Part 3:
Personalized Genetic Engineering

Christina Agapakis

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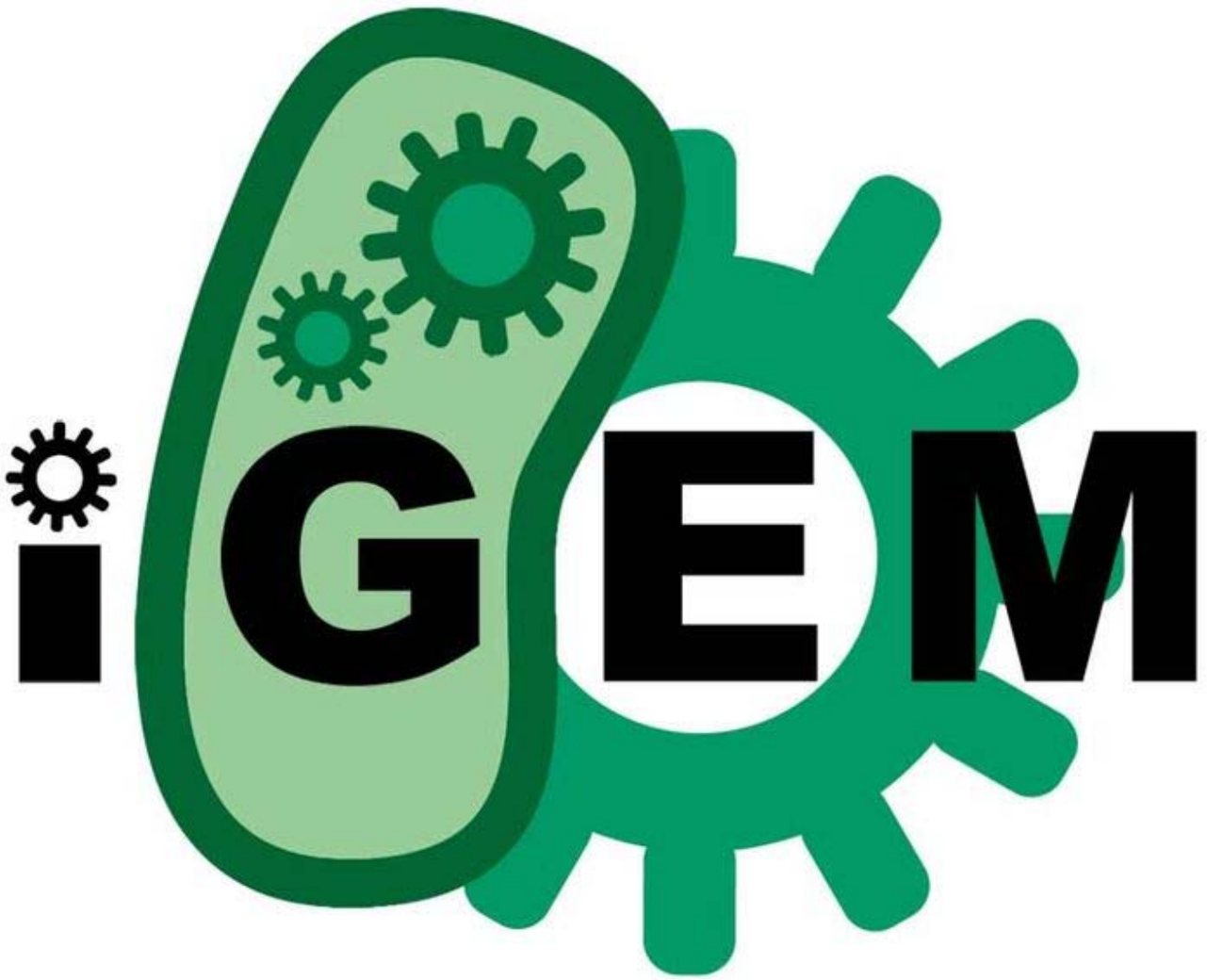
the international genetically engineered machines competition



- undergraduate competition in synthetic biology design
- open source
- biological engineering solutions to big problems

