

N₂-fixing bacteria in microbial mat and stromatolite consortia

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Cuatro Ciénegas:
“An aquarium in the desert”

Low nutrient (P and reduced N), oligotrophic waters:
analogue to Cambrian environments?





Stromatolites
(fossil)
~2.7 byo

Origin of life
~3.6-3.7 byo

CCC
Relict ocean
Trapped inland
~150 mya

Stromatolites



Calothrix

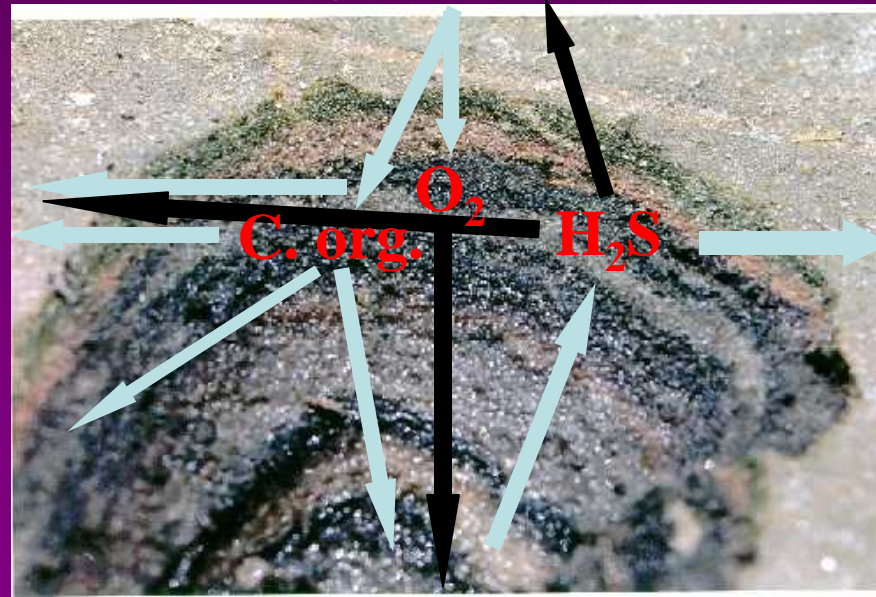


Mats



Cyanobacteria ← Fix N₂

Heterotrophs
Methanogens



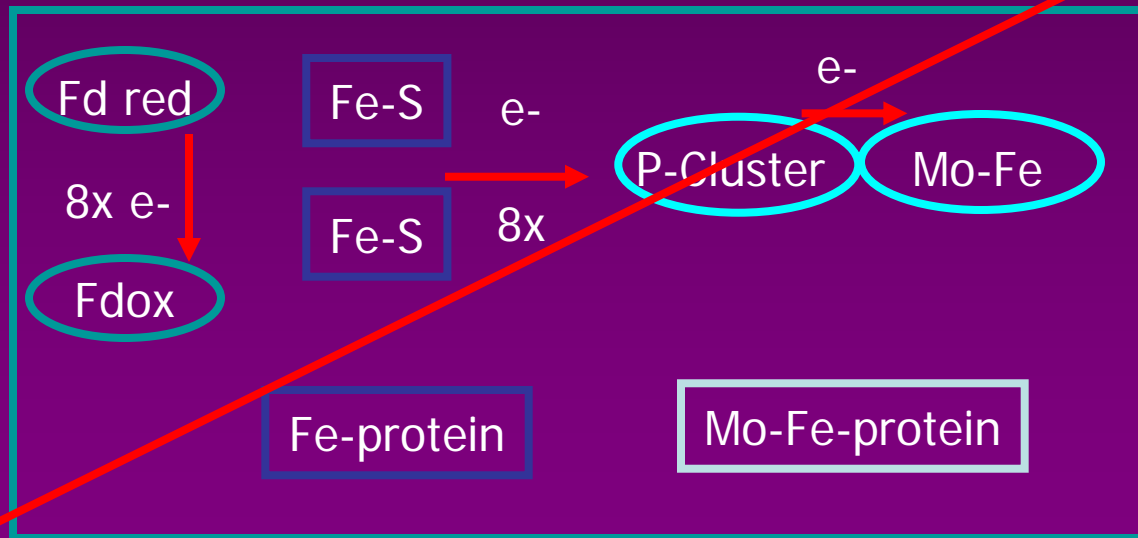
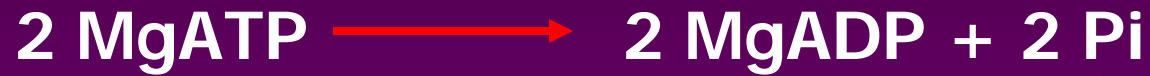
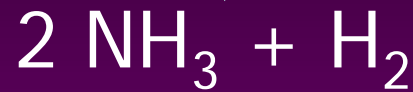
Purple and
Green
Sulfur
Bacteria

