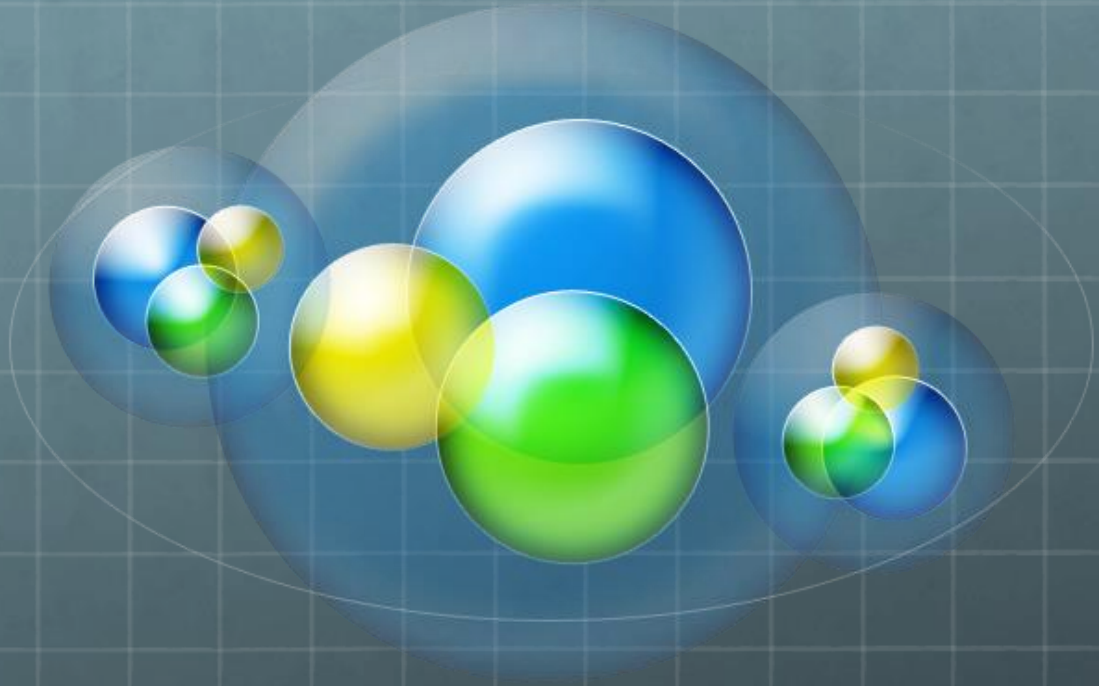
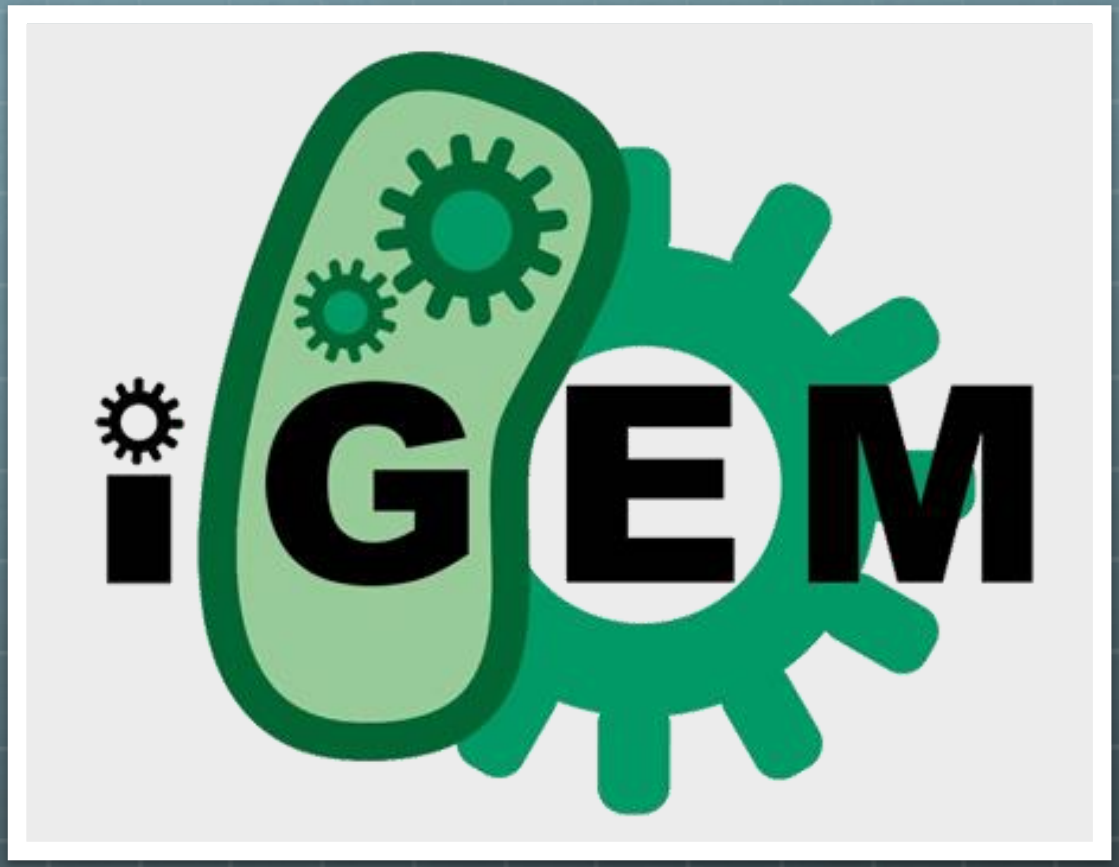
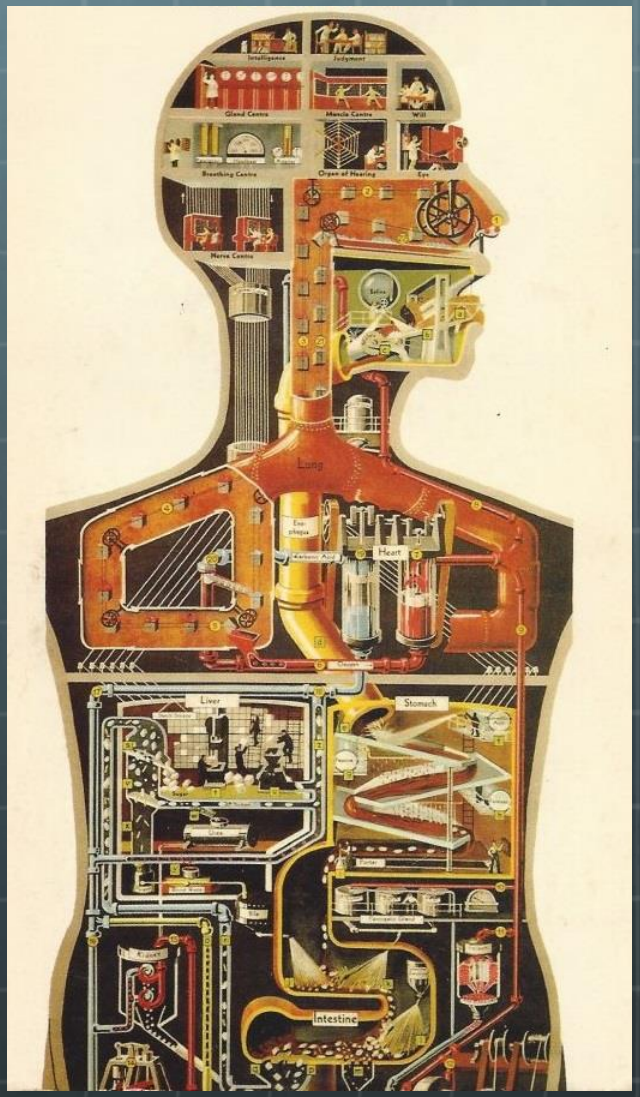