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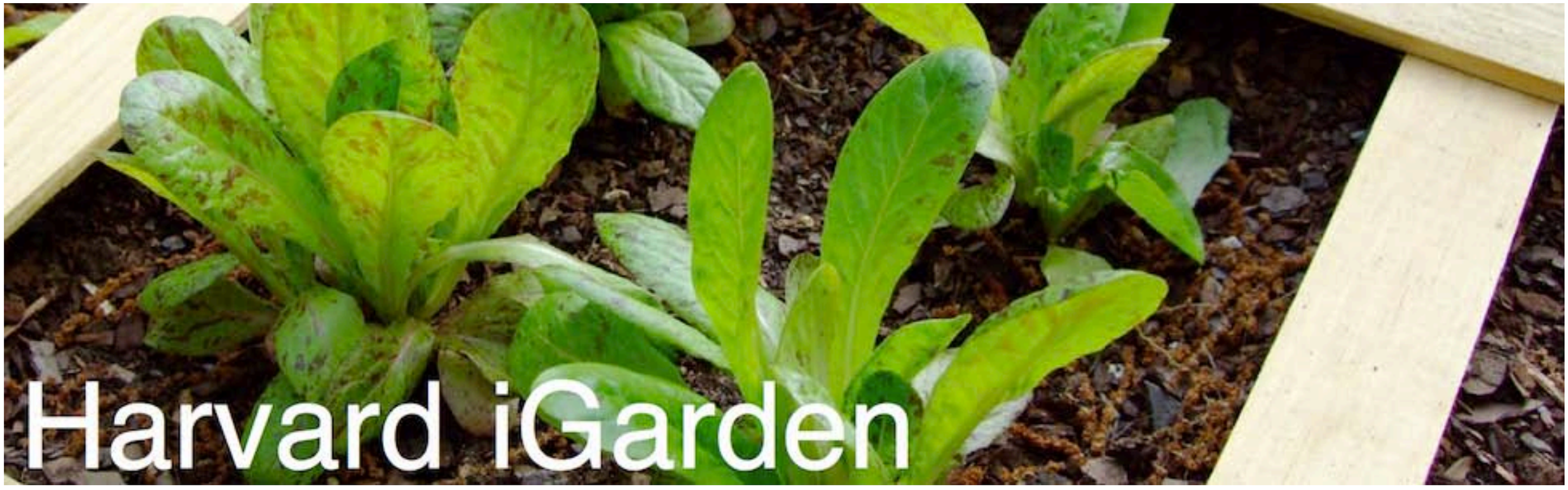


Flickr user ambernussbaum

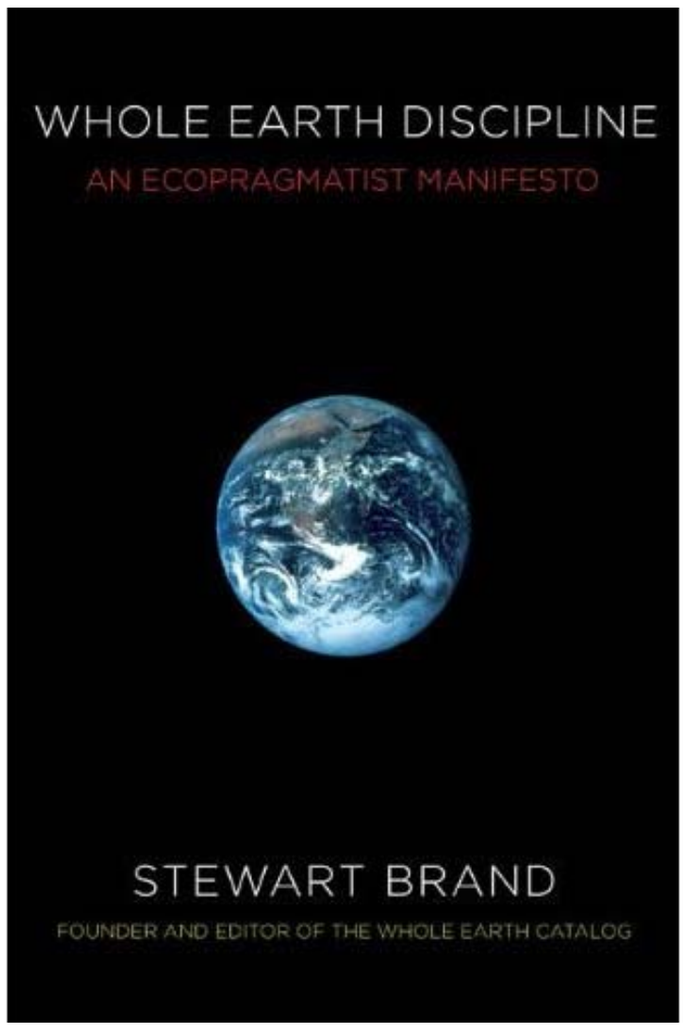
Scott Ingram
Photography

genetically engineered farmer's markets?

Flickr user Ninja M

customize plants to local needs and environments for small-scale rural or urban farmers?

educational?
nutritious?
healthy?
environmentally and socially conscious?
organic?



“One can imagine organic crops biotically engineered as Rachel Carson might do it. They would be designed in detail to protect and improve the soil they grow in, to foil the specific pests and weeds that threaten them...to increase carbon fixation in the soil and reduce the release of methane and nitrous oxide, to be as nutritious and delicious as science can make them, and to invite further refinement by the growers.”

