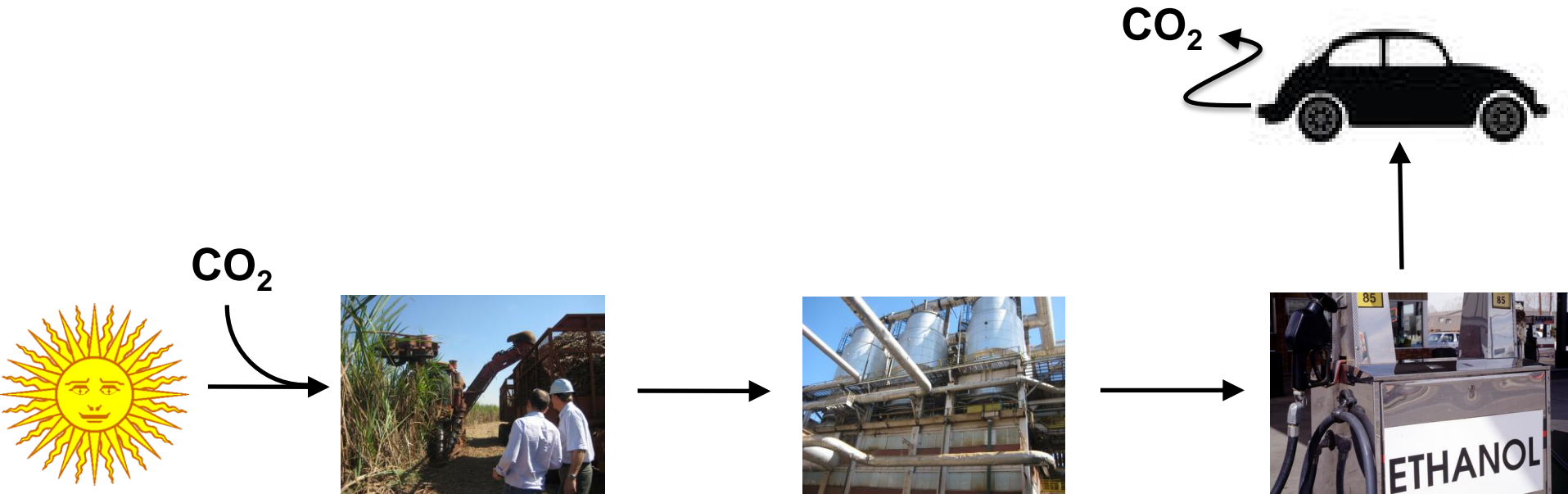


Joint BioEnergy Institute



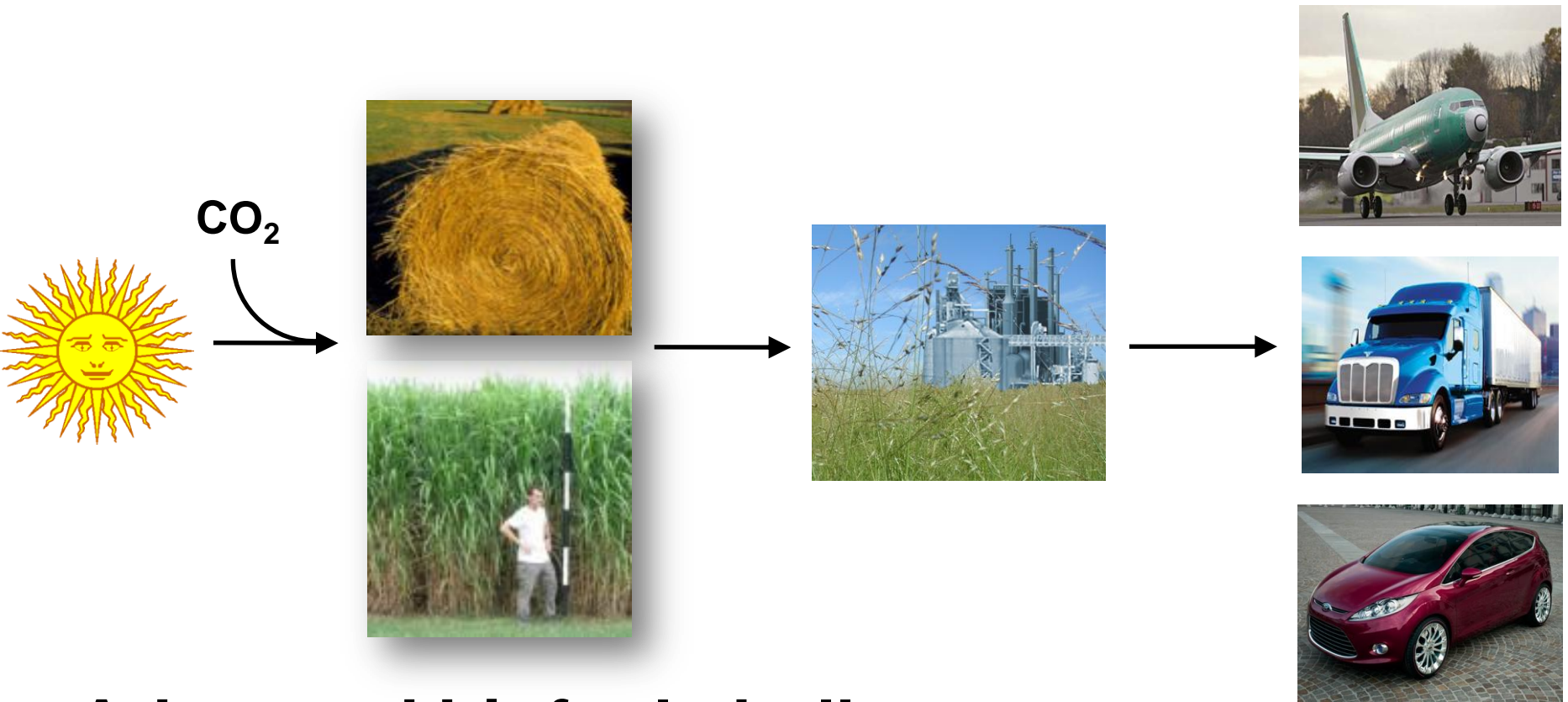
Mission: to develop technologies to transform cellulosic biomass into advanced biofuels