Synthetic Biology and iGEM



Genetically Engineered Machine (iGEM) Competition

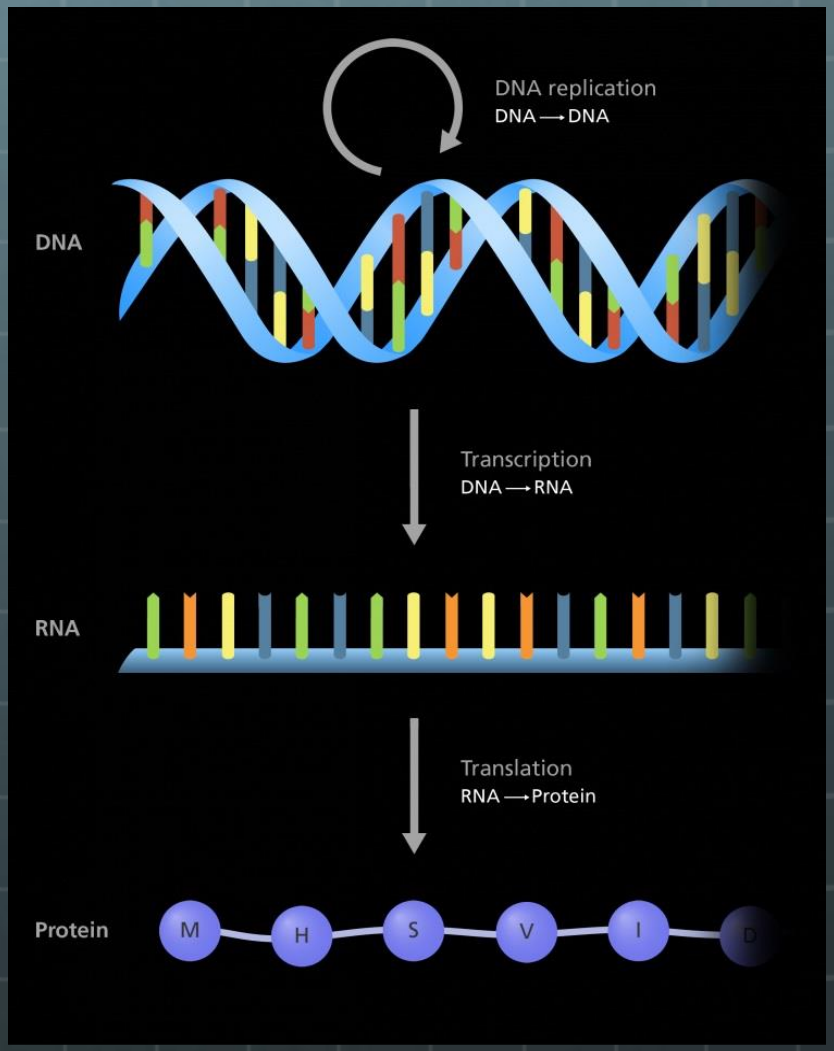
Synthetic biology: what is it?



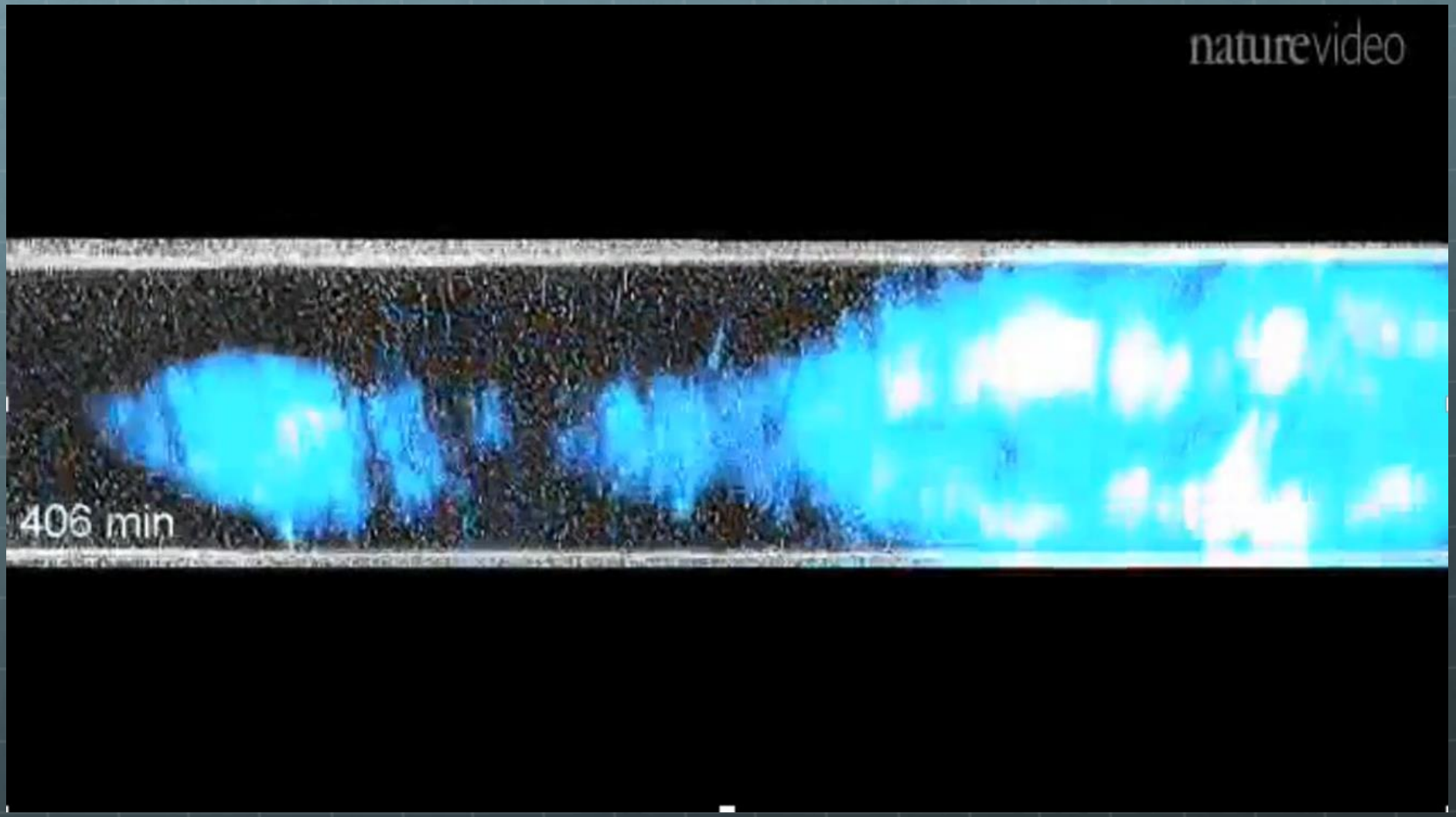
Cover of *Man Modified*, David Fishlock

“The Lego of Life”

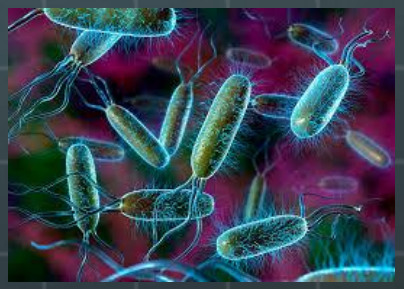
Transcription and Translation



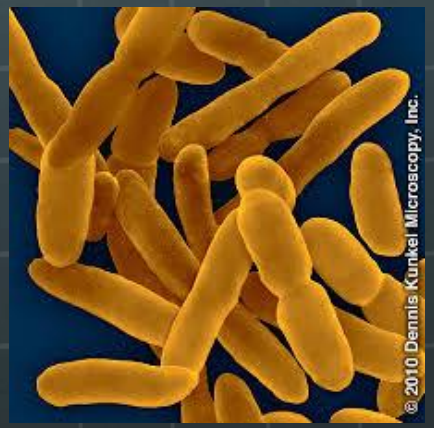
Synthetic biology: how do we do it?


naturevideo
406 min

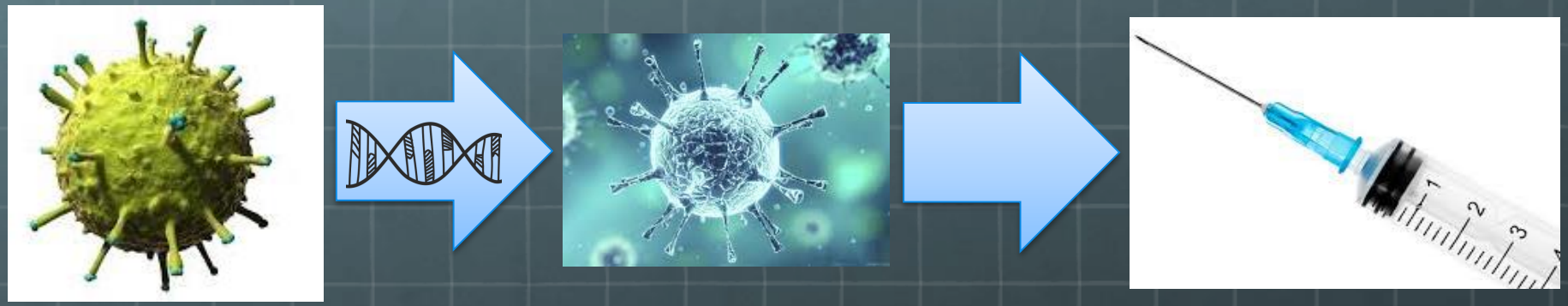
Synthetic biology: why is it important?

