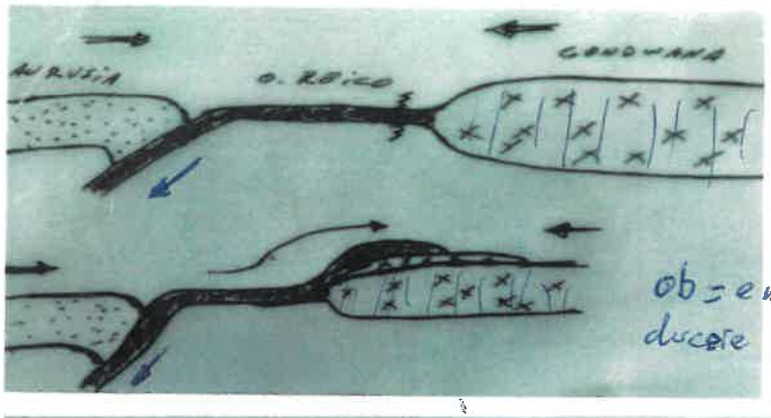
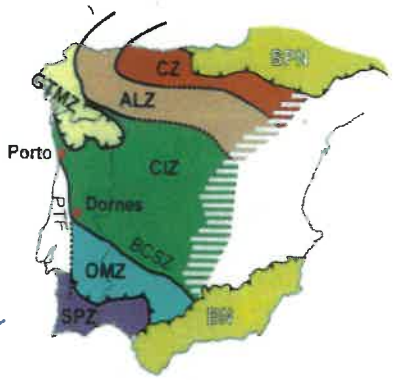
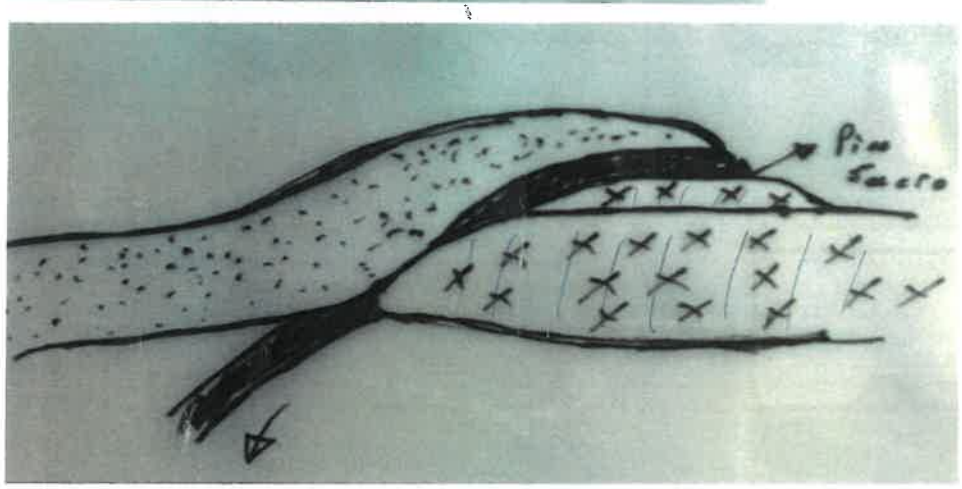
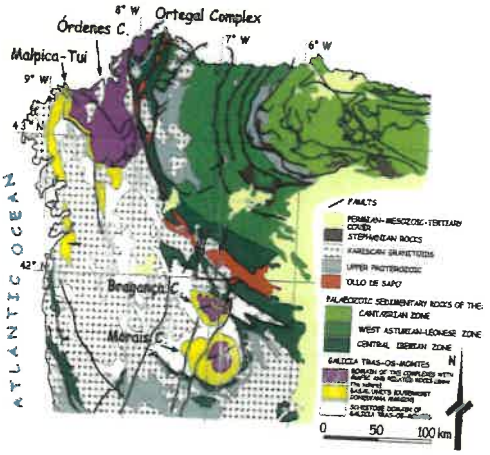
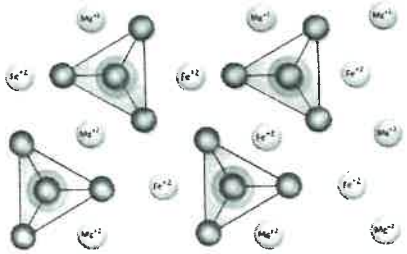


ob = encima
ducere = llevar





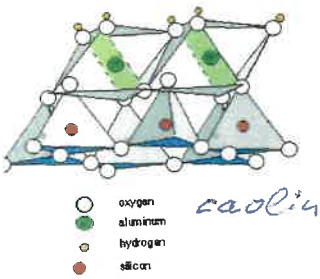




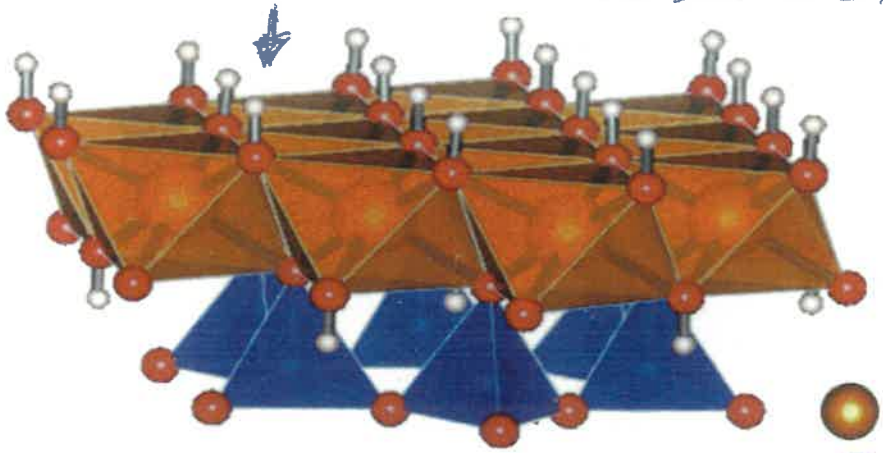
+ OUTRAS

REACCIÓNS:

Olivina (silicato de Fe e Mg) + H_2O → serpentina (xeito de arxila) + (brucita) (óxido de Fe e Mg)

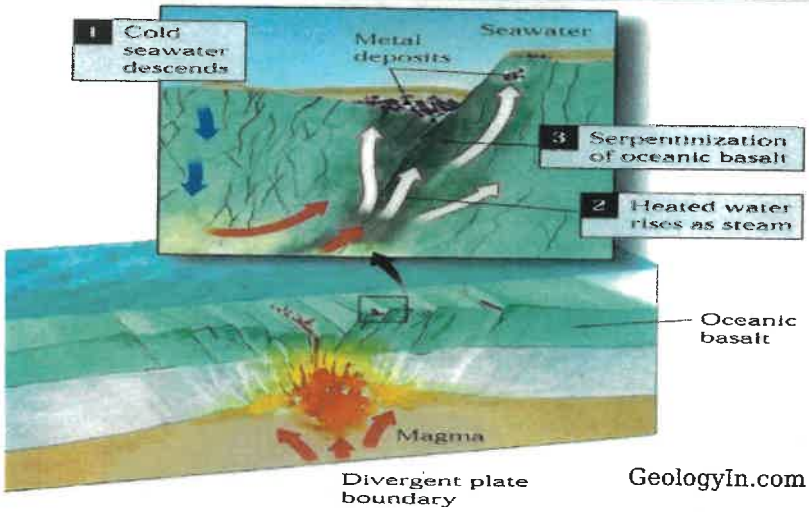


caolín



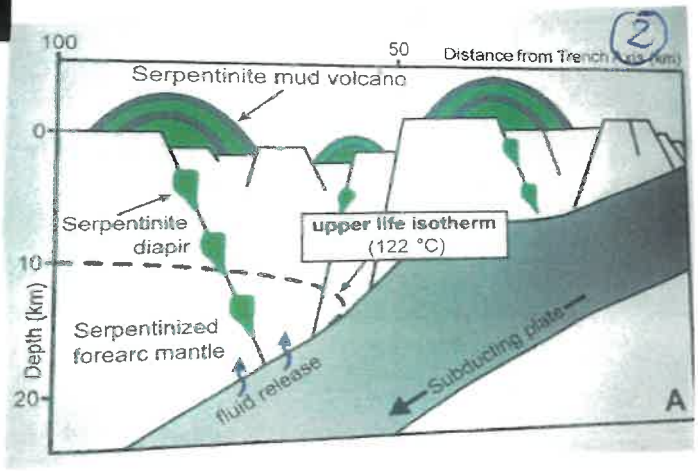
Olivina (silicato de Fe) + (H_2O) → magnetita (óxido de Fe) + bilicid (SiO_2) + (H_2)

