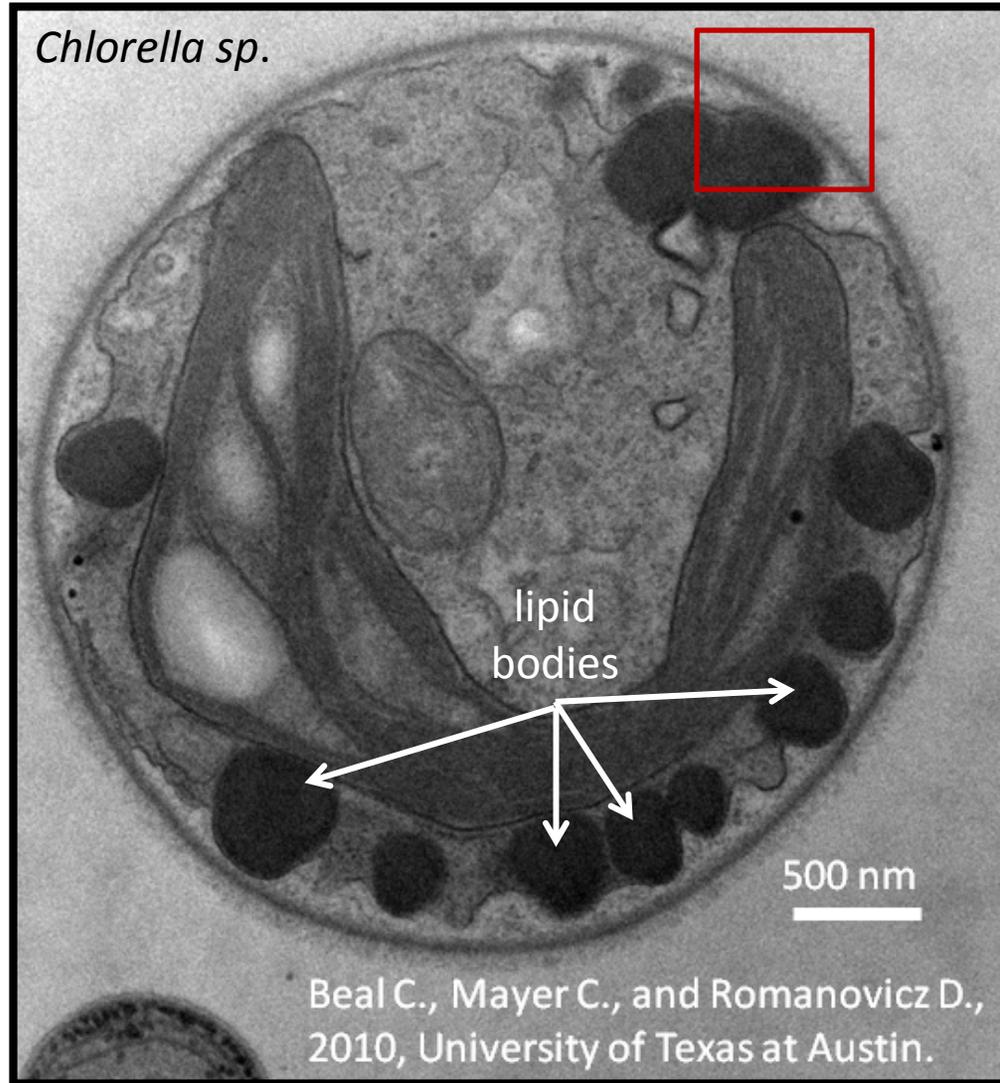
# Microalgal Products

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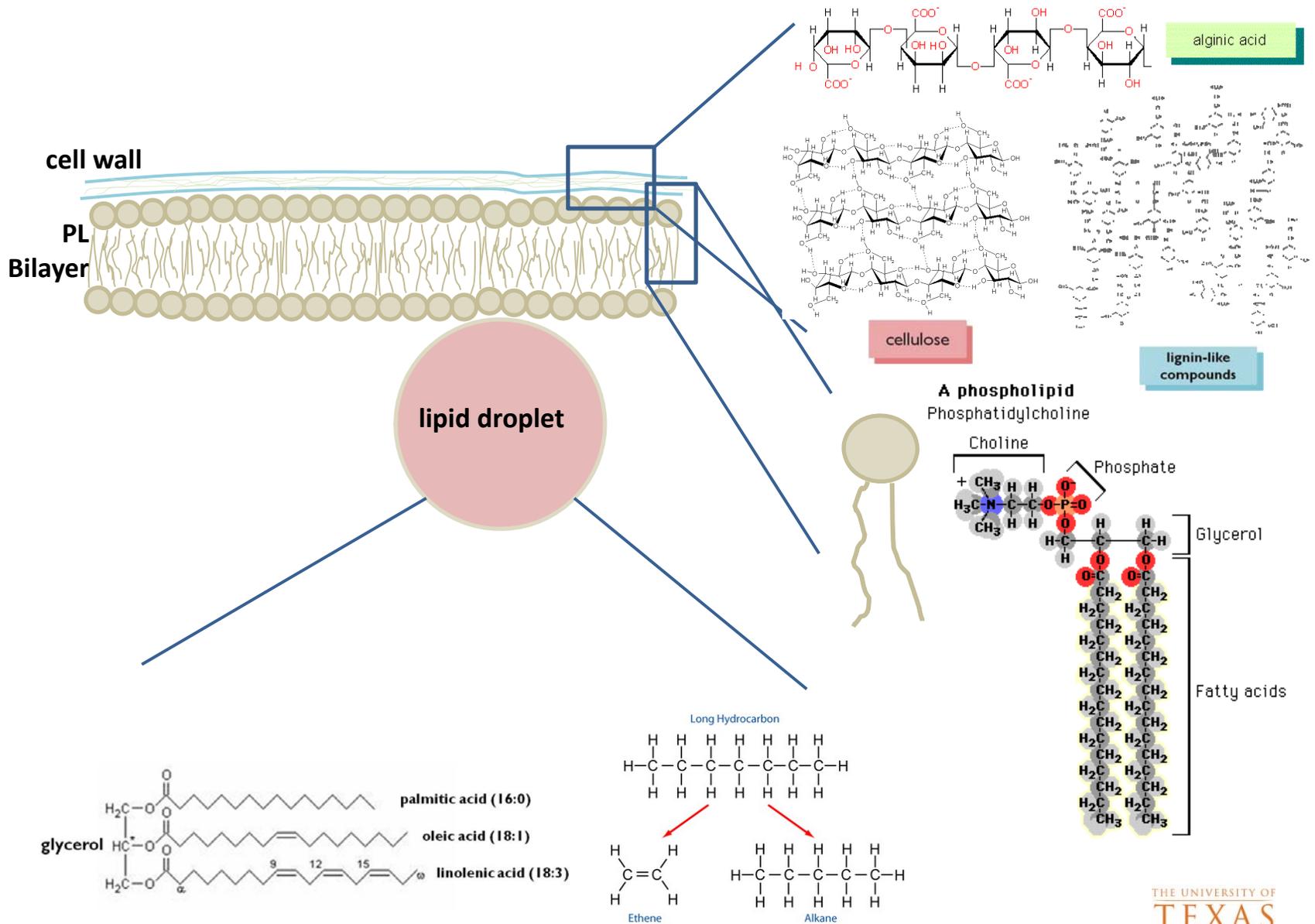