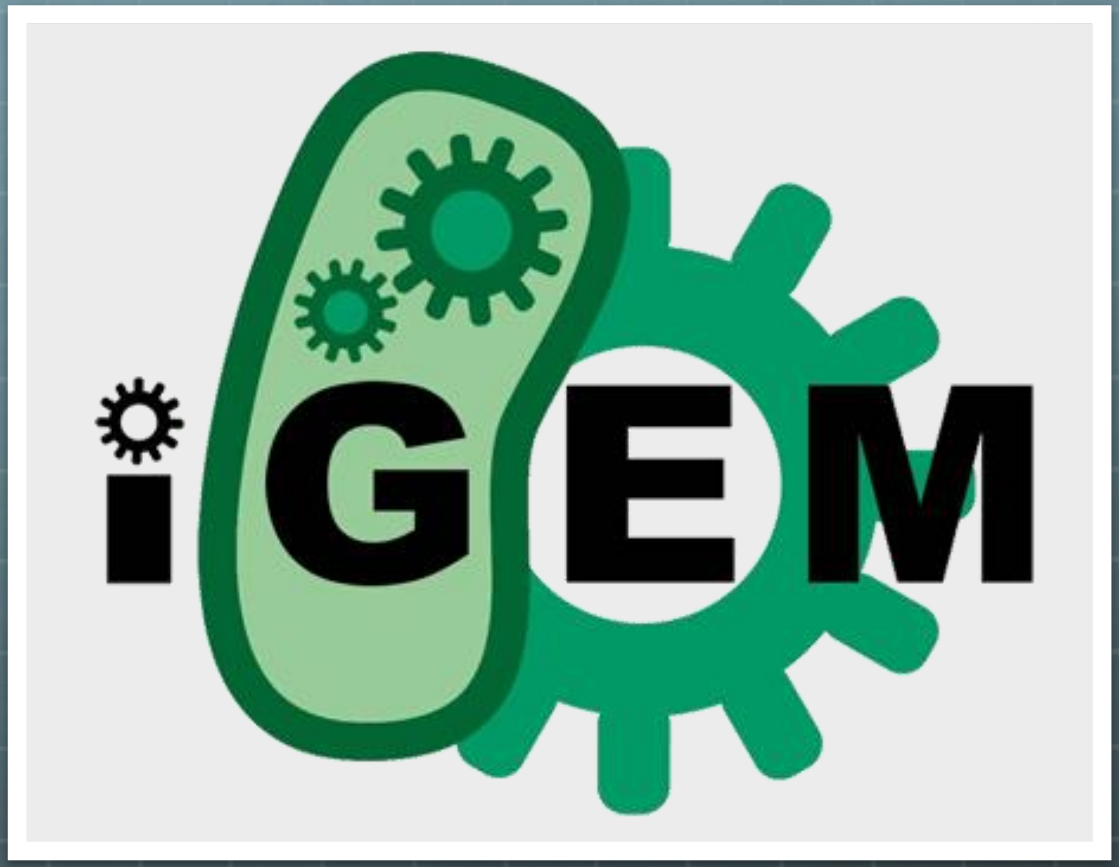


Synthetic biology: why is it important?



Synthetic biology: why is it important?

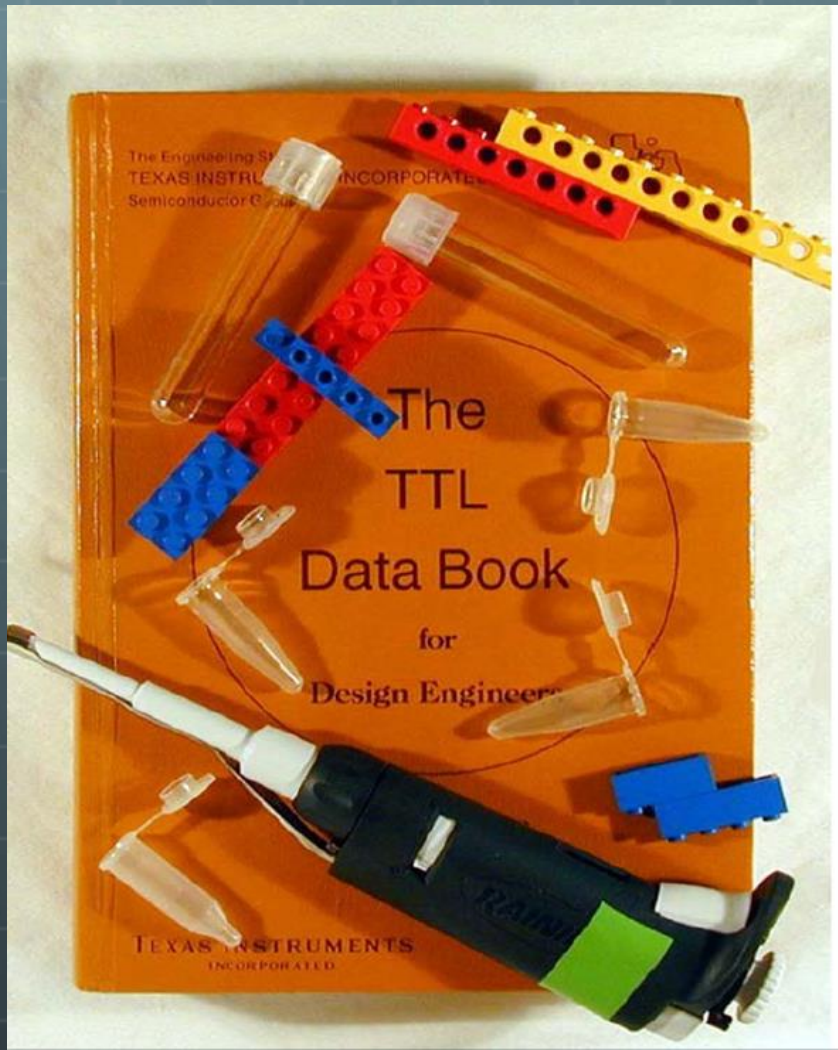




Genetically Engineered Machine (iGEM) Competition

iGEM Jamboree 2015

Registry of Standard Biological Parts

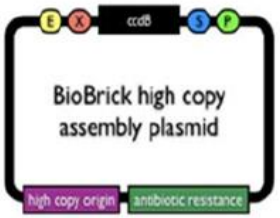


High copy number assembly plasmid backbones

The most common set of plasmid backbones that people use to assemble BioBrick® standard biological parts together are high copy BioBrick plasmid backbones. High copy plasmid DNA is easily purified in high yield from cultures, so it makes obtaining enough DNA for assembly easy.

The high copy plasmid backbones listed below have a common set of features.

1. A complete BioBrick® cloning site for easy cloning and assembly of BioBrick parts.
2. Terminators flanking the BioBrick® cloning site to insulate the vector from read-through transcripton originating in the cloned BioBrick® part, device or system.
3. Primer binding sites for the standard BioBrick® verification primers VF2 (BBa_G00100) and VR (BBa_G00101). These primers are located for convenient sequencing and screening by colony PCR of cloned BioBrick® parts, devices, and systems.



Plasmid backbones are distributed by the Registry with a default insert. There are just a handful of default plasmid inserts used in the Registry. Many the available plasmid backbones have the *ccdB* positive selection marker (BBa_P1010) as the default plasmid insert within the BioBrick® cloning site. The *ccdB* gene ensures that when assembling two BioBrick® parts together, the uncut plasmid is not transformed. However, inclusion of the *ccdB* gene means that these vectors must be propagated in a *ccdB* tolerant strain, such as *E. coli* strain DB3.1 (BBa_V1005).

Finally, to make assembly of BioBrick® parts easier, these BioBrick® assembly plasmid backbones are available with three different antibiotic resistance markers, so that you can use 3 antibiotic assembly methods to assemble BioBrick® parts.

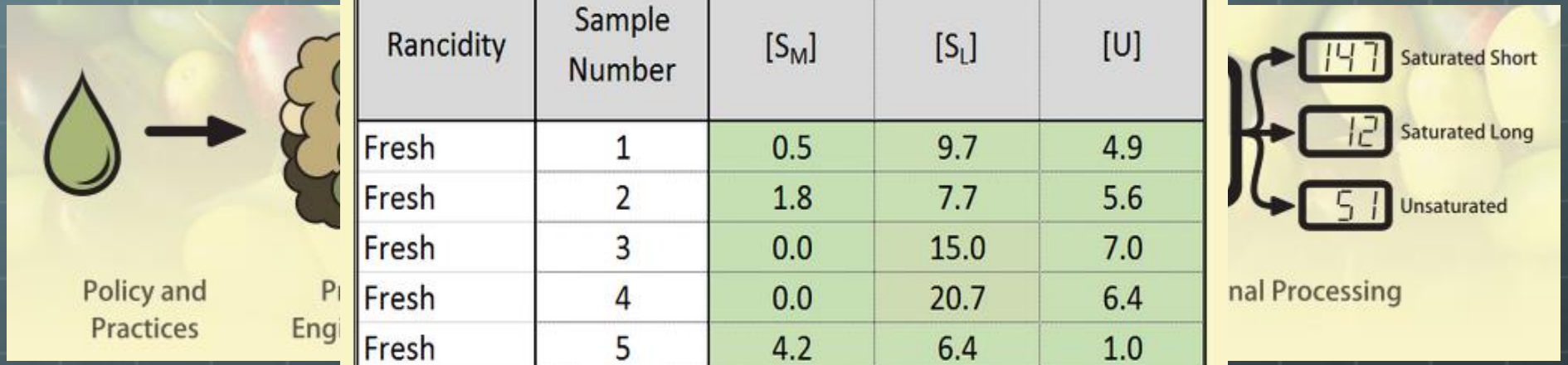
-?-	Name	Description	Resistance	Replicon	Copy number	Chassis	Length
A W	pSB1A3	High copy BioBrick assembly plasmid	A	pMB1	100-300		2157
A W	pSB1A7	Transcriptionally insulated high copy BioBrick plasmid	A	pMB1	100-300		2431
A W	pSB1AC3	High copy BioBrick assembly plasmid	AC	pMB1	100-300		3055
A W	pSB1AK3	High copy BioBrick assembly plasmid	AK	pMB1	100-300		3189
A W	pSB1AT3	High copy BioBrick assembly plasmid	AT	pMB1	100-300		3446
W	pSB1C3	High copy BioBrick assembly plasmid					2072
W	pSB1K3	High copy BioBrick assembly plasmid					2206
W	pSB1T3	High copy BioBrick assembly plasmid					2463

Karmella Haynes, an instructor of the 2006 Davidson College iGEM team, designed and constructed the plasmid backbone pSB1A7). You can read more about the 2006 Davidson project in their open-access paper Engineering bacteria to solve the Burnt Pancake Problem published in the *Journal of Biological Engineering*.