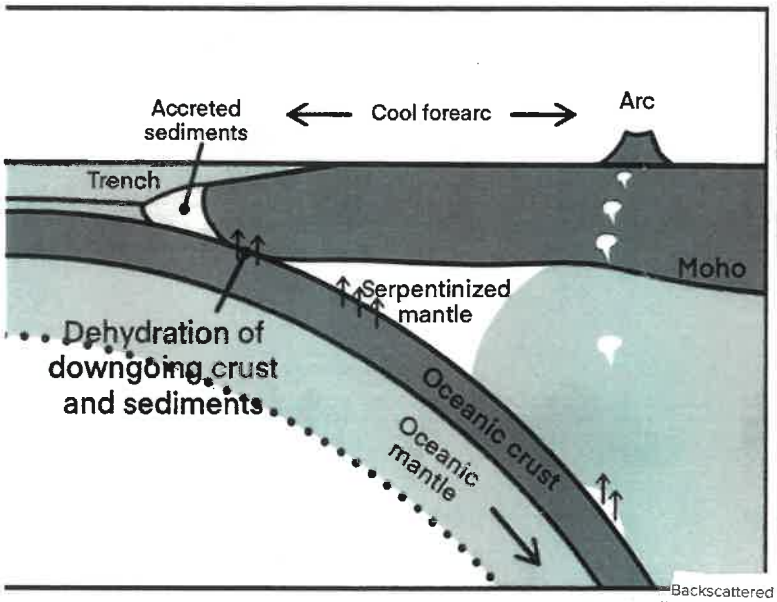
ydrothermal Metamorphism

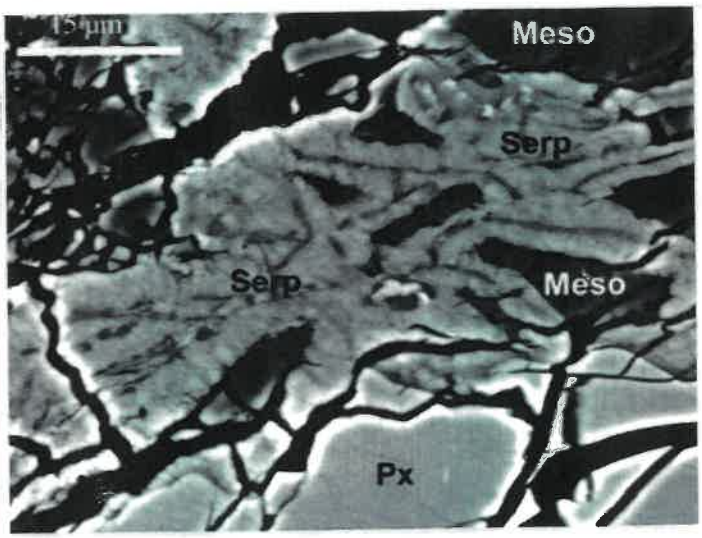


Divergent plate boundary

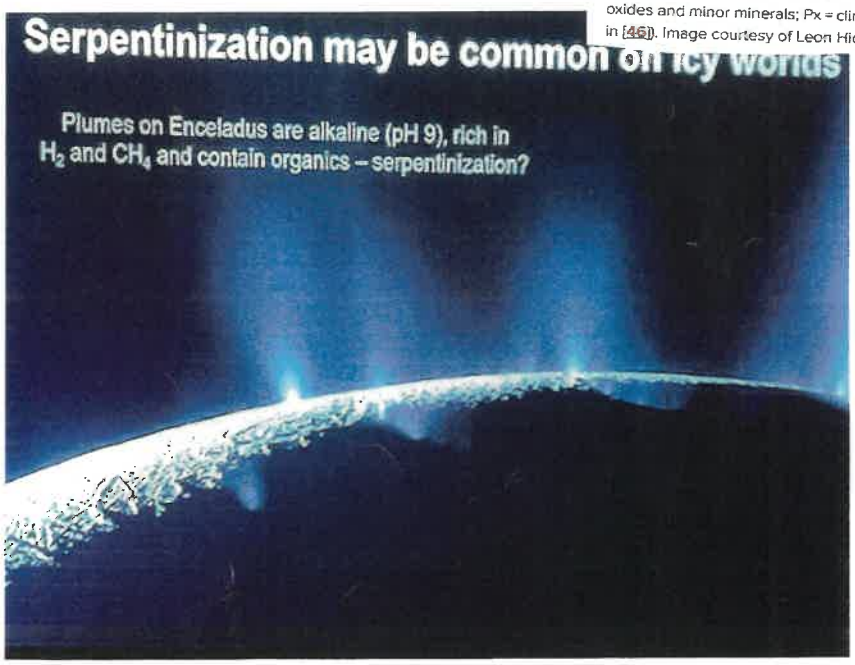
GeologyIn.com



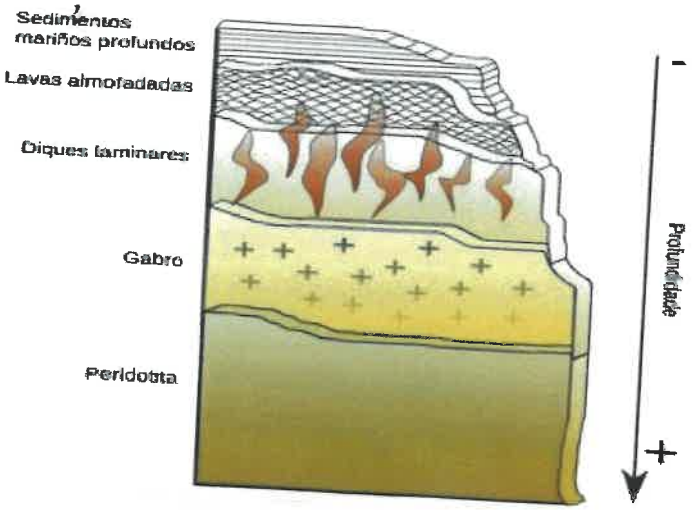


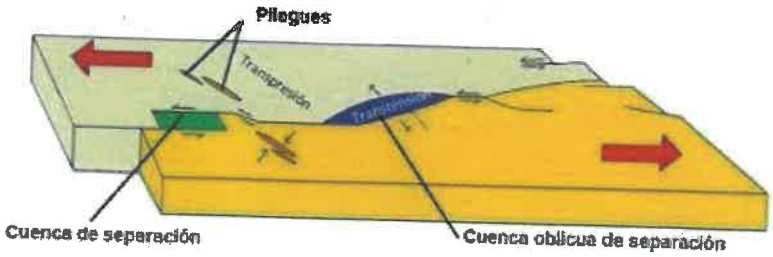


Backscattered electron image of serpentine and other pre-terrestrial alteration minerals in martian meteorite Lafayette. Serp = serpentine; Meso = poorly crystalline or amorphous mesostasis, composed of plagioclase, glass, Fe-Ti oxides and minor minerals; Px = clinopyroxene grains. (This image appeared mislabelled as martian meteorite NWA 817 in [46]). Image courtesy of Leon Hicks.



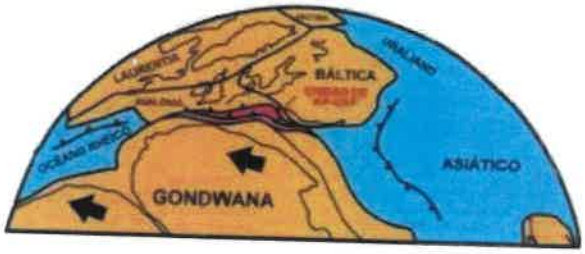
Serpentinite (pot recipe)



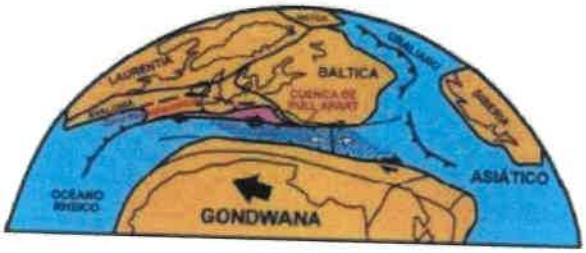


c.420 Ma
Océano Rheico contractivo

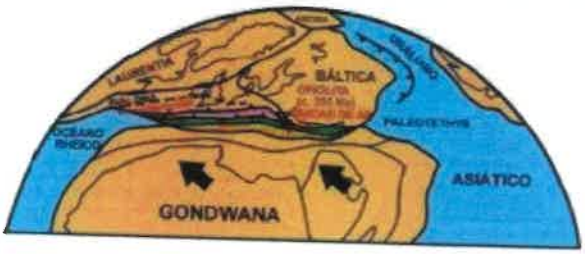
c.410-400 Ma
Primera colisión: evento de AP-UAP.