Sulfate-reducers



N₂ Fixation

Bacteria and Archaea

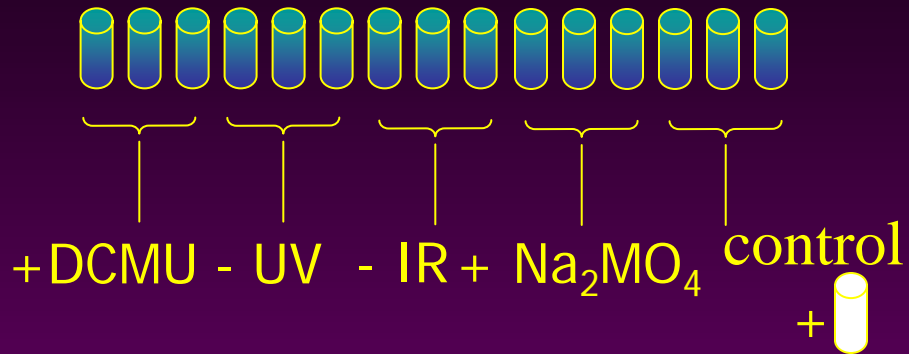


Nitrogenase





N₂ fixation experiments:



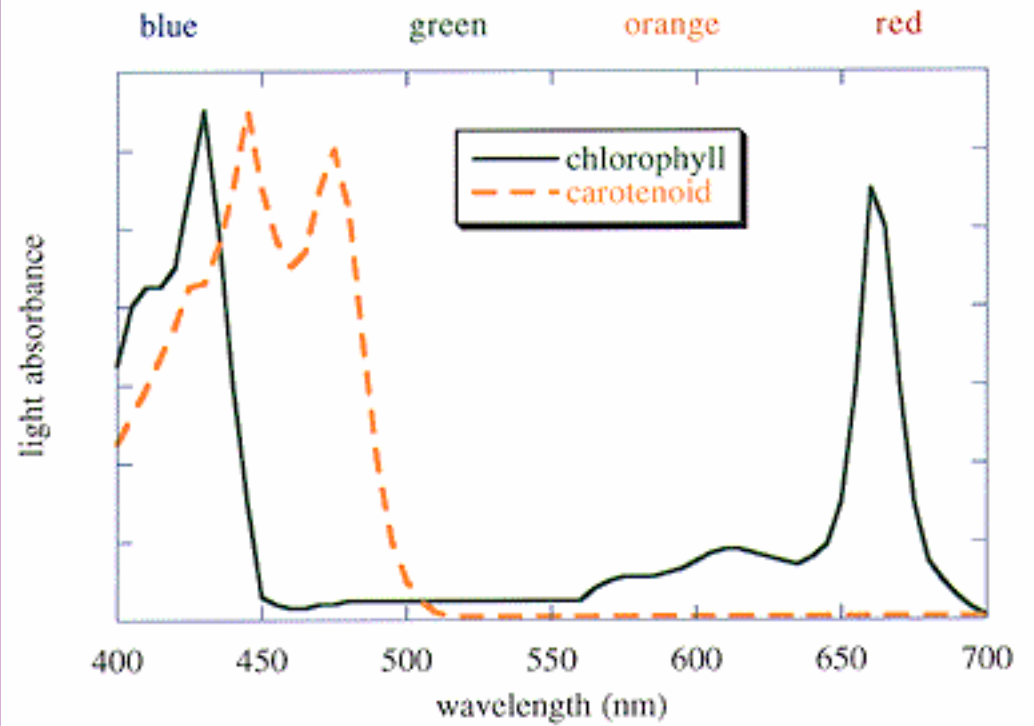
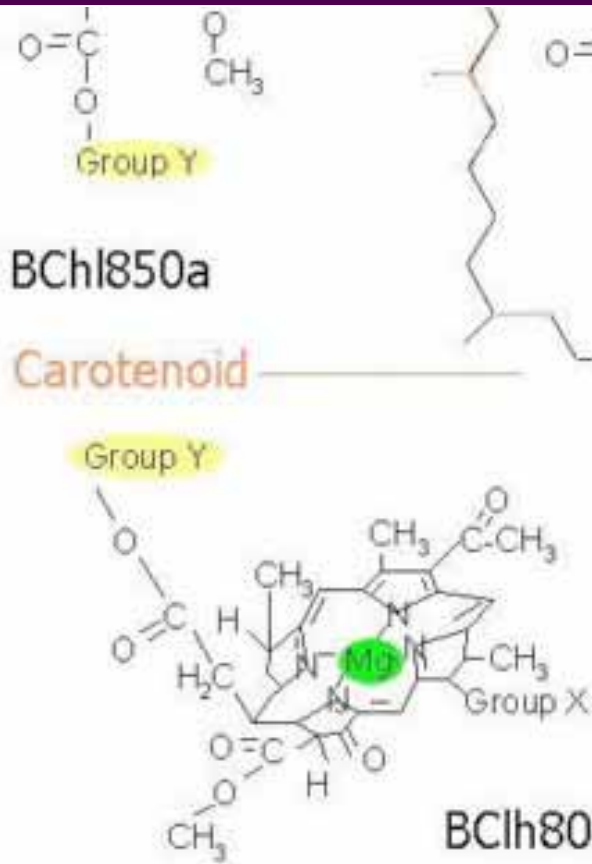
+C₂H₂