Robbie Bryant constructed the plasmid backbone pSB1AC3 in Tom Knight's lab.

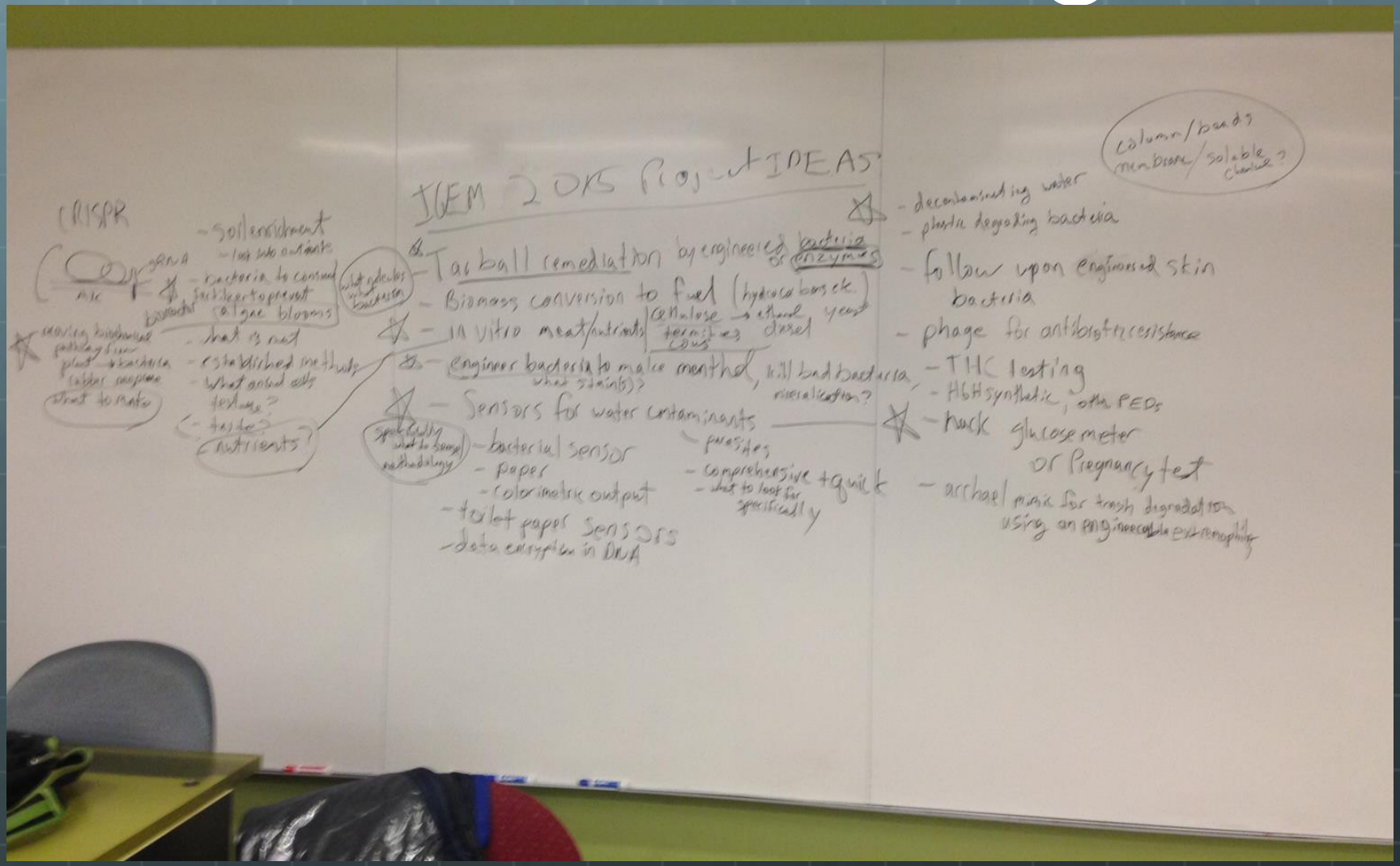
Grand Prize Winner, 2015

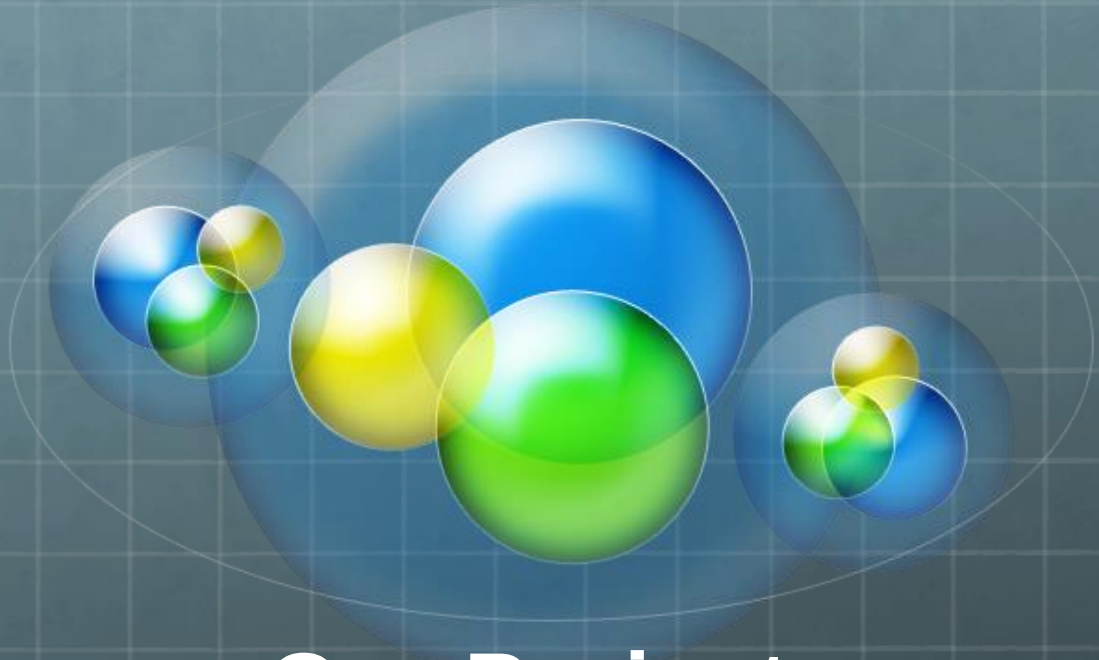
UC Dav



Olive Oil		Predicted Concentration (μM)		
Rancidity	Sample Number	$[S_M]$	$[S_L]$	[U]
Fresh	1	0.5	9.7	4.9
Fresh	2	1.8	7.7	5.6
Fresh	3	0.0	15.0	7.0
Fresh	4	0.0	20.7	6.4
Fresh	5	4.2	6.4	1.0
Fresh	6	0.0	15.0	1.8
Rancid	7	36.4	0.0	35.9
Rancid	8	104.6	0.0	28.3
Rancid	9	0.0	21.9	9.1

