

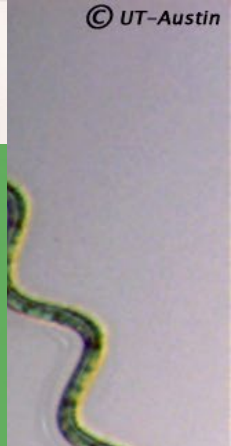
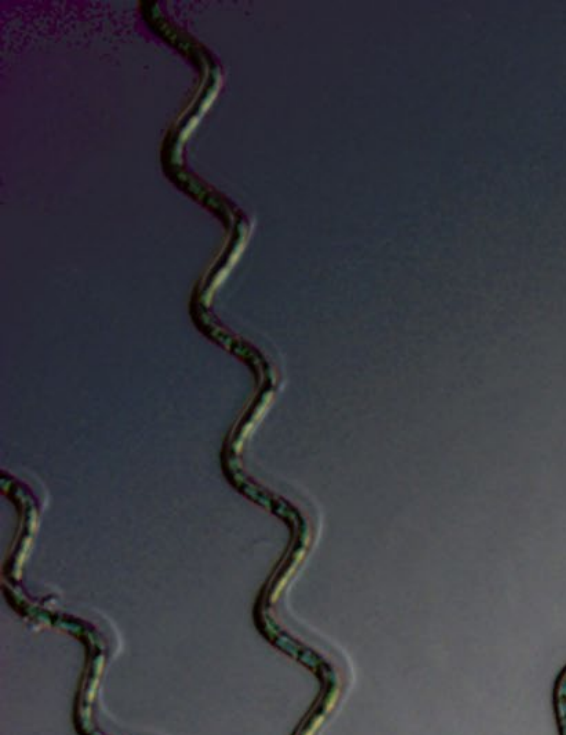


