QGEM

Queen's Genetically Engineered Machine Team

Information Night 2011

QGEM: Queen's Genetically Engineered Machine Team

- We are the Queen's team for the International Genetically Engineered Machine competition (iGEM)
- Diverse multidisciplinary team

The 2010 QGEM team

QGEM: Queen's Genetically Engineered Machine Team

- Entirely student run, mentored by faculty collaborators
- Research in the emerging field of Synthetic Biology
- Work over the summer on a project chosen annually by the team
- Then compete at the annual iGEM competition
- In 2010, QGEM won Gold Standard at the iGEM jamboree at MIT

The iGEM Competition

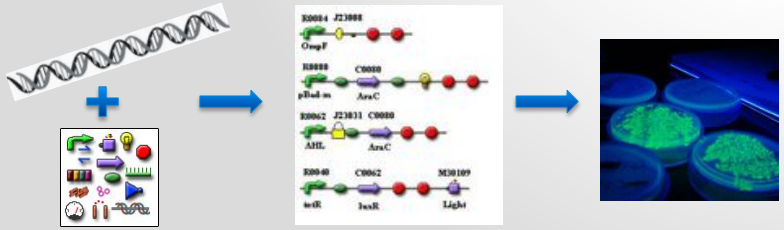
iGEM is the premiere undergraduate Synthetic Biology competition and the largest Synthetic Biology conference in the world!

iGEM cont'd

- The goal of each team is to use standardized DNA parts called BioBricks to design and build biological systems and operate them in living cells
- Teams present their projects at the Championship Jamboree at MIT
- In 2010, there were 130 teams and 1300 participants at the jamboree

Synthetic Biology: the union of biology and engineering

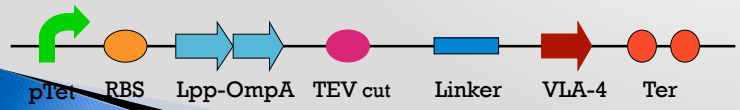
It is a newly emerging field of biology that aims at designing and building new biological systems



Basically, make cells do cool things!

Synthetic Biology: the union of biology and engineering

- Through study of Synthetic Biology:
- Learn to approach biology from an engineering perspective
- Use mathematical and programming skills to analyze biological systems
- Apply design principles to making living "machines"



Why be a part of QGEM?

The Team

- Entirely Student run
- Interdisciplinary undergraduate students
- Work with like-minded, motivated individuals and have the opportunity to learn from each other's diverse experiences

Why be a part of QGEM?

The Research

- Self directed research
- Extensive lab experience
- Work in a cutting edge field, with cutting edge technology
- Expert advice from professors
- Opportunity to get to know the professors on a personal basis

Why be a part of QGEM?

The Finances

- Six guaranteed paid positions so far
- Earn 14 $/hour x 35 hour/week x 16 weeks
- = $ 7840
- More than NSERC / USRA positions
- Tickets and accommodation at Boston also paid for

Last year's project QGEM Project :

wormworks

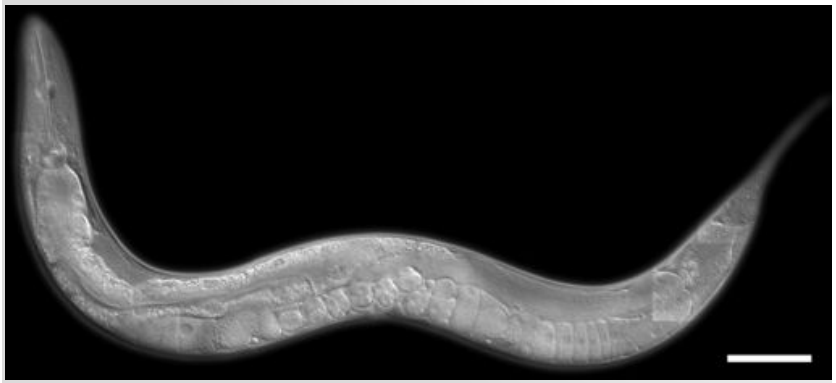
limitations

What are the limits of the most common iGEM chassis (*E. coli*)?

limitations

One cell = one compartment.
Plasmid capacity.
Movement speed and range.

