Eau d’coli

N Kuldell for 20.020
Spring 2010
System level description: initial planning

Input → Black box functions → Output

Inputs | Information Processing | Outputs
--- | --- | ---
BioMarker 1 | Decoder | Response Pathway
BioMarker 2
System level description: initial planning

Input

precursor

Black box functions

Output

e.g.

smell

WGD

and

BGD

WGD: Wintergreen Generating Device
BGD: Banana Generating Device
System level description: scent production

Input
- e.g. precursor

Black box functions
- WGD
- BGD

Output
- e.g. smell

WGD: Wintergreen Generating Device
BGD: Banana Generating Device
System level description: scent production

Input: e.g. precursor

Output: e.g. smell

Black box functions

WGD: Wintergreen Generating Device

BGD: Banana Generating Device
System level description: precursor production

Input
- e.g. cell growth

Black box functions
- WGD: Wintergreen Generating Device
- BGD: Banana Generating Device

Output
- e.g. smell

saGD: salicylic acid Gen Dev
iaGD: isoamyl alcohol Gen Dev
System level description: precursor production

Input
- e.g. cell growth

saGD
- saGD: salicylic acid Gen Dev

iaGD
- iaGD: isoamyl alcohol Gen Dev

Black box functions

WGD
- WGD: Wintergreen Generating Device

BGD
- BGD: Banana Generating Device

Output
- e.g. smell

WGD: Wintergreen Generating Device
BGD: Banana Generating Device

saGD: salicylic acid Gen Dev
iaGD: isoamyl alcohol Gen Dev
System level description: growth regulation

Input
- e.g. cell growth

Output
- e.g. smell

Diagram:
- WGD
- BGD
- saGD
- iaGD

Graph:
- Cell density over time
- Phases: "lag", "log", "stationary"
System level description: growth regulation

Input
- e.g. log growth

ON
- saGD
- WGD

OFF
- iaGD
- BGD

cell density

"lag" → "log" → "stationary" → wintergreen smell

time
System level description: growth regulation

Input
- saGD
- WGD
- iaGD
- BGD

e.g.
stationary growth

OFF
ON

cell density

"lag"

"log"

"stationary"

banana smell

time
System level description: growth regulation

OsmY is a promoter that is only active during stationary phase
System level description: growth regulation

Input

- e.g. stationary growth

OsmY+ inverter

<table>
<thead>
<tr>
<th></th>
<th>Stationary phase</th>
<th>Log phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>OsmY</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>OsmY+ inverter</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
System level description: growth regulation

Input

- e.g. stationary growth

- saGD
- iaGD

- WGD
- BGD

- osmY

OFF

ON
System level description: Chassis modification

Input

e.g. stationary growth

\[ \text{saGD} \rightarrow \text{osmY} \rightarrow \text{WGD} \rightarrow \text{OFF} \]

\[ \text{iaGD} \rightarrow \text{osmY} \rightarrow \text{BGD} \rightarrow \text{ON} \]

eliminate natural indole production
System level test: gas chromatographs

E. coli

no methyl salicylate [no peak at 9.1 minutes]

E. coli + precursor (SA) + WGD

methyl salicylate
MW = 152
System level test: uninformed experimental subjects??

![Bar chart showing percentage distribution for A (Mint), B (Stinky), and C (Banana).]