

# Genetic engineering Part 1: Overview

## In this series:

- Building basic plasmids
- DNA assembly strategies
- Promoter deep dive
- Designing custom proteins
- Gene localization
- Enzyme pathways
- Genetic Logic
- And whatever else you want to learn!

(Leave a comment)

# What is Genetic Engineering?

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How is it different than  
Biochemistry, Synthetic  
Biology, and Genetics

## **Genetic Engineering**

Modifying organisms to change their DNA to alter their properties

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## **Biochemistry/Molecular Biology**

The techniques used to modify and analyze the organisms and their byproducts

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## **Synthetic biology**

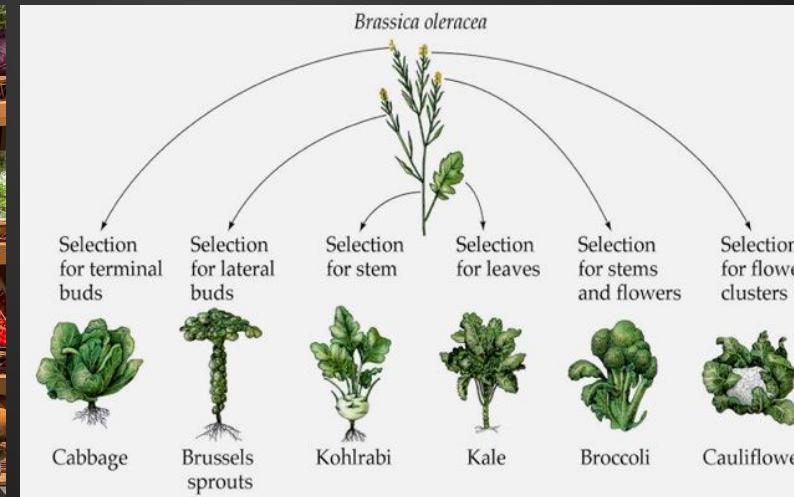
An extension of genetic engineering, redesigning organisms to serve useful purposes and giving them new abilities

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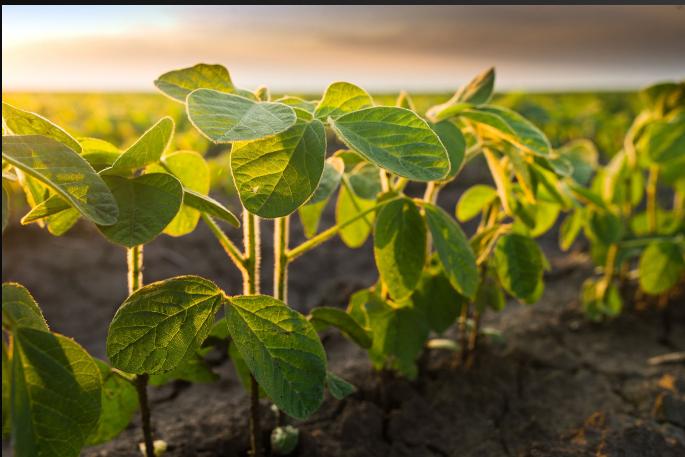
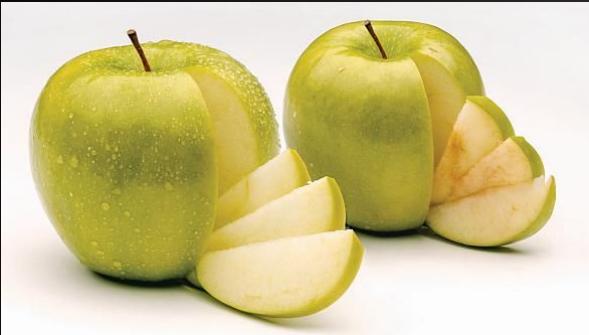
## **Genetics**