# Structure of a Microalga

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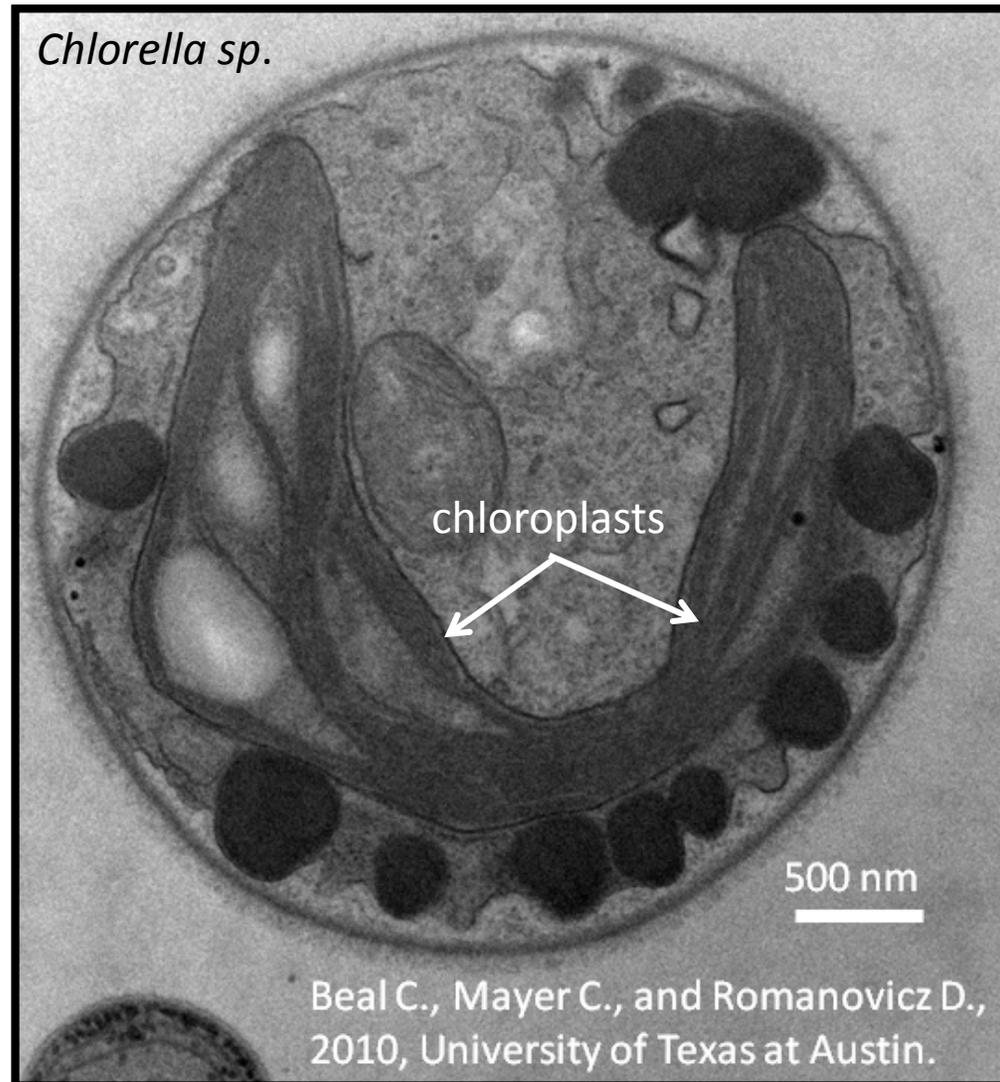
# Structure of a Microalga – At the Membrane