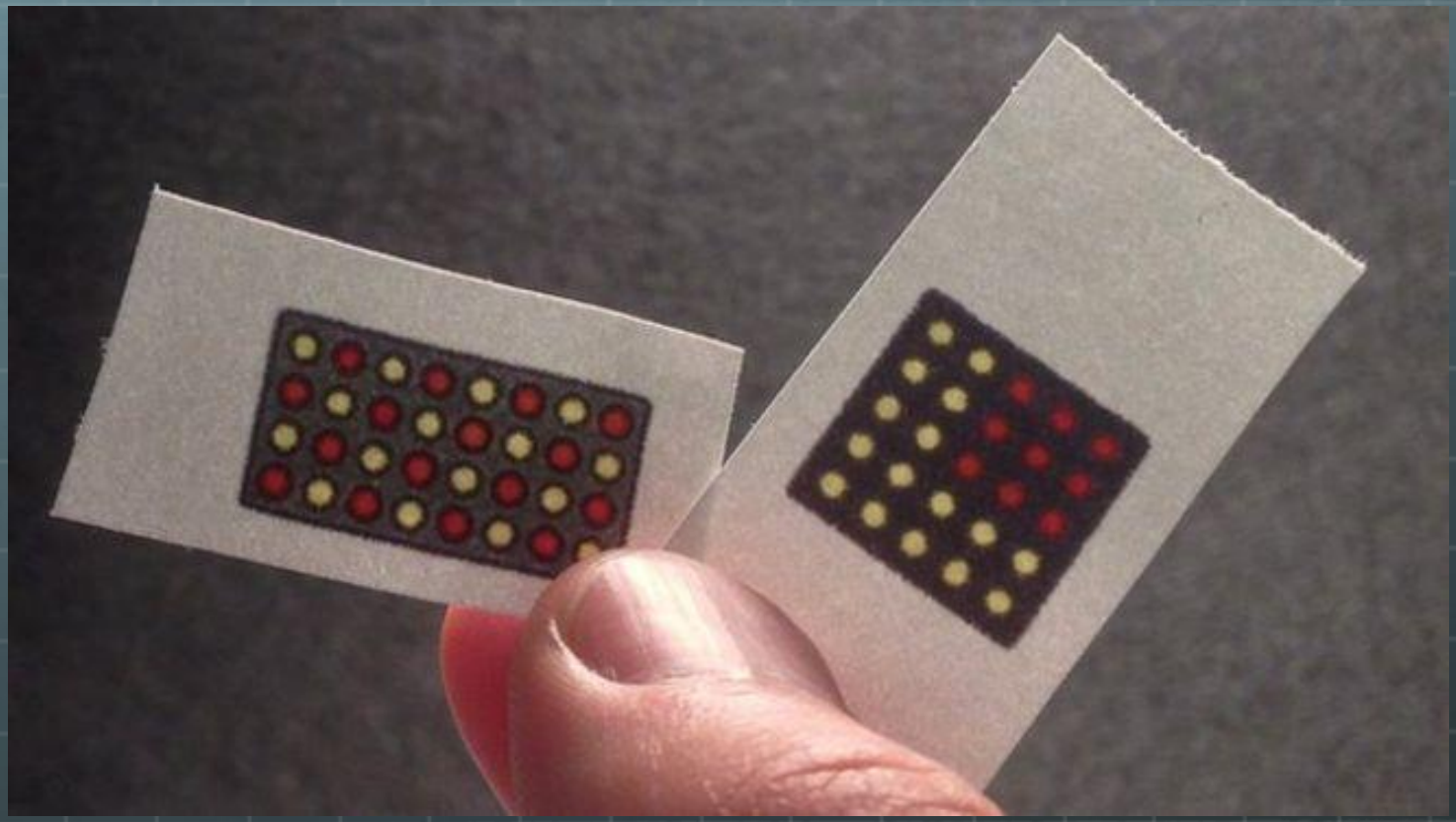
Brainstorming





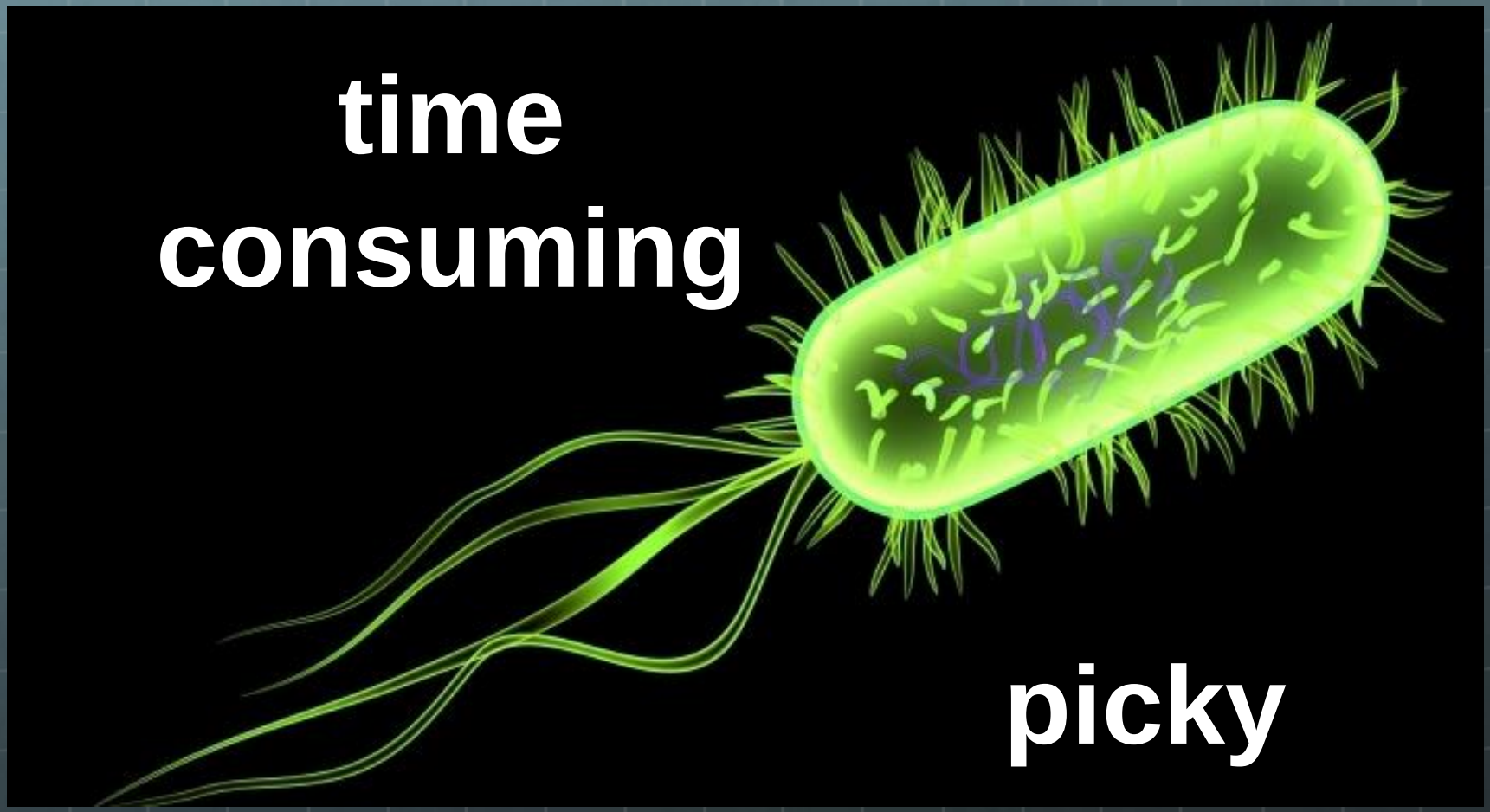
Our Project: Paper-Based Cell-Free Thallium Sensor

Paper-Based Sensor

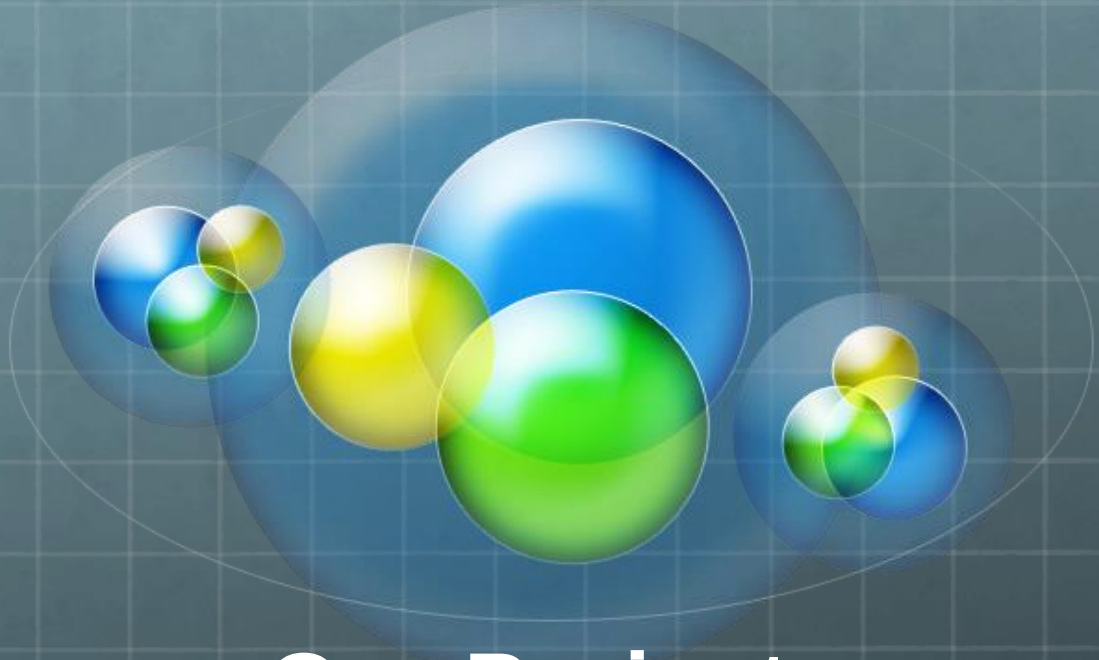


BBC, “Prototype paper test can detect Ebola strains”

