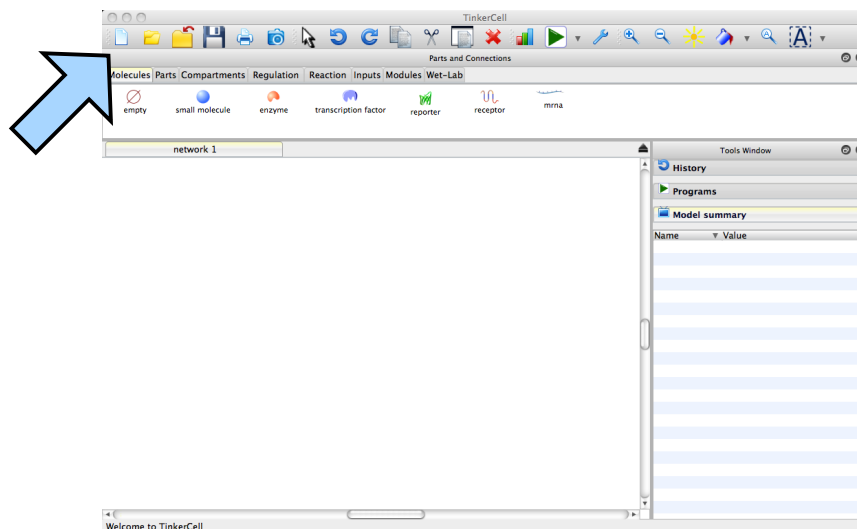


TinkerCell Tutorial: The Bacterial Photography System

Thanks and appreciation to Deepak Chandra from U of W, who developed TinkerCell and modified it to teach the bacterial photography system. The system itself was made by the 2006 Univ. Texas iGEM team.

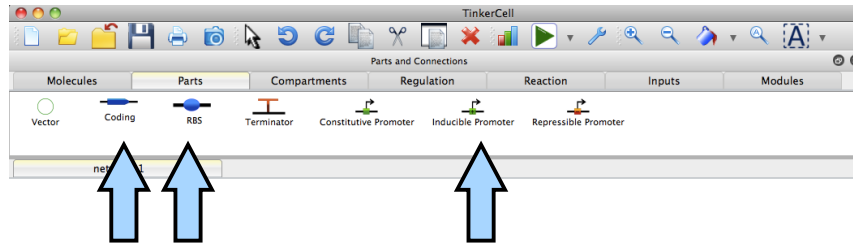
Start a new canvas

Select "New canvas" from the File menu or use the "New" icon at the left of the top toolbar



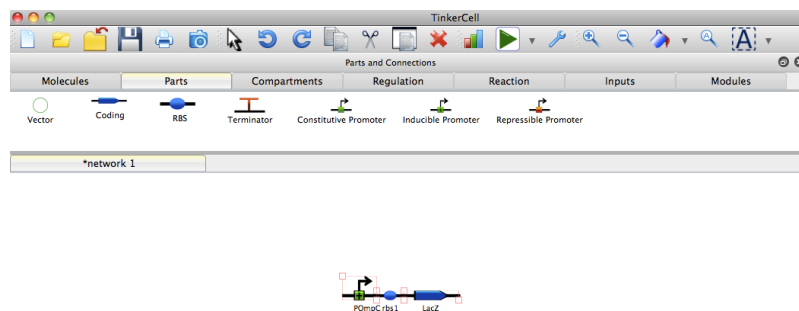
Assemble Reporter

From the “Parts” tab, select and place an “Inducible Promoter”, “RBS”, and “Coding” icon on the canvas.