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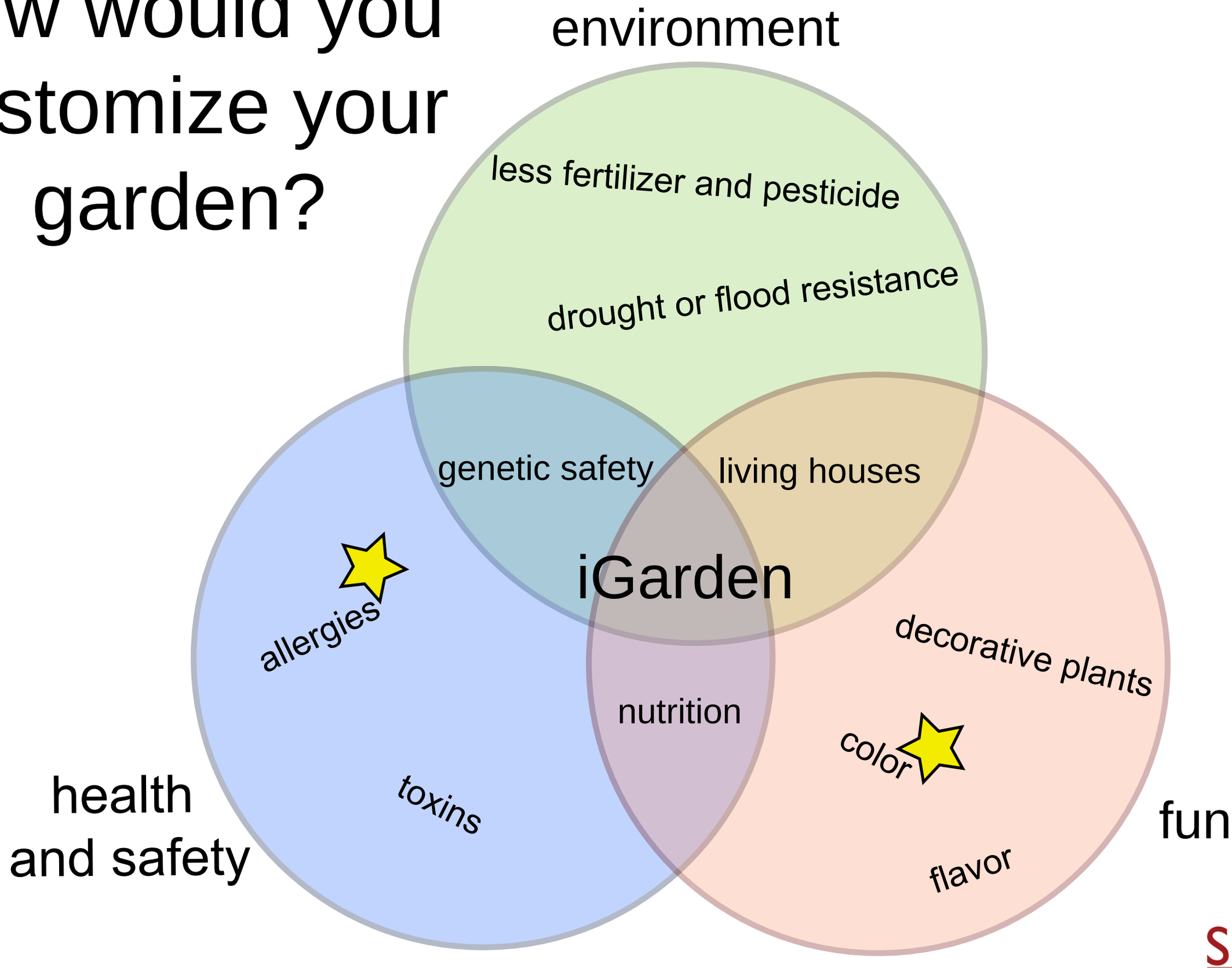
how would you customize your garden?



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can we make food safer by genetically engineering hypoallergenic plants?

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Bet v 1 is a pan-allergen present in birch tree pollen

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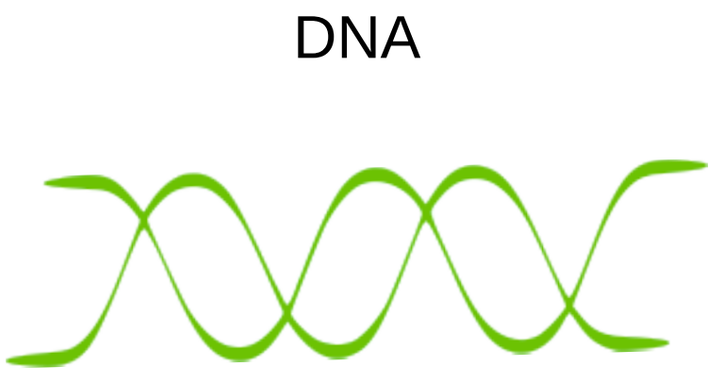
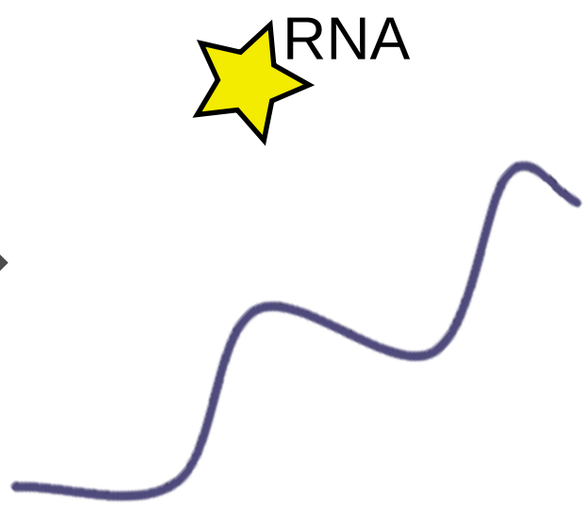
from genes to proteins