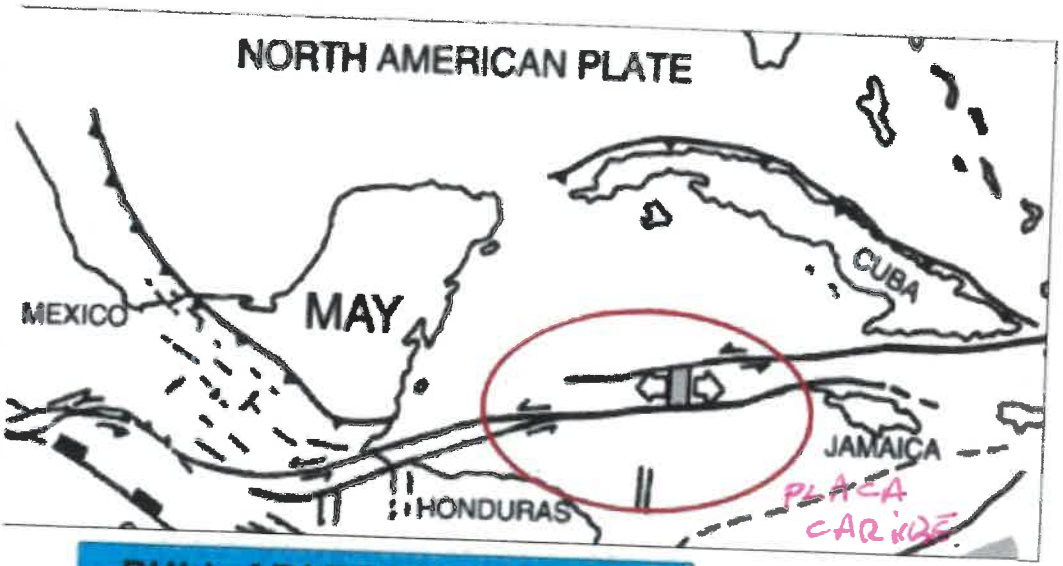
c.395 Ma
Generacion de una microplaca oceánica.



c.380-370 Ma
Segunda colisión: Obducción de ofiolitas y segundo evento de AP.



UNIDADES SUPERIORES UNIDADES OFIOLÍTICAS UNIDADES BASALES



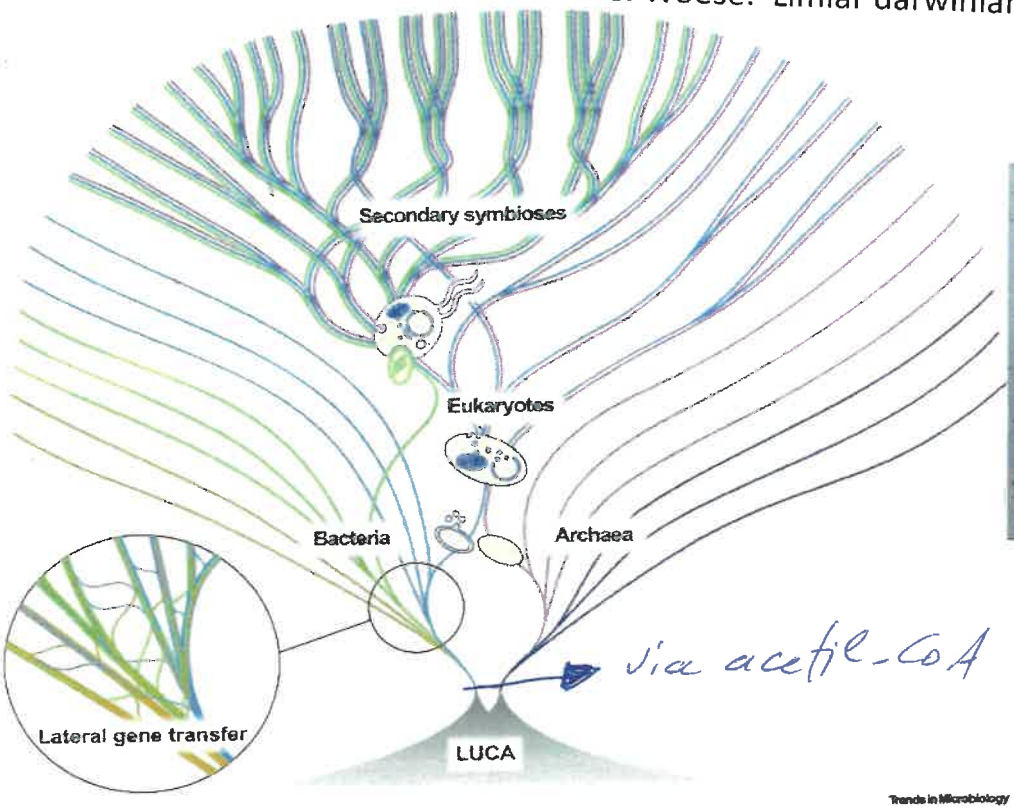
PULL-APART MARINA MÁS GRANDE DEL MUNDO

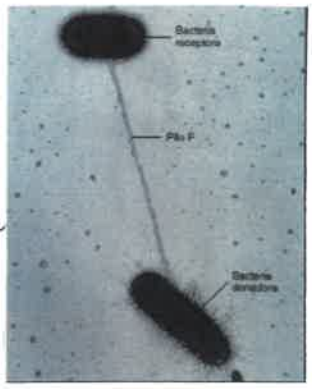
(Giunta *et al*, 2006)

NASA.

A vida é un sistema químico autosuficiente (auto sostible) coa capacidade de evolución darwiniana.

C. Woese. Limiar darwiniano





A. Szent-György. A vida non é máis que un electrón buscando un lugar onde descansar.

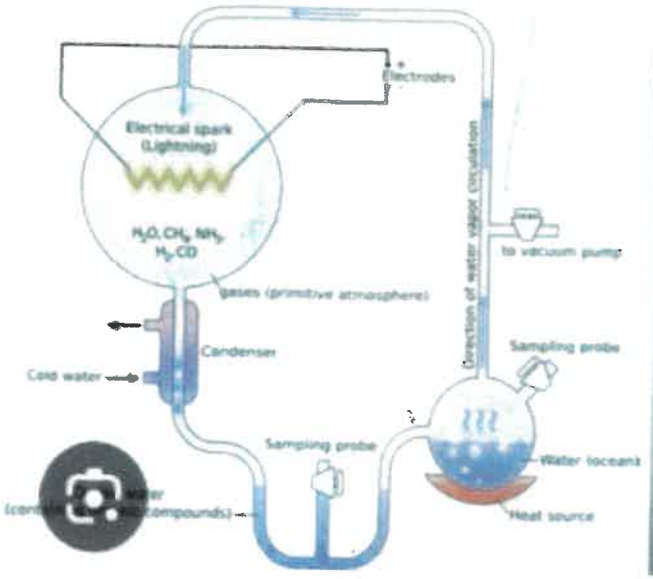
Hai un desequilibrio enerxético entre o manto da Terra e o exterior. No interior hai, por cada átomo, máis electróns dispostos a interaccionar que no exterior. Isto crea unha "tensión enerxética", e a vida semella un conduto para disip-

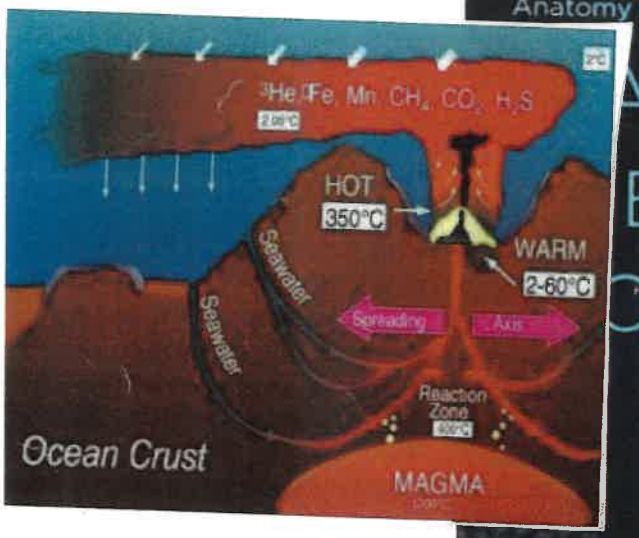
Biosfera redutora: $CO_2 + H_2 \rightarrow CH_2O$ Ecosistemas redutores: págase por comer. Seres quimioautótrofos.

