School of Freshwater Sciences

UNIVERSITY of WISCONSIN UWMILWAUKEE

Great Lakes WATER Institute

Wisconsin Aquatic Technology and Environmental Research

Segundo Simposio Internacional de Estromatolitos

Bacalar, QR Mexico

13 – 14 de Enero, 2012

Nanakuli beach laminated communities at the edge of an urban center.

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Carmen Aguilar

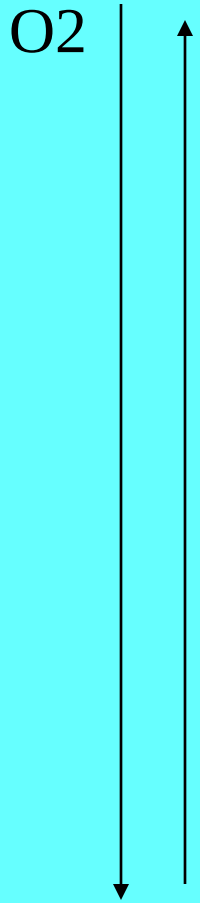
- Egresada de la UNAM-Facultad de Biologia
- Interes -bacterias en la historia temprana de la Tierra y el océano
- Bacterias que utilizan minerales para su nutrición
- Y a la vez, bacterias que producen minerales

Quiero dedicar esta platica a la Dra. Lynn Margulis
Fue la persona que me inspiro a apreciar los “Tapetes microbianos laminados” de Guerrero Negro en Baja California.

Y al Dr. Claire Folsome del laboratorio de Exobiología donde realizé los estudios de los tapetes de Nanakuli, Hawai'i

"NANAKULI" BEACH PARK

"To Look At The Knee"