Studying genes and their interactions and flow through populations

# The Original GMO's



# Modern GMO's /Products



Light-bio.com

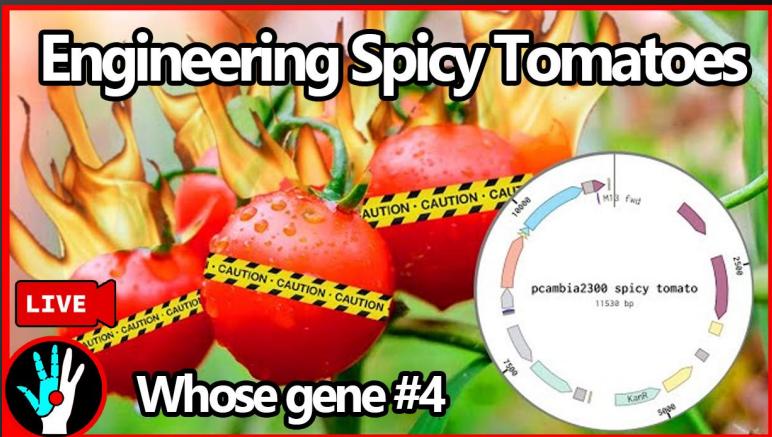
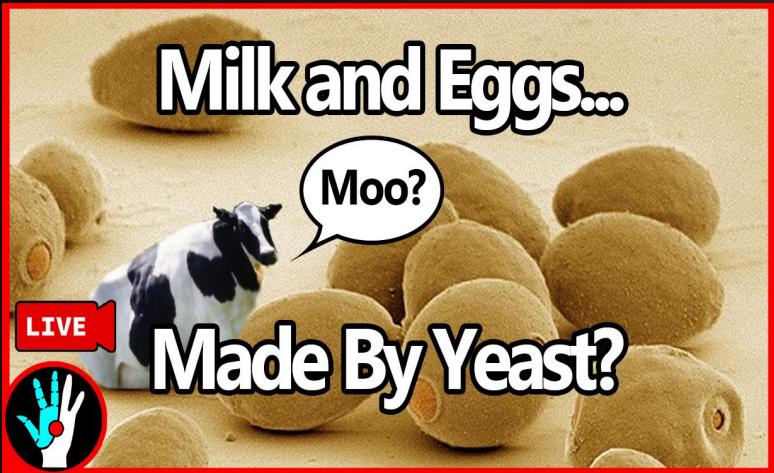


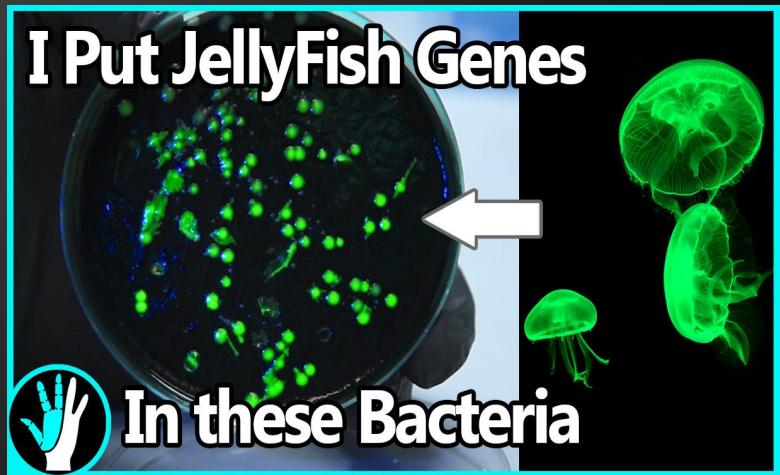
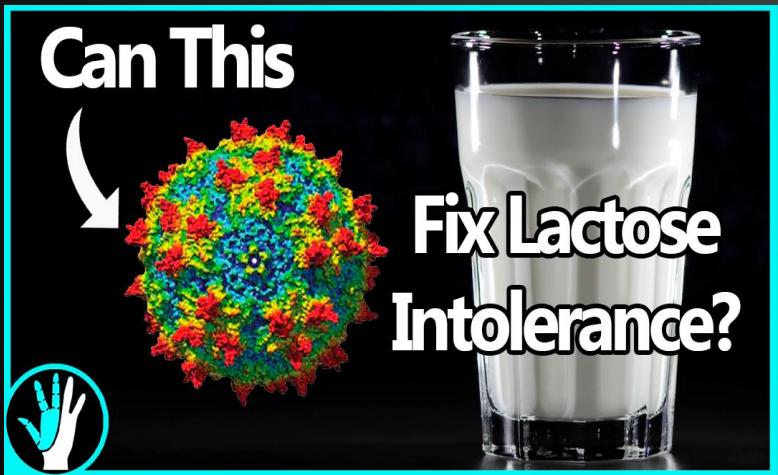
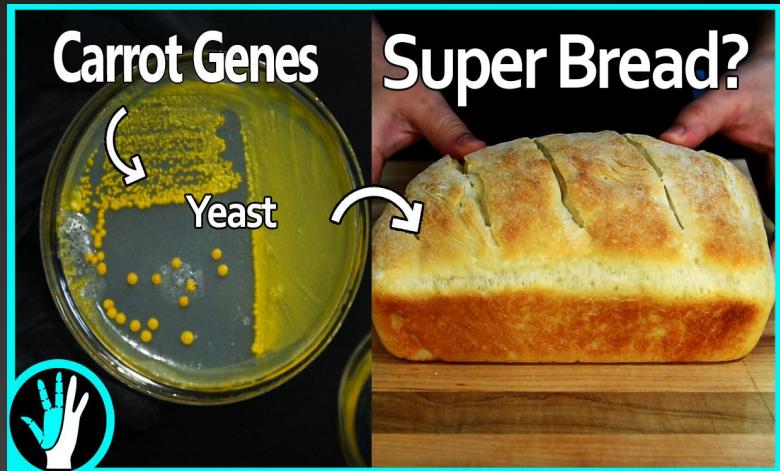
Glowfish