Cane to Ethanol



Cane to Ethanol:

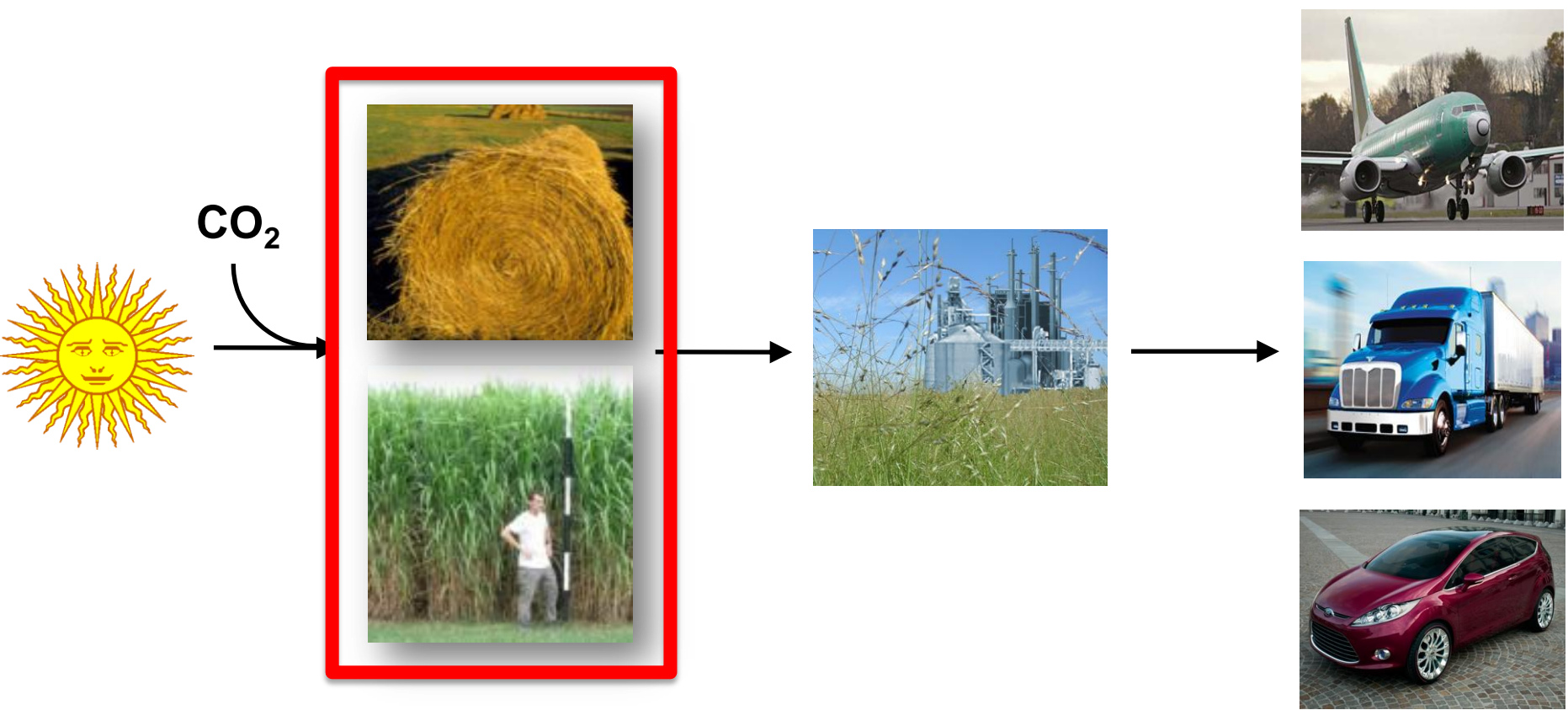
- Cane is a great sugar source
- Flexible infrastructure



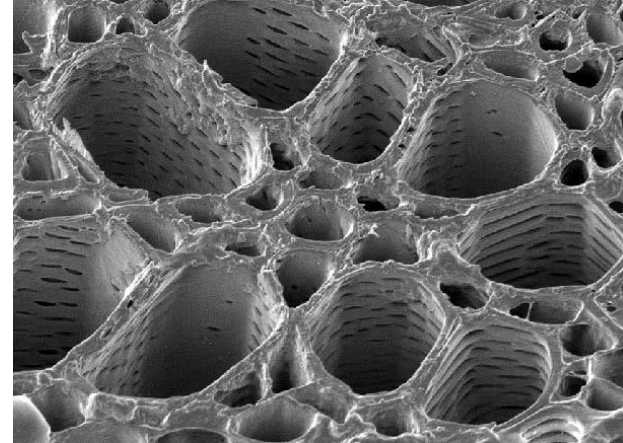
Advanced biofuel challenges:

- Sugars in biomass are difficult to access
- Transportation infrastructure is not flexible

