

Berkeley Algal Science Center (BASC): carbon concentrating mechanisms (CCM) & biosequestration (CaCO₃ & algaenans)

microbes - solar, self-repairing, reproducing, catalytic – very hard to beat

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1. Calcium carbonate mineralization

White cliffs of Dover largely due to algal biomineralization (CaCO₃)

CO₂ storage - billions of metric tons

Ocean sediments ~1000,000,000 vs

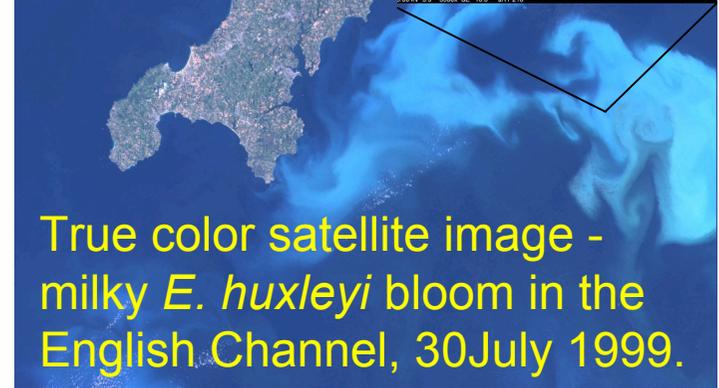
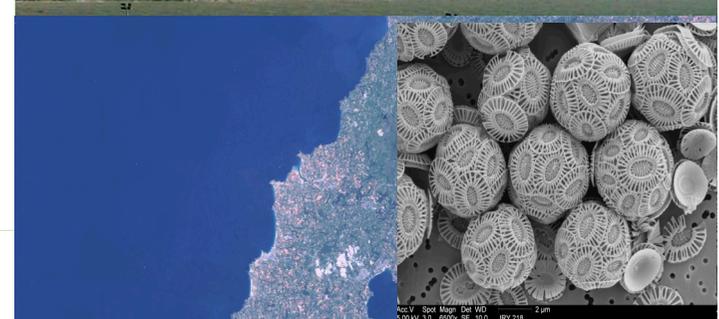
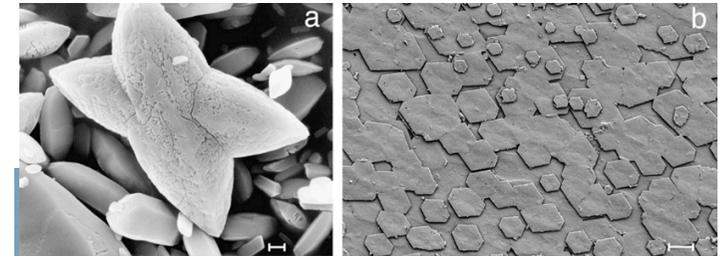
Fossil Fuels ~4,000

(scale - bay area 480 acres of salt flats restored)

