



EXCELENCIA
MARÍA
DE MAEZTU

Centro de Astrobiología
(INTA-CSIC)

Unidad de Excelencia María de Maeztu

4th Stable Isotopes Course in Ecology and Environmental Sciences

Estación Biológica de Doñana (Sevilla)

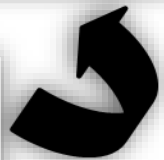
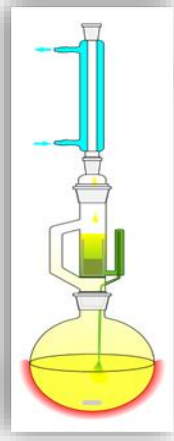
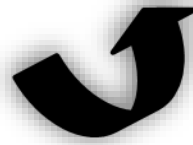
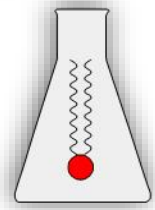
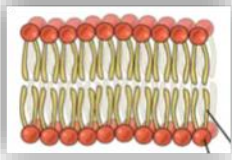
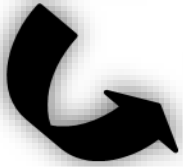
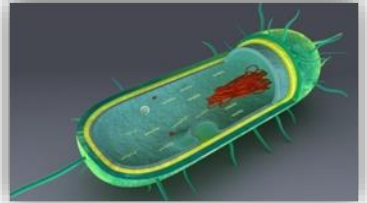
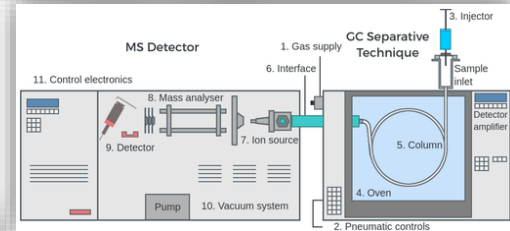
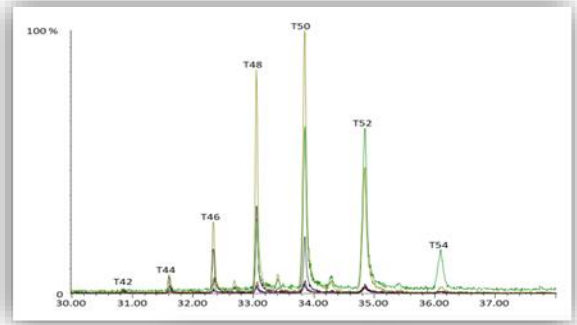
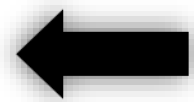
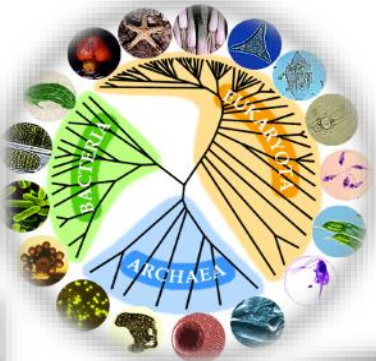
22-25 February 2022

