

Activity: Design Your Own BioBrick

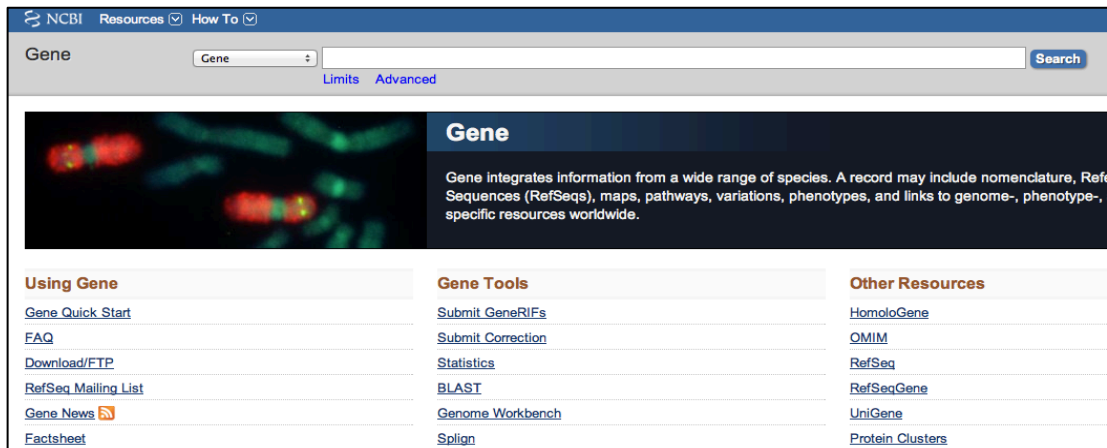
Introduction:

Gene constructs include multiple subcomponents in addition to the gene itself. A promoter is located upstream of the gene in order to initiate gene transcription. This is followed by the ribosome binding site (RBS), a short sequence on mRNA upstream of the start codon to which the ribosome binds to initiate protein translation. The gene follows, and the construct ends with a terminator. Promoter, RBS, and terminator sequences exist as BioBricks within the Parts Registry, a repository of DNA samples for thousands of parts submitted by various iGEM teams.

Objective: To develop a gene construct, identifying a gene sequence through NCBI Blast and a promoter, a RBS, and a terminator through the Parts Registry. Students should become familiar with and feel comfortable using these powerful databases.

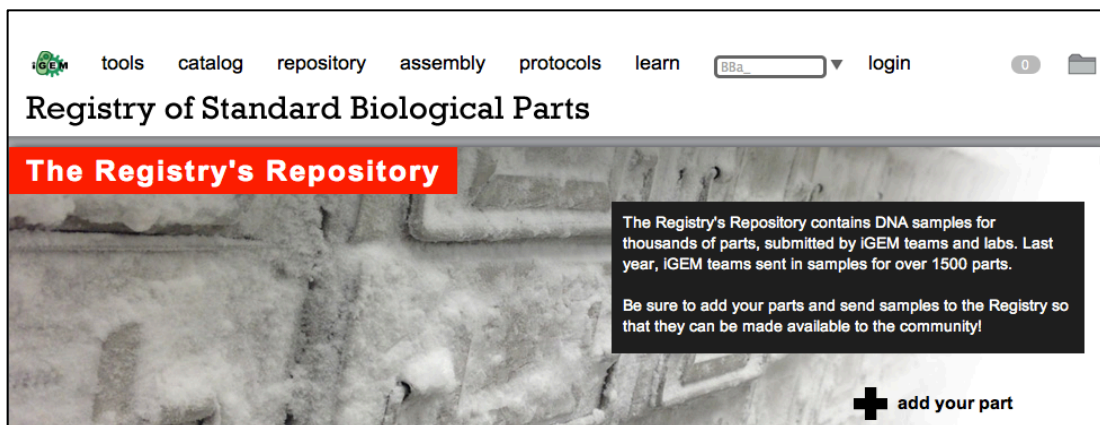
Procedure:

1. Choose a gene to introduce into your BioBrick. Look up the specific gene sequence on NCBI Blast: <http://www.ncbi.nlm.nih.gov/gene>.