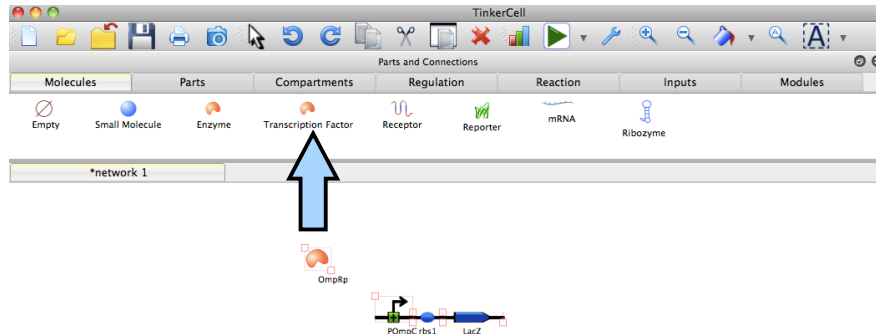
Align and Name

Drag items on the canvas next to one another to align them. Rename the promoter “PompC” and the coding sequence “LacZ”.



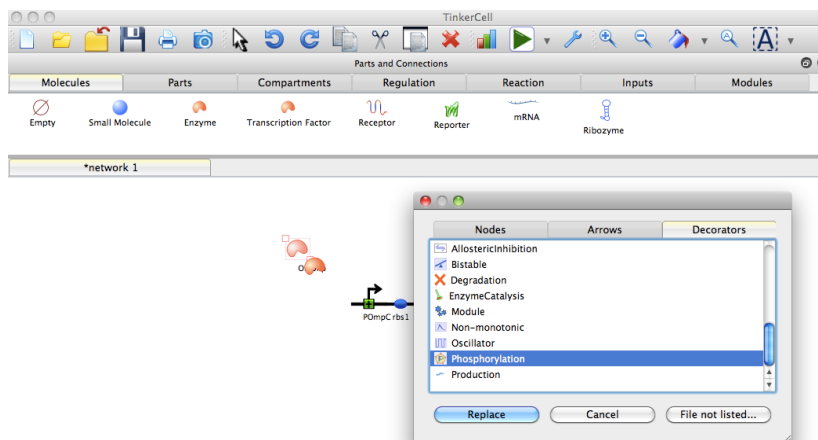
Add a transcription factor

From the “Molecules” tab, add a transcription factor to the canvas and rename it OmpRp



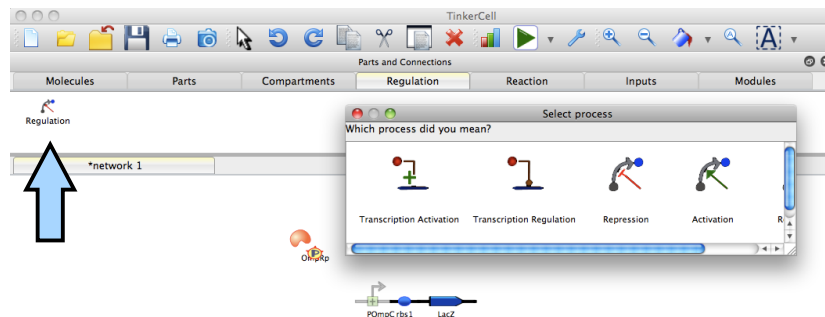
Visual appeal: add a 'P'

Select OmpRp, then from the “Edit” menu, choose “Add Decorator”. From the “Decorator” tab, select “phosphorylation”.



