

## 1 | Symbiosis with plants to make Nitrogen

Plants have bacteria that turn  $N_2$  into  $NH_3$ . The bacteria has a enzyme called nitrogenase.

So much fossil fuels are used in the fertilizer industry to do the same conversion. Why can't we just use the enzyme to make a bioreactor? The enzymes don't actually work with oxygen around. So how can plants create a low oxygen environment in their root systems? It turns out that the root nodules of the plants make leghemoglobin to soak up the oxygen. Impossible foods found the gene in the plant and put it in yeast, which is what makes it taste like meat.

- Oxygen is a non-competitive inhibitor of nitrogenase20bio201srcOxygenInhibitsNitrogenase.png

### 1.1 | Also cows, apparently

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## 2 | Cyanobacteria

- "fix atmospheric dinitrogen" can make energy from light.
  - They need nitrogen, but they can't do it in the same cells that that are photosynthesizing because Nitrogenase doesn't work with oxygen
    - So, they somewhat specialized so some cells do the photosynthesis and some do the nitrogen synthesis
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