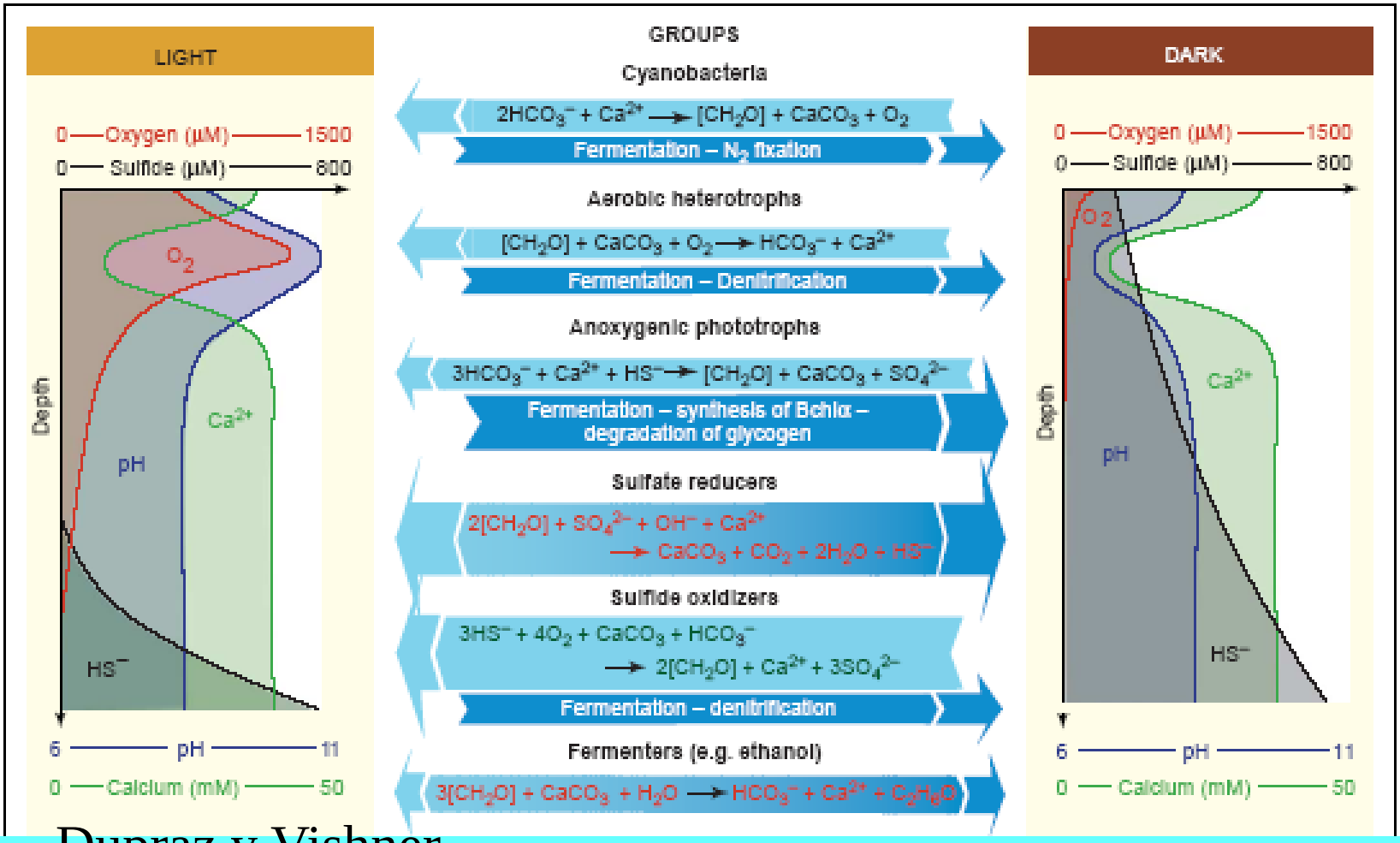
Sunlight, UV light

Long wavelength PS bacteria

Sulfate reducers

Heterotrophic bacteria

Layered biogeochemistry



Dupraz y Vishner

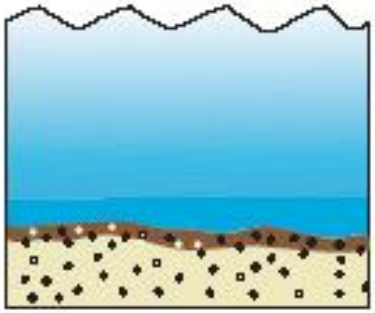
Sediment

Biomass

Non-lithifying mat

OPEN MARINE – Intertidal

Texel, NL



Environment

Marine (32 ‰)

Intertidal – high energy

pH = 8 (slighty alkaline)

Dominant bacteria

Microcoleus

Precipitation

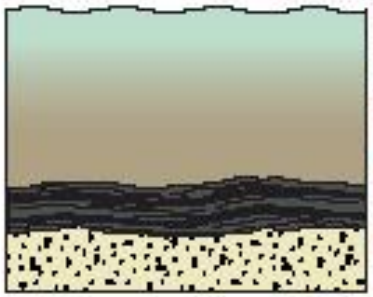
None

Fossilization potential

Low

HYPERSALINE LAKES

Eleuthera – Guerrero Negro



Environment

Hypersaline (94-120 ‰) – low energy

pH = ca. 8.5 (alkaline)