Cell-Free

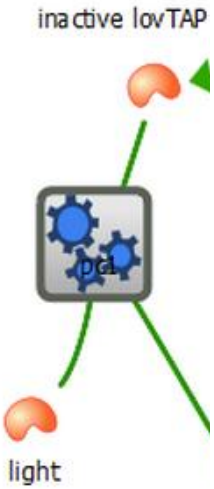


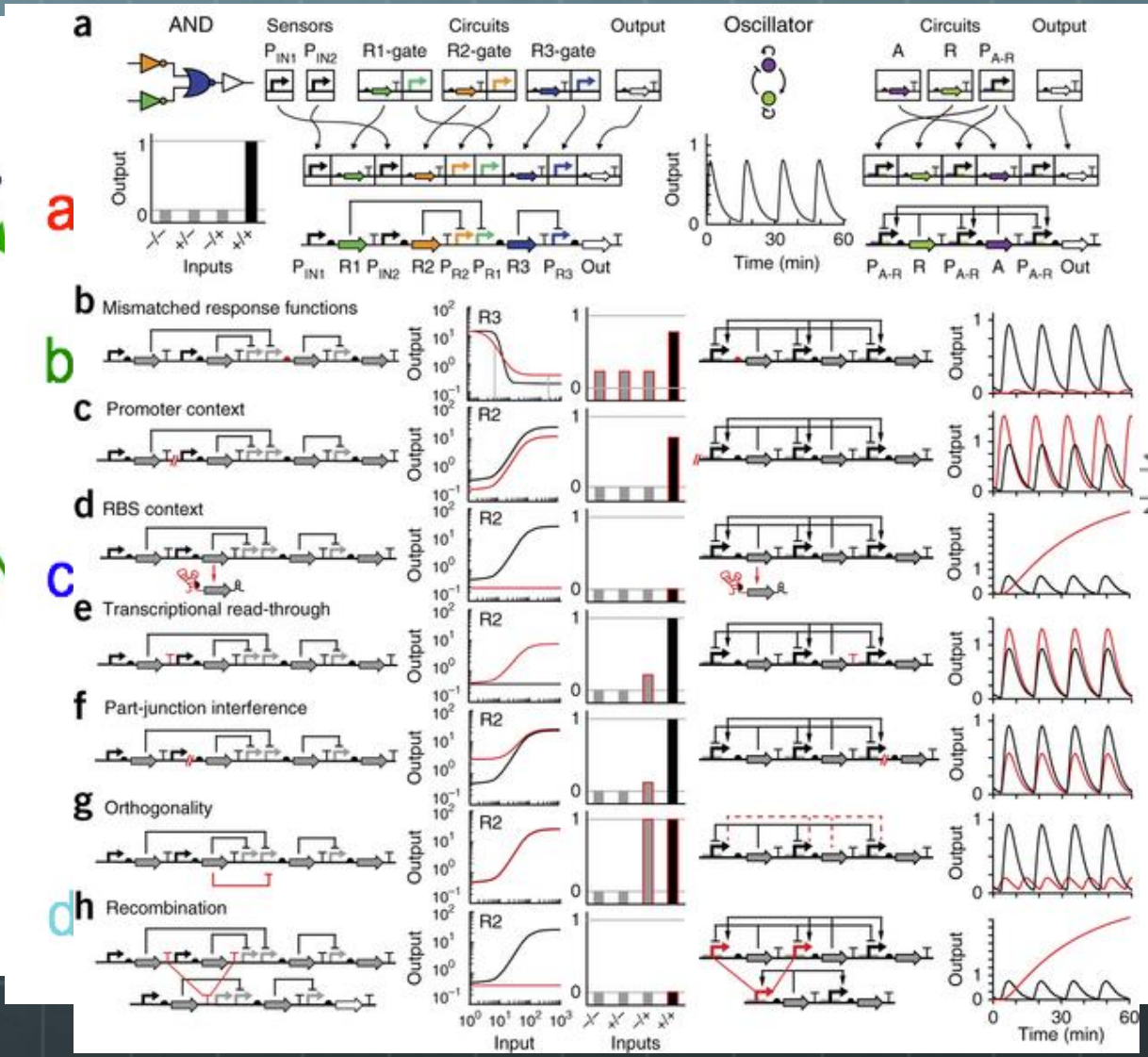
Thallium



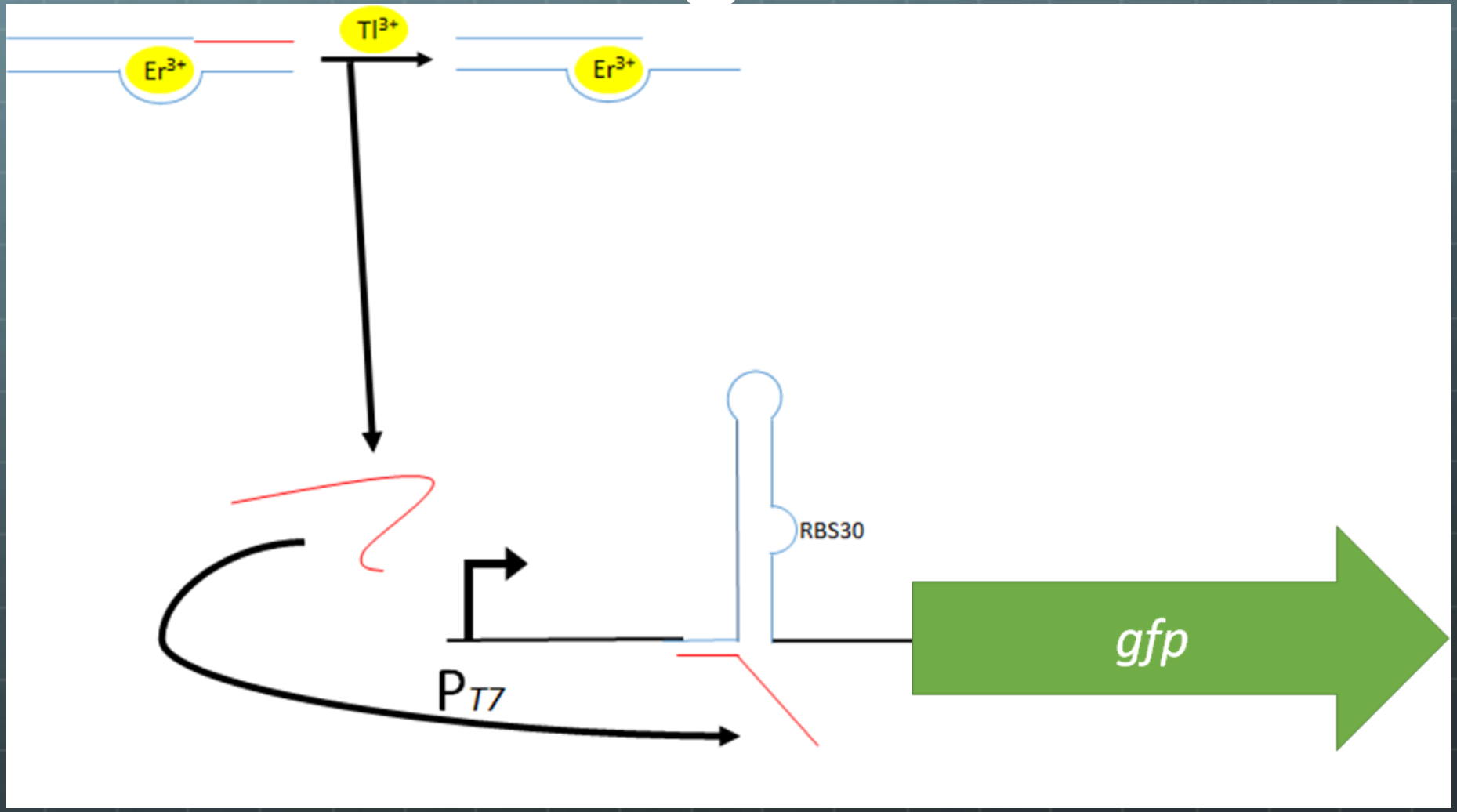
Our Project: Paper-Based Cell-Free Thallium Sensor