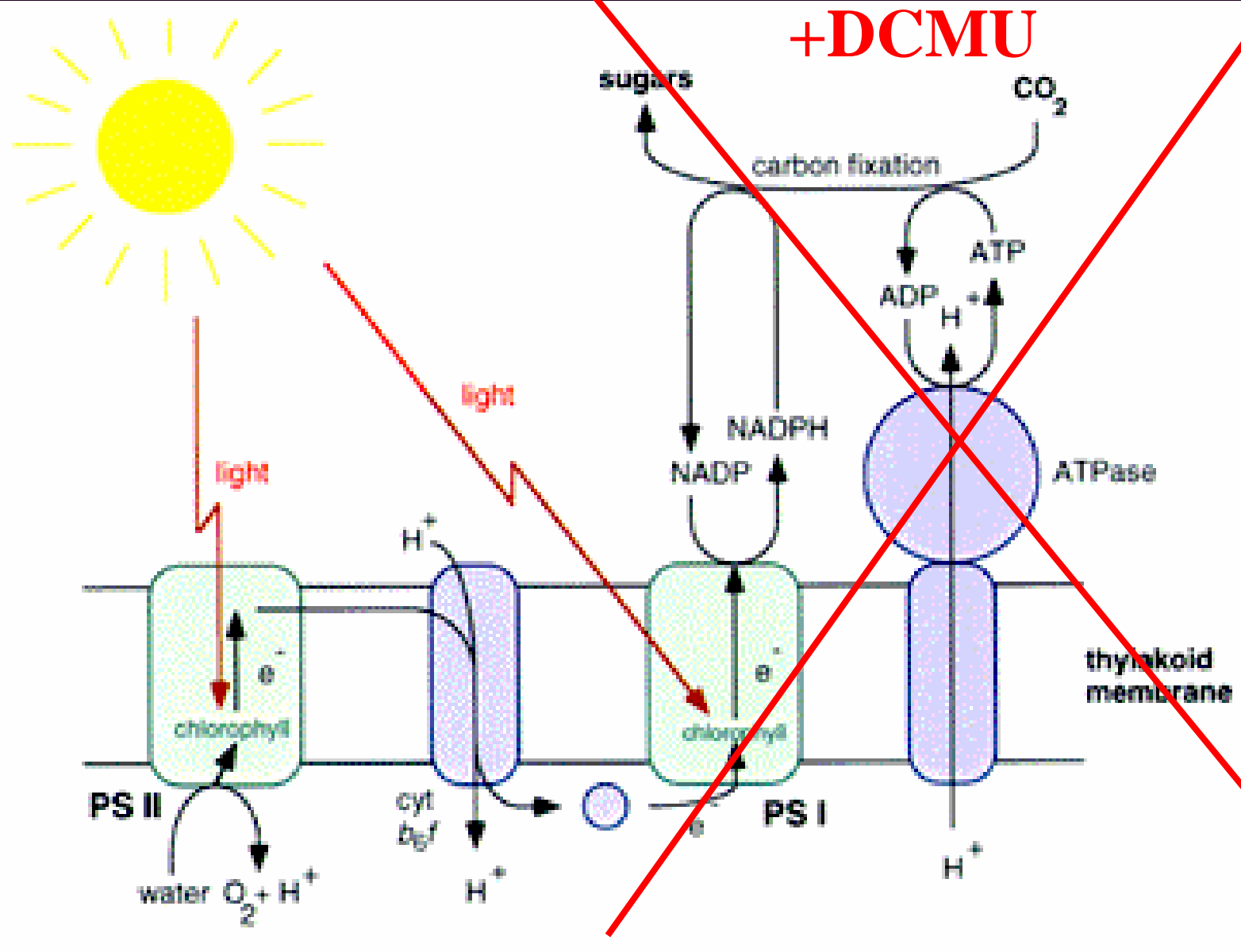
Sampled to
read C₂H₄ in GC
(Vacutainers)
every 6 h for
24h