Nyoka

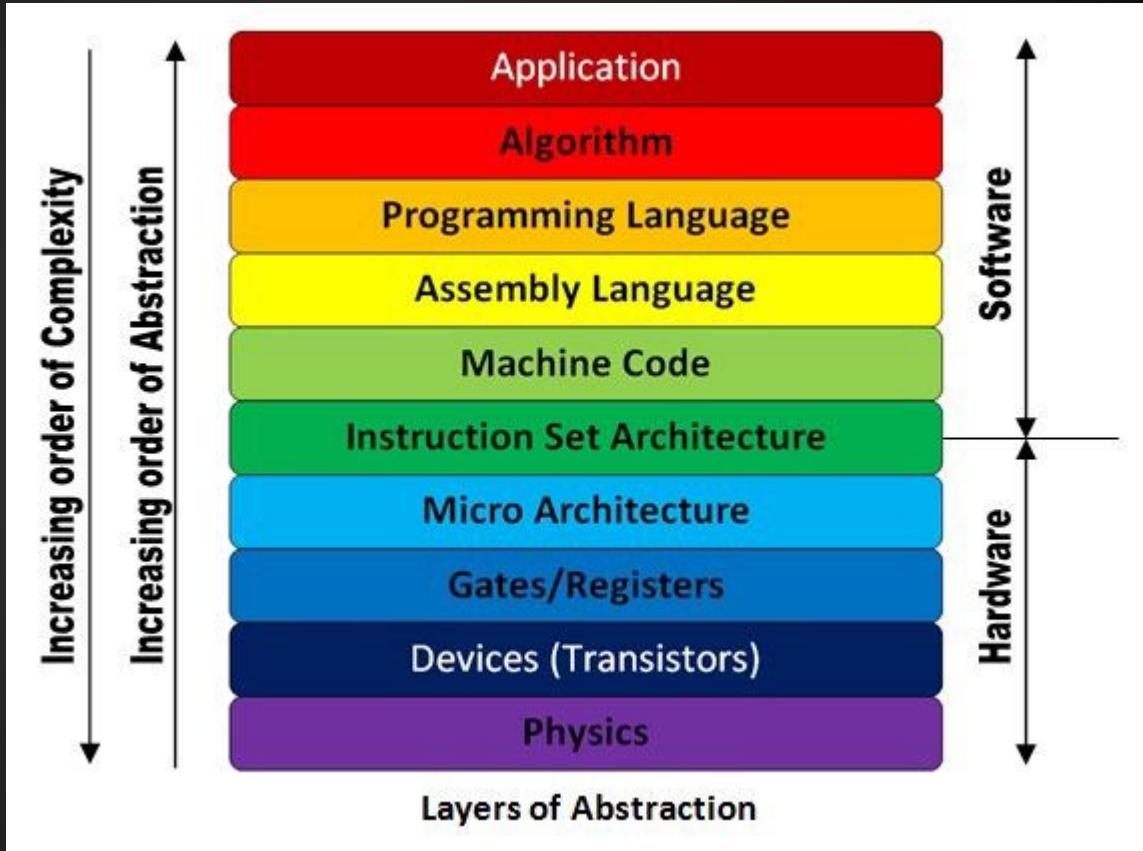




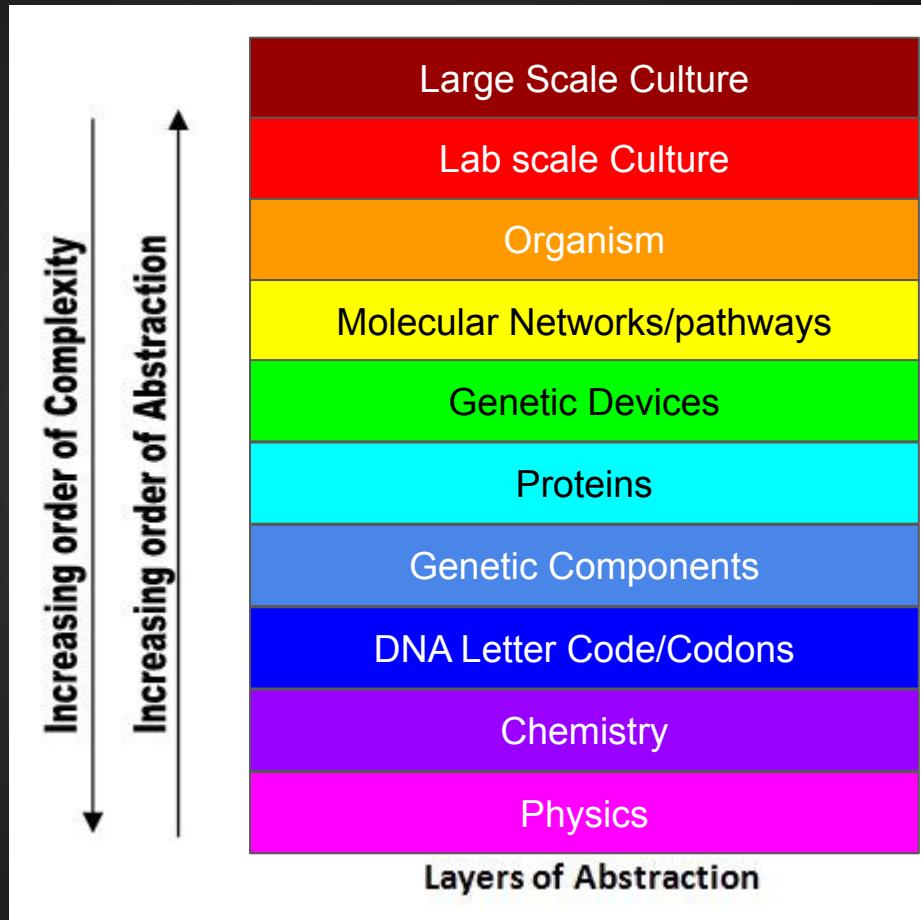


Ok, How does it work?

# Computer abstraction



# Genetic abstraction



Step 1: Pick an Organism and Desired Outcome

Step 2: Break the problem into parts

