

the

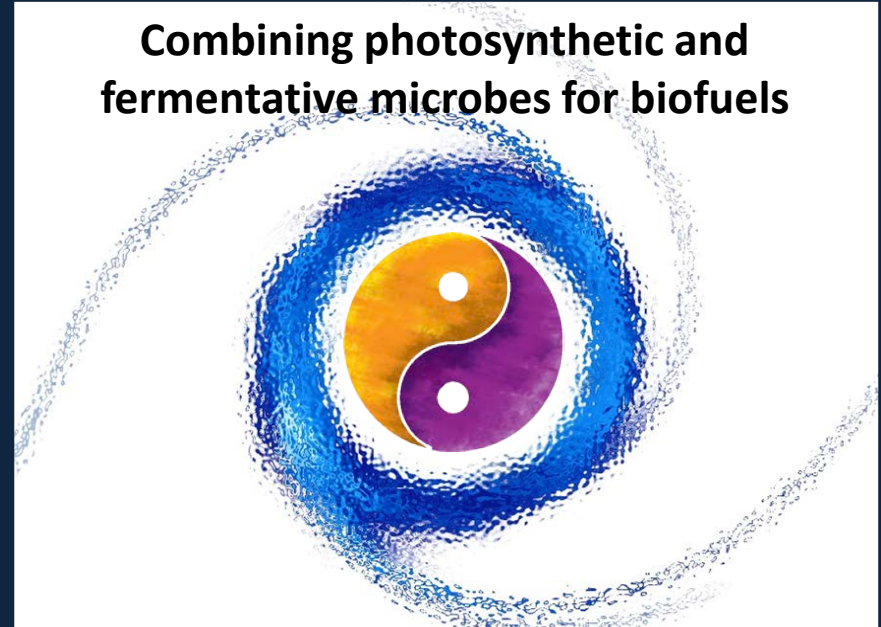
McKinlay Lab

Department of Biology
Indiana University, Bloomington



Fertilizing ethanol
fermentations with N_2 gas

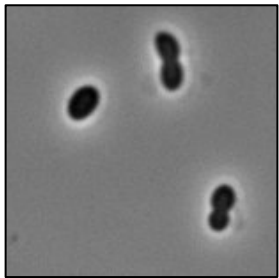
Combining photosynthetic and
fermentative microbes for biofuels



Using N₂ as a nitrogen source for cellulosic ethanol production by *Zymomonas mobilis*

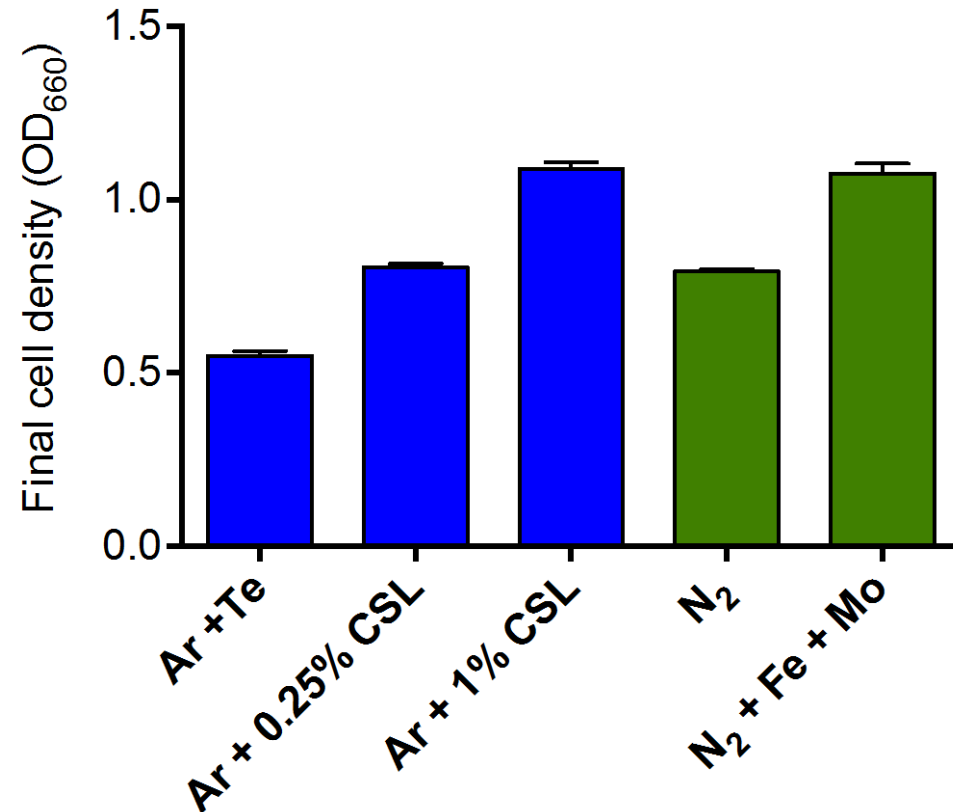
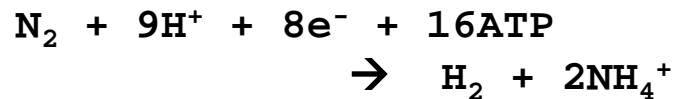
Zymomonas mobilis