Advanced biofuels from cellulosic biomass

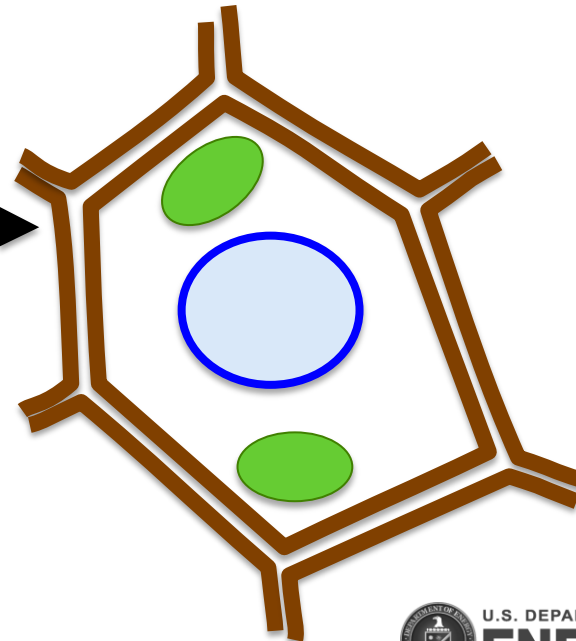


Cell walls contain sugar

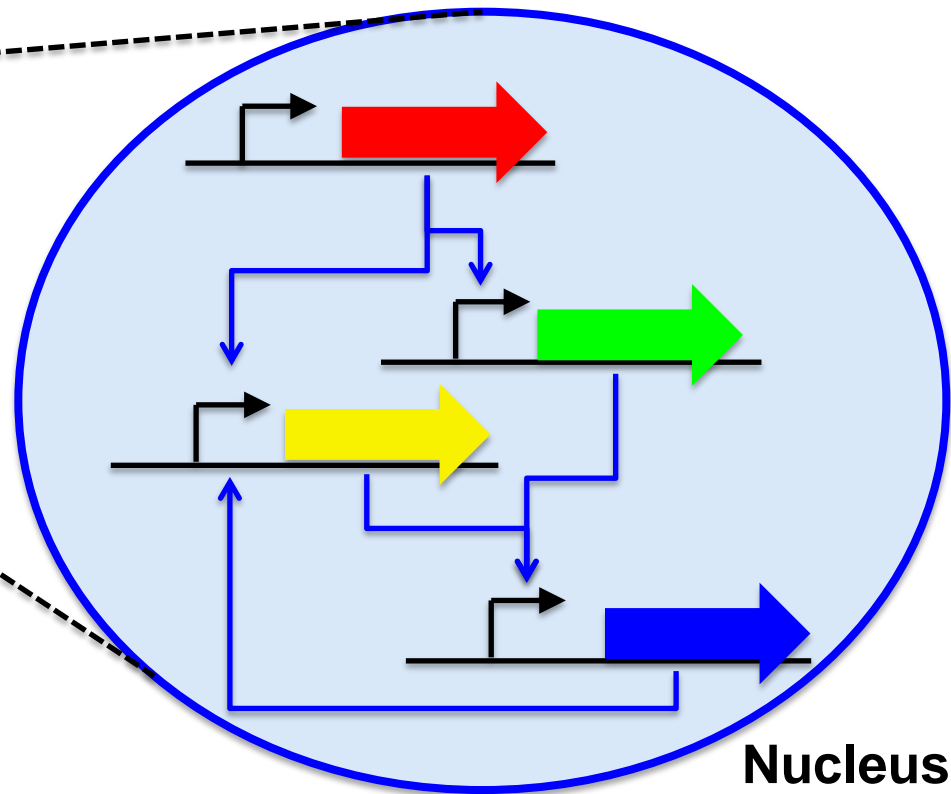
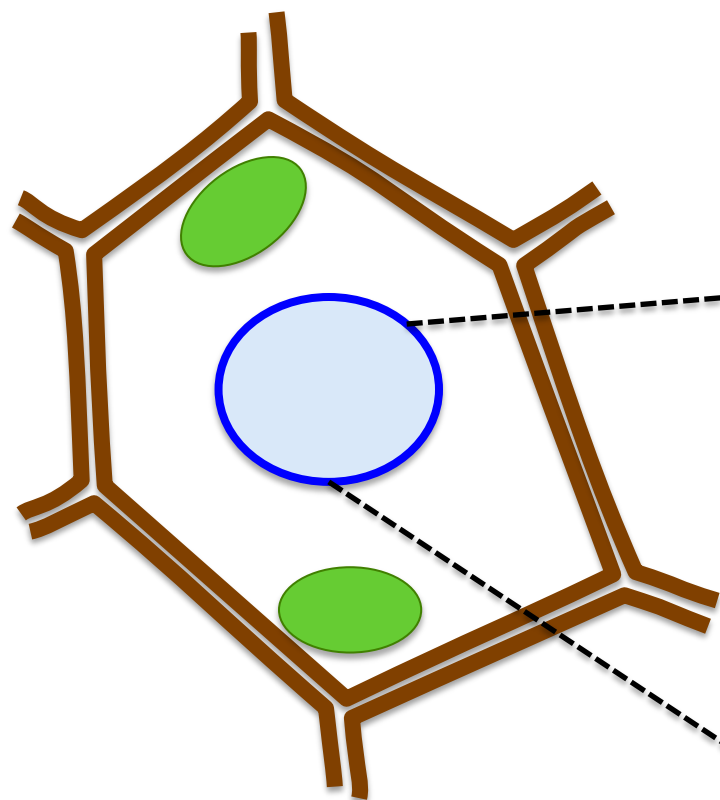


Cell walls contain:

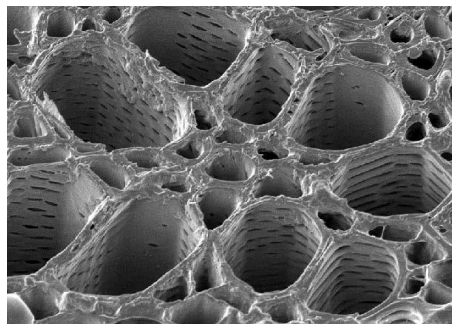
- Cellulose (sugar)
- Hemicellulose (sugar)
- Lignin