Laura Sánchez García
Ramón y Cajal researcher
Dept. Molecular Evolution

Forensic Geochemistry in extreme environments with astrobiological interest

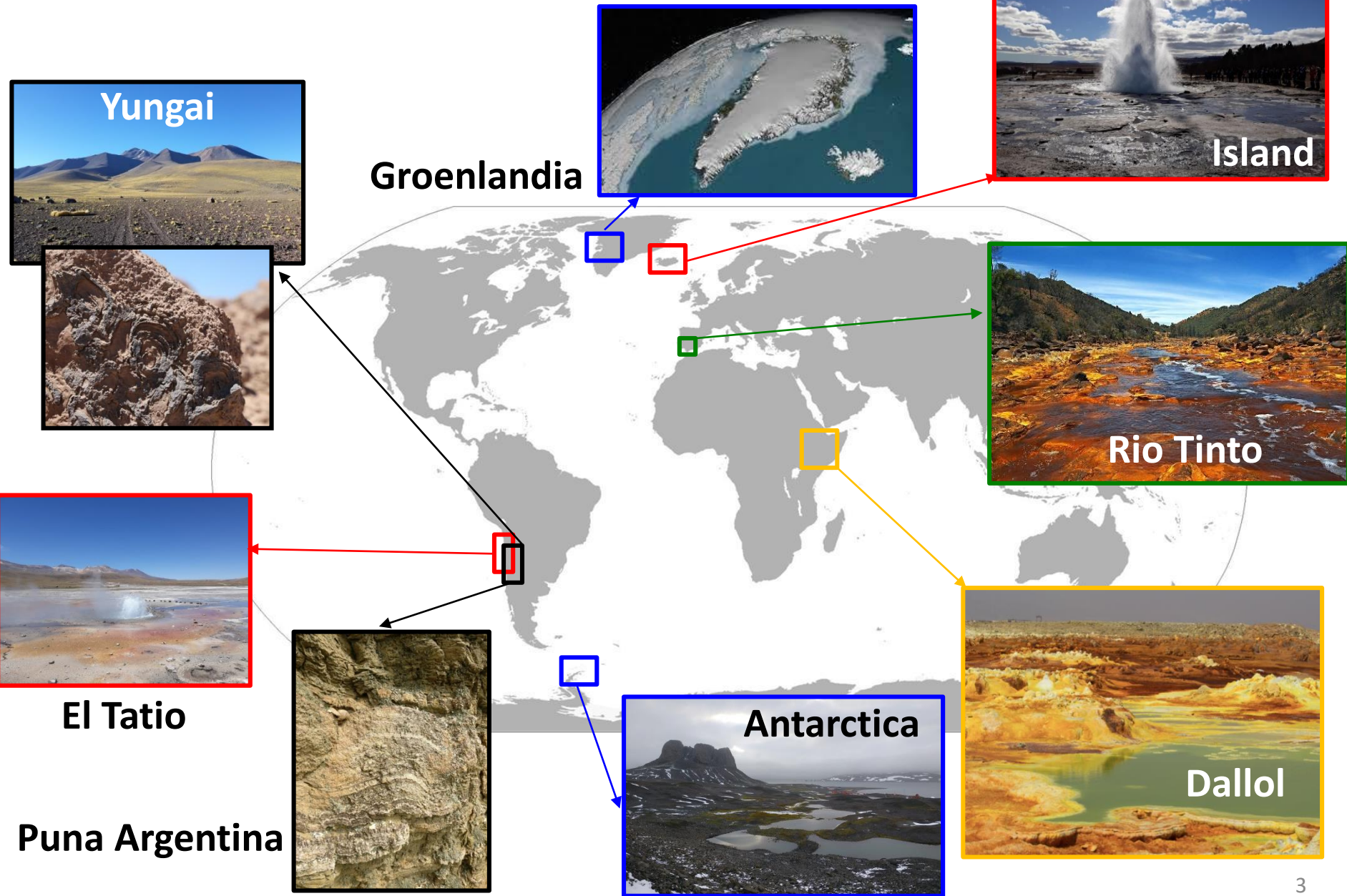


Search for life