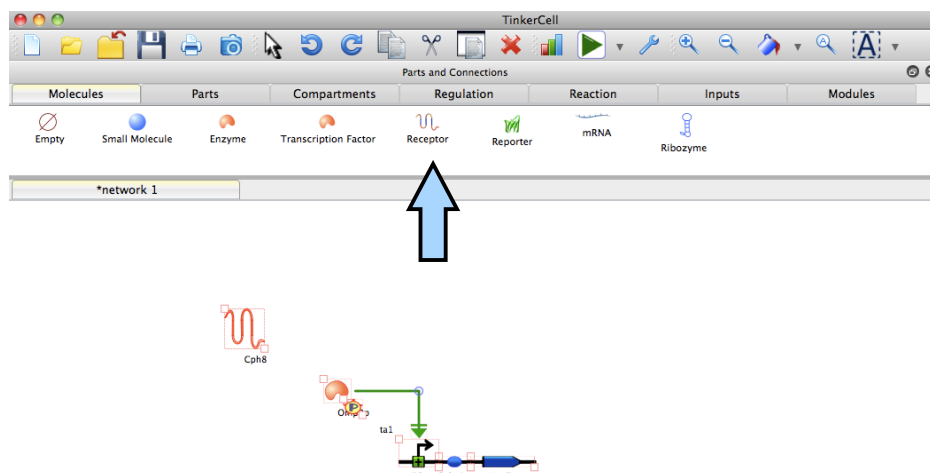
Regulate transcription

From the “Regulation” tab, choose “Regulation”, then click OmpRp and PompC. Choose “Transcriptional Activation” from the pop-up.



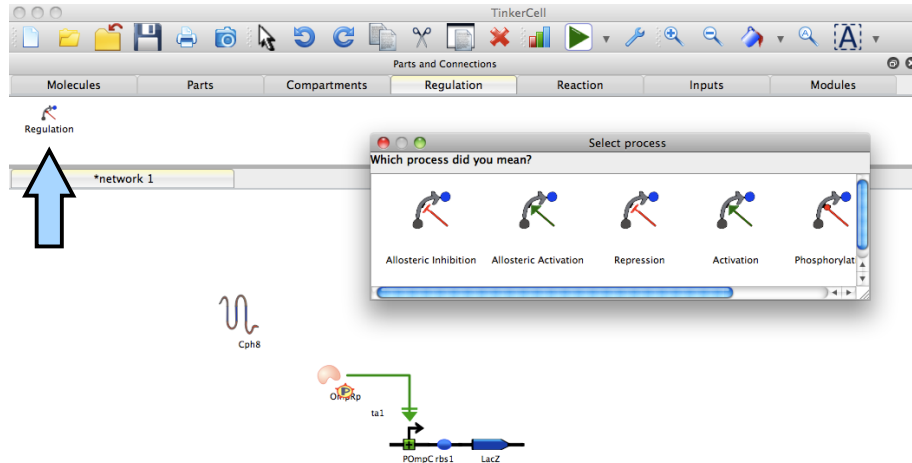
Add light receptor

From the “Molecules” tab, place a “Receptor” on the canvas and rename it Cph8.



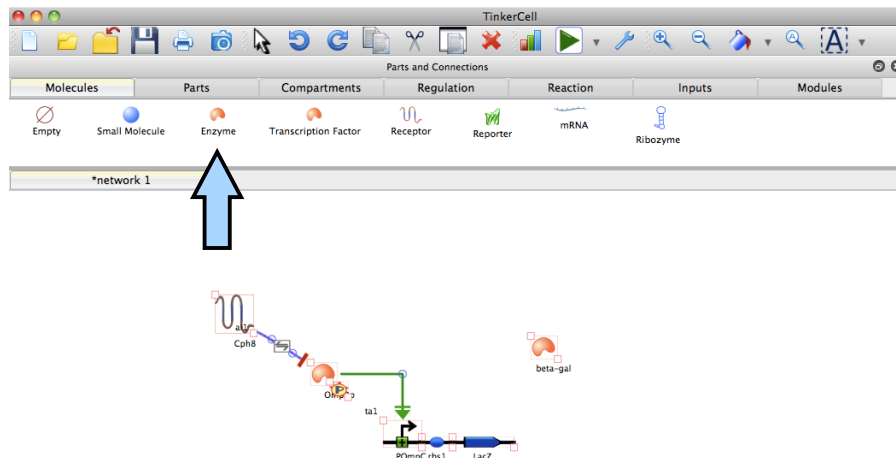
Regulate OmpRp with Cph8

From the "Regulation" tab, choose "Regulation", then click on Cph8 and OmpRp, then select "Allosteric Inhibition" from the popup menu.