DNA



RNA



Protein

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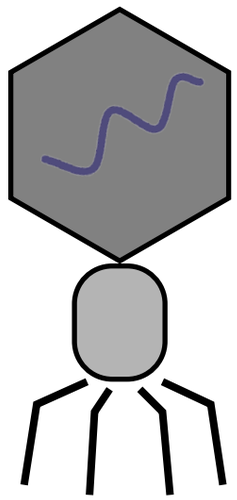
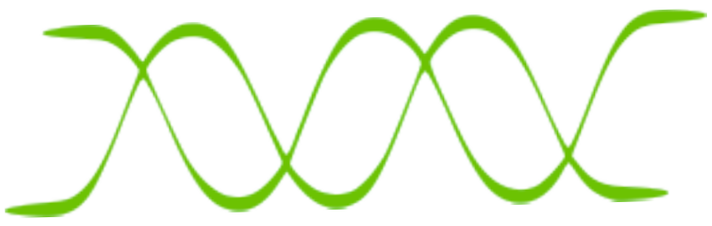
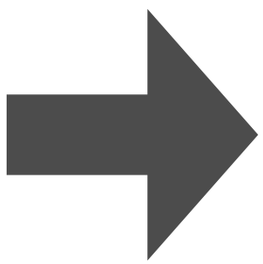
plants protect themselves from foreign genes



harnessing RNA knockdown

purple flower gene DNA





purple flower gene RNA

purple flower pigment

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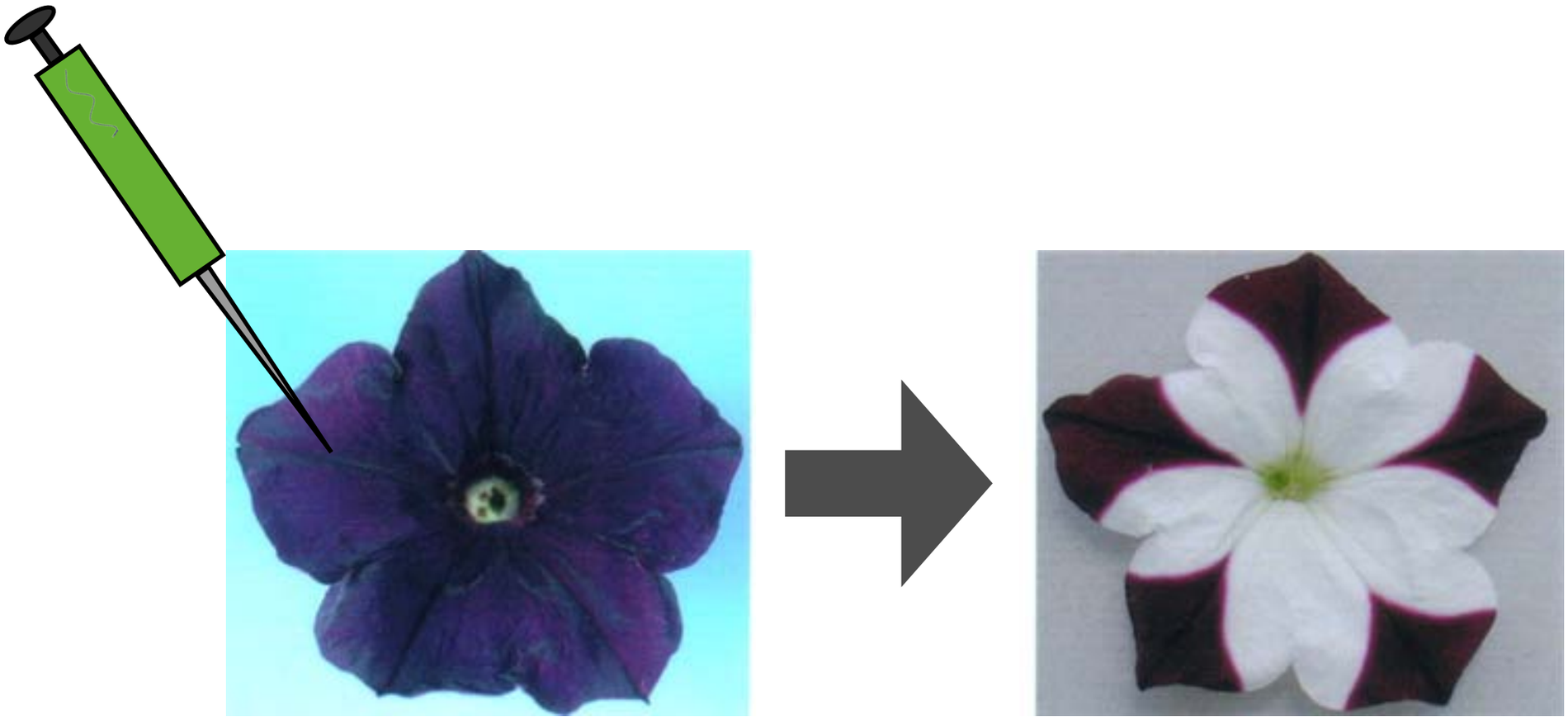
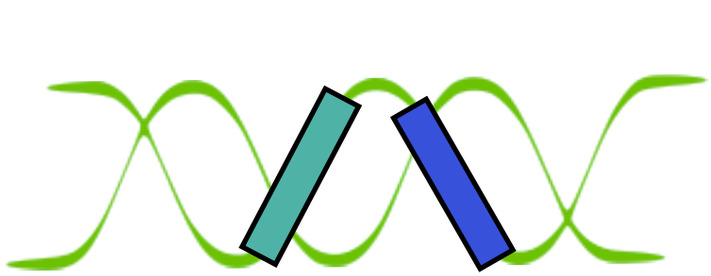
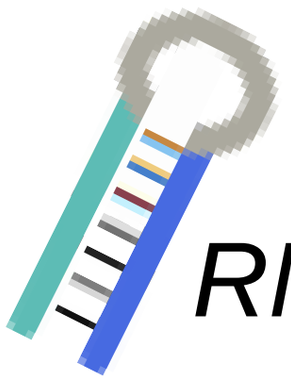
harnessing RNA knockdown