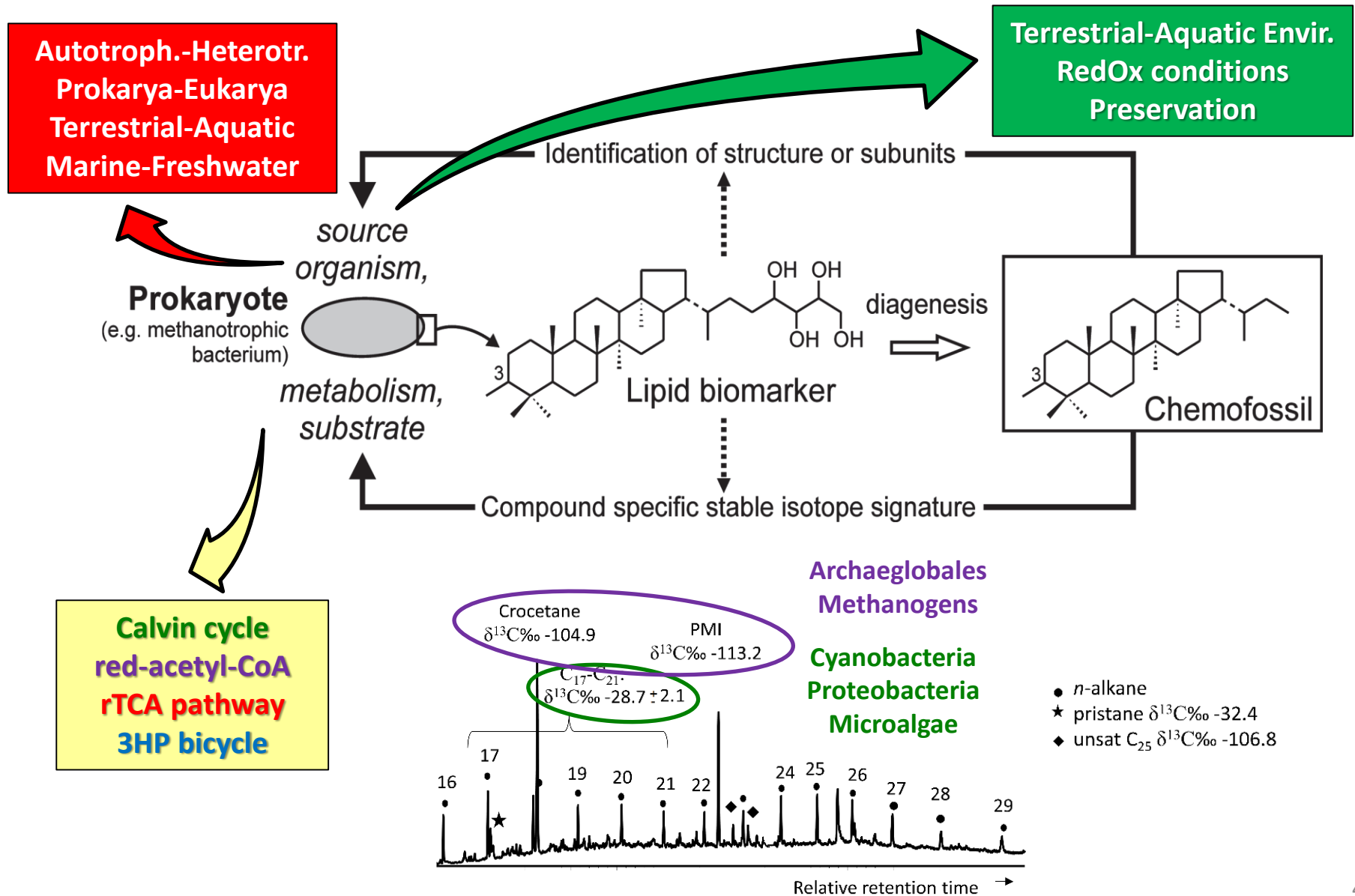


Lipids: cell-membrane derived biomolecules

Use of Terrestrial Analogs



Combining molecular and isotopic analysis



$\delta^{13}\text{C}$: Metabolic tracer