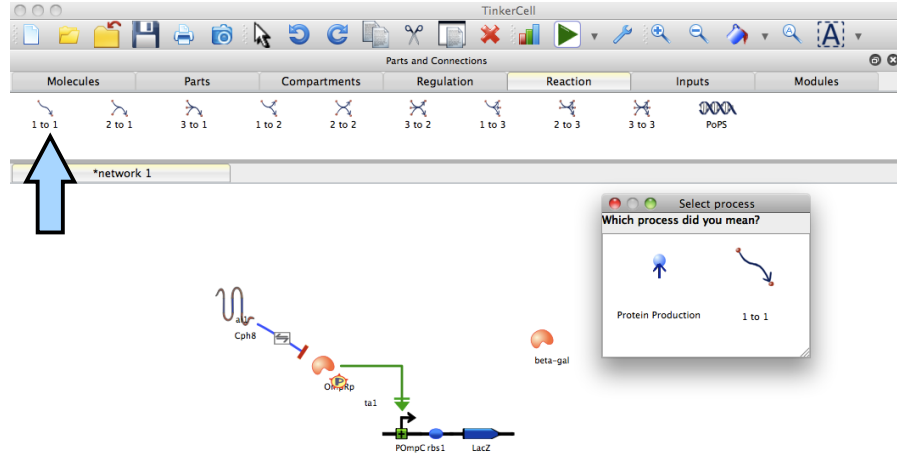
Add the BetaGal protein

From the "Molecules" tab, place an "Enzyme" on the canvas. Name it "BetaGal".



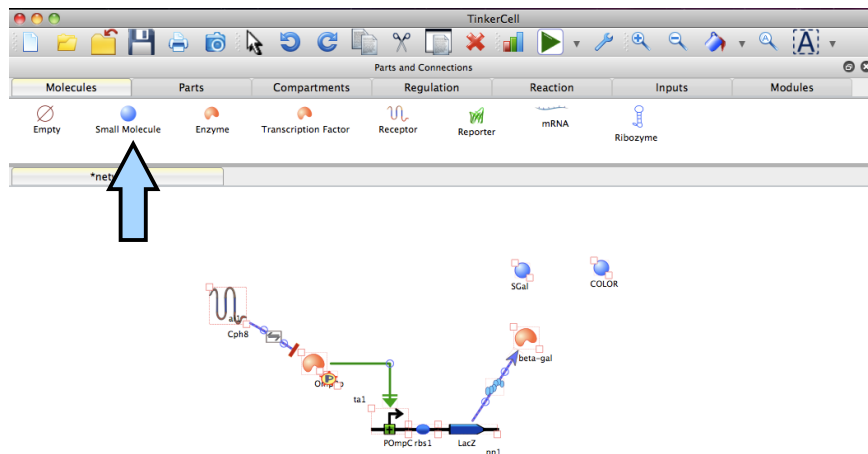
Produce BetaGal protein

From the "Reactions" tab, choose "1 to 1" then click on the lacZ orf and the beta-gal protein, and choose "Protein Production" from the popup menu.