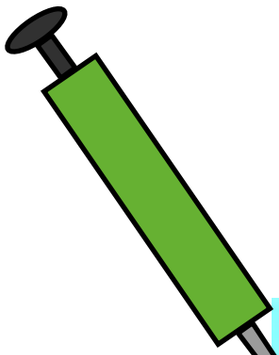
RNA interference

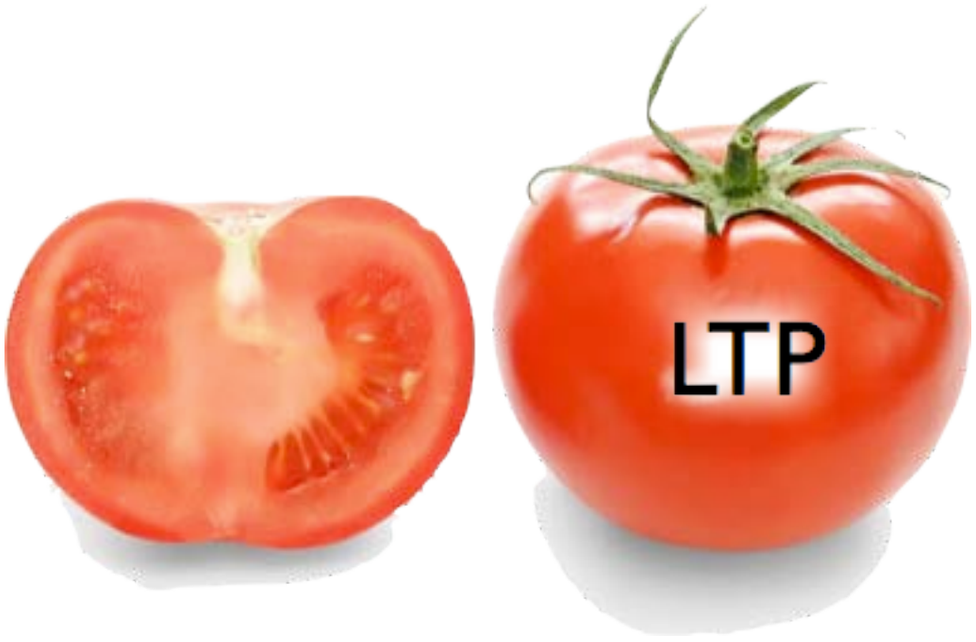
engineering RNA interference





artificial RNA interference





knocking down the known allergens in many plants can make food safer for millions of people

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customizing flower color

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red pigment comes from lycopene,
a compound found in many plants

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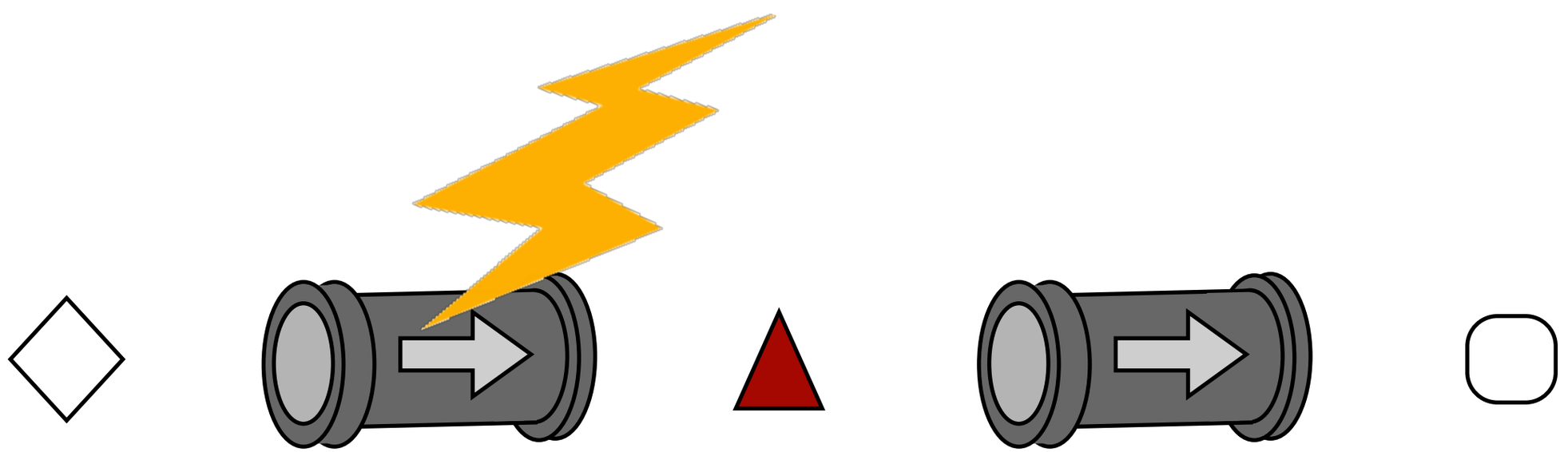
lycopene metabolism: a series of tubes