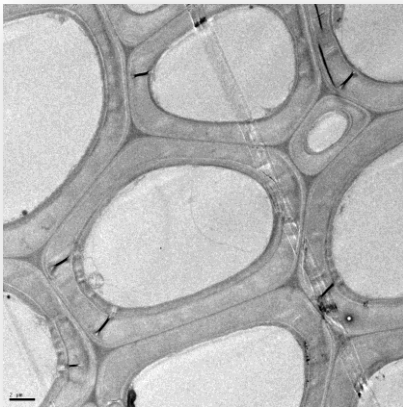
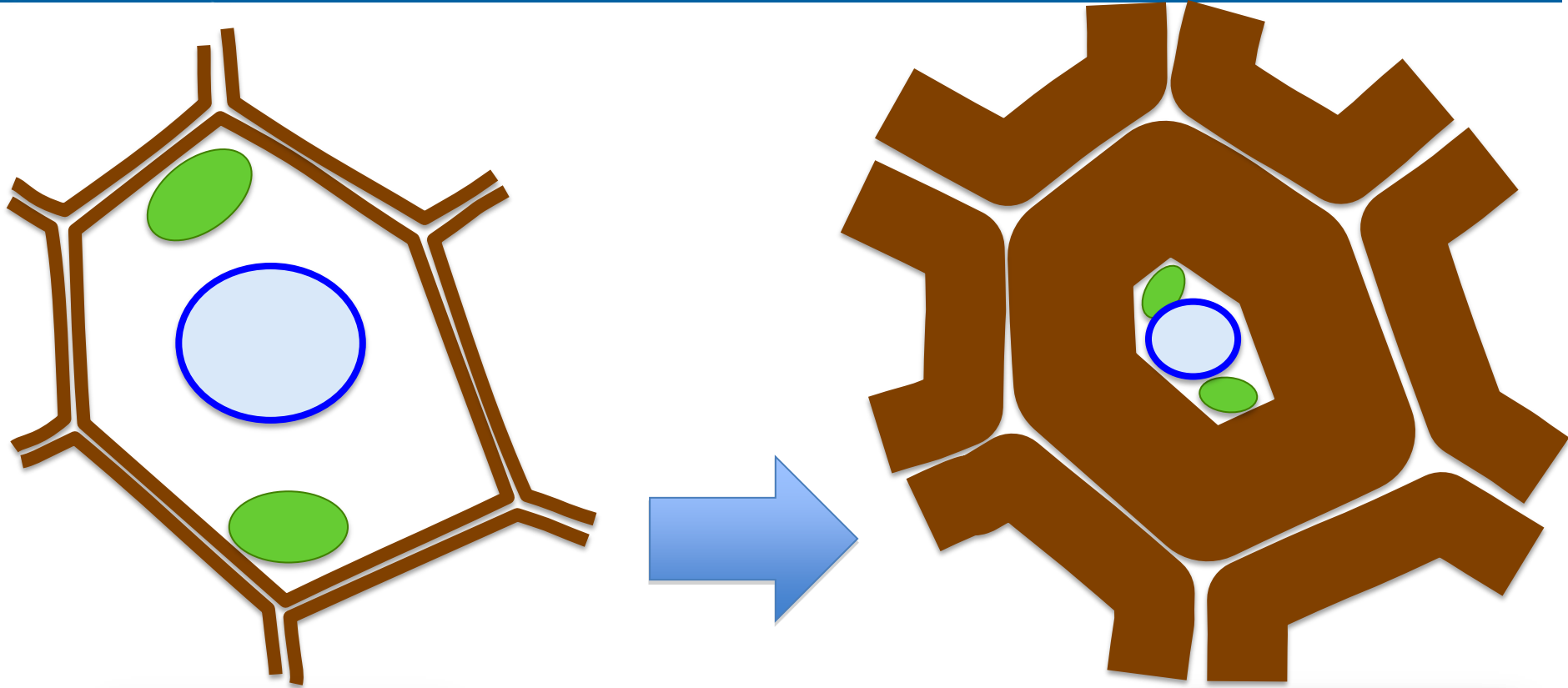
JBEI uses synthetic biology to change the genetic program of the cell