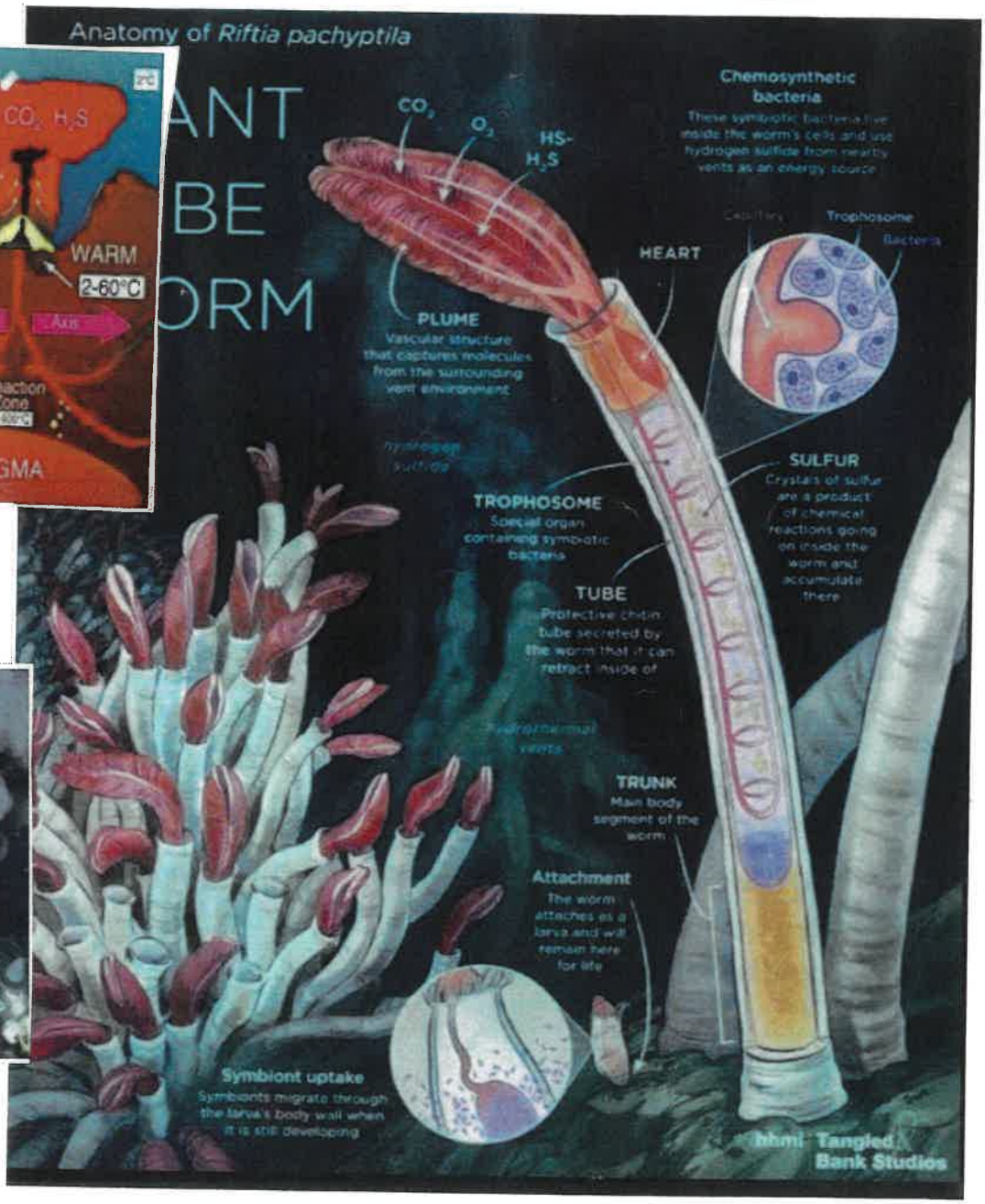
Co tempo, crearon o seu propio "marco de desequilibrio" canalizando o desequilibrio da radiación solar. Fotosíntese. Aparición do O_2. Un novo desequilibrio deu novo impulso á vida.

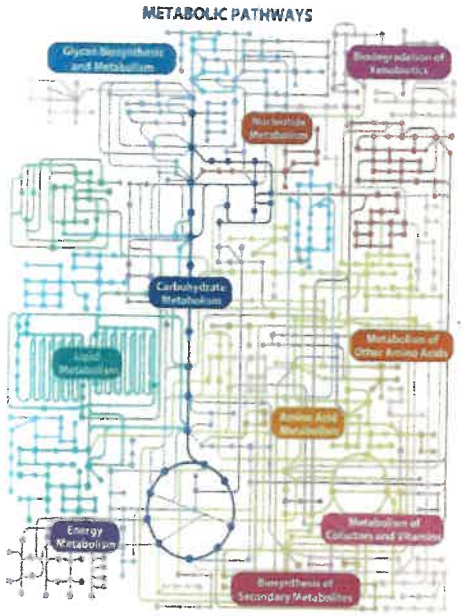
$$CO_2 + H_2O + luz \rightarrow CH_2O + O_2$$

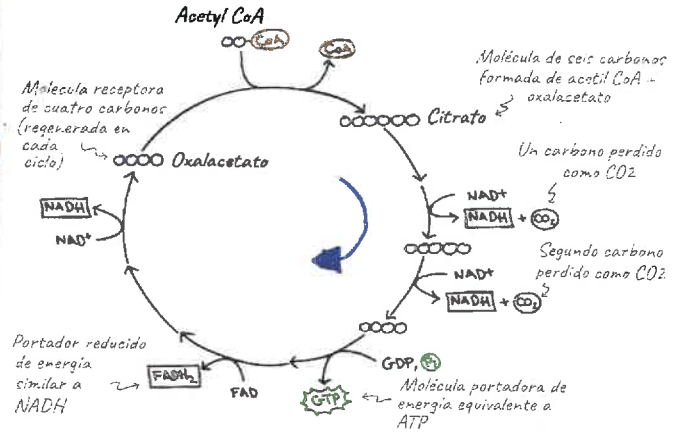
$CO_2H + O_2$ -> $CO_2 + O_2H$ + enerxía Ecosistemas oxidantes: "non hai comida gratis"

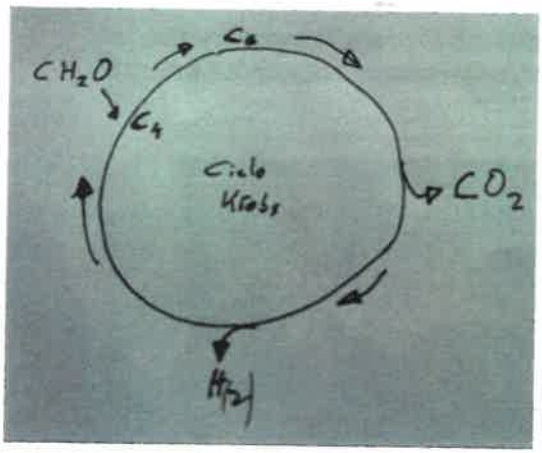

Electrodes
Electrical spark (Lightning)
H_2O, CH_4, NH_3, H_2CO
gases (primitive atmosphere)
Condenser
Cold water
Sampling probe
Sampling probe
to vacuum pump
Fraction of water vapor circulation
Water (ocean)
Heat source

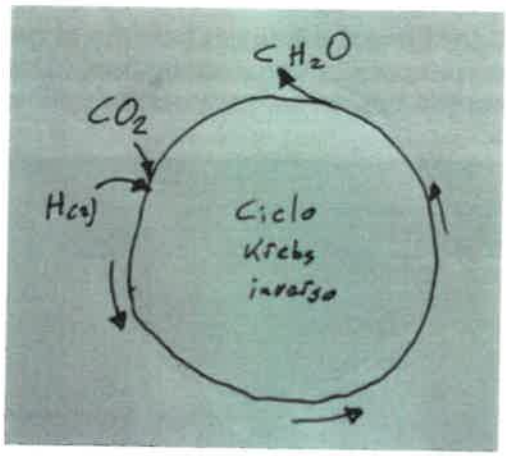

^3He Fe, Mn, CH_4, CO_2, H_2S
2-60°C
HOT
350°C
WARM
2-60°C
Seawater
Seawater
Spreading
Axis
Reaction Zone
MAGMA
Ocean Crust


Anatomy of Riftia pachyptila
ANT
BE
ORM
CO_2
O_2
HS-
H_2S
Chemosynthetic bacteria
These symbiotic bacteria live inside the worm's cells and use hydrogen sulfide from nearby vents as an energy source
Capillary
Trophosome
Bacteria
HEART
PLUME
Vascular structure that captures molecules from the surrounding vent environment
SULFUR
Crystals of sulfur are a product of chemical reactions going on inside the worm and accumulate there
TROPHOSOME
Special organ containing symbiotic bacteria
TUBE
Protective chitin tube secreted by the worm that it can retract inside of
TRUNK
Main body segment of the worm
Attachment
The worm attaches as a larva and will remain here for life
Symbiont uptake
Symbionts migrate through the larva's body wall when it is still developing
hhmi Tangled Bank Studios