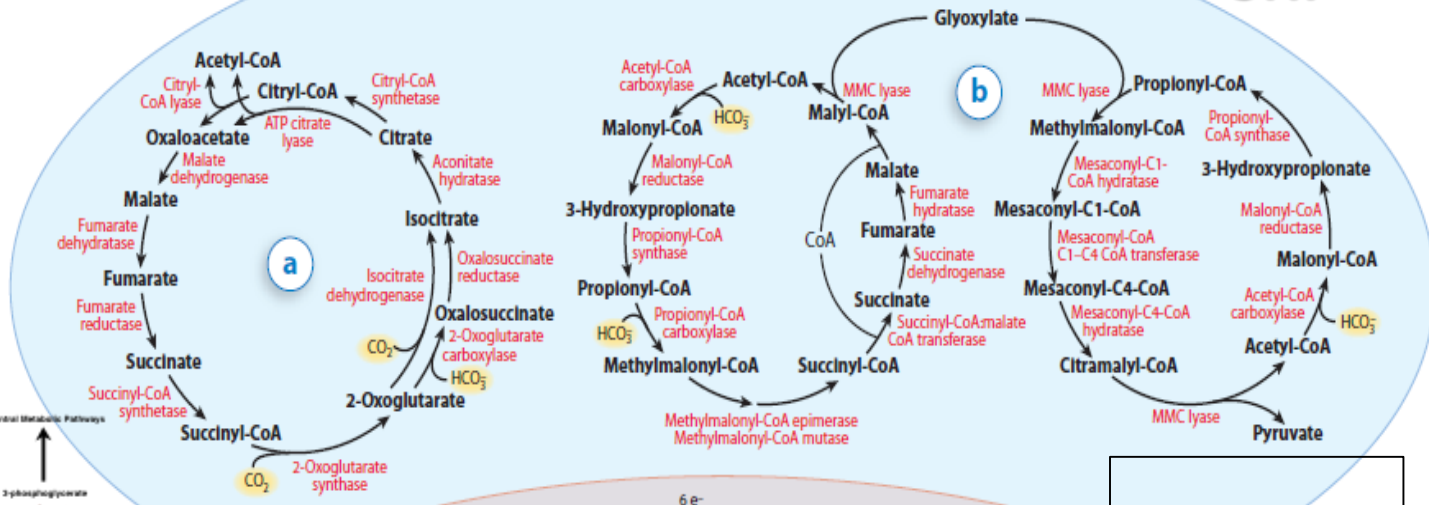
rTCA

$$\epsilon = -3/-10\text{‰}$$

Bacteria

3HP

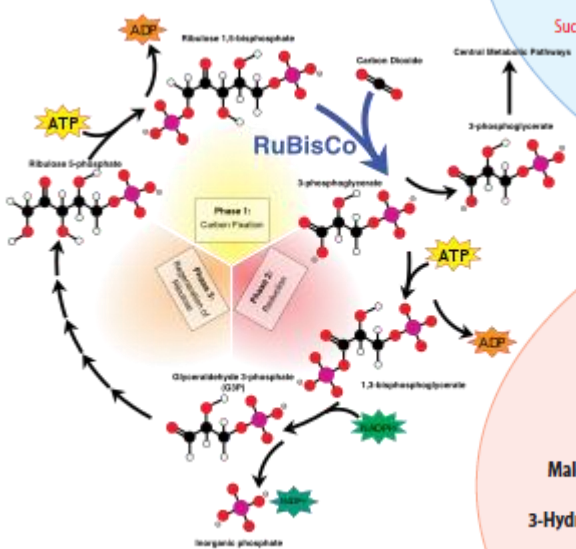
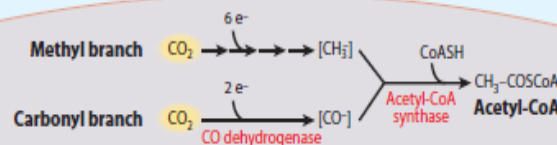
$$\epsilon = -20\text{‰}$$