Dominant bacteria

Microcoleus

Precipitation

None

Fossilization potential

Low

Eleuthera - soft mat

Guerrero Negro

Saturation ir

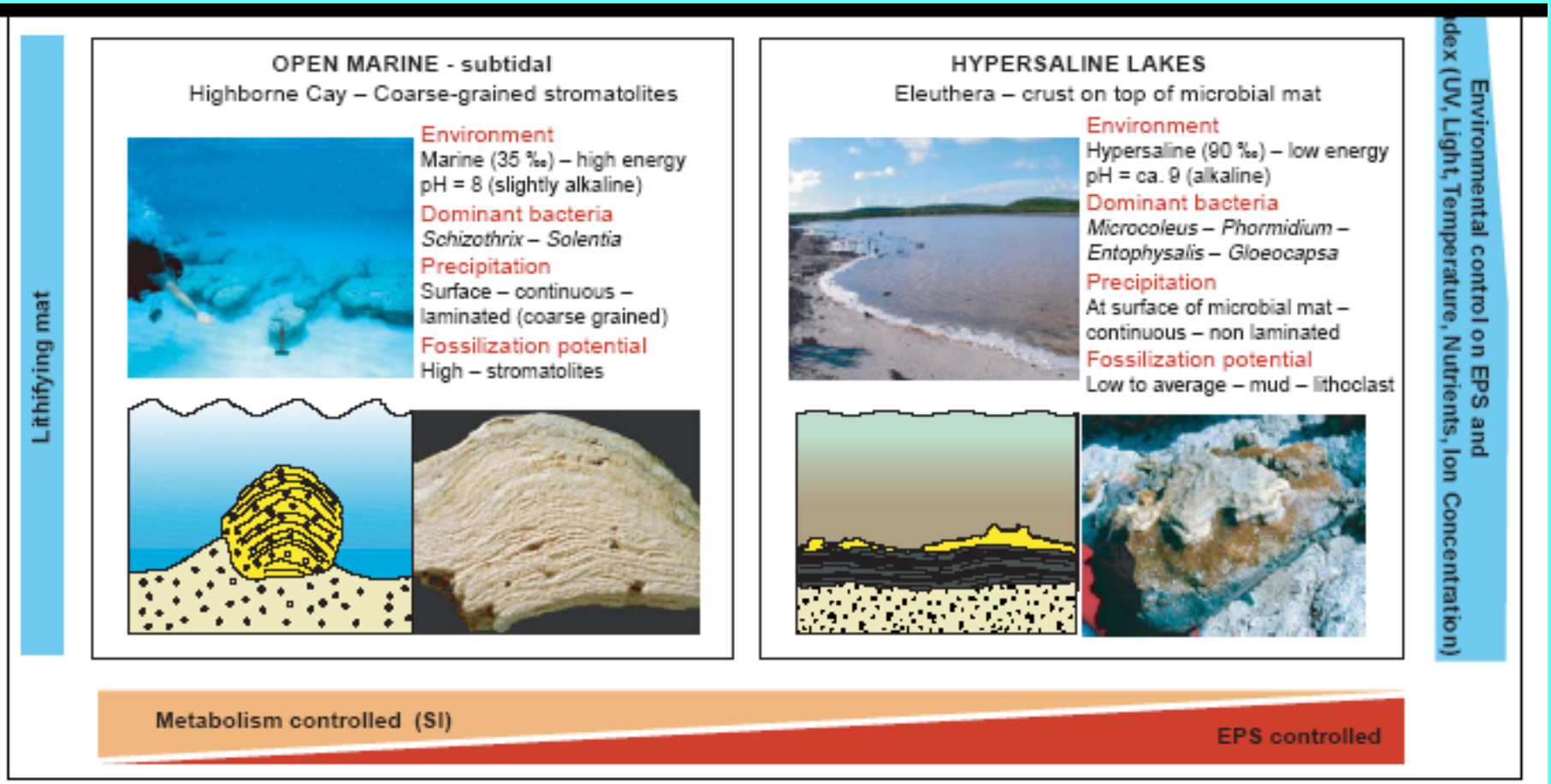


Figure 3. Model of controls on lithification. Four microbial mat types: the bottom two lithify, the top two do not lithify. Mats on the left harbor lower biomass and trap and bind sediments, the ones on the right have higher biomass systems that trap and bind relatively little sediment, and produce more exopolymeric substances (EPS; brown). The degree of environmental controls (blue arrow to the right of mat boxes) decreases from bottom to top, resulting in net precipitation in the bottom two mats, and little or no precipitation in the top two mats.