Step 3: Research the biochemistry/enzyme/protein

Step 4: Design DNA to accomplish the task

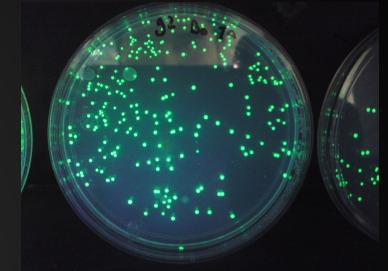
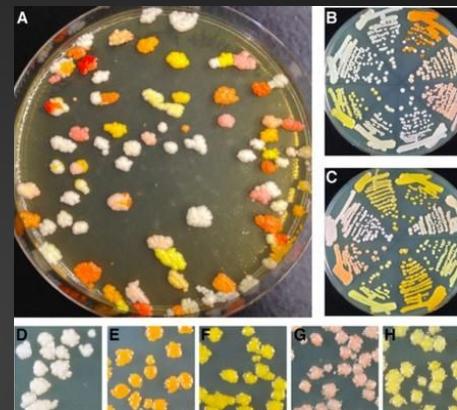
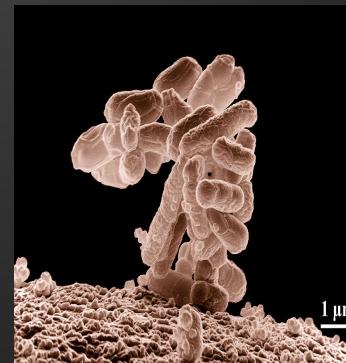
Step 5: Have it made, and put it into your organism

