

iGEM×BIC

a mutually orthogonal awesome

Agenda

- Waterloo iGEM's software
- Waterloo iGEM's modelling projects
- SOLVER

Software

- The modelling team currently doubles as a software team
- Two standing problems that we can solve soon
 - Keeping track of inventory
 - Diagramming BioBrick circuits

Inventory Needed

- What's in the fridge?
- When do we need to order more of it?
- Why is it in there?
- Which of these physical sequences are backed by data copies?
- Does someone else need our stuff?
- Do we need someone else's stuff?

BioMortar 2.0

- A web based wet lab freezer management tool
- Keeps lab operations tidy and adds a local layer of BioBrick registry
- Makes exporting to parts registry and interlab exchange easy

BioMortar 2.0

- Think big, start small
 - Bring BioMortar to our lab first
 - Standardize BioMortar across iGEM teams across Canada

Software

- Next, BioBrick Diagramming Tool...

Diagramming Tool

- BioBrick circuit drawing is a pain now.
- Non-standard.
- Tedious.
- But what's a BioBrick?

BioBr..Wh?

- A BioBrick is a sequence of DNA that is admissible to the iGEM parts registry.
- This sequence is enclosed with specific restriction sites.
- This standard allows building-block-like construction of genetic circuits.

BioBricks

- BioBricks may contain metadata such as start and stop semantics
- Usually code for a functional protein
- Frequently used BioBricks include reporter genes such as the Green Fluorescent Protein.

Back to Diagrams

- With the software tool we're discussing, we can easily create BioBrick diagrams amongst other genetic circuits.
- A few example diagrams that exist today that we hope this software will generate in future.

Part:BBa_I746666
 Designed by Yue Miao Group: iGEM07_Cambridge (2007-)

Pspac-hy with GFP

Pspac-hy is a B.subtilis/E.coli promoter inducible by IPTG.

Sequence and Features

Format: Subparts | [Ruler](#) | [SS](#) | [DS](#) Search:

Part:BBa_I712037
 Designed by Katja Kolar Group: iGEM07_Cambridge (2007-)