"NANAKULI" BEACH PARK

"To Look At The Knee"

Nanakuli laminated communities

- Intertidal
- High Energy
- Not lithified
- N2 fixing cyanobacteria
- Purple Photosynthetic
- heterotrophs

- Intermarea
- Energia alta
- Poca litificacion
- Con fijacion de nitrogeno
- Bacterias purpuras
- heterotrofos

Nanakuli

- Very thin over rocks
- Great model to model growth in closed systems
- Cyanobacteria- Microcoleus, Oscillatoria, Rivularia
- Red layer Chromatium

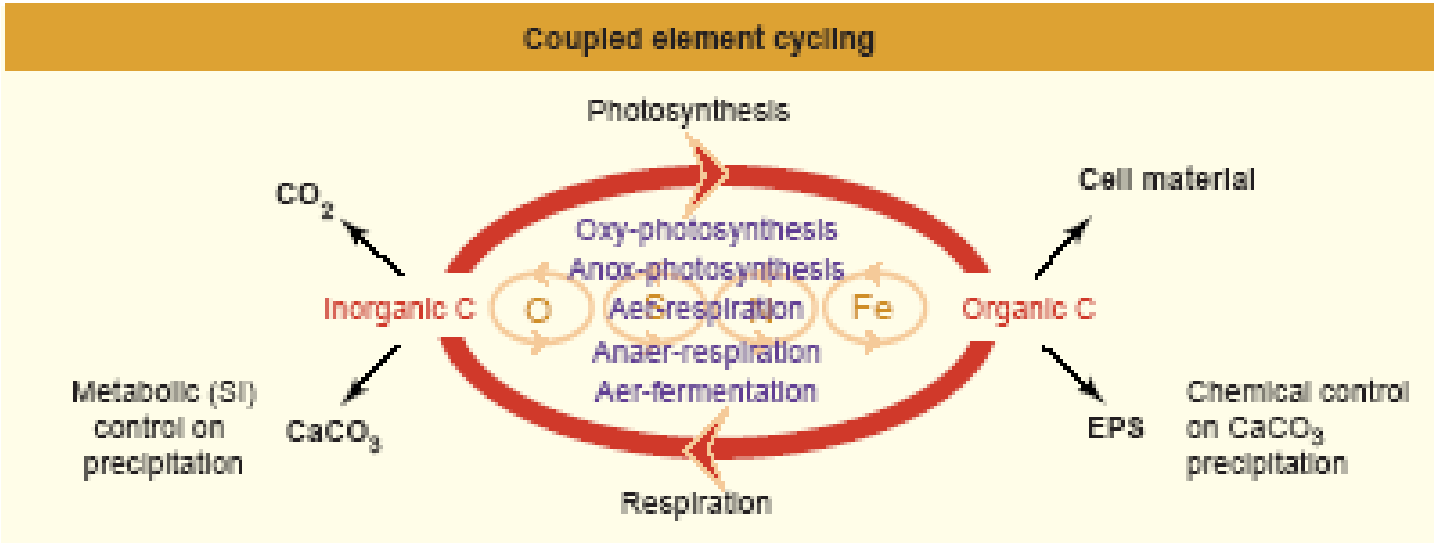
- Laminas delgadas sobre rocas
- Buen modelo en sistemas cerrados
- Cianobacterias presentes Microcoleus, Oscillatoria, Rivularia
- Capa roja Chromatium