Nucleus

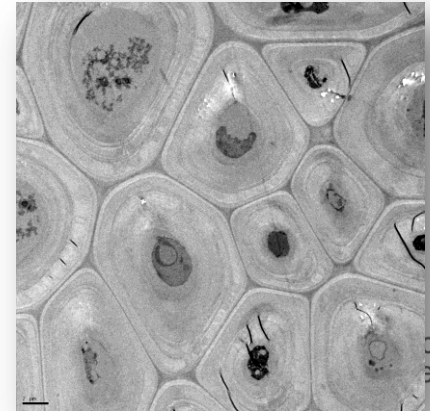


Increasing cellulose and decreasing lignin in the plant cell wall

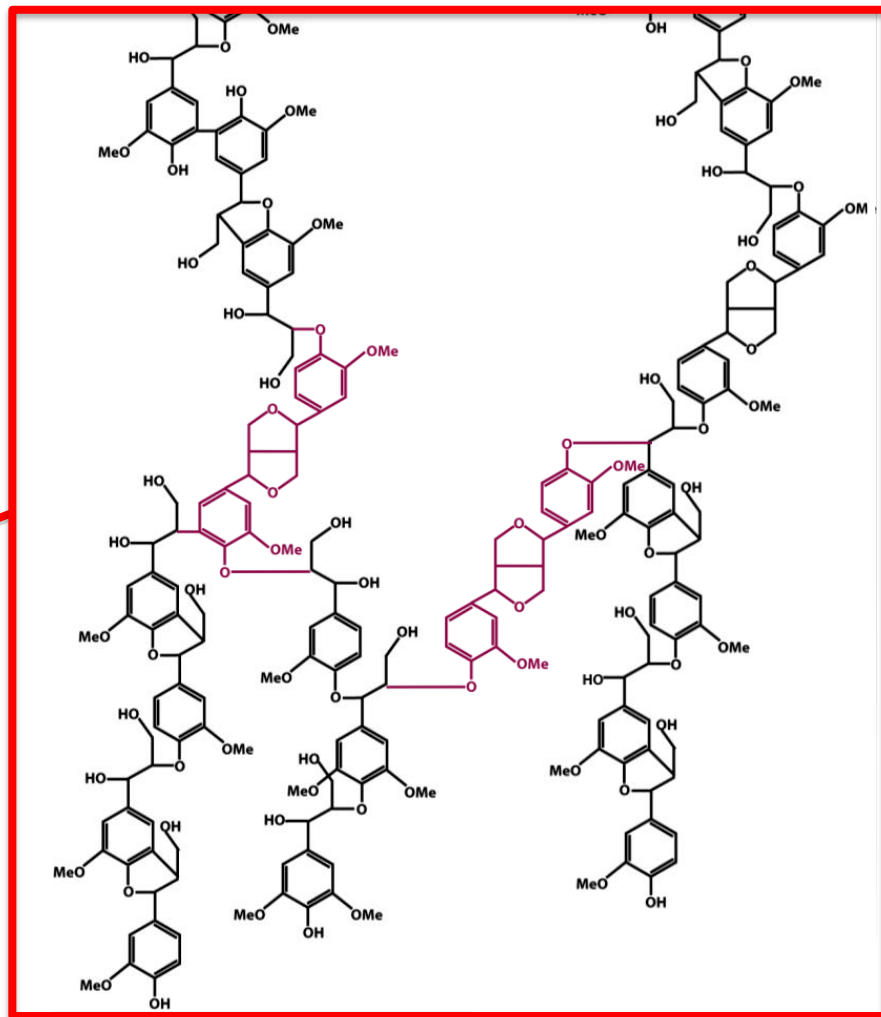
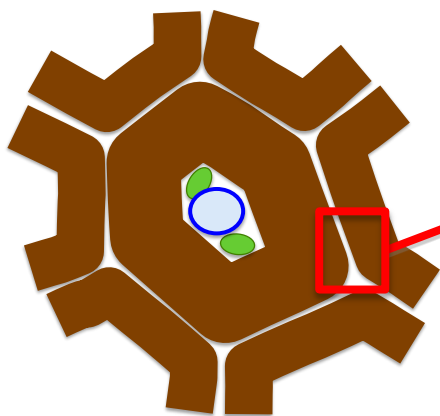
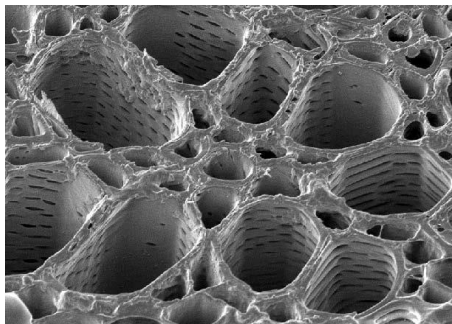


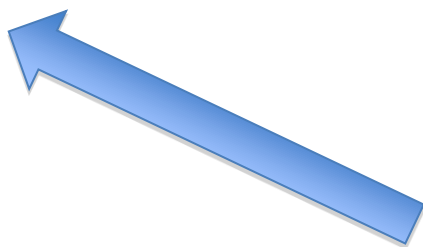
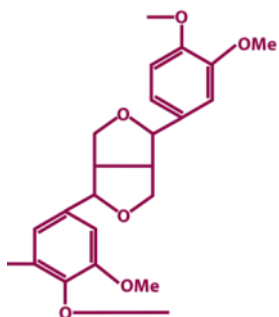
**Normal
plants**

**Engineered
plants**



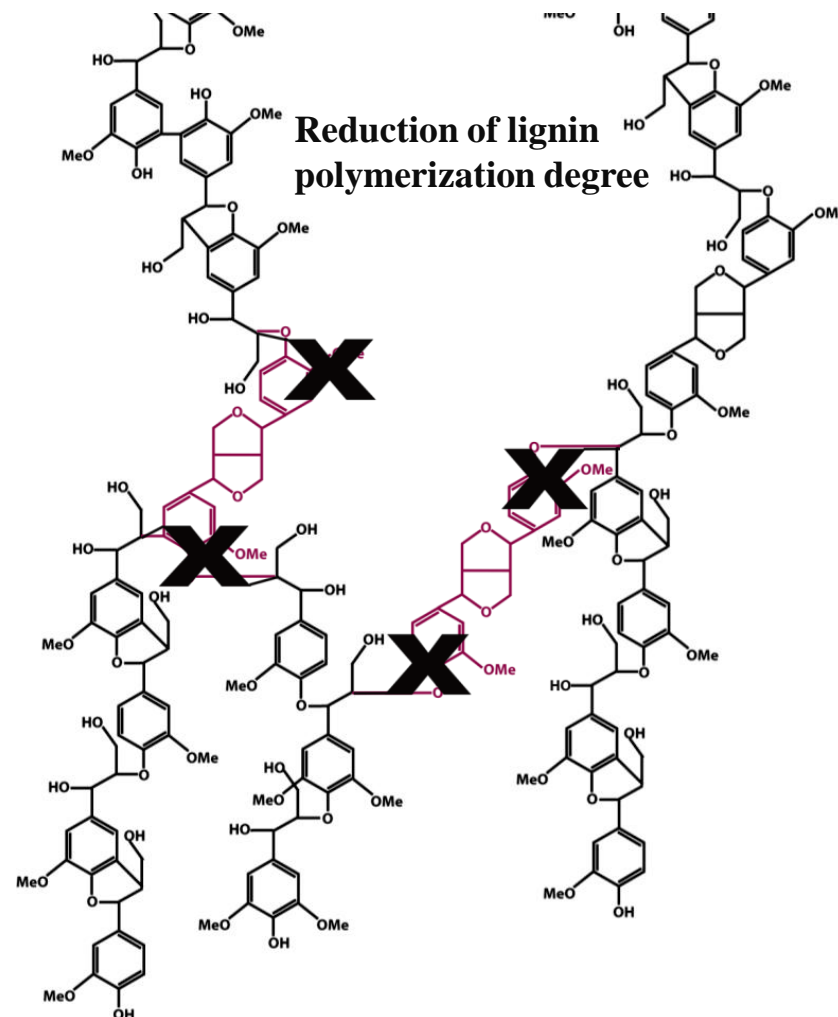
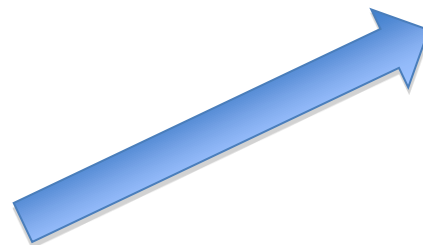
Making plant cell walls easier to degrade