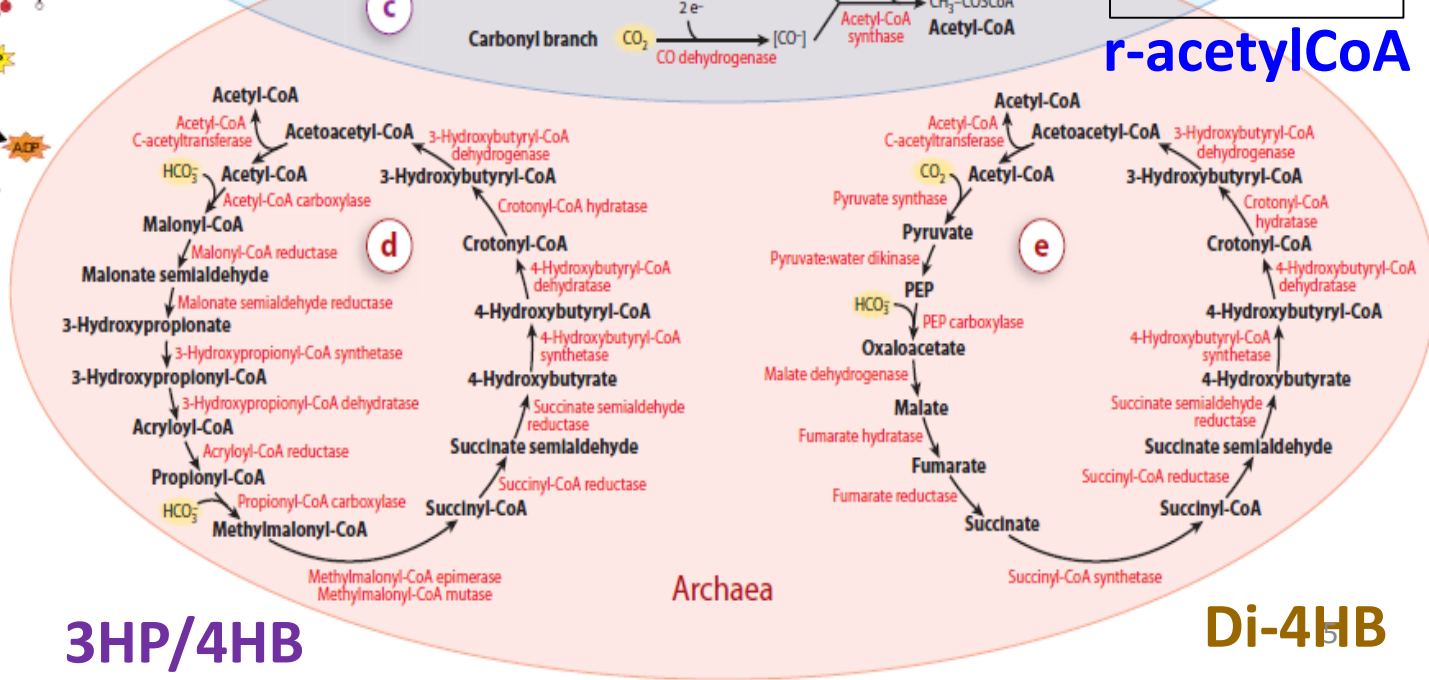
$$\epsilon = -30\text{‰}$$

r-acetylCoA

c



Calvin

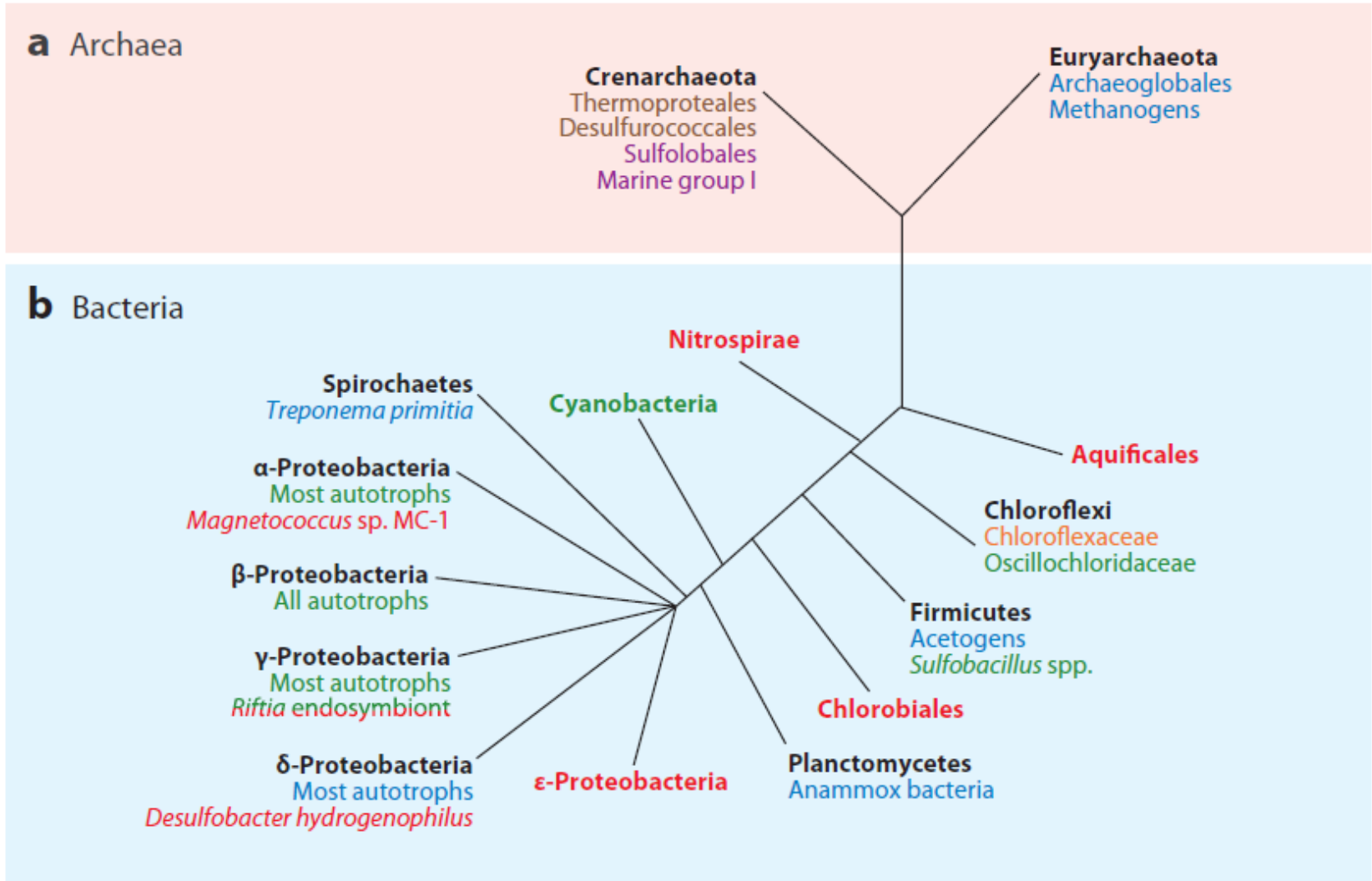


Archaea

Di-4HB

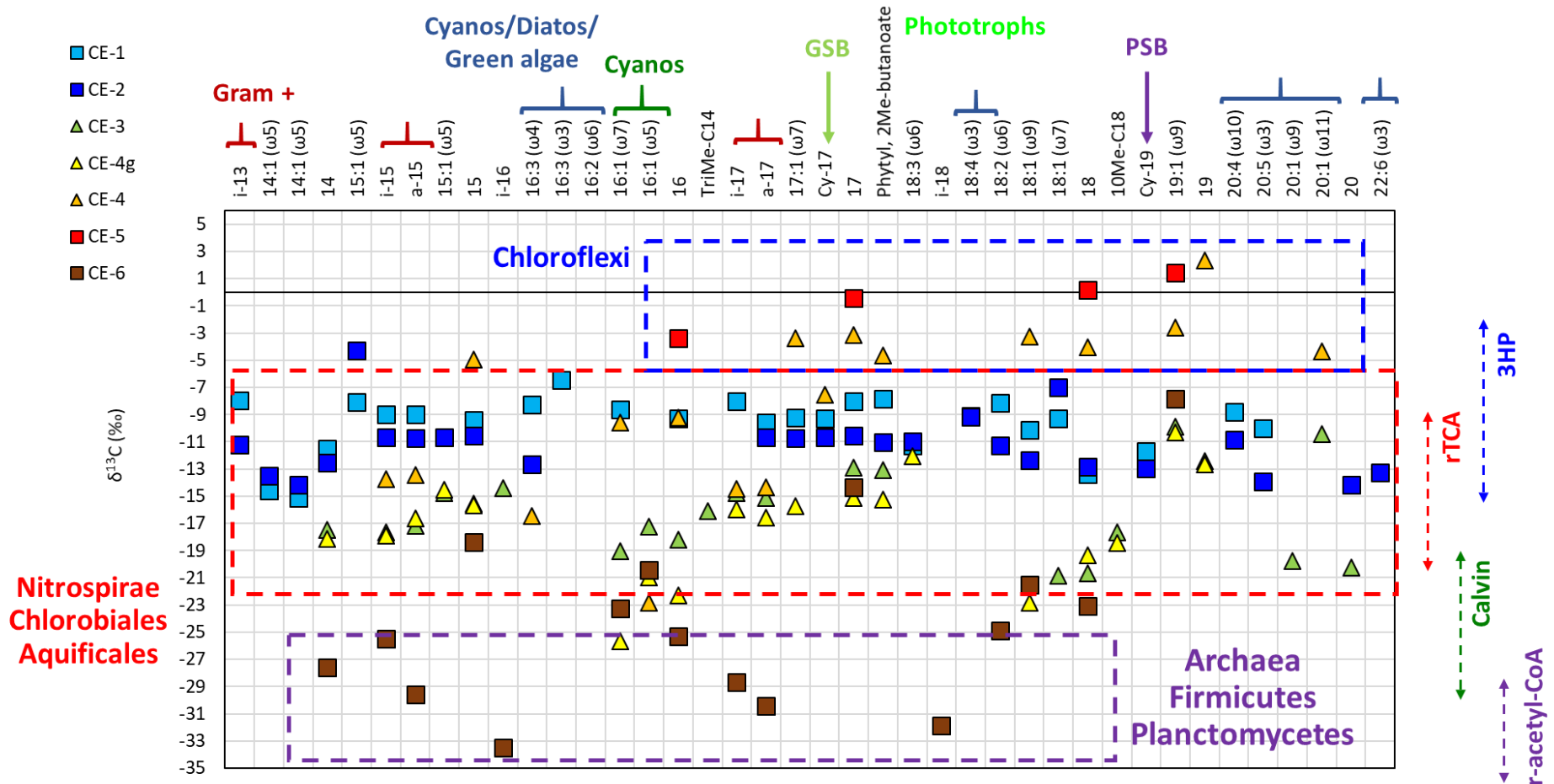
3HP/4HB