Bacalar-type Stromatolites

Microbialites

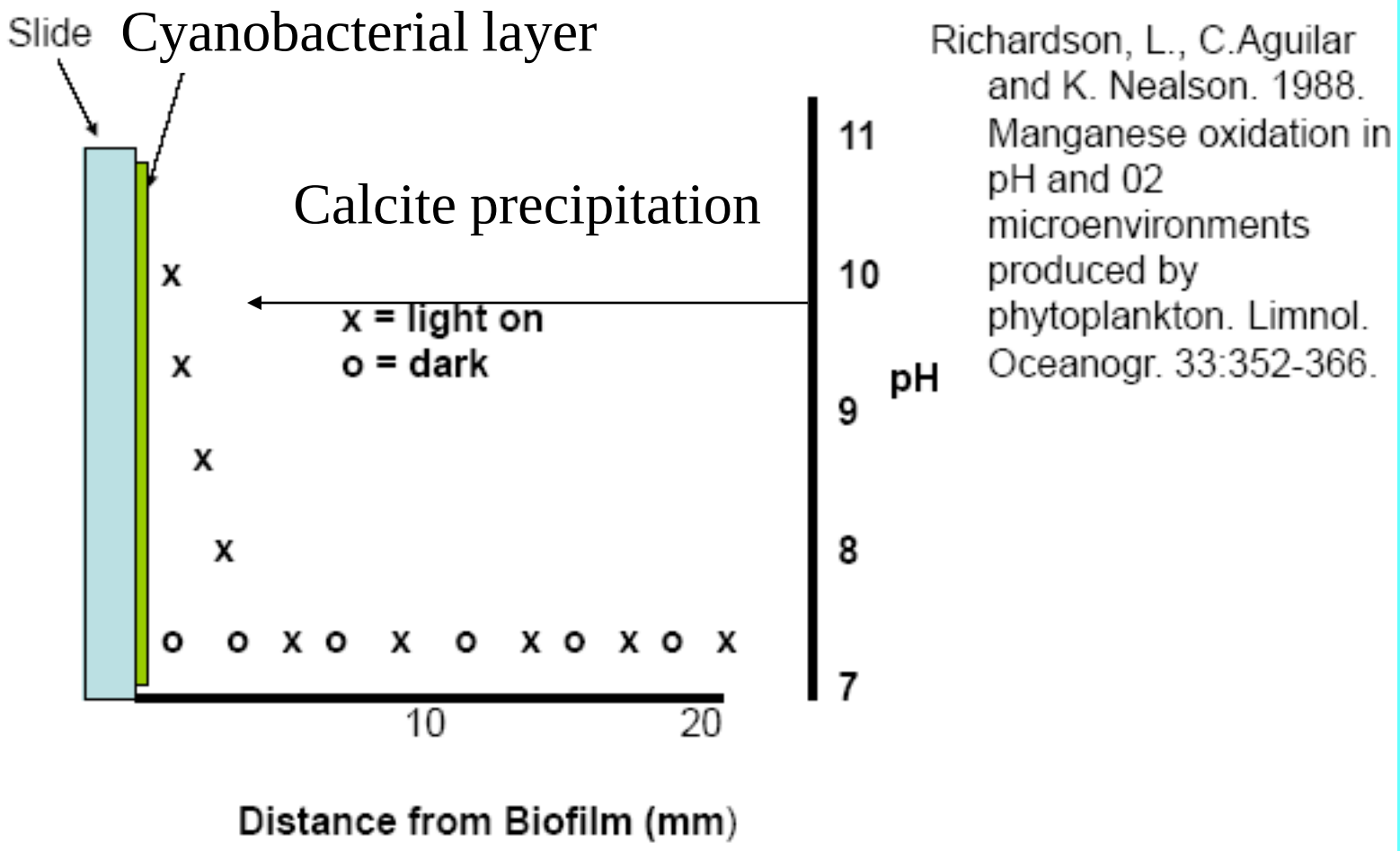
- Guerrero Negro
- Cuatro Cienegas
- Laguna Bacalar
- Yellowstone National Park WY
- Shark Bay
- Bahamas- carbonate system
- Hawai’i

Coupled cycles



Dupraz y Vishner

Light-induced pH changes



Richardson, L., C.Aguilar and K. Nealson. 1988. Manganese oxidation in pH and 02 microenvironments produced by phytoplankton. Limnol. Oceanogr. 33:352-366.

Some questions..

- Growth rate under low nutrient conditions
- Why are the microbialites only on the edge
- How much phosphate is associated with the carbonate sediments

- Crecimiento en concentracion baja de nutrientes
- ?Porque hay mas microbialitos rn la orilla?
- Cuanto fosforo se encuentra en el sedimento de carbonato de calcio

Research / Investigación

- Measurement of Mg and Ca in the water and microbialites
- What is the importance of magnesium
- What is the effect of UV light –use of actinometers

- Medir la concentracion de Mg y Ca tanto en el agua como en los microbialitos
- Cual es la importancia del magnesio
- Cual es el efecto de la radiacion UV-uso de actinometros

Thank you / Gracias