Step 6: Analyze the resulting organism

Step 7: Iterate and tune to meet your requirements

# Step 1: Pick A Thing

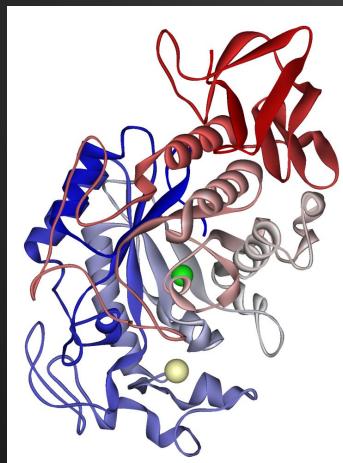
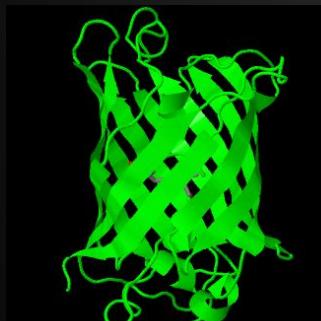
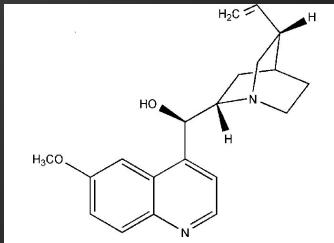
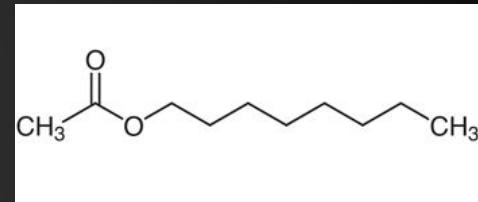
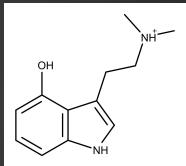
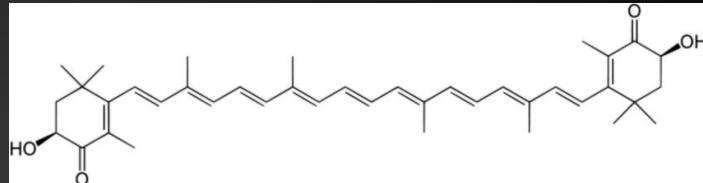
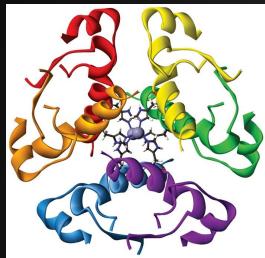
# First Pick an Organism



## Protein/Enzyme(s)

## Then Pick A Product

Chemical



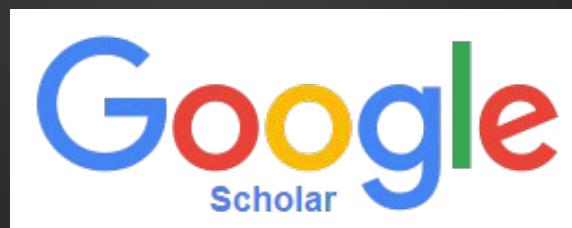
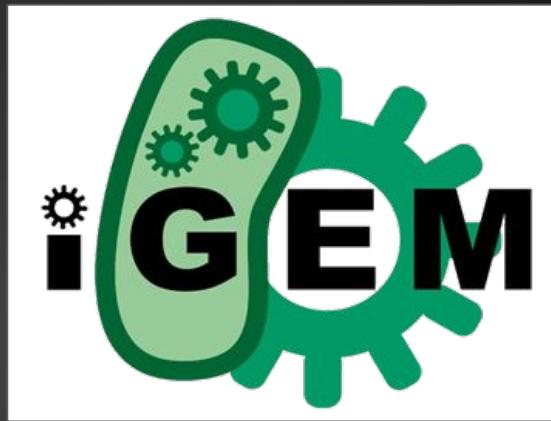
# Step 2: Break The Problem Into Parts

# Break it down

- How well understood is the problem in the literature?
  - Will it take you a lot of basic research to accomplish your goal or is the info mostly just available?
- How many genes to accomplish your goal?
- What do you want to do with your thing when it works?
  - Scale - is the goal just to make something cool? Or to industrialize the process?
  - Medical/Food/Animals - Does the thing or doing the lab work on the thing have to respect any specific regulations?
- How much do you expect the research to cost? And to deploy?