infrared

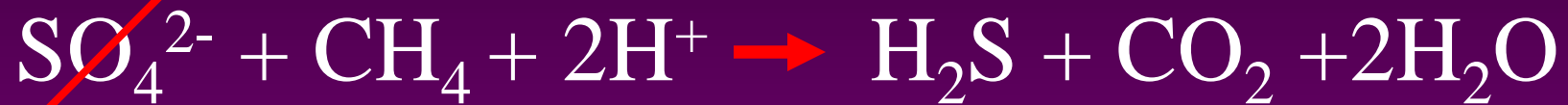
UV

ar de QuickTime™ y de un descompreso

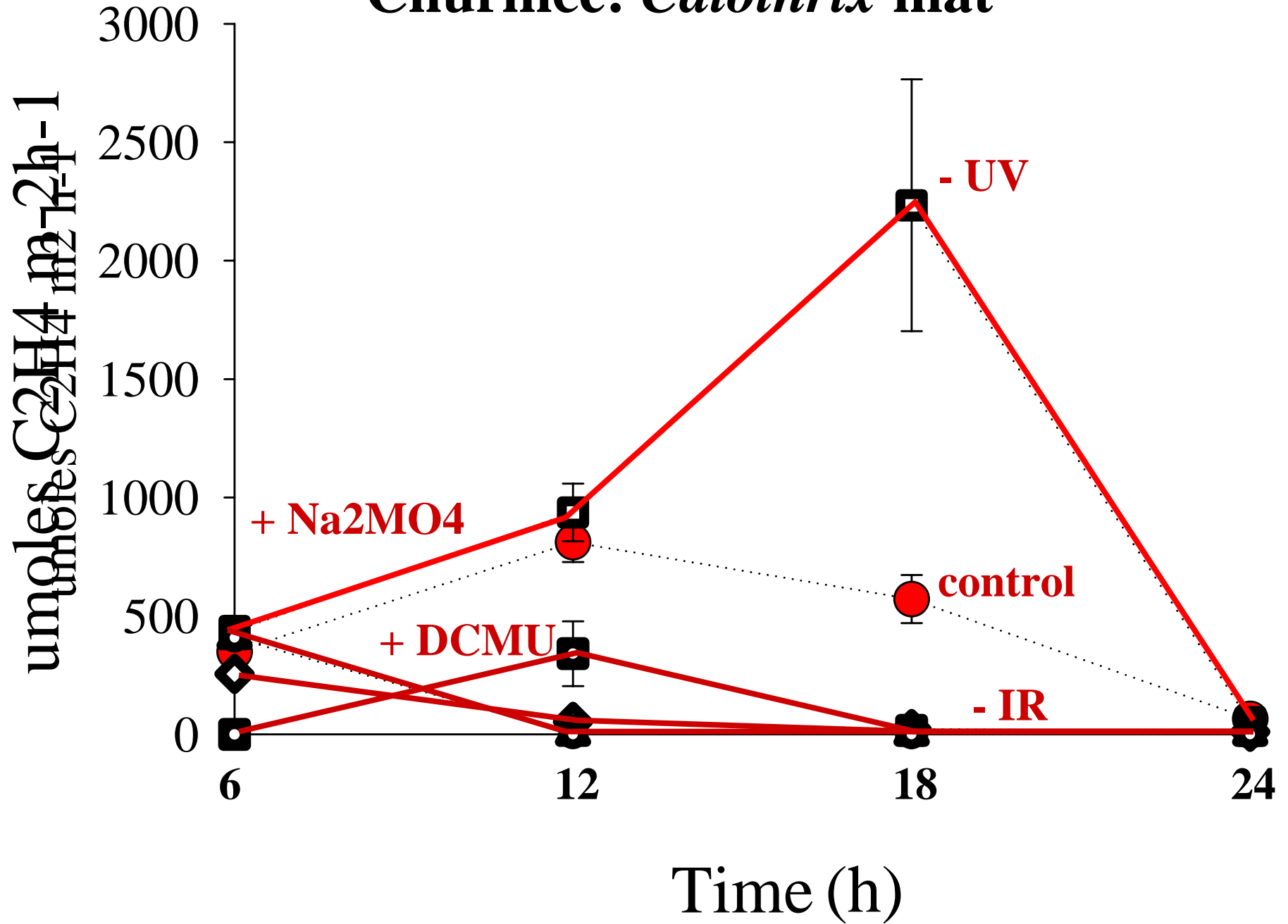




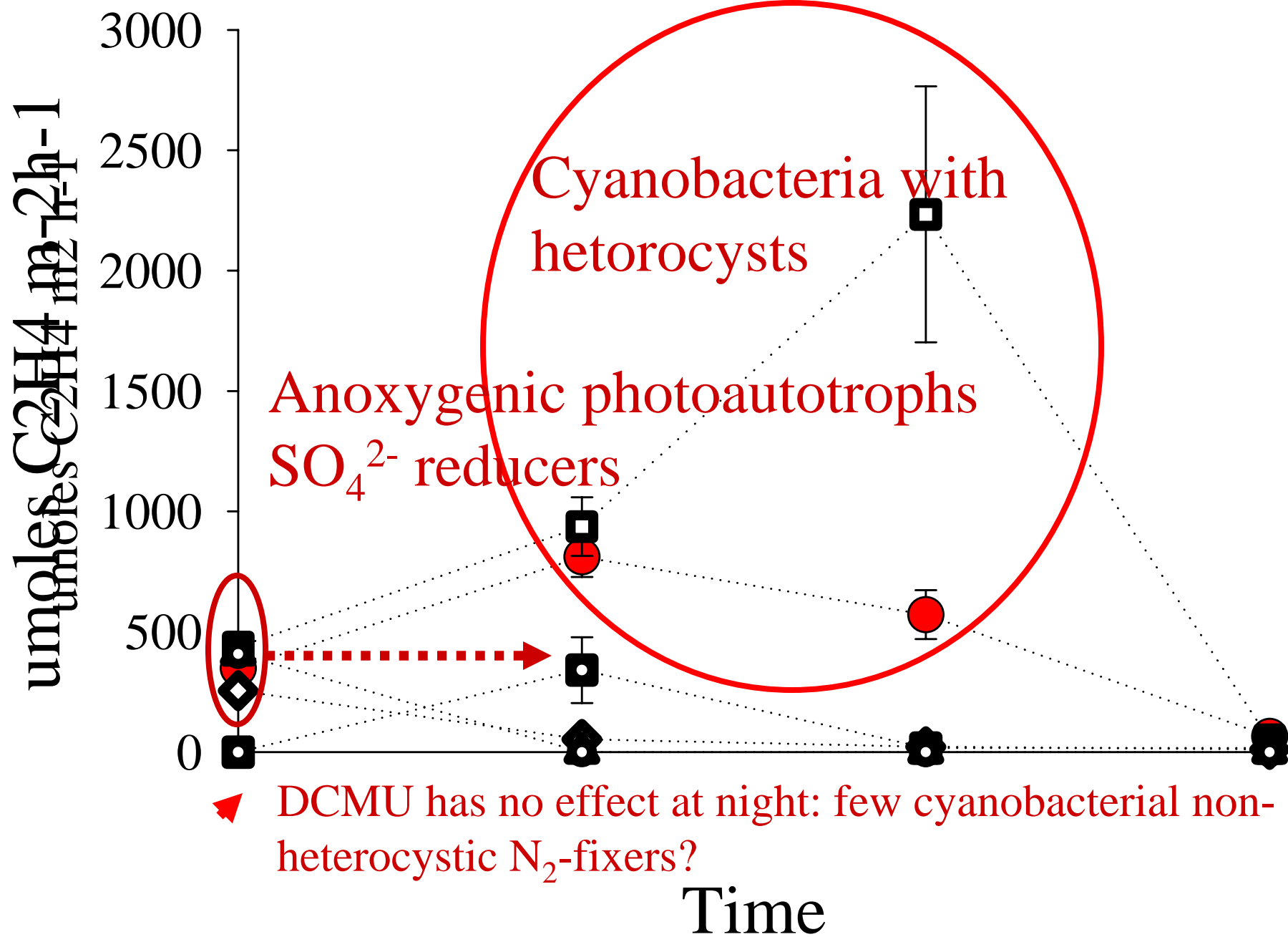