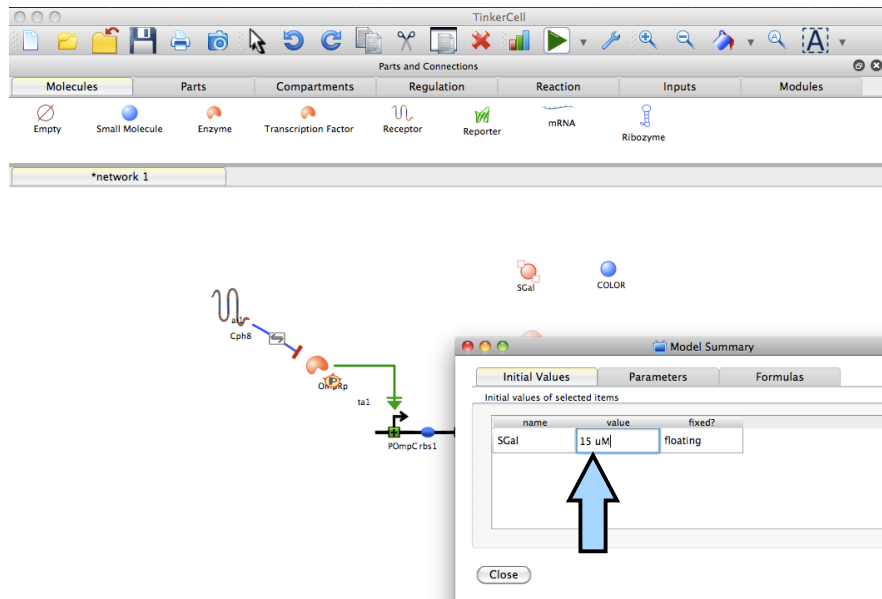
Add the colorful molecule

From the "Molecules" tab, place two "small molecules" on the canvas. Name the first "SGal" and the second "COLOR".



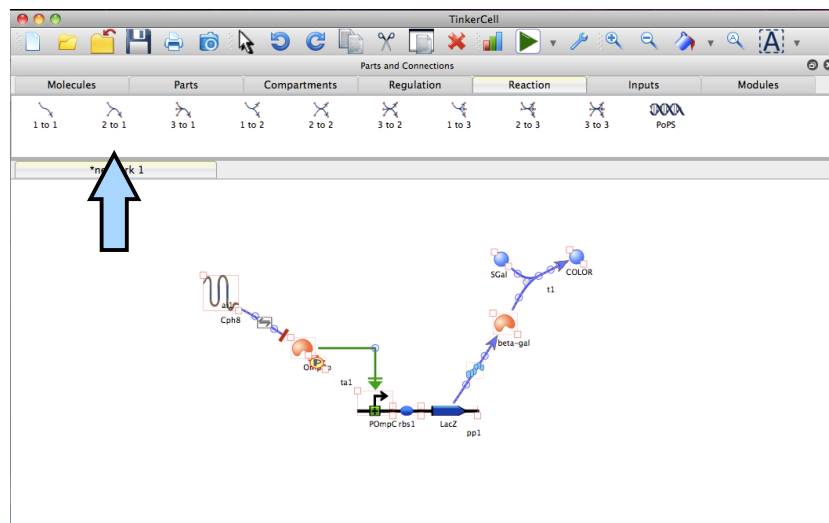
Supply SGal

Double-click on SGal, select the "Initial Values" tab, and change its initial concentration from 1 μM to 15.



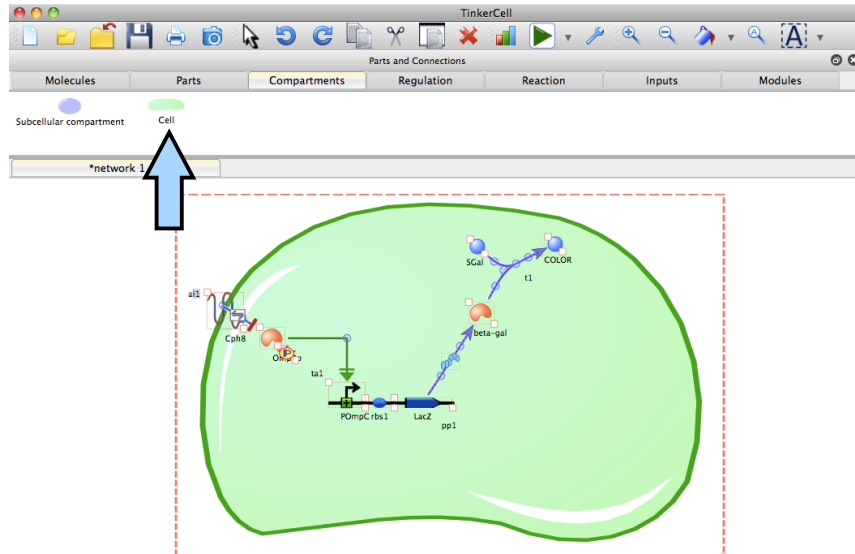
Add the color reaction

From the "Reaction" tab, choose "2 to 1", then click on BetaGal, SGal, and COLOR.