# Step 3: Research

## Good Places to Find Info:



# Step 4: Design the DNA

DNA Editors:



SEQUENCE MAP

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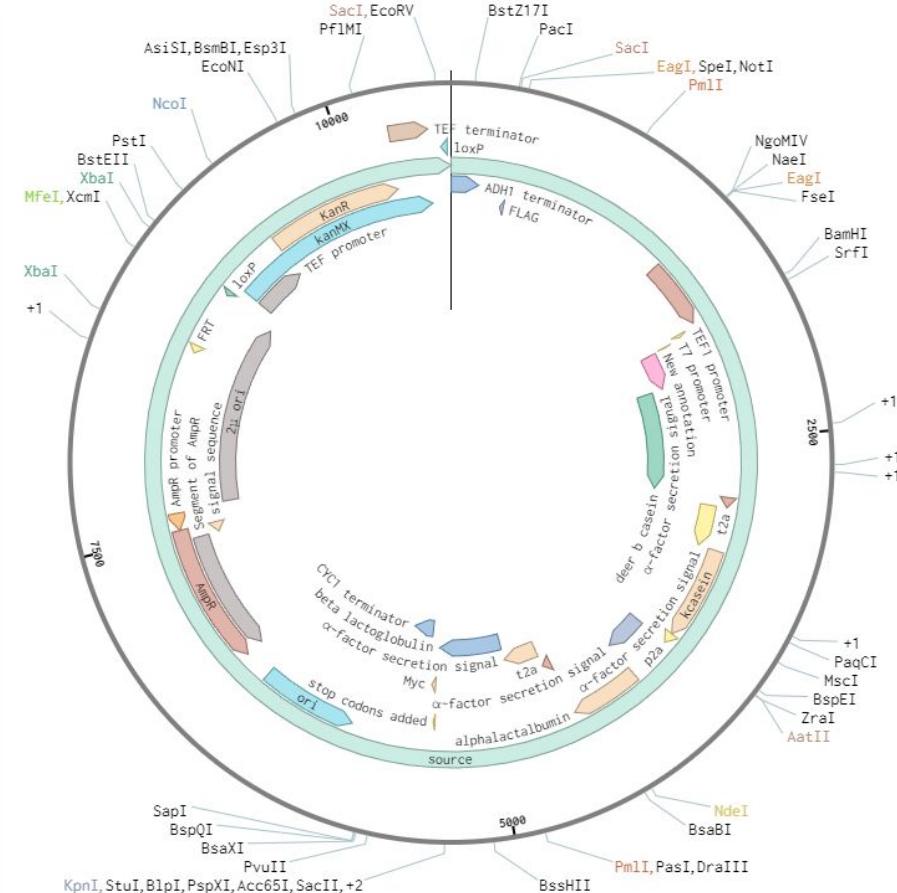
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## LINEAR MAP DESCRIPTION METADATA

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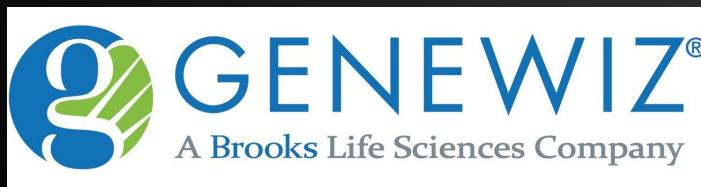