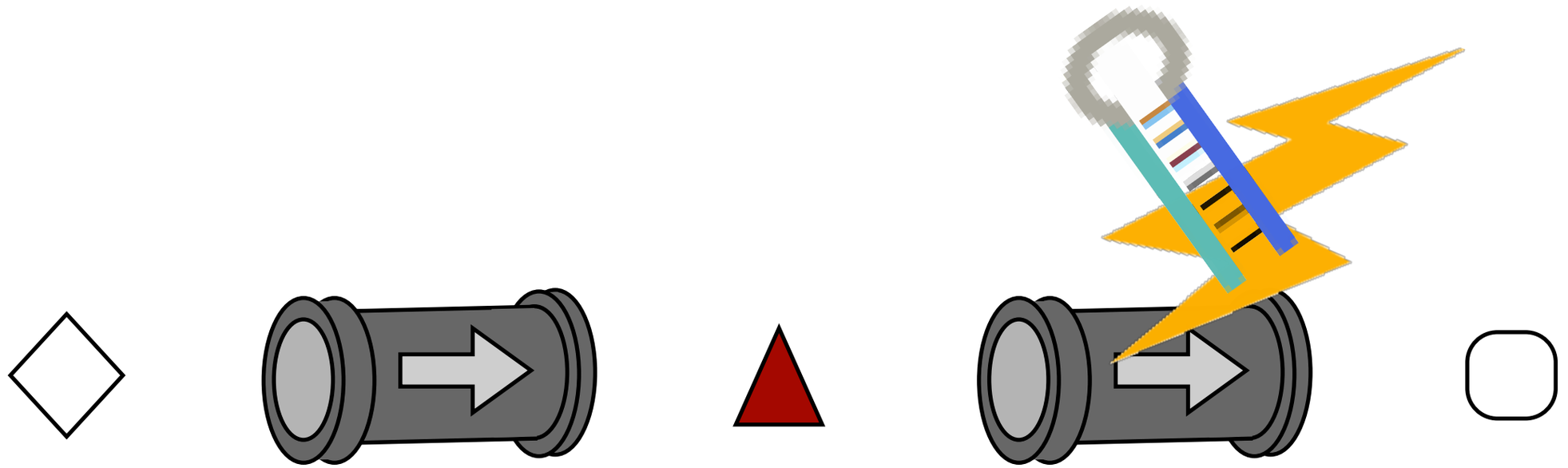


neurosporin ⟶ lycopene ⟶ oscillol

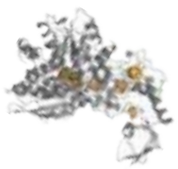
iGEM 2009 champions

E.chromi

lycopene metabolism: a series of tubes



neurosporin ⟶ lycopene ⟶ oscillol



RNA interference can be used to INCREASE flower color!

