Learning Activity

Tree : Using Computational Biology

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Abstract:

Students will use nucleotide to blast 2 genes found in plants. While we are studying the photosynthetic properties of Euglena and the Kingdom of Protists. Students will review the base pairing rules. Students will see the conversions and capabilities of the software to convert base pairs to nucleotides and then to proteins. Discussed will be the rbcl gene and natK

Gene for an enzyme Rbcl that guides photosynthesis

https://www.ncbi.nlm.nih.gov/gene/?term=rbcl lists of all the organism

function of rbcl

The rbc*L gene is a valuable tool for assessing phylogenetic relationships. This gene is found in the chloroplasts of most photosynthetic organisms. It is an abundant protein in leaf tissue and very well may be the most abundant protein on earth (Freeman 2008). Thus this gene exists as a common factor between photosynthetic organisms and can be contrasted with the* rbc*L genes of other plants in order to determine genetic similarities and differences. It codes for the large subunit of the protein ribulose-1, 5-biphosphate carboxylase/oxygenase (rubisco) (Geilly, Taberlet, 1994).*

Another Plant gene NatK **Gene query NC_000964.3**

Gene symbol	natK
Gene description	sensor histidine kinase
Locus tag	BSU02730
Gene type	protein coding
RefSeq status	PROVISIONAL
Organism	Bacillus subtilis subsp. subtilis str. 168 (strain: 168, sub-species: subtilis)
Lineage	Bacteria; Firmicutes; Bacilli; Bacillales; Bacillaceae; Bacillus

Function of nat K enzymes that play a role in signal transduction across the cellular membrane

signal transduction = the process by which a chemical or physical signal is transmitted through a cell as a series of molecular events so the cell can respond

Learning objectives:

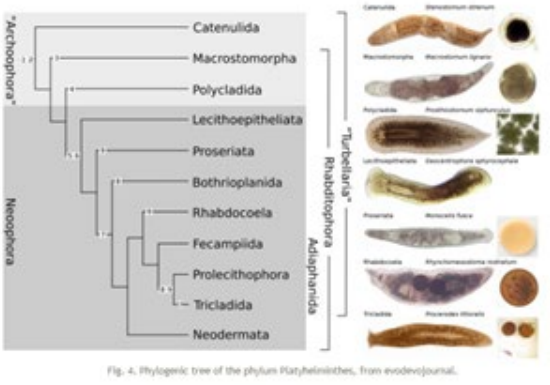
1. Blast gene query rbcl to find NC_001603.2 *([*E uglena gracilis*]*
2. Blast gene query natK **NC_000964.3**
    - **Procedure:**

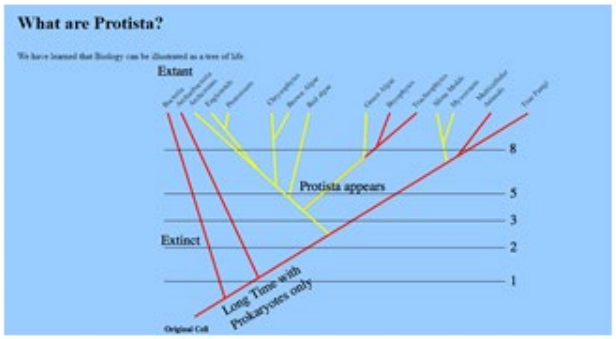
- https://www.ncbi.nlm.nih.gov/
- select blast
- select nucleuotide
- put in NC??? Code
- Mega
- File
- Align

3. Gather abiotic factor data from http://worldclim.org/current

4. Explore www.idigbio.org

Learning Activity





Timeframe:

Review Base pairing rules Activity Cat who did it. 1 day

Learn genetics Utah 1 day (clone a mouse)

Input 2 genes into ncbi 1 day

List of materials:

Computers, scissors , Cat lab internet… various trees to compare

Procedure and general instructions (for instructor). REQUIRED.

Review Base pairing rules and translation

Procedure and general instructions (for students).

Time with Utah genetics clone a mouse and other activites http://learn.genetics.utah.edu/

Assessment Questions

- Each individual has two "factors" that determine what external appearance the offspring will have. (We now call these factors genes or alleles)

Mendel established three principles (or Laws) from his research

1. **The Principle of Dominance and Recessiveness** - one trait is masked or covered up by another trait
2. **Principle of Segregation** - the two factors (alleles) for a trait separate during gamete formation
3. **Principle of Independent Assortment** - factors of a trait separate independently of one another during gamete formation; another way to look at this is, whether a flower is purple has nothing to do with the length of the plants stems - each trait is independently inherited