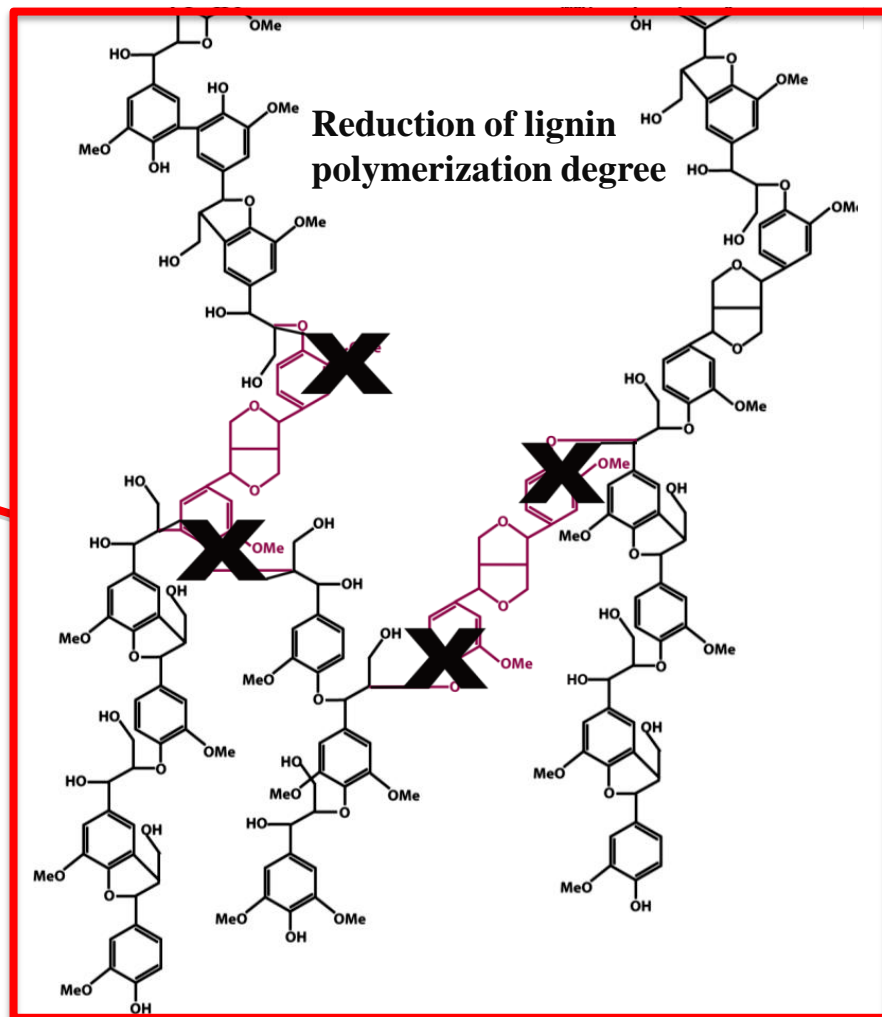
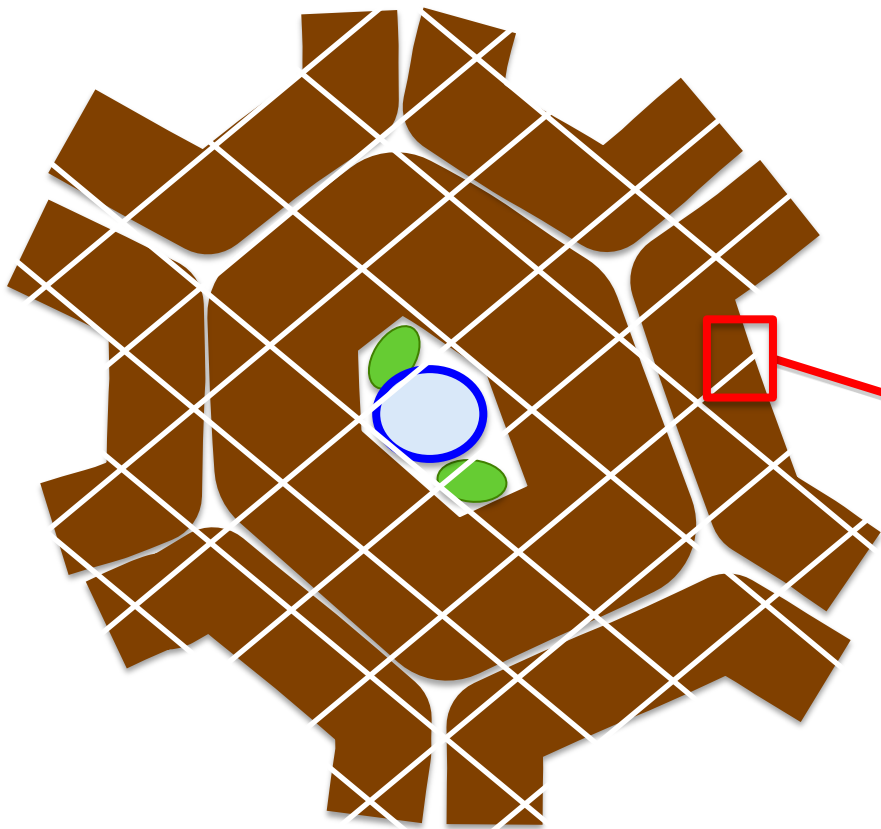