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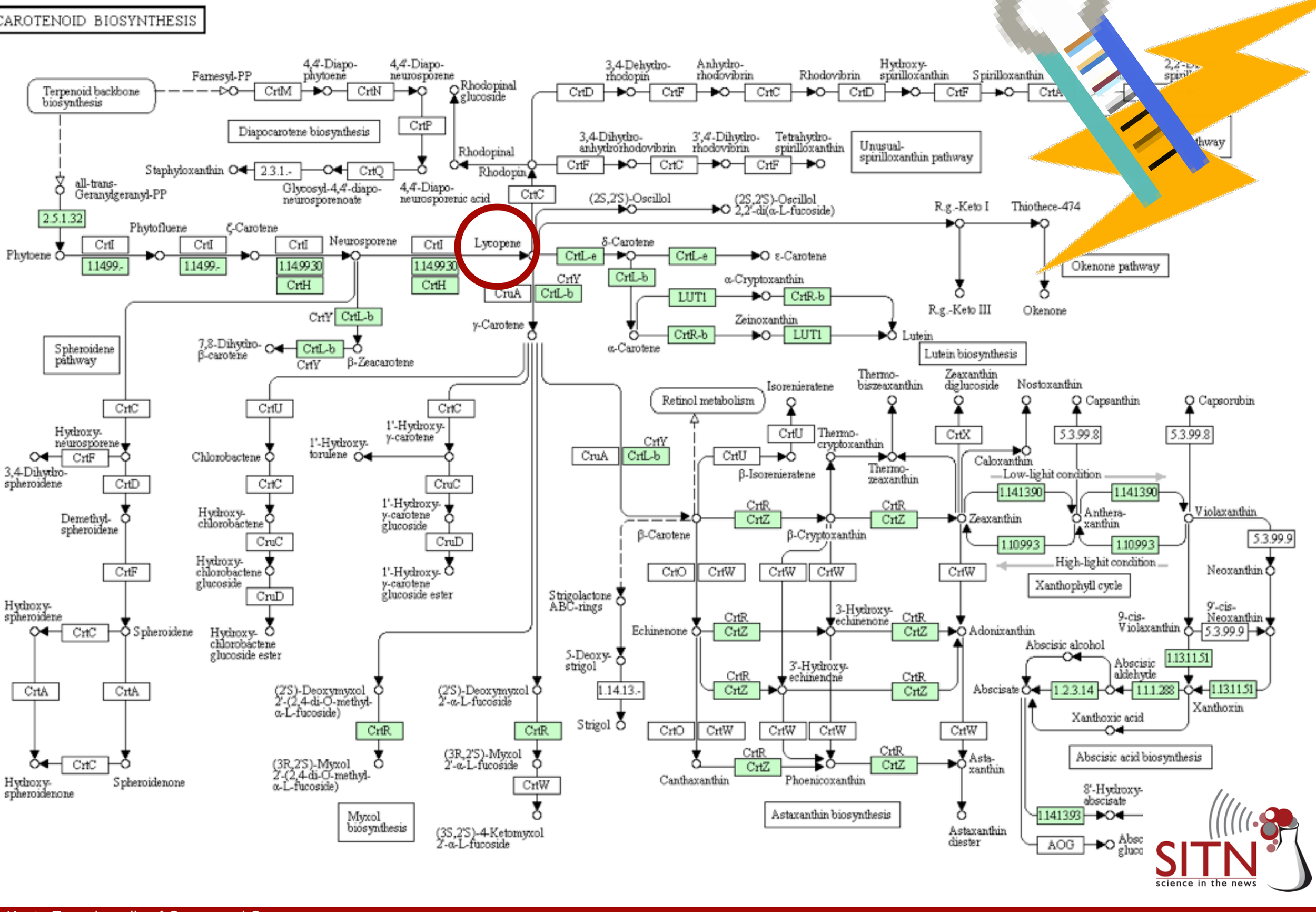
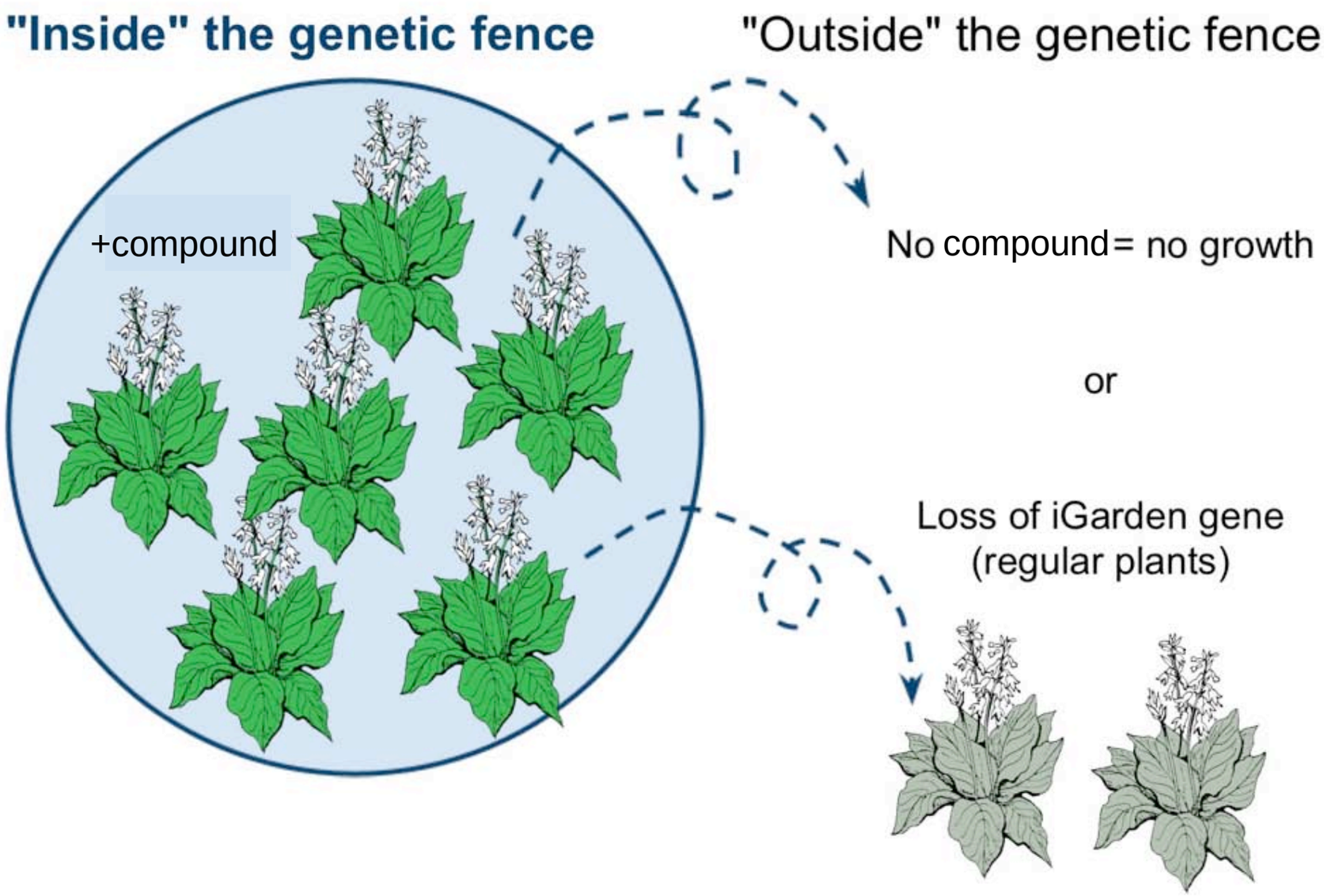
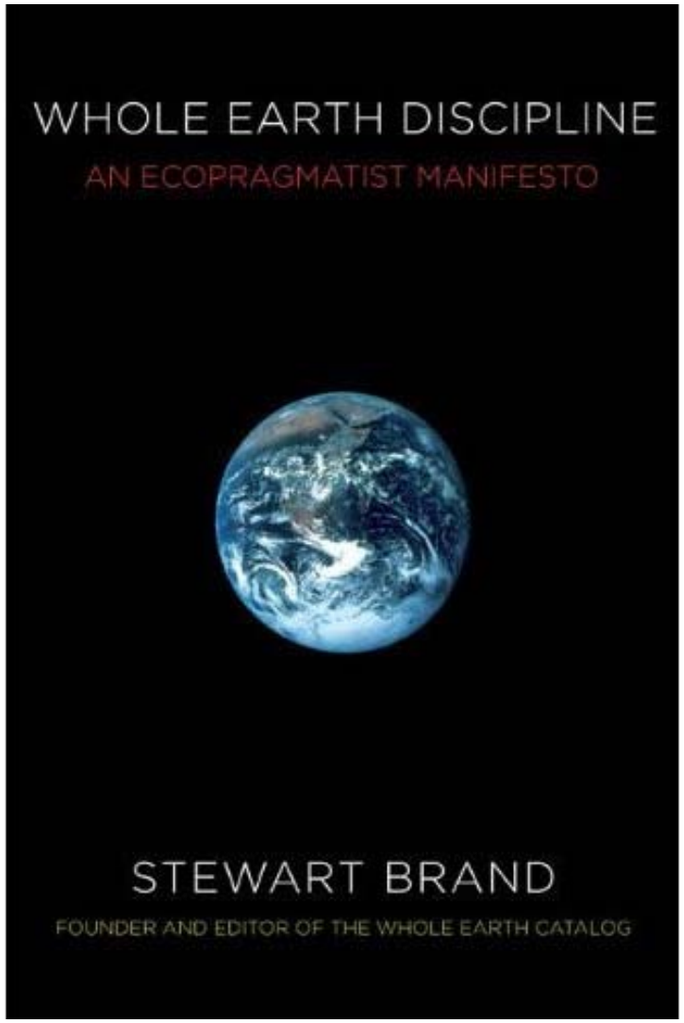
CAROTENOID BIOSYNTHESIS