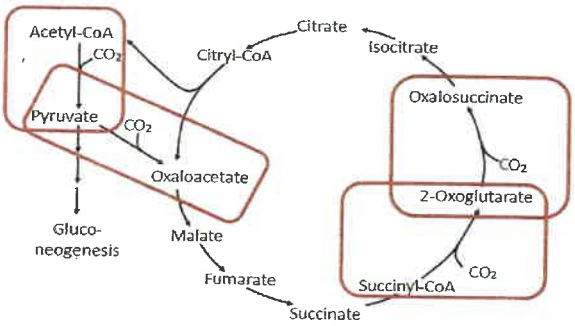






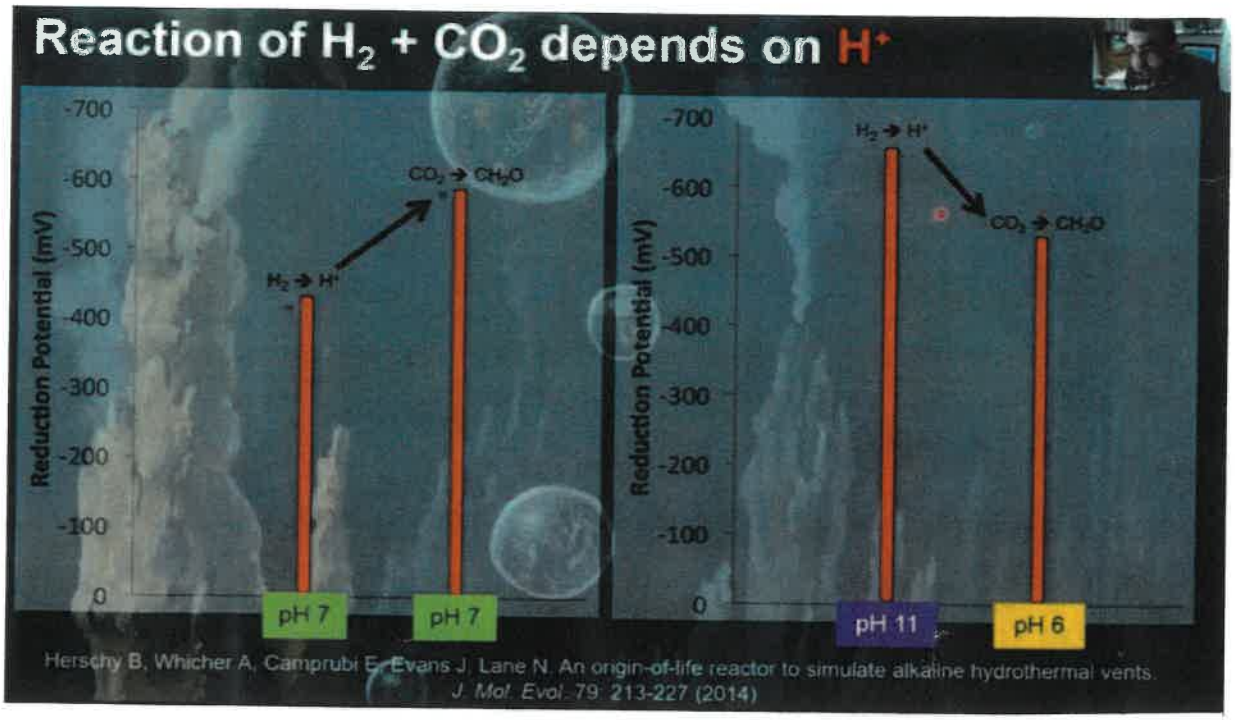


Reductive TCA cycle

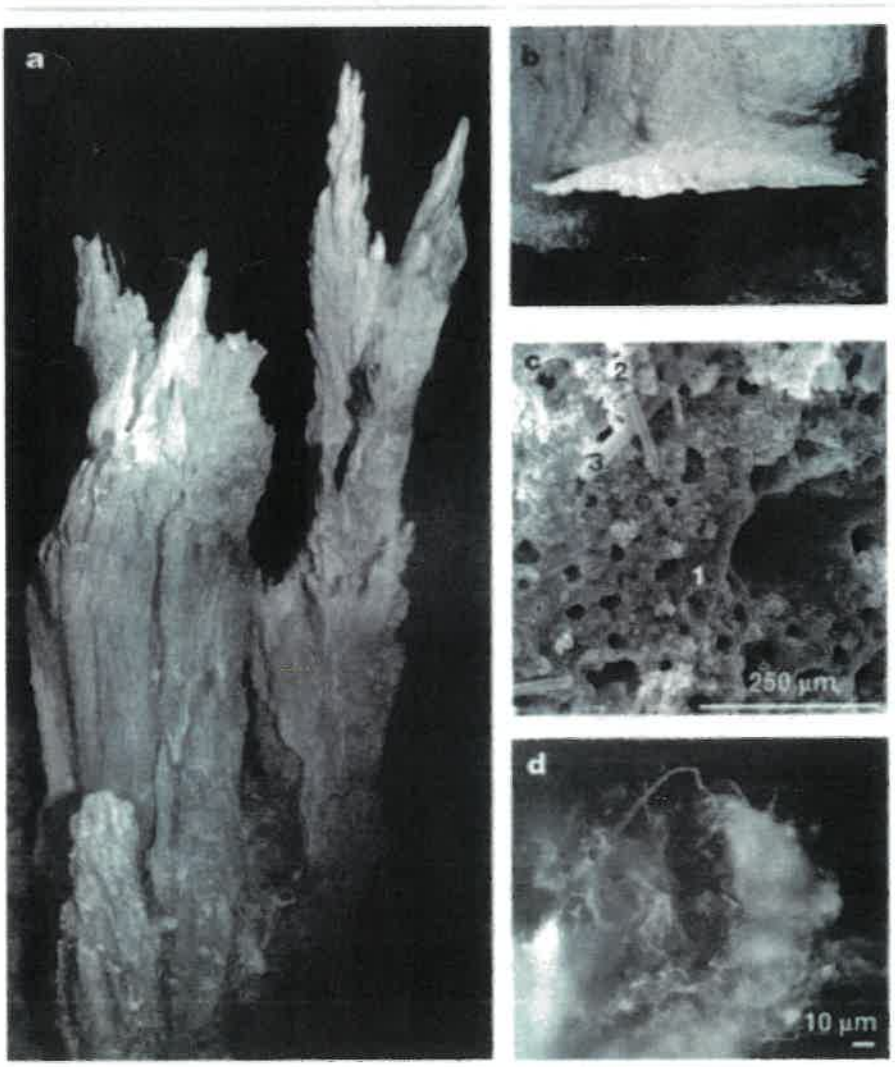


$4CO_2 \rightarrow$ Oxaloacetate (4ATP + 10[H])

A maioría das reaccións químicas necesarias para sintetizar acetil-CoA, esencial para as rutas bioquímicas básicas para a vida, teñen lugar durante a serpentinización.[15] As agrupacións de sulfuro-metal que activan moitos encimas lembran os minerais sulfurados formados durante a serpentinización.



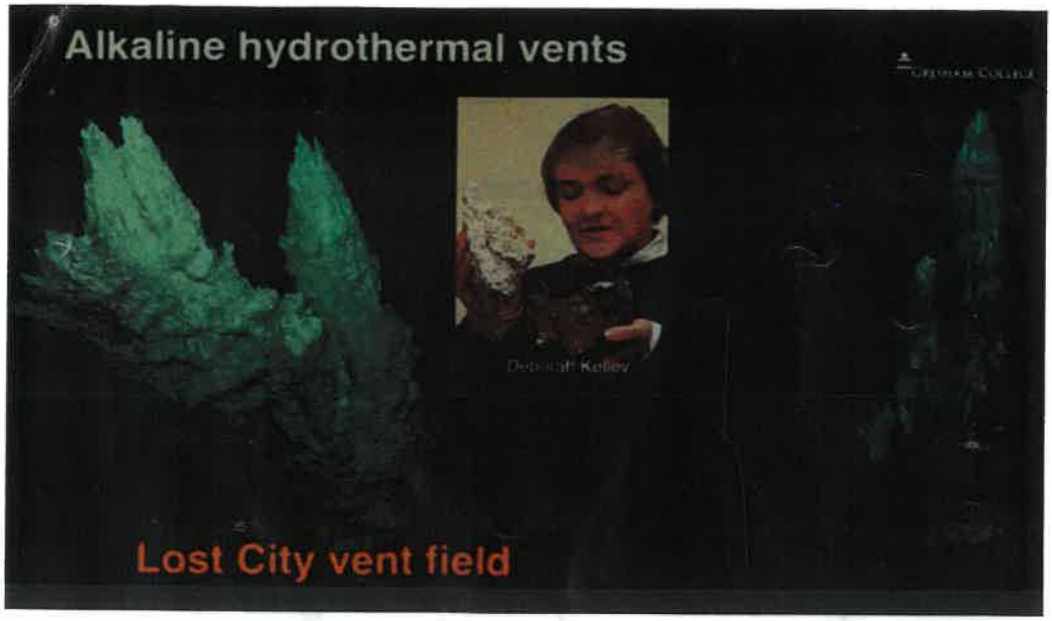
Alkaline hydrothermal vents at Lost City in the Atlantic Ocean, formed by the nonvolcanic process of serpentinization, in which seawater reacts with minerals derived from the upper mantle, such as olivine