- the bacterial version of Baker's yeast



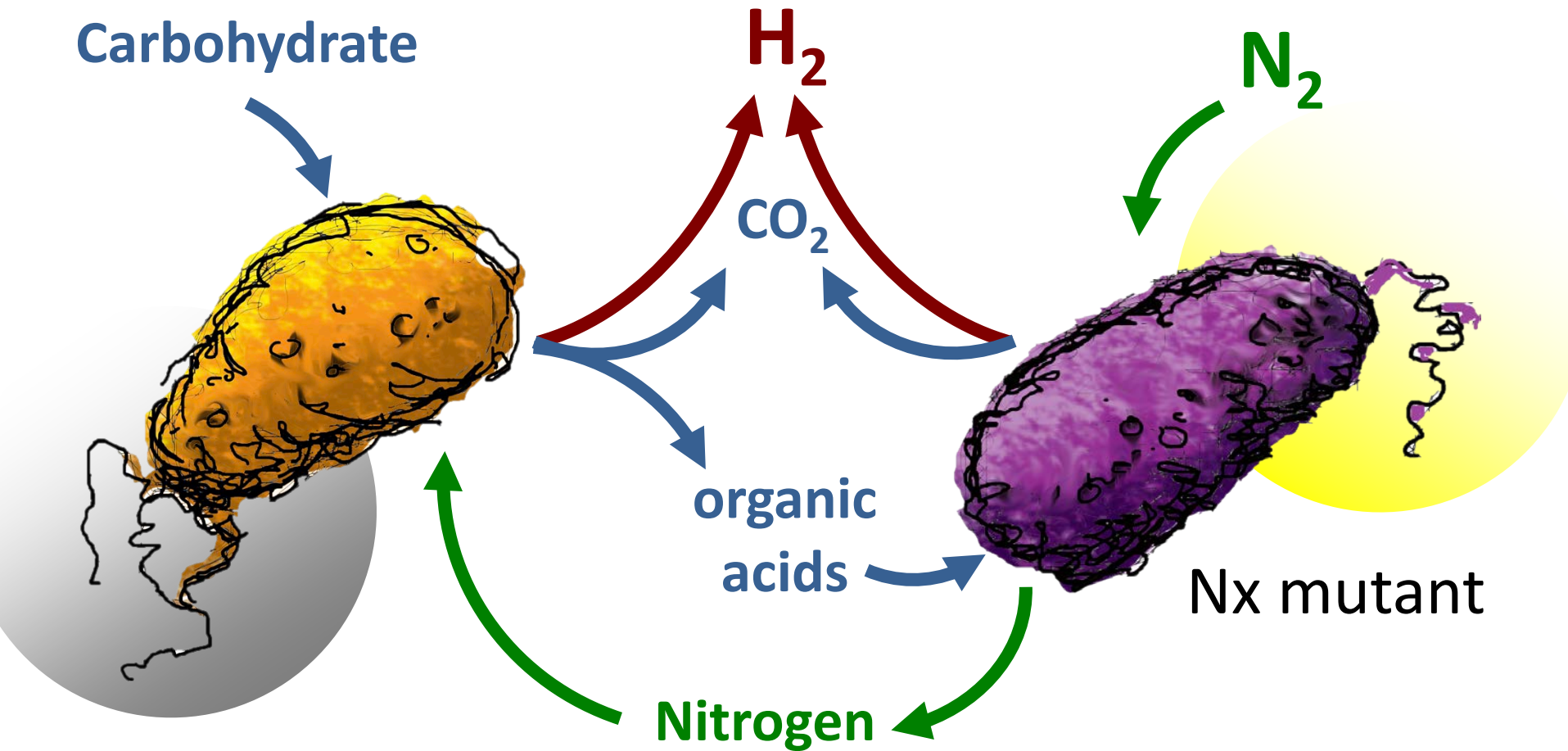
- Produces ethanol at 97% of theoretical max yield