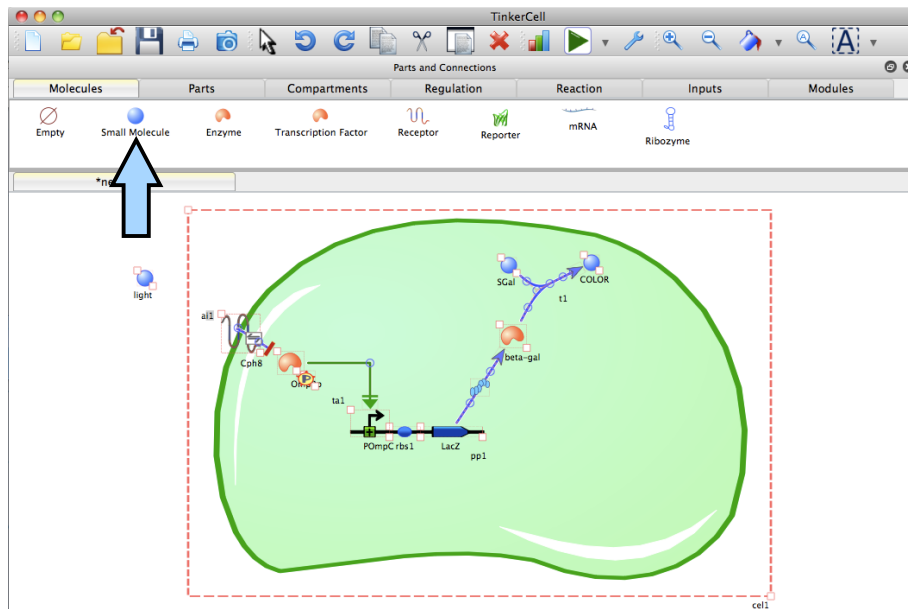
Add a chassis

From the “Compartments” tab, choose “Cell”. Place and resize it on the canvas to include all components (but leave Cph8 in the membrane).



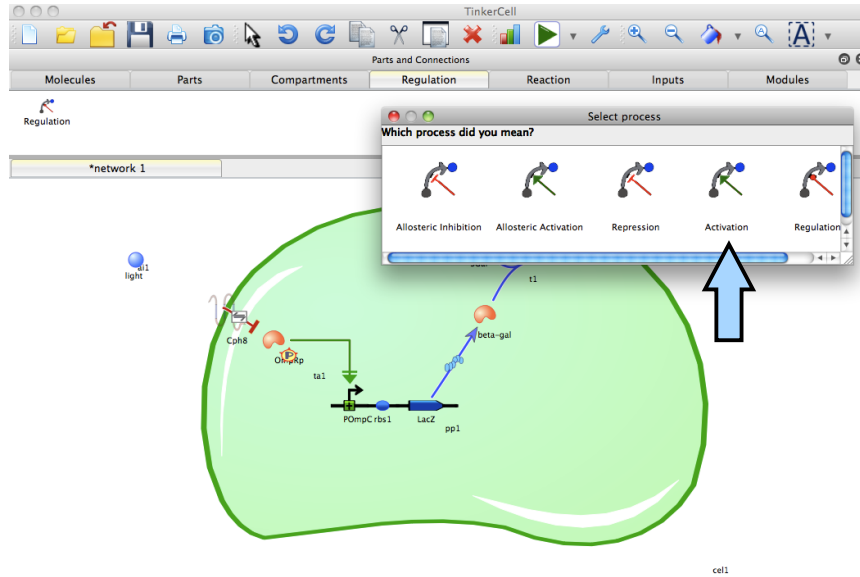
Add light

From the “Molecules” tab, place a small molecule outside the cell and rename it “Light”.