Genetic Circuits

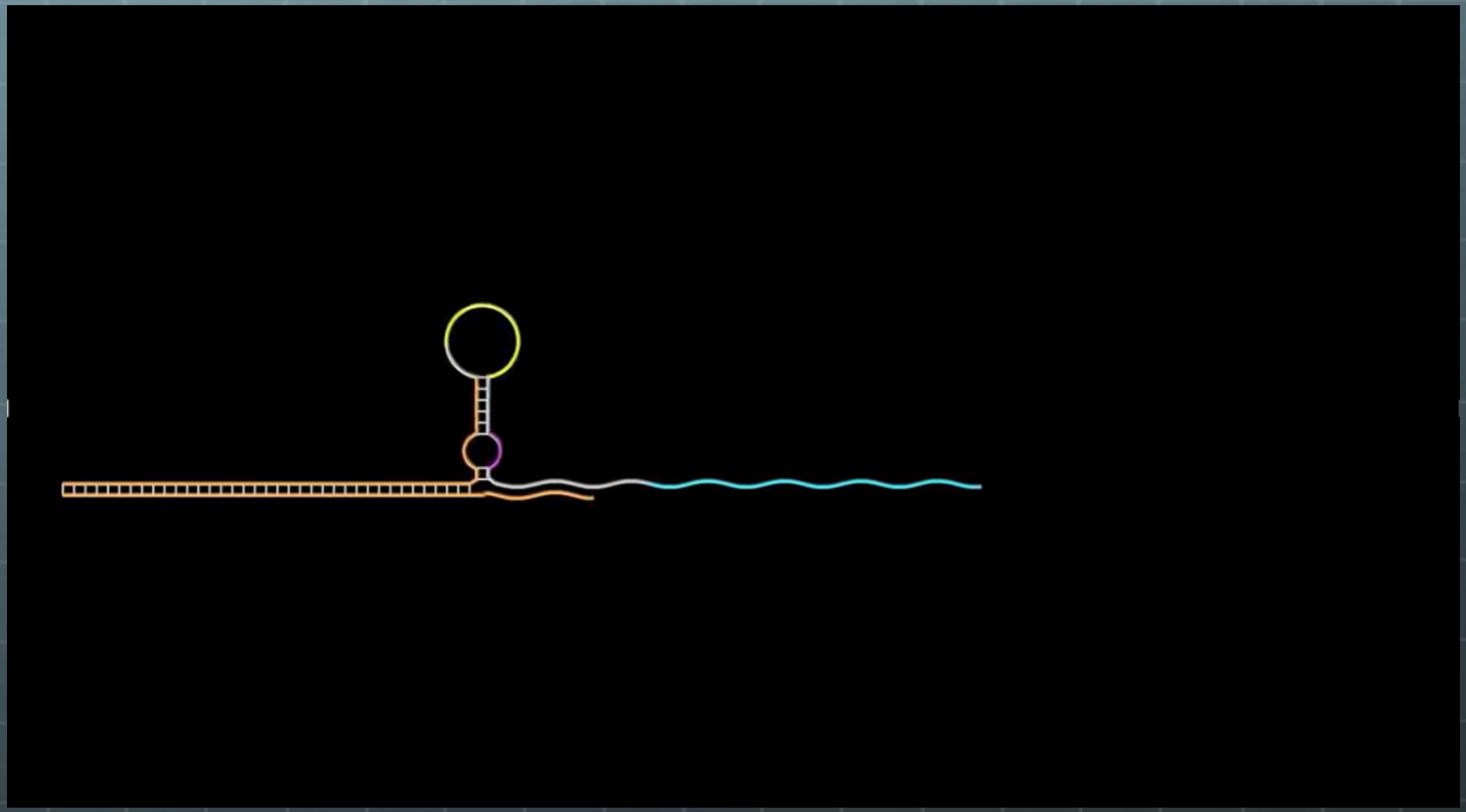




Genetic Circuit Diagram

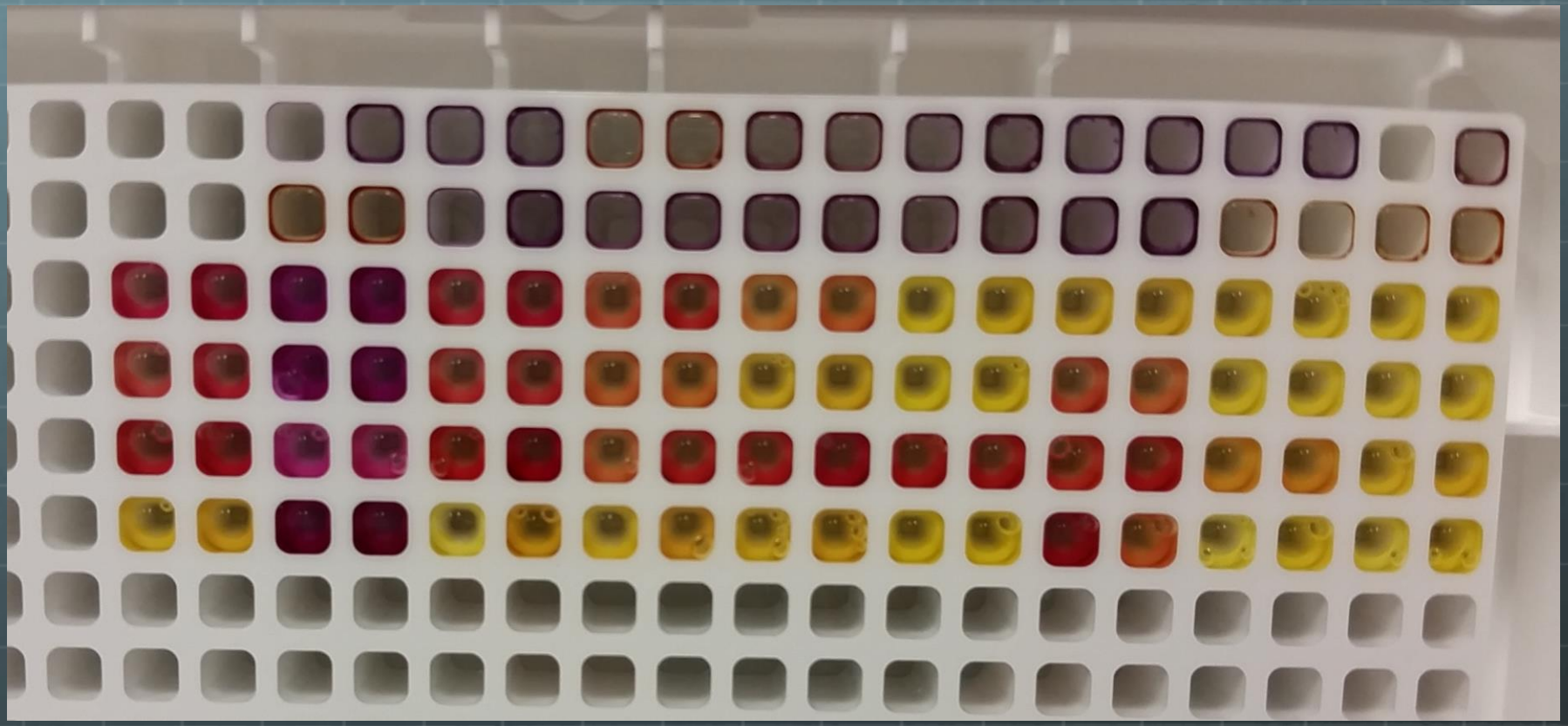


Toehold Switch

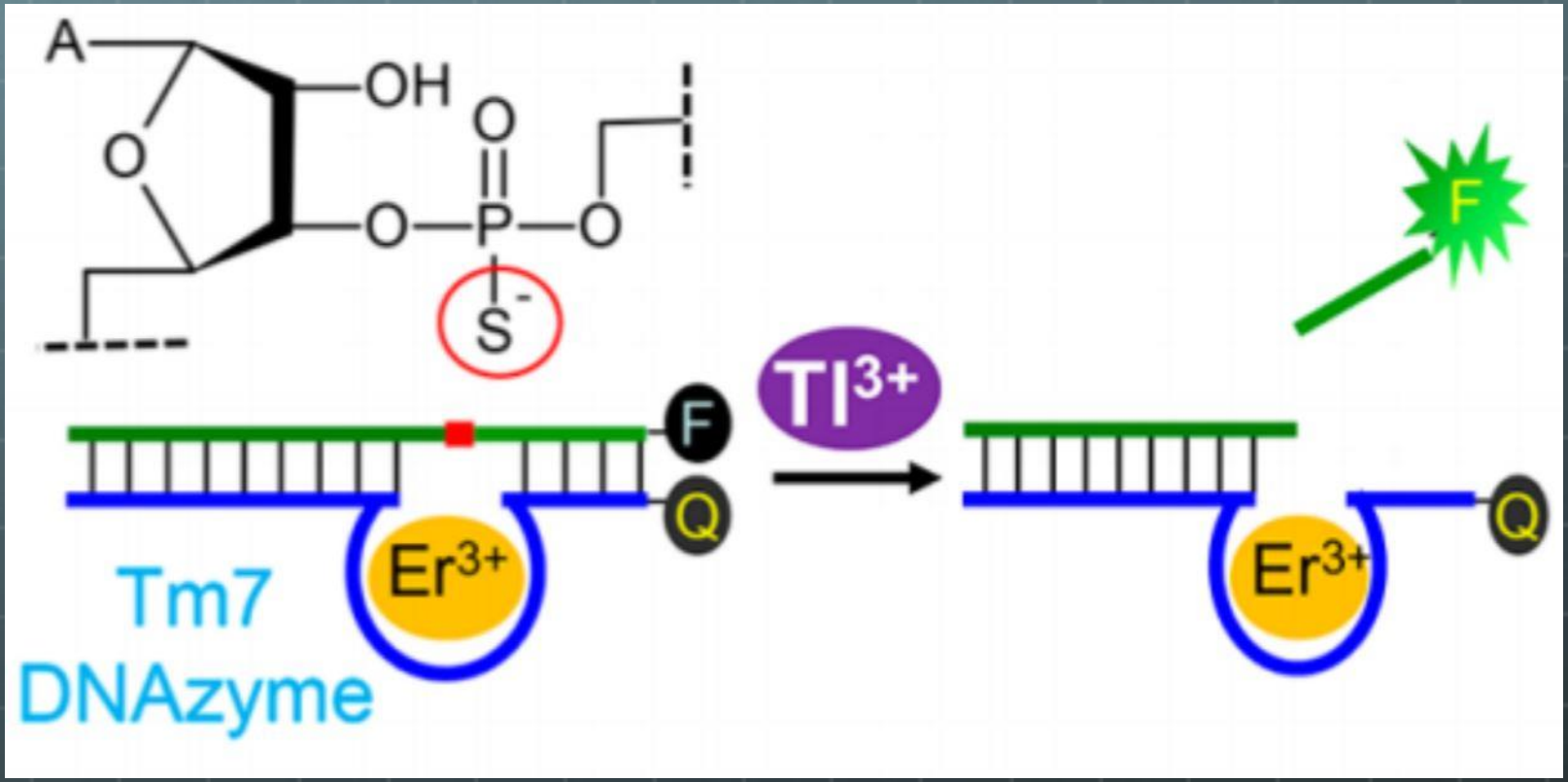


Mechanism of the Toehold Switch, Harvard University, 2014