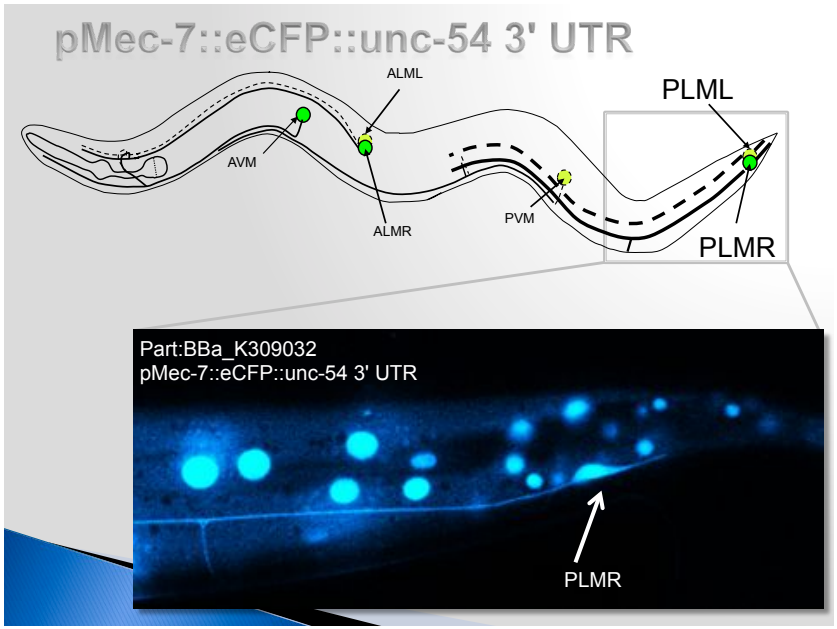
Caenorhabditis elegans

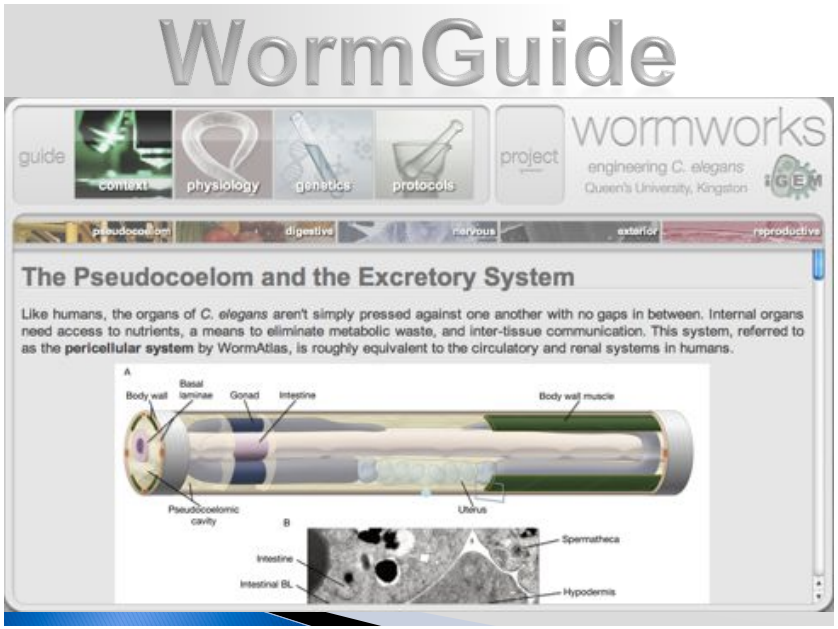


Our Accomplishments

Parts

Promoters
Reporters
Effectors
Terminators



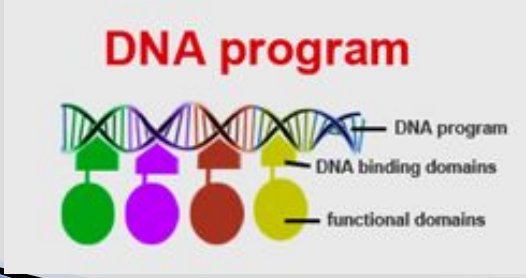


What else can be done?

- The possibilities of genetic engineering and synthetic engineering are endless
- QGEM provides YOU the platform to explore these possibilities and push your intellectual boundaries
- Following are examples of other fascinating projects that were showcased at past iGEM conferences

Slovenia

- A DNA assembly line
- DNA framework
- Co-localize enzymes
- More efficient enzymatic activity

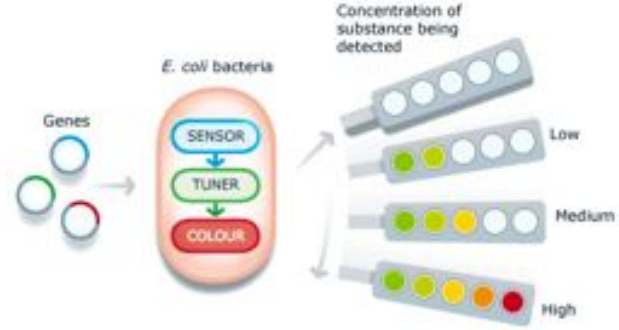


TU Delft

- The team design a biological system to treat oil-contaminated environments
- The microorganism created using synthetic biology was able to:
  - Degrade oil
  - Sense external environments to activate gene expression at the optimal moment in time
  - Survive in toxic environments
  - Improve solubility of oils

Cambridge

- Created variable colour (pigment) output from quantized input chemical concentration



UC Berkely

- Engineered cheap culturable blood substitute.
- E. coli:
  - produced hemoglobin
  - Changed composition of surface proteins to reduce immunogenic effects
  - Cut up own genome

Calendar and Timeline

- **February 15th** : Applications for volunteer and paid positions due at midnight
- **March 5 and 6** : Interviews
- **March 13**: Team assembled
- **March 14th– 23rd**: Educational Sessions
- March 24th – April 8th: Project brainstorming
- **May 1st– September 3rd**: Work on the project

Applying

- Apply for a paid position through SWEP (Student Work Experience Program)
- Login to the Queen's Career Services website: https://careers.sso.queensu.ca/home.htm using your Net ID
- Click on search the SWEP Postings: You can either find the position by entering the Job ID: 35219, or searching for "IGEM research associate"
- Applications are due Feb 15th at 11:59pm

Application Process and Specific Instructions

- If you apply for a paid position, you are automatically considered for a volunteer position in case you are not hired
- For those people **only interested in a volunteer position**, apply by sending the following to apply@qgemteam.com by Feb 15th at midnight:
  - CV
  - Cover letter including your reasons for interest in volunteering,
  - A list of any courses that you will complete by May 1st that you think will be an asset to you in the position

To Summarize

- The QGEM team works on a synthetic biology project over the summer, and competes at the annual iGEM conference with universities from all around the world
- If selected, you will have the opportunity to work with students from diverse backgrounds, conduct research under the supervision of exceptional faculty members
- Get paid (approx. $8000)
- Applications due February 15th

Thank you for your attention.

Any Questions??