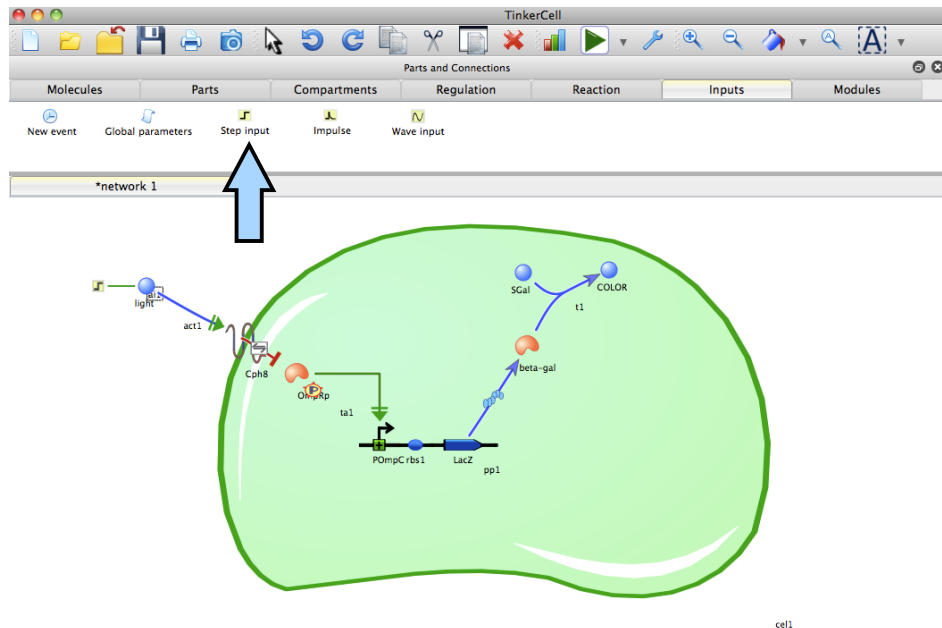
Regulate Cph8 with light

From the "Regulation" tab, choose "Regulation" and click on Light and Cph8 and choose "Activation" from the popup menu.



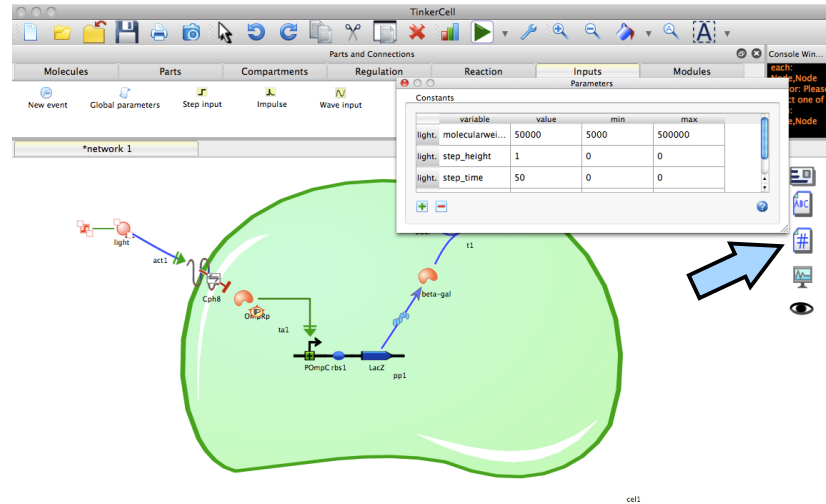
Turn on the light

From the "Inputs" tab, choose "Step input" and click on the Light molecule.



Change the timing

Double click on the “step” that’s on the canvas then click the numerical icon. Change “Step_time” to 50.



Start Simulating!

Your circuit should be complete. Now you can start modeling the outputs. Use the “play” arrow to run simulations with different inputs for each element.