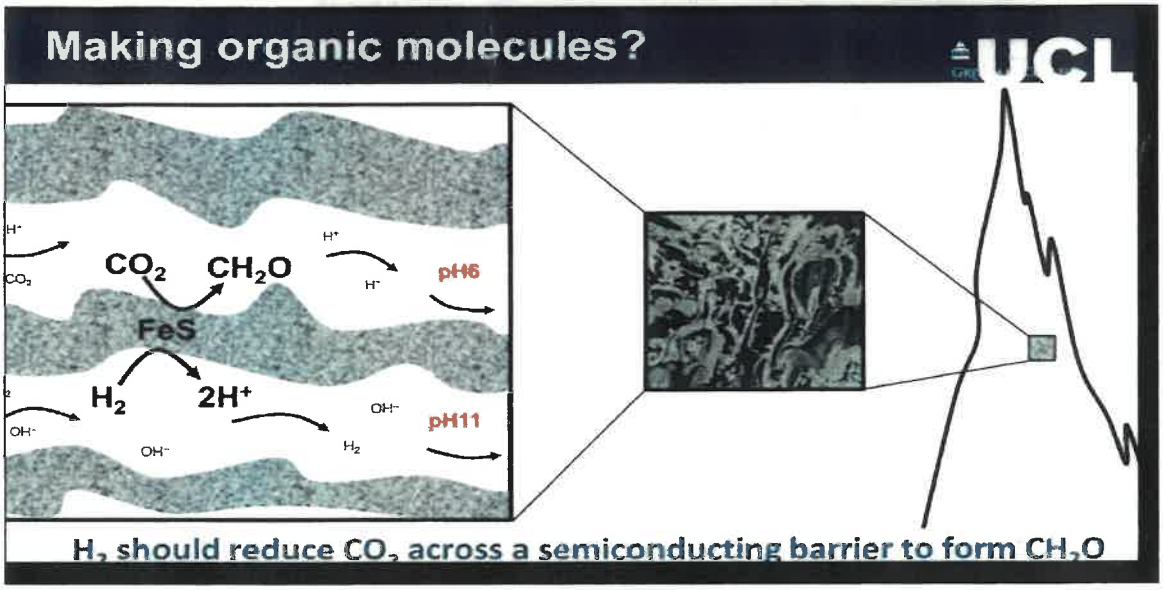


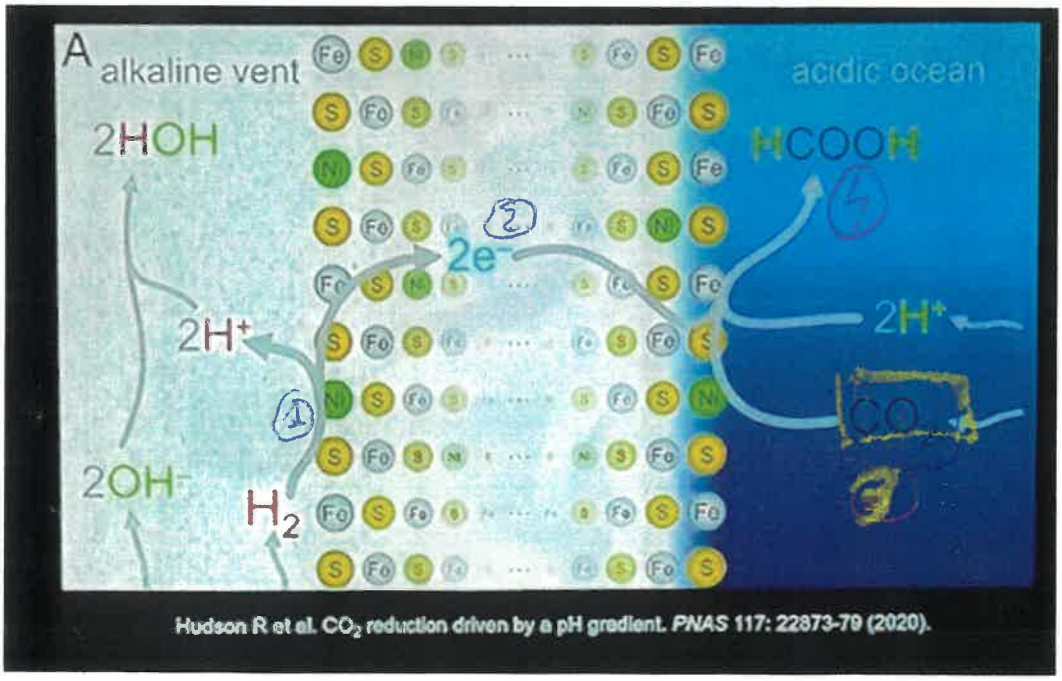
Alkaline hydrothermal vents at Lost City in the Atlantic Ocean, formed by the nonvolcanic process of serpentinization, in which seawater reacts with minerals derived from the upper mantle, such as oli
Similarly porous vents, circulating reactive fluids through catalytic cells, would have made ideal electrochemical reactors incubating the origin of life

"Esta rede de transferencia de electróns pode ser descrita como a palca base dun circuíto eléctrico global, impulsado pola enerxía solar e transducido por encimas (1) capaces de catalizar o fluxo de electróns. A esta escala, as conexións entre "transistores biolóxicos" as realizan os "fluídos xeofísicos" (atmosfera e océanos) que actúan como "cables" (condutores) globais, movendo oxidantes e redutores por todo o planeta."

1 oxidoreductasas







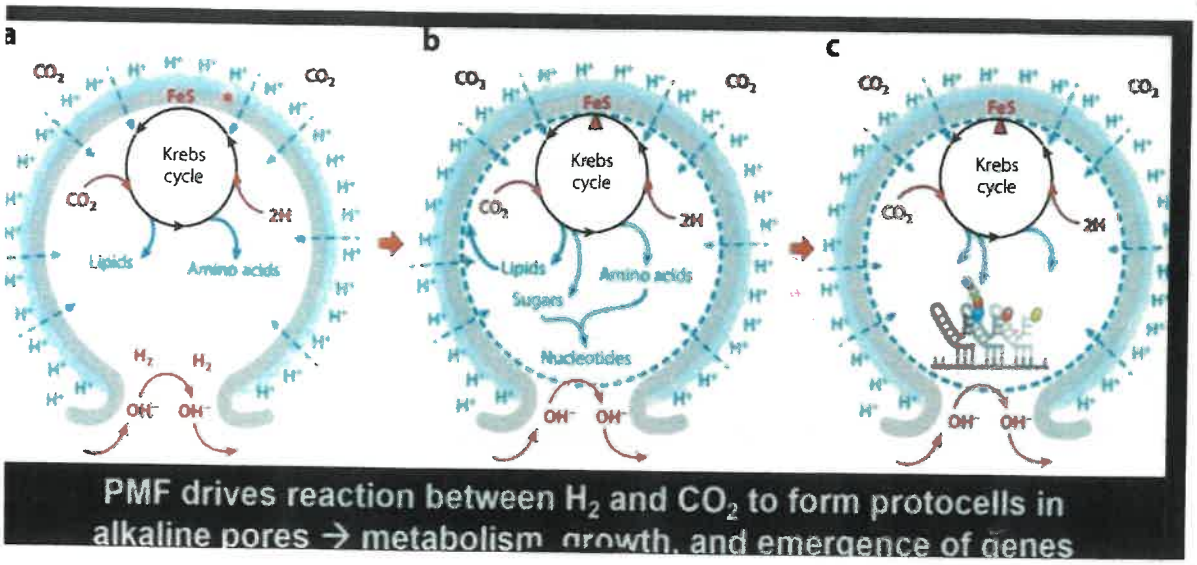
Autotrofía:

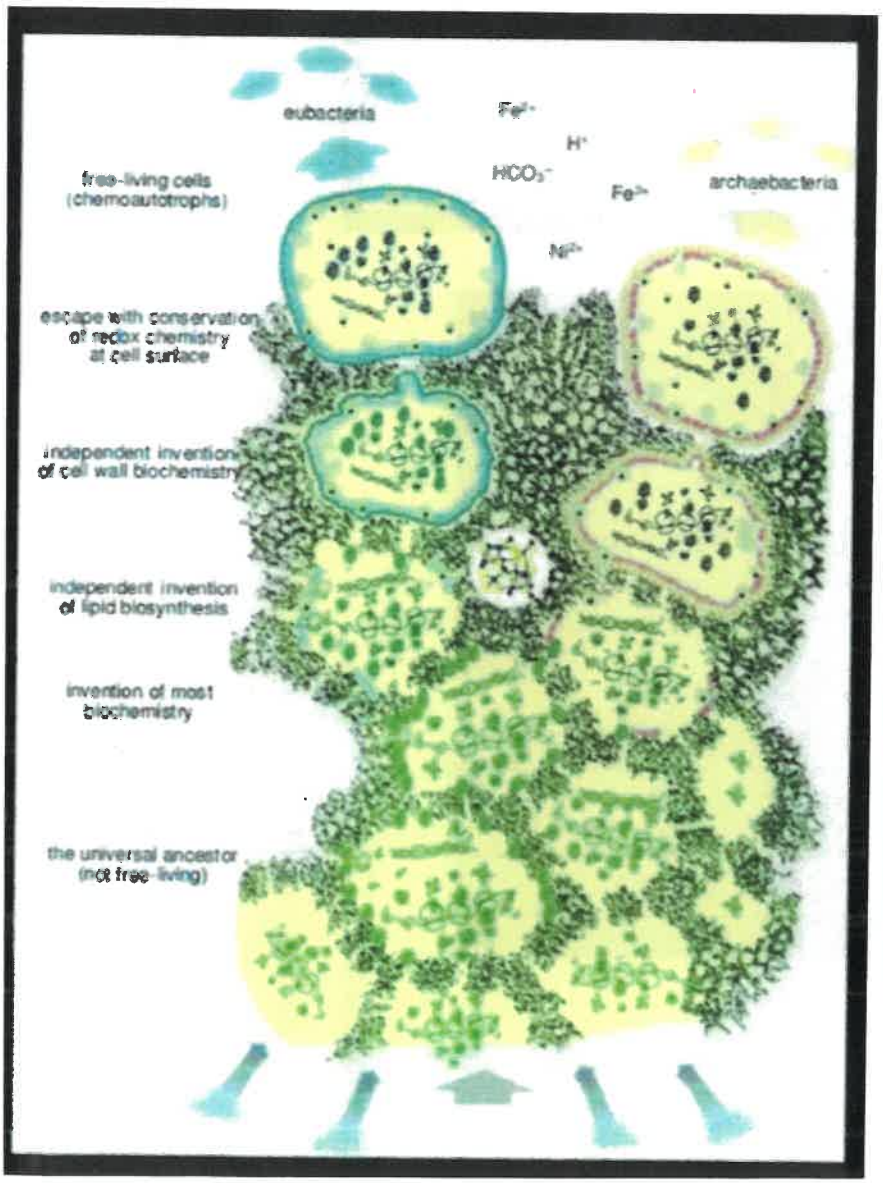
$SH_2 + CO_2 \rightarrow S^0 + CH_2O$

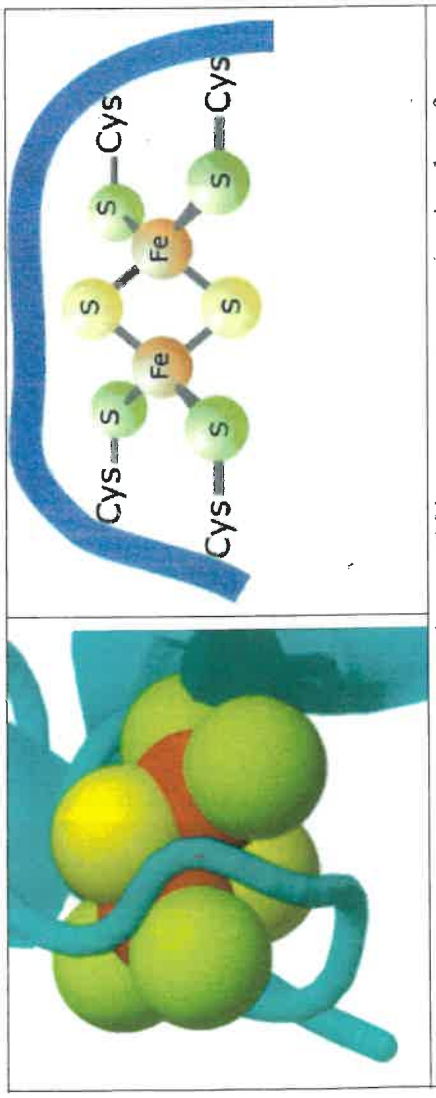
Respiración:

$CH_2O + O_2 \rightarrow H_2O + CO_2$

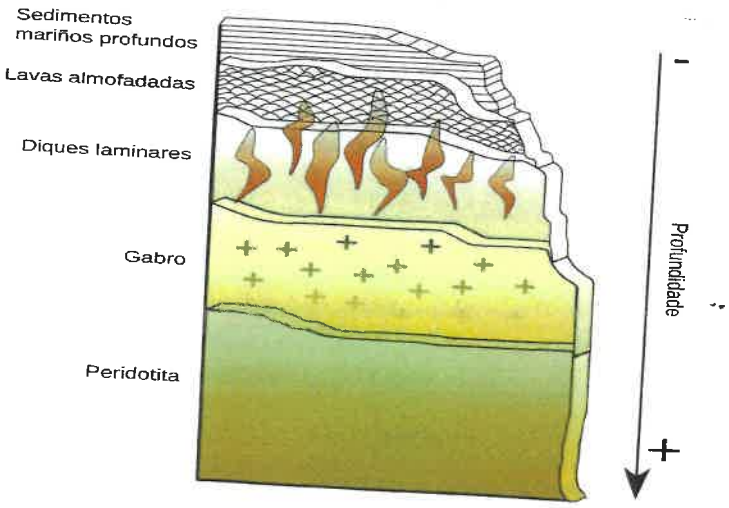
$CH_2O + SO_4^{2-} \rightarrow H_2S + CO_2$







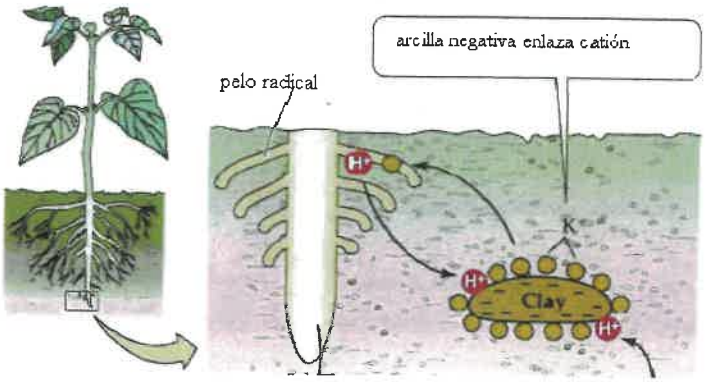
Centro Fe_2-S_2 en la ferredoxina de espinaca. El hierro se muestra en naranja, el azufre inorgánico en amarillo y el azufre de las 4 Cys en verde. Note que los 4 azufres de las Cys están en el mismo plano, perpendicular a los dos azufres inorgánicos


Sedimentos marinos profundos
Lavas almofadadas
Diques laminares
Gabro
Peridotita
Profundidade
-
+

"Considéranse endémicas dun territorio político todas as especies que viven exclusivamente nese territorio, sen sobordar os seus límites". J. Izco.

(10)

A flora galega comprende 2,400 sps e subsps. Hai nela 75 endemismos ibéricos, e 15 endemismos estritos de Galiza. A maioría deles (9) son de áreas serpentinizadas, que representan só o 0.2% da superficie galega.



$Mg^{2+} = Ca^{2+}$

Ni^{2+} Ni^{3+} tóxicos

Localización de las zonas serpentinizadas importantes en Galicia

Riscos excluíntes das zonas serpentinizadas :

* Solos "tóxicos" para moitas plantas, pois proveñen de rochas moi ricas en metais de transición (MT), como Fe, Mg, Ni, Cr... e, en alta concentración, poden ocupar un lugar inadecuado en moléculas catalíticas, inactivándoas.

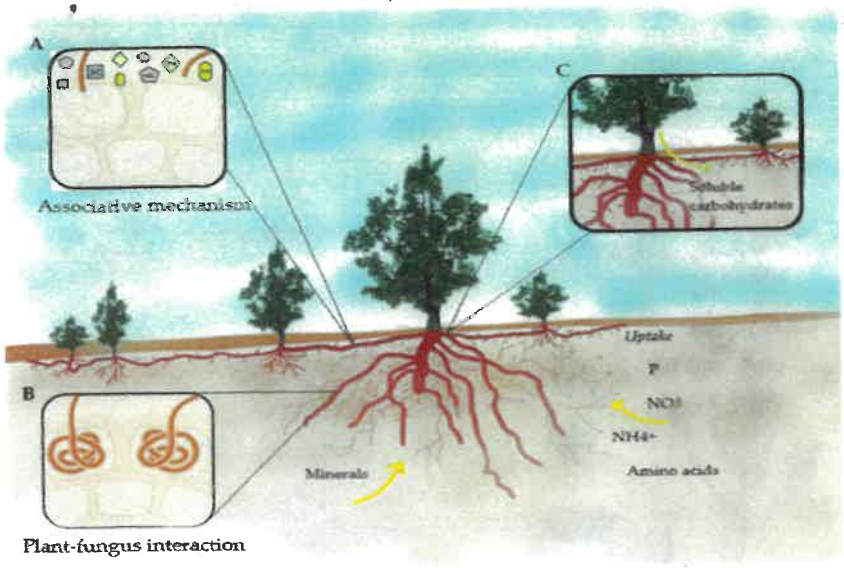
*Solos de pobre estrutura, con pouca arxila, pois as rochas das que proveñen xa "pasaron" pola auga, teñen menor marxe de ser meteorizadas.