BioDiesel from Algae

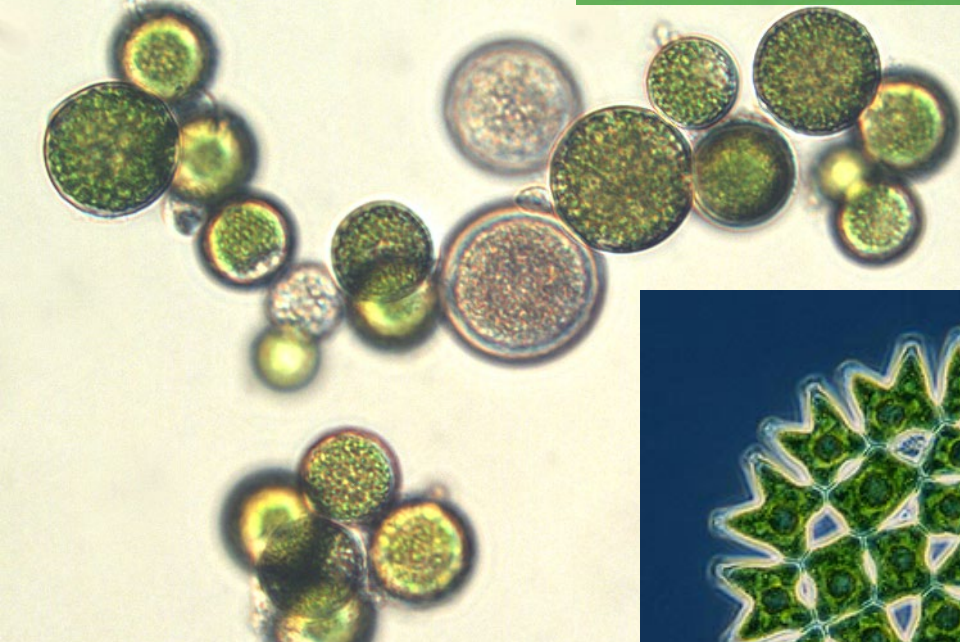
An Integrated Approach

10 µm
1000X Oil Brightfield

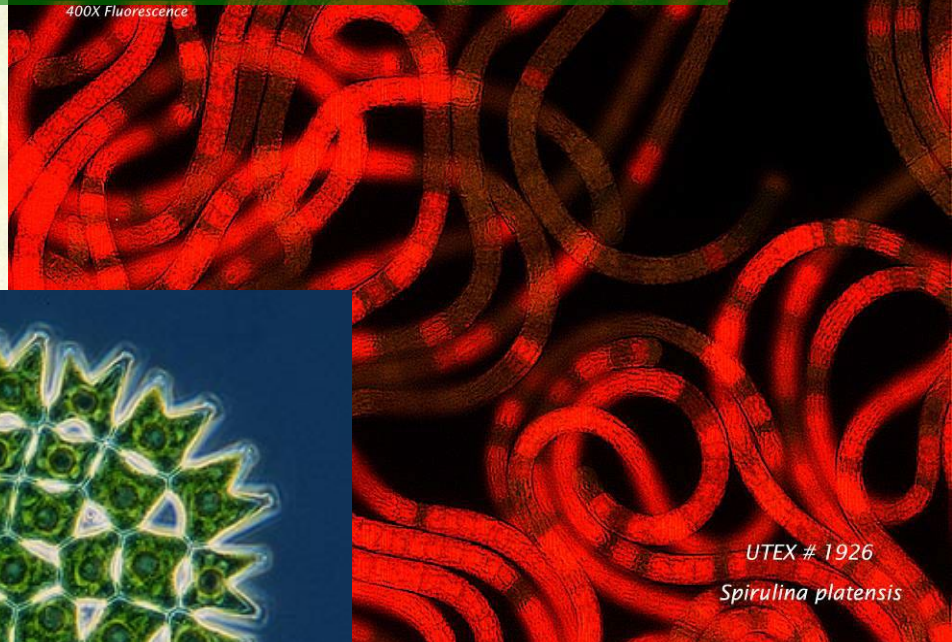
Algae (*pl. n.*) : any of various chiefly aquatic, eukaryotic, photosynthetic organisms, ranging in size from single-celled forms to the giant kelps.



12 µm
400X

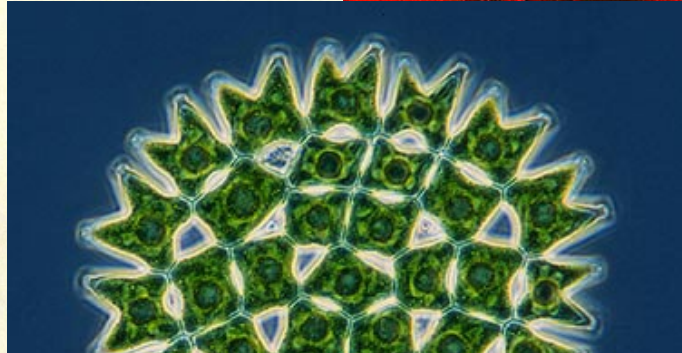


UTEX # 20
Chlorella ellipsoidea



400X Fluorescence

UTEX # 1926
Spirulina platensis



Why Algae?

- Photosynthetic organisms are capable of efficiently using solar energy and CO_2 to create biomass.
- Algae, like terrestrial plants, produce storage lipids in the form of triglycerides.
- Capable of utilizing high nutrients in waste water streams
- Incredible growth rates

Why Algae?

- As the use of biofuels expands globally, traditional food crops such as **corn** and **soy beans** are increasingly being used as feedstocks for the most popular liquid biofuels, **ethanol** and **biodiesel**, rather than as foods.
- This raises price competition between fuels and food commodities- not a **sustainable** practice.
- Algae can be grown on non-arable land, where food crops simply cannot grow.

Strain Selection

- 1. Lipid production
- 2. Biomass production rate
- 3. Resistance to photo-inhibition
- 4. Sensitivity to osmotic stress
- 5. Ease of Harvest

Waste Water Treatment Using Algae

- Algae have been used successfully to treat nutrient excess of sewage/manure wastes generated by animals and human activities (Nurdogan and Oswald 1995, Lincoln *et al.* 1996, Wilkie and Mulbury 2002).
- In concert with anaerobic digestion algae can eliminate waste water problems

Waste to Energy

- Algae thrive in high nutrient environments
- Transforming excess nutrients in wastewater into a high utility commodity:
BIODIESEL
- CO₂ emissions, from combustion, can supplement algae photosynthesis rates

Project Goals

My project will deal with overcoming biological and technical obstacles

Primary Goal:

- Bio-prospecting for an alga suitable as a biodiesel feedstock

Secondary Goals:

- Efficient production of the alga
- Efficient harvesting
- Efficient oil extraction

Literature Cited

- Lincoln, E.P., A.C. Wilkie, and B.T. French. 1996. Cyanobacterial process for renovating dairy wastewater. *Biomass and Bioenergy*. Vol. 10:1 pp. 63-68.
- Nurdogan Y., W.J. Oswald. 1995. Enhanced Nutrient Removal in High-rate ponds. *Wat. Sci. Tech.* Vol. 31:1 pp. 33-43.
- Wilkie, A.C., W.W. Mulbury. 2002. Recovery of dairy manure nutrients by benthic freshwater algae. *Bioresource Technology*. Vol. 84:1 pp. 81-91.