Sulfate reduction



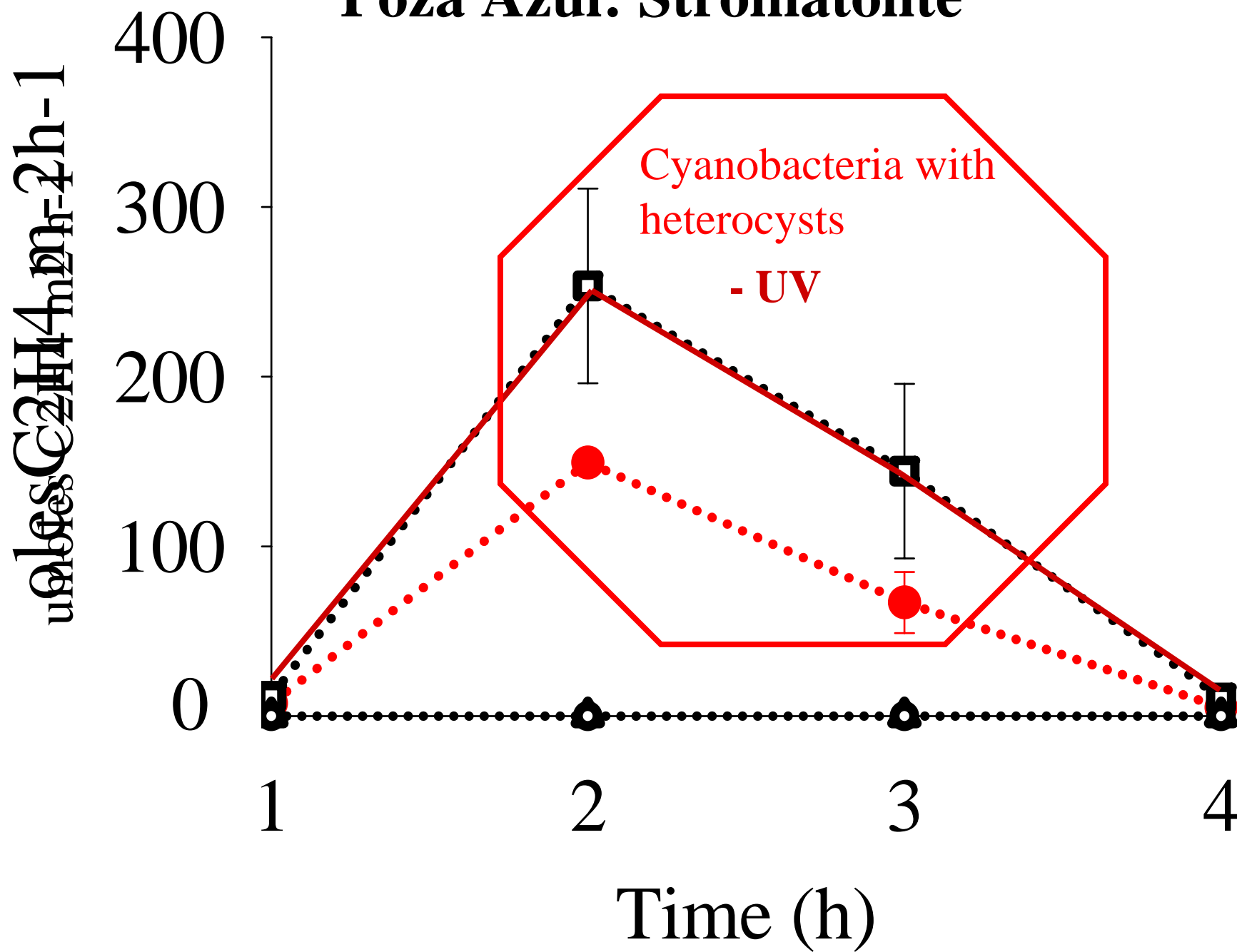
Churince: *Calothrix* mat



Churince: *Calothrix* mat



Poza Azul: Stromatolite





Other questions:

❖ How is the activity of different N_2 -fixers changing throughout the year?

❖ Diversity of *nif* genes.

Are mats and stromatolites conducting to HGT?

❖ Why is *Calothrix* everywhere in CCC mats and stromatolites?