*Solos pobres en certos nutrientes esenciais (P, Na, K..) que se concentran en magmas graníticos.

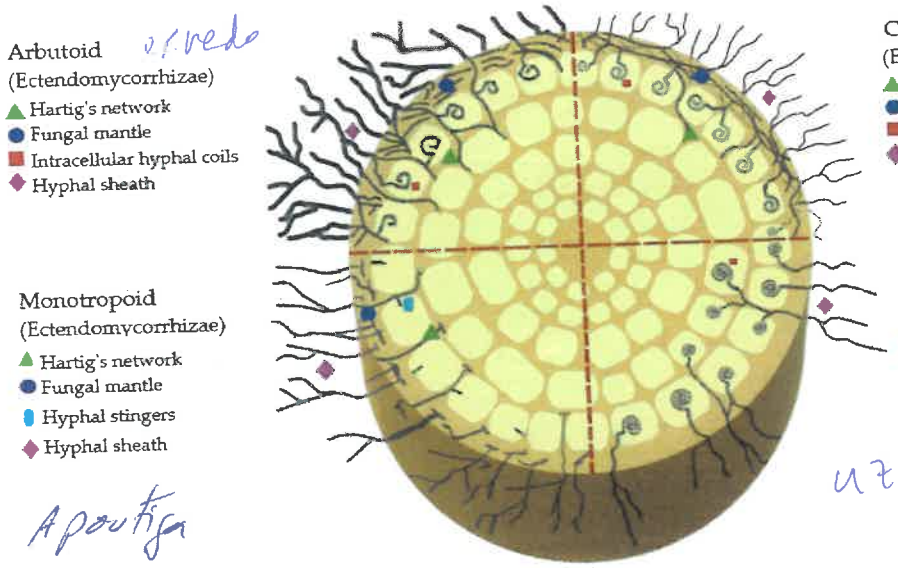
*Solos pobres en N asimilable, pois os MT inhiben a acción dos microorganismos mineralizadores.

*Solos con moito Mg, que dificulta a absorción de Ca (por "competencia").

En resume, "síndrome das serpentinas": Pouca fertilidade; pouca produtividade; pouca fracción arxilosa; toxicidade.



Schematic diagram of ericoid mycorrhizal interaction between plants and fungi according to their mechanisms. (**A**) Recognition mechanism of an associated fungus for the formation of mycorrhizae; (**B**) establishment of the plant–fungi association; and (**C**) transfer of soluble carbohydrates from plant to fungus. PC: phenolic compounds, VOC: volatile organic compounds, OA: organic acids, PH: phytohormones.



Mecanismos de defensa e/ou tolerancia:

MT (por ex. Ni) "estancados", exercendo un papel osmótico positivo fronte ao estrés hídrico.

Produción de moléculas que bloquean aos MT (fitoquelatinas, pequenos péptidos).

Efecto barreira, para os MT, das micorrizas ericoides.

Reliquias serpentinícolas.

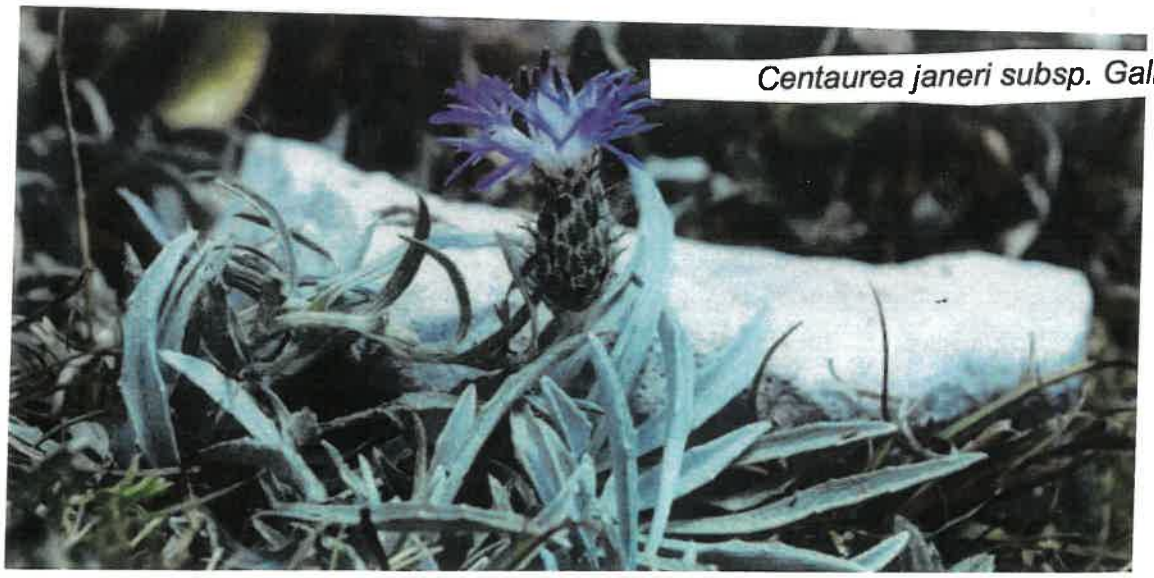
As zonas serpentinizadas acubillan plantas doutras áreas, chegadas a elas noutras condicións medioambientais, e que ao chegar as actuais non foron desprazadas por competencia polo inadecuado doas hábitats para outra plantas.

Erica vagans

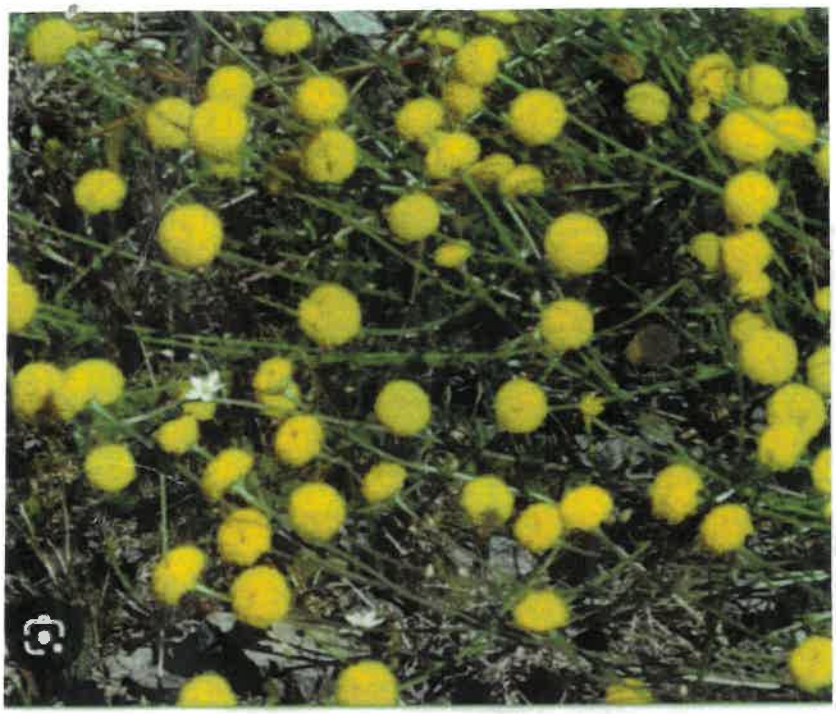
E. Cinerea

Leucanthemum gallaecicum
Rodr.Oubiña & S.Ortiz -...

Leucanthemum gallaecicum
Rodr.Oubiña & S.Ortiz -...

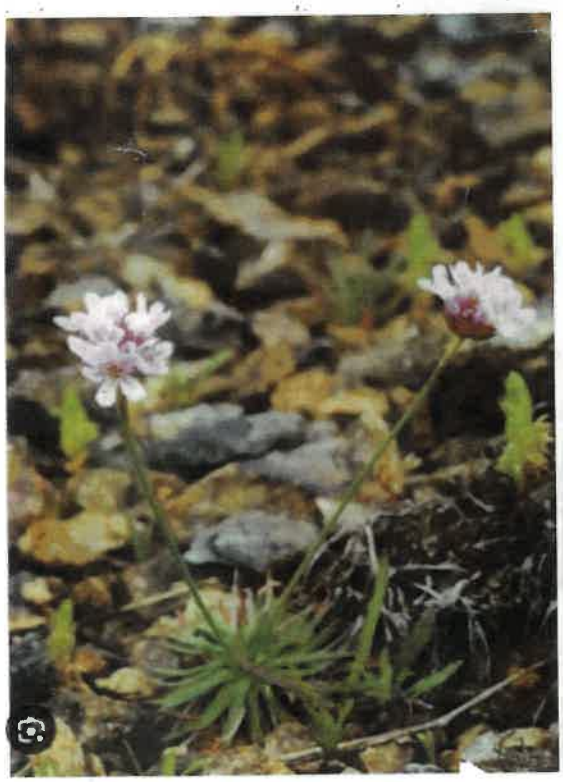


Centaurea janeri subsp. Gallaecica



Santolina melidensis (Rodr. Oubiña