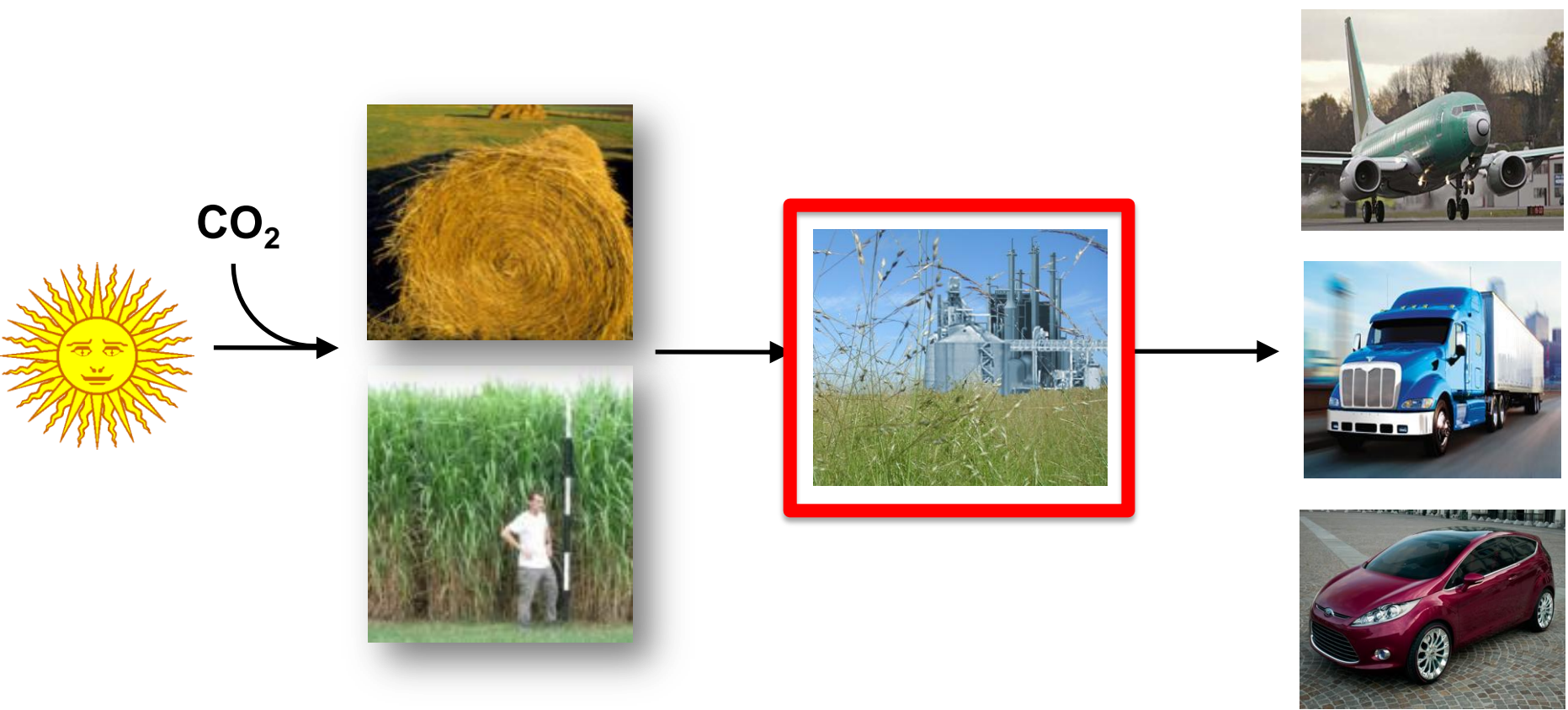
X

**Phenyl-
derivative**

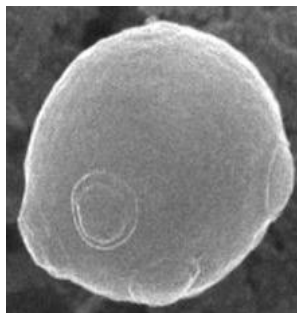




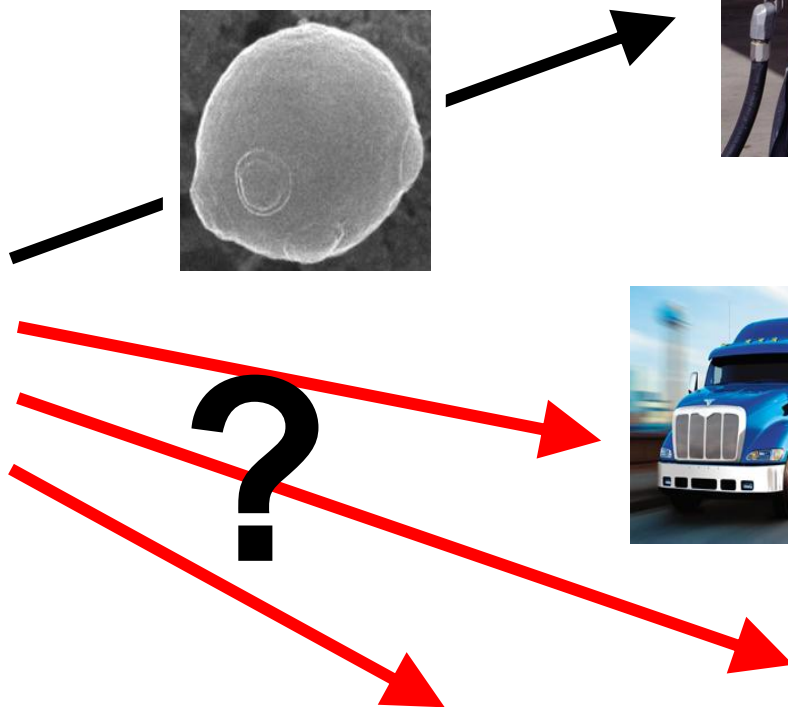
Advanced biofuels from cellulosic biomass