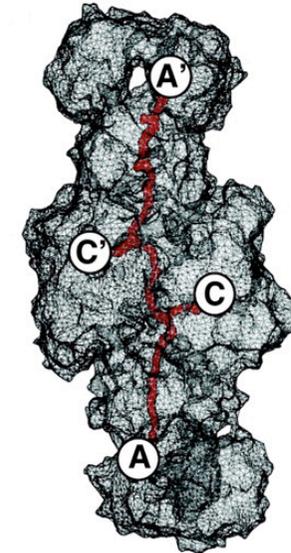
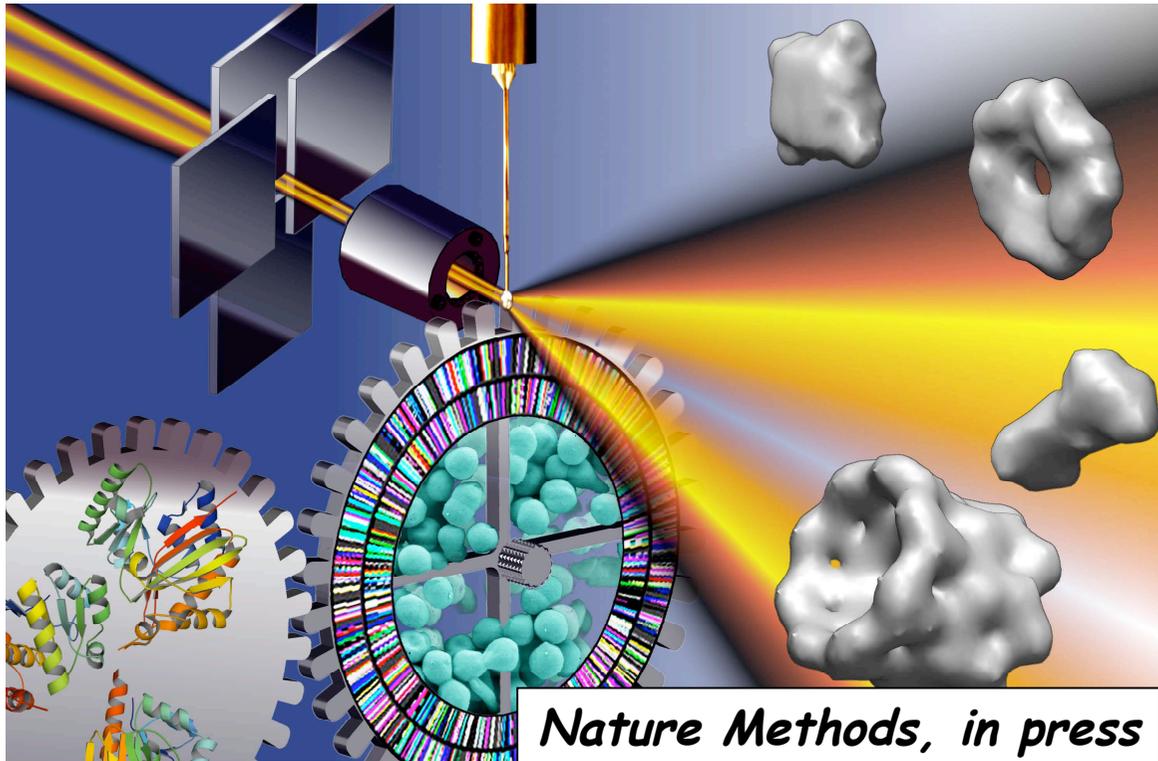
Insoluble and highly aliphatic, algal cell wall
~30% of biomass, resists acid/base
hydrolysis & degradation in sediments.

3. CO₂ conversion into ethylene

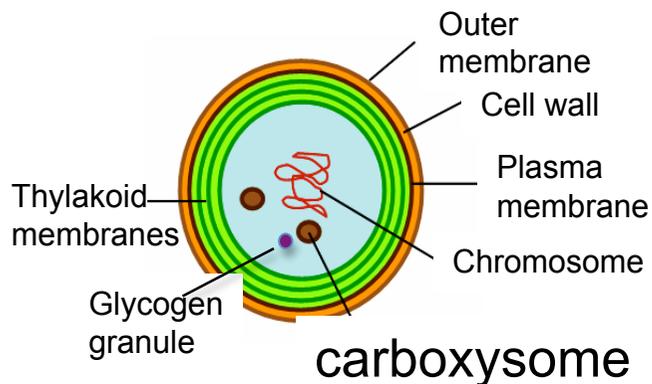
>100 million metric tons/year for making
drugs, polymers, etc.



Toward control of recalcitrant carbon by algal design: HT solution structural analyses by X-ray scattering



acetyl CoA synthase
Metalloenzymes - remove
CO₂ and CO from air



Goal: predictive control of carbon pathways
Microbes: self-powered, self-sustaining
Biology - can optimize greatly (agriculture)
HT solution structures >85% of samples
Links: LBNL-UCB- Scripps-ALS-NERSC-JGI
Companies: Sapphire matching \$\$