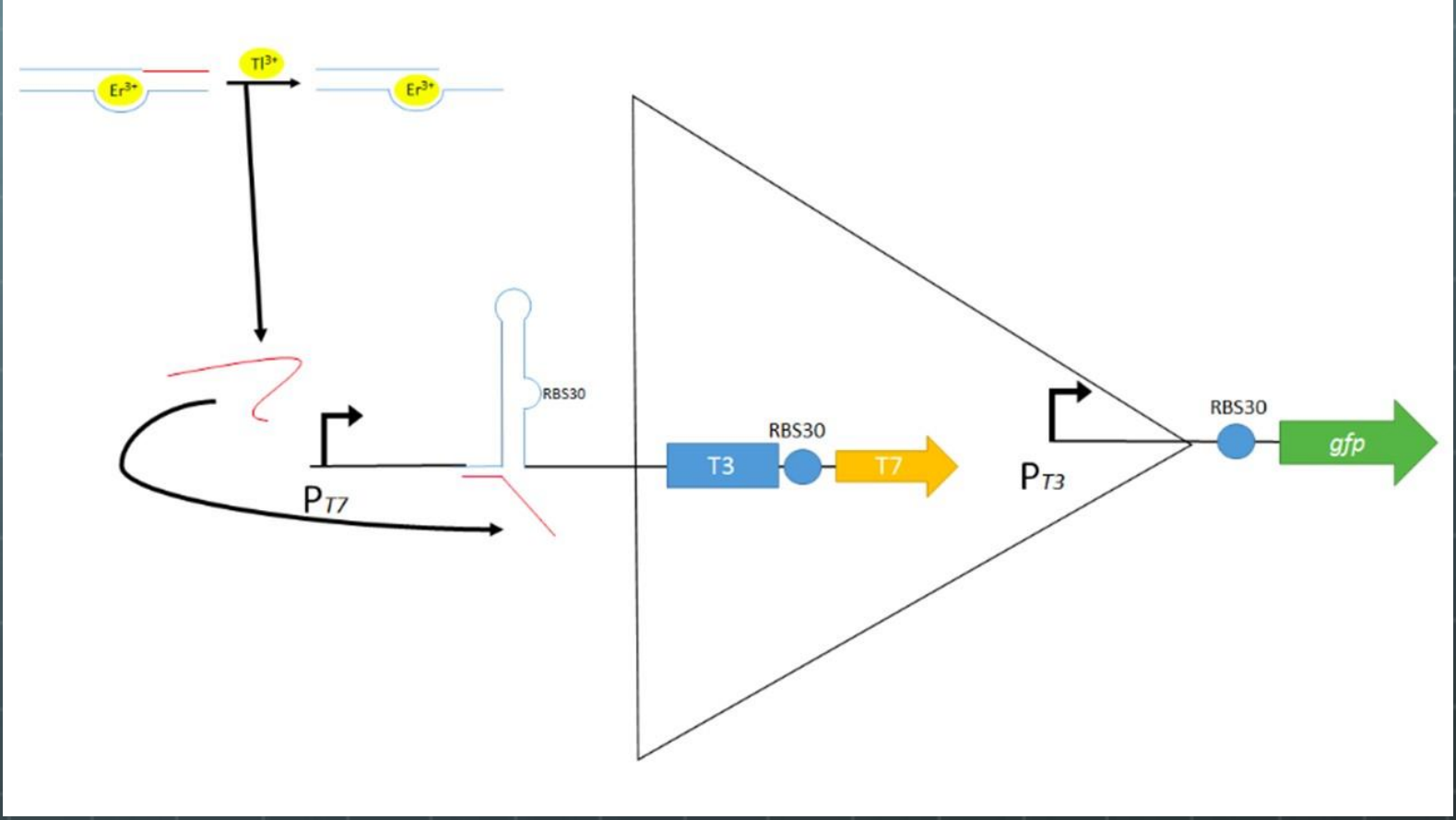
Reporter



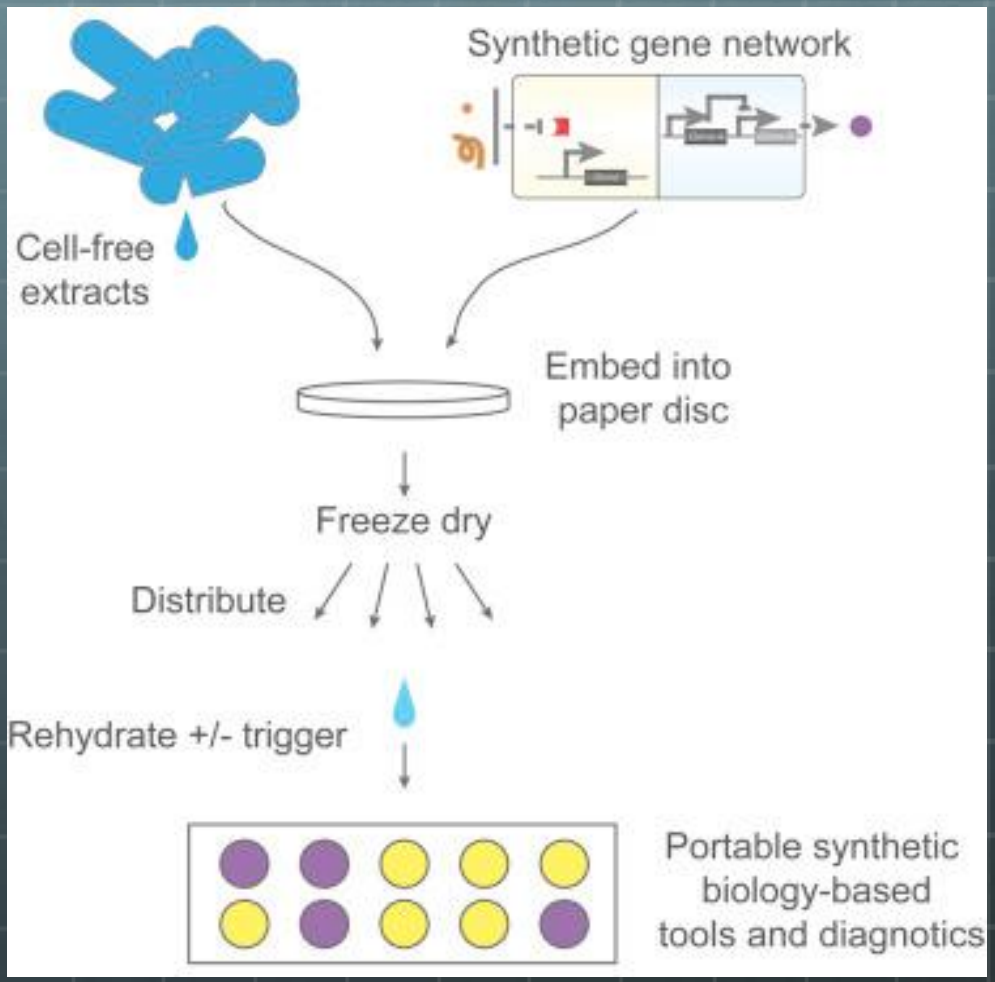
DNAzyme



Amplifier



Cell-Free, Paper-Based Sensor



Paper-Based Synthetic Gene Networks, Pardee et al., 2014

Any Questions?