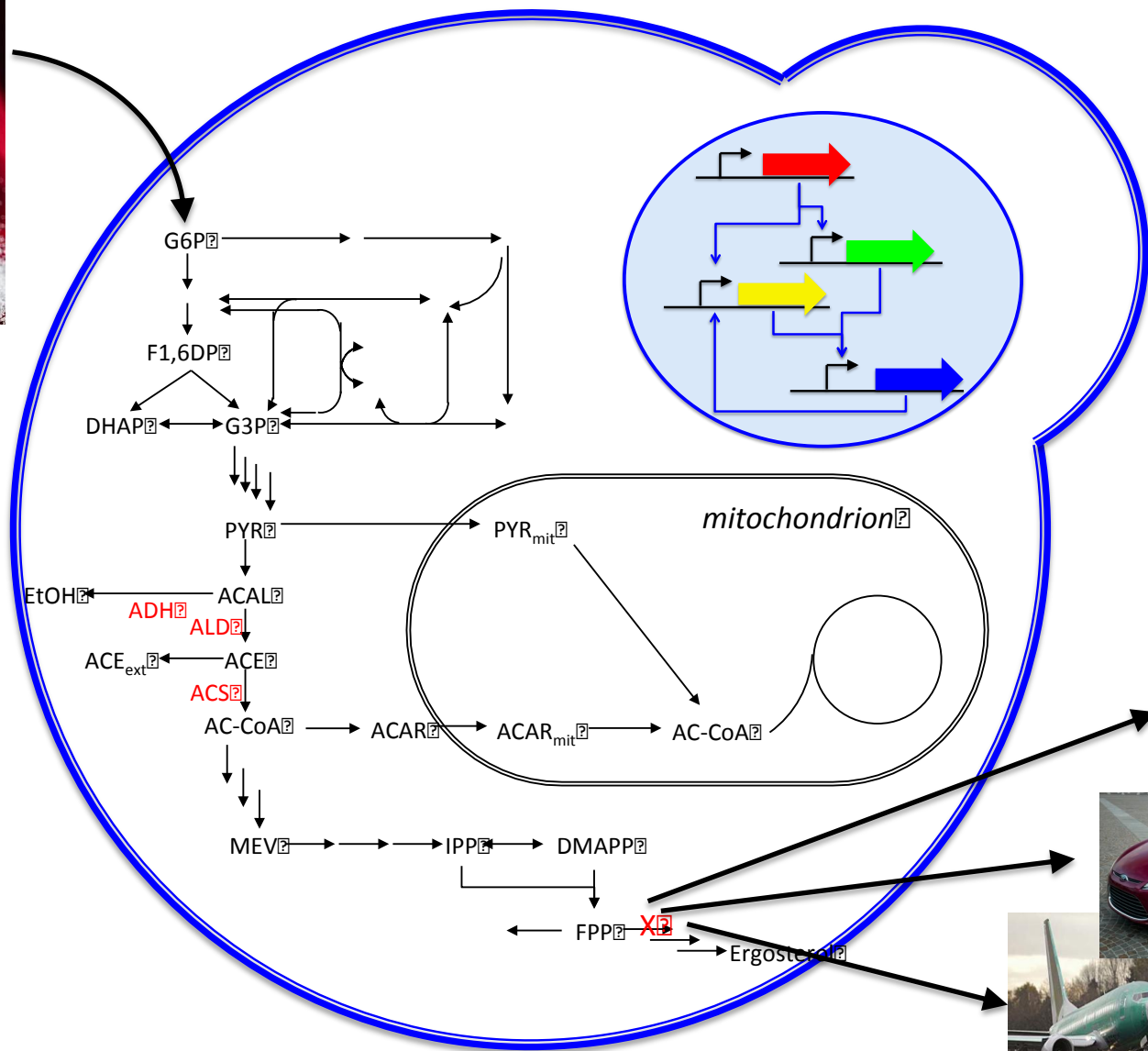
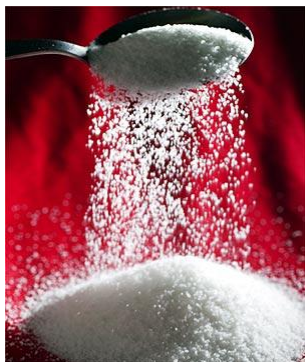
Ethanol from sugar



Advanced fuels



Synthetic biology for advanced biofuels



Phase separation allows simple purification of fuel