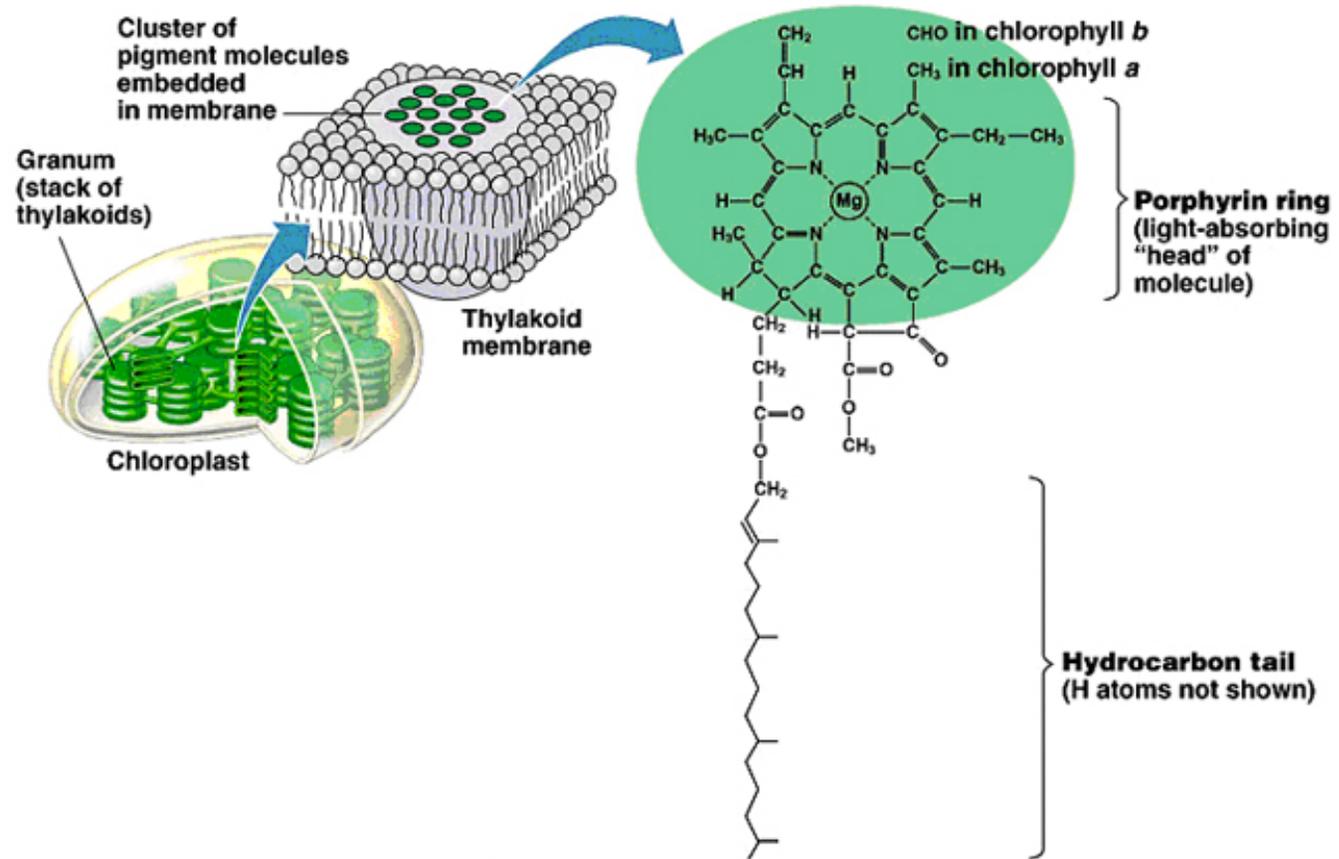


# Structure of a Microalga

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# Structure of a