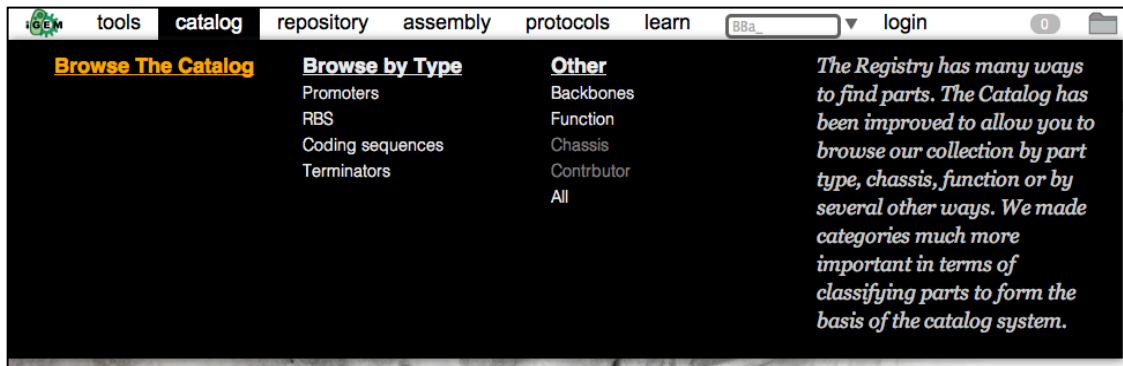
The screenshot shows the NCBI Gene database homepage. At the top, there is a search bar with the text "Gene" and a "Search" button. Below the search bar, there are links for "Limits" and "Advanced". The main content area features a large image of a DNA double helix with red and green segments. To the right of the image, the word "Gene" is displayed in a large font, followed by a brief description: "Gene integrates information from a wide range of species. A record may include nomenclature, RefSeq Sequences (RefSeqs), maps, pathways, variations, phenotypes, and links to genome-, phenotype-, specific resources worldwide." Below this, there are three columns of links: "Using Gene" (Gene Quick Start, FAQ, Download/FTP, RefSeq Mailing List, Gene News, Factsheet), "Gene Tools" (Submit GeneRIFs, Submit Correction, Statistics, BLAST, Genome Workbench, Splign), and "Other Resources" (HomoloGene, OMIM, RefSeq, RefSeqGene, UniGene, Protein Clusters).

2. Go to the Registry of Standard Biological Parts website: http://parts.igem.org/Main_Page.

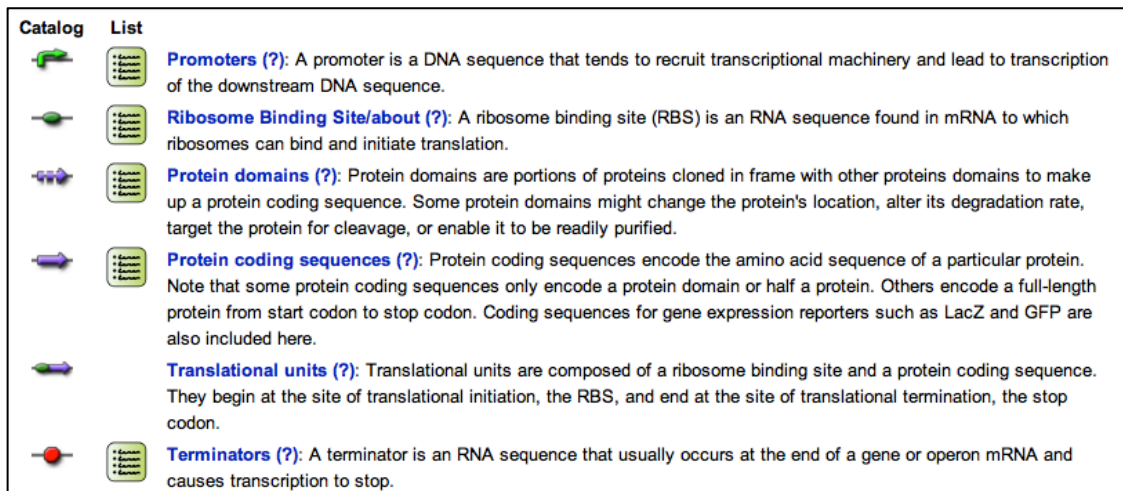


The screenshot shows the Registry of Standard Biological Parts website. At the top, there is a navigation bar with links for "tools", "catalog", "repository", "assembly", "protocols", "learn", and "login". Below the navigation bar, the text "Registry of Standard Biological Parts" is displayed in a large font. A prominent red banner reads "The Registry's Repository". Below the banner, there is a large image of a DNA double helix. To the right of the image, there is a text box that reads: "The Registry's Repository contains DNA samples for thousands of parts, submitted by iGEM teams and labs. Last year, iGEM teams sent in samples for over 1500 parts. Be sure to add your parts and send samples to the Registry so that they can be made available to the community!". At the bottom right of the page, there is a plus sign icon followed by the text "add your part".

3. Hover over the catalog tab in the top left-hand corner. Click on the orange link entitled Browse the Catalog.



4. Explore the promoter, ribosome binding site, and terminator catalogs. Choose one of each for your BioBrick.



5. Draw out your three chosen BioBrick parts from step four. Develop a plan to combine the three together and to insert your gene DNA into the construct.