Step 5: Order the DNA, Then  
Put It Into The Host Organism

# DNA Synthesis Companies:



**ThermoFisher**  
SCIENTIFIC



# Putting DNA in Bacteria/Yeast:



This Bacteria is a  
**NIGHTMARE**

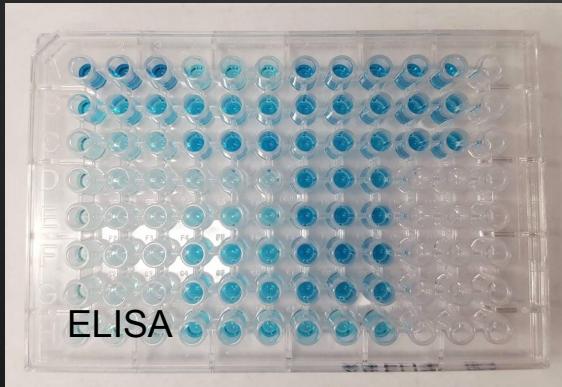
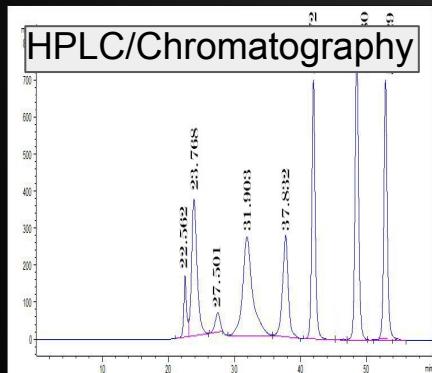
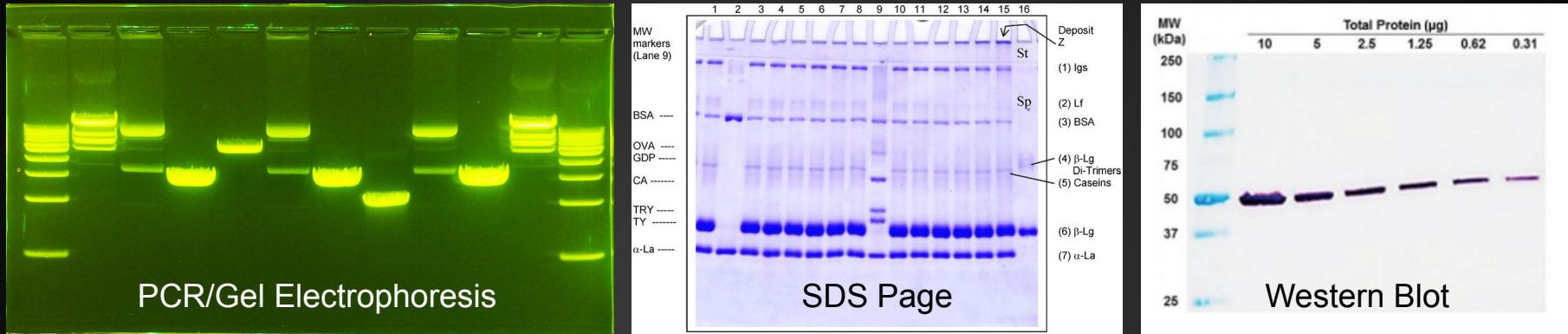


Synthetic Spider Silk



# Step 6: Analysis

# Analysis: As many methods as you can dream of



....And  
Many More

Step 7: Rinse And Repeat Until It Works...

Or Pivot.

Or Break Down Mentally.

Dealers choice.



Remember- Biology is REALLY  
Hard

Bonus Step 8: Success!  
Now what..?