Tree scheme metabolisms

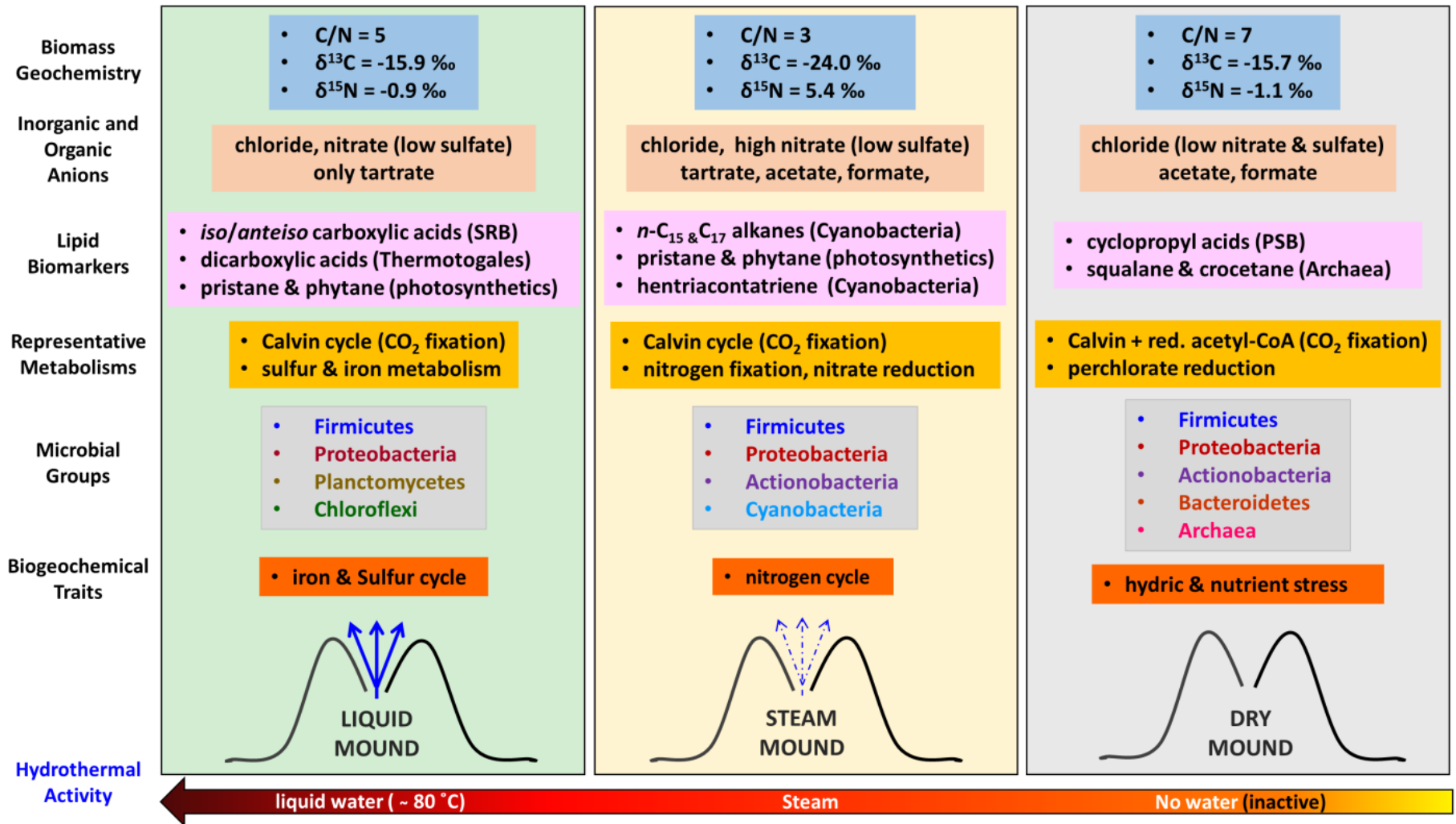


- Calvin
- rTCA
- R-acetylCoA
- Reductive pentose phosphate cycle
- Reductive tricarboxylic acid cycle
- Reductive acetyl-CoA pathway
- 3-Hydroxypropionate bicycle 3HP
- 3-Hydroxypropionate/4-hydroxybutyrate cycle 3HP/4HB
- Dicarboxylate/4-hydroxybutyrate cycle Di-4HB

- Identify biological sources from molecular analysis
- Infer carbon fixation pathways from CSIA



Reconstruct biogeochemical functioning of paleoenvironments by combining molecular and isotopic analysis of lipids with DNA sequencing, metaproteomics, immunoassays, and bulk geochemistry.



Applicability of lipid biomarkers