CMVp - CD4 - CUb - mCherry

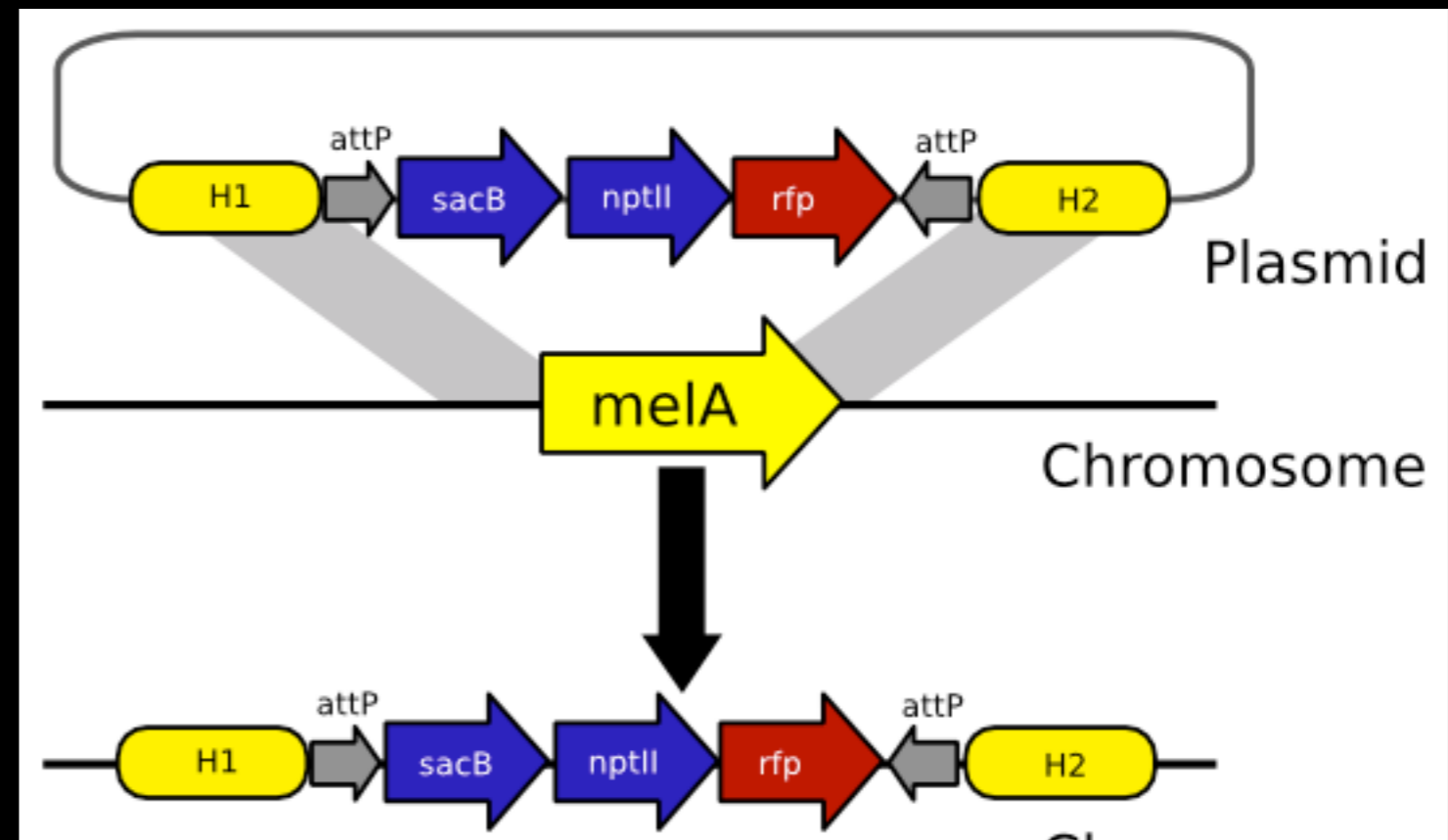
CD4 fused with C-terminal half of sp...

Sequence and Features

Format: Subparts | [Ruler](#) | [SS](#) | [DS](#) Search:



From Headless Chicken,
 Waterloo 2008
Photoshop



From ChromoBricks, Waterloo 2009
Inkscape

Two BioBricks from the
 Parts Registry
HTML, ...

BioBrick + SVG

- Script driven circuit drawing
 - Specify what parts, icons to draw and their relationship
 - Automatically drawn and scaled
 - Generated as an SVG
 - Create once, deploy anywhere

Modelling Projects

- Software projects are great, but what about the modelling?

Modelling Projects

- Recombinatron (2009)
 - For a certain integrase enzyme (Φ_C -31), recombination can occur when complimentary “att” sites occur between two strands of DNA
 - Challenge: Find a combination of att-sites that supports deterministic sequential insertion
 - Finding this combination with brute force is a factorial challenge
 - Conclusion: for no practical solution for our ‘n’.

Modelling Projects

- Potential projects for this year
 - Computation in Vivo
 - Graph problems (Network clustering?)
 - Inspired by DAG finder
 - Biology in Silico
 - Enzyme activity like Recombinatron
 - Concurrent modelling & wet lab possible

Finally...

- SOLVER
 - Coming this summer
 - Weekly short projects
 - Working in small teams of three
 - Programmer, Bio/Chem Researcher, Experienced Student in Bio, Chem or CS
 - Solving short, one-off problems with reusable solutions
 - More on this later...
 - Needs assessment, interest to be polled...

Meetings this Semester

- **Modelling & Software Meetings**
 - Wednesdays 6pm BI-273 Gleave Library
- **Design Meetings**
 - Thursdays 6pm BI-266 Dean's Conference Room
- uwigem@gmail.com
- igem.uwaterloo.ca/forum