## 2 Main Options:

Publish



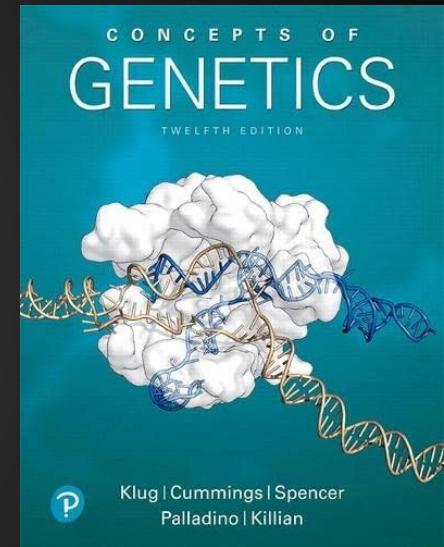
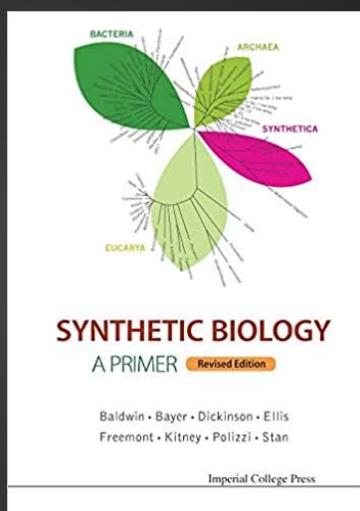
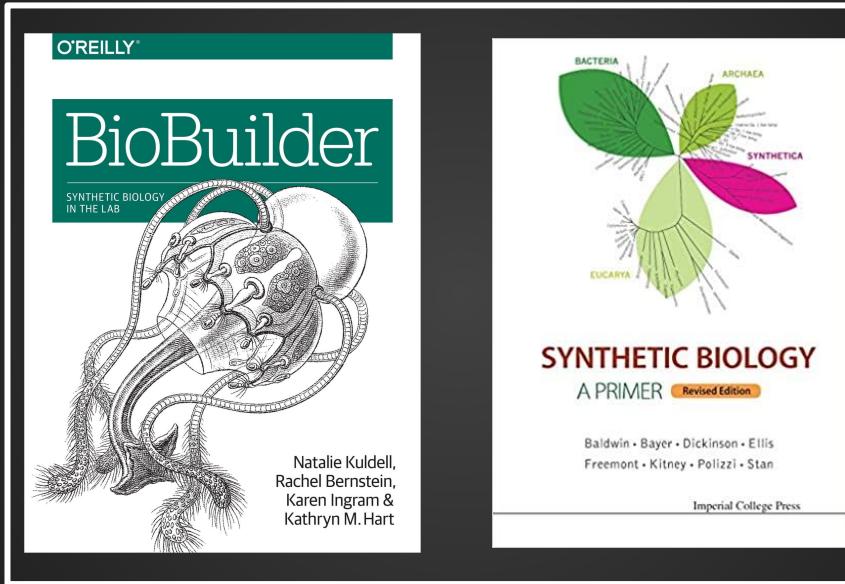
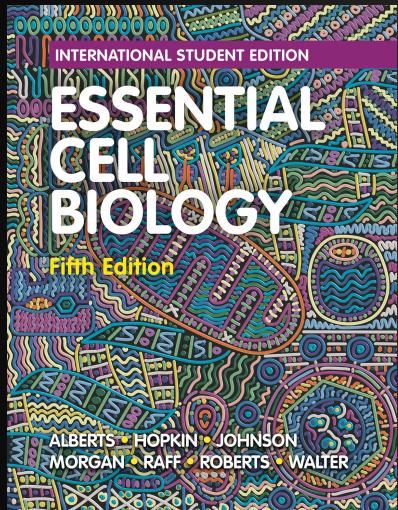
Commercialize



# Resources To Help You Get Started

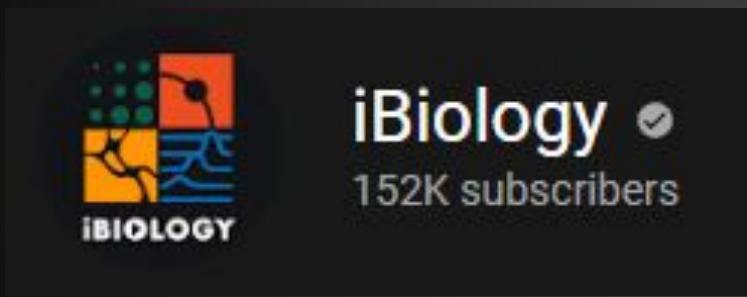
# Books:

Increasing Complexity

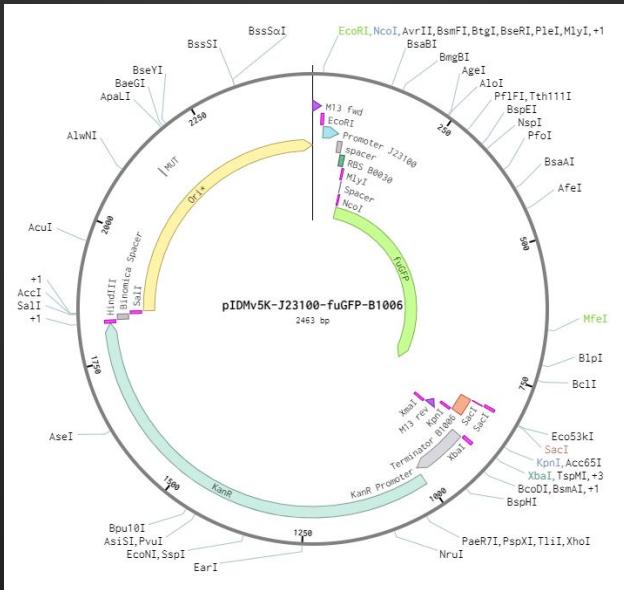


Most Useful

# Youtube Channels:



# Next Time: Building basic plasmids



END