Microalga – Light Harvesting and Photoprotection



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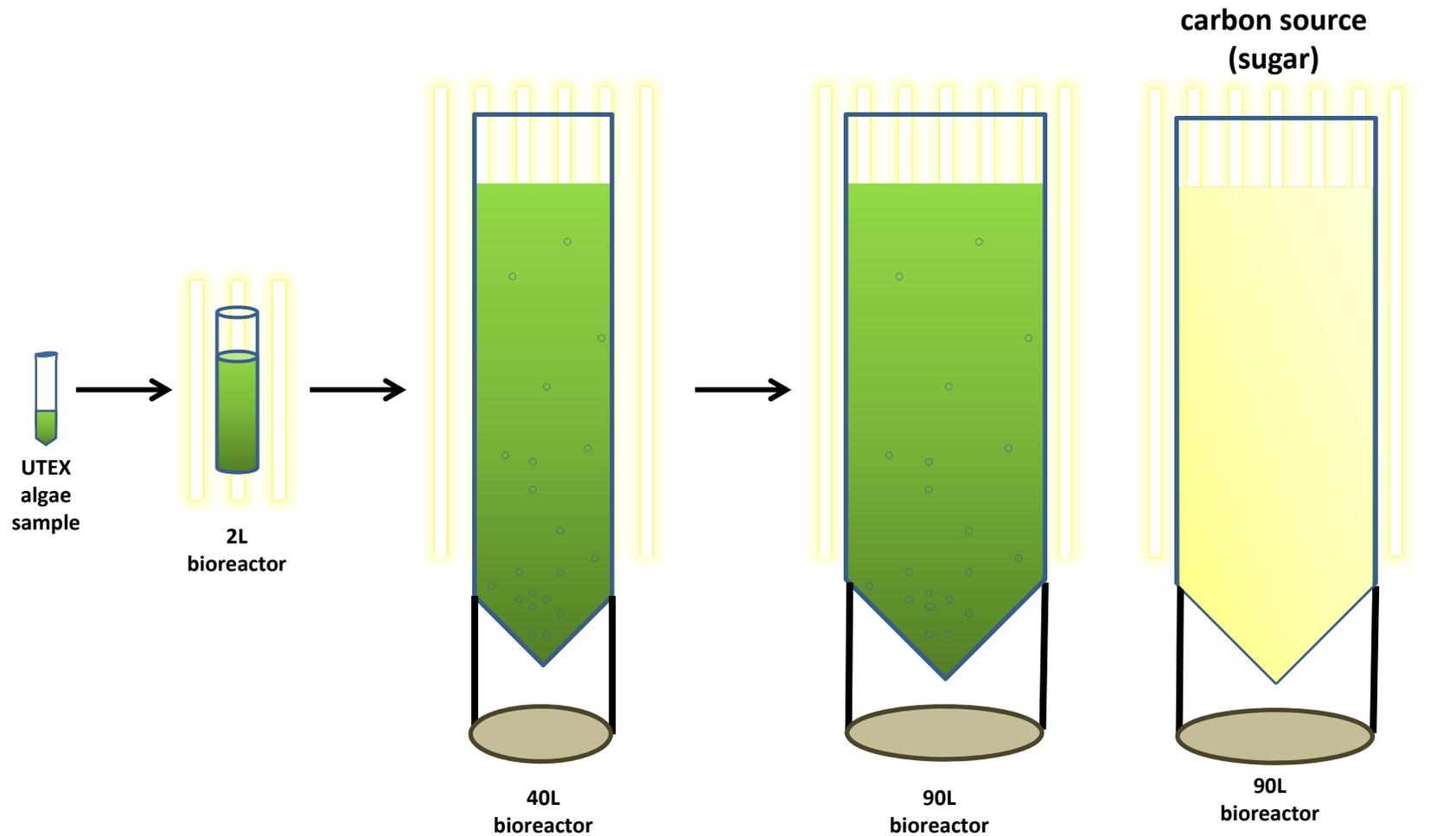