Z. mobilis has nitrogenase



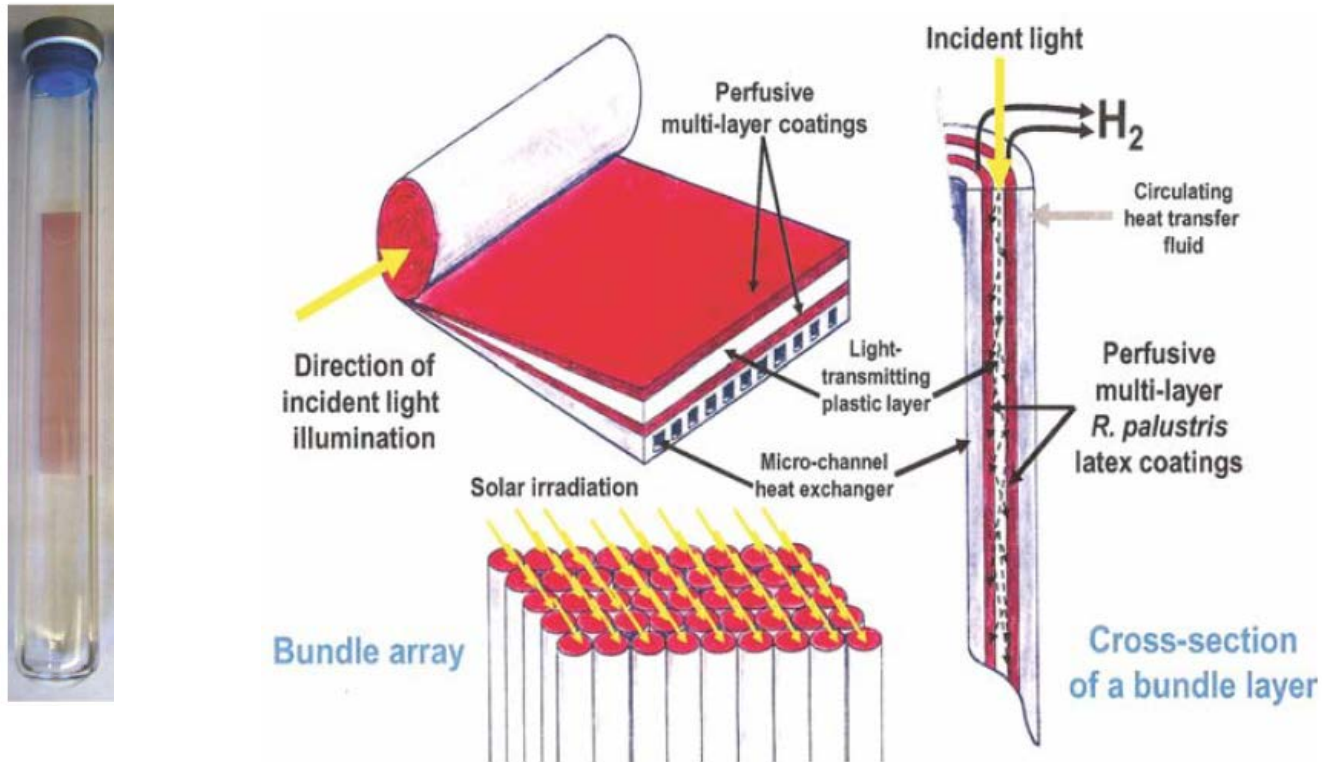
- The ethanol yield was 94% of th. max with CSL and 97% of th. max with N₂
- Using N₂ with the metals needed for nitrogenase activity could save an ethanol plant over \$1 million per year

Combining synergistic microbial features through imposed obligate syntrophy



Together, the two microbes produce more H₂ than either microbe could alone.

Opportunities for scale up



- Any photosynthetic process is limited by the illuminated surface area
- Artificial biofilms and light-conducting plastics may offer a way to maximize photosynthetic capacity per unit space