**Diatom acclimation to elevated CO2 via cAMP signalling and coordinated gene expression**

LETTERS

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**Collaborate with your jig-saw group to complete the following:**

1. Why is it “energetically expensive” for CCMs to fix carbon at modern levels (400+ppm)?

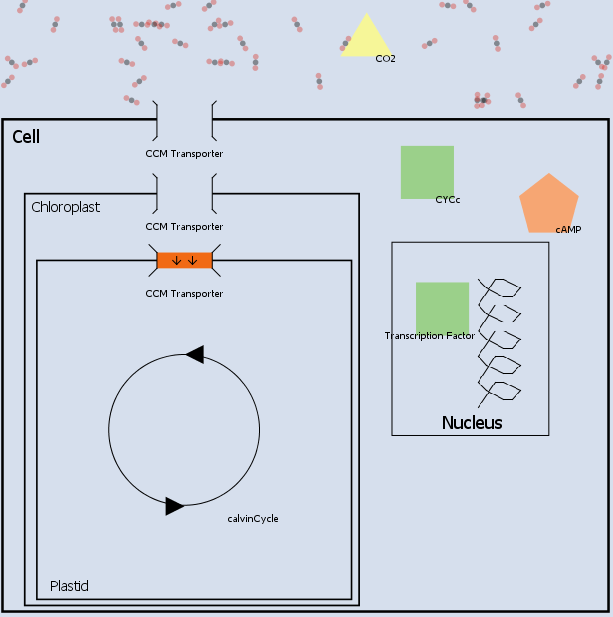
2. How does the cell regulate how much CO2 is in the plastid (stroma/Calvin cycle) at any given

time?

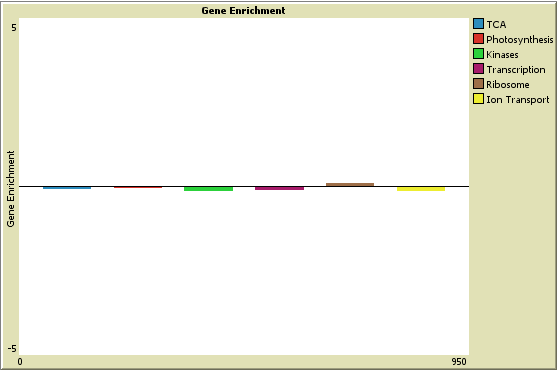
3. Put these major components in order: cAMP, CCM, transcription factors, CO2

4. Draw arrows where you think the pathway of carbon goes from outside the cell to the Calvin

cycle.



5. The following graph shows gene expression at zero ppm CO2. Use arrows to show which genes are upregulated and which are downregulated for the



6. People might predict that photosynthesizing organisms (such as diatoms) will produce sugar

(G3P) and oxygen at an accelerated rate. Why is this unlikely to be true?

7. Make a prediction: how will diatoms such as *Thalassiosira pseudonana* respond to high

levels of CO2 (climate change)?