# Algae Targets

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- fatty acids and hydrocarbons – refine into biodiesel and gasoline
- carotenoids – nutraceutical products
- carbohydrates
  - food additives
  - ethanol
- protein – animal feed supplement
- biomass
  - methane
  - syngas
  - biofertilizer

# Growth Systems



Algae Phototrophic Growth Scale-up  
\*density 200mg/L – 2 g/L

Algae Heterotrophic Growth  
\*density 2 g/L – 150 g/L



10 ml  
UTEX



2 L  
UTAP



90 - 260 L  
UTAP



1,000 L  
UTAP



50,000 L  
AlgEternal Technologies



20,000 L  
AlgaStar  
(coming soon)

Biomass Scale-up

Metabolite Analysis +  
Engineering Support

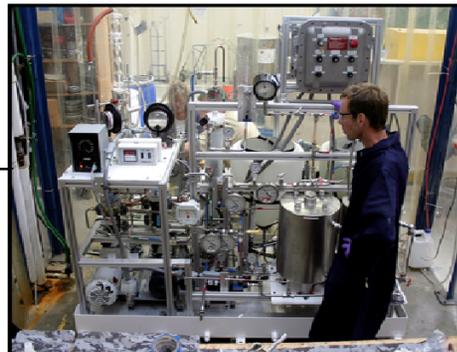
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Product and Process  
Optimization

Product Extraction and Biocrude Production



Biocrude Production Unit



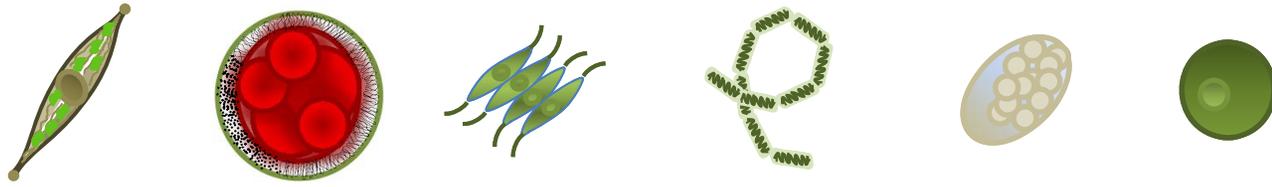
University of Texas Product Recovery Unit



University of Texas Algae Concentration Unit

value-added  
products

biocrude



## Today's Lab – Establishing and scaling up a microalgae culture

1. Acquiring algae
2. Starting a 500ml culture in a photobioreactor
3. Monitoring growth kinetics (dry cell weight, spectrophotometry to measure chlorophyll, microscopy)
4. Troubleshooting ( competing algae, predators, bacteria)
5. Transferring a starter culture to a working scale 2L photobioreactor system
6. Examining the effects of light quality on the accumulation of high-value products