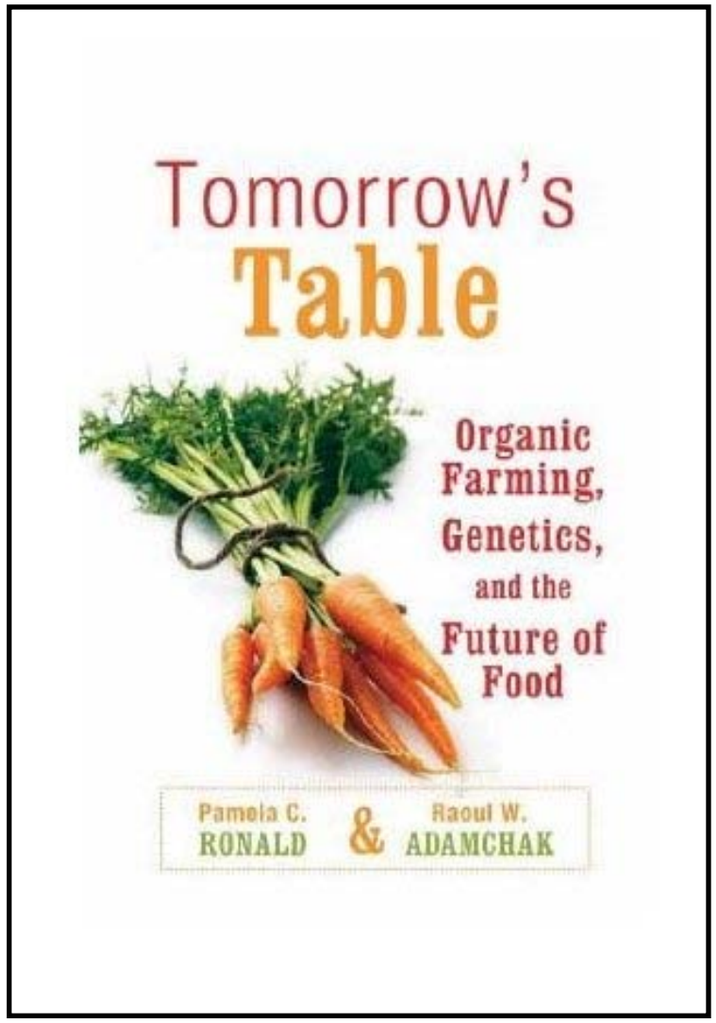


stopping the spread of engineered genes with the genetic fence



learn more





http://2010.igem.org/Team:Harvard

http://www.cambia.org

http://scienceblogs.com/oscillator

http://hydrocalypse.com

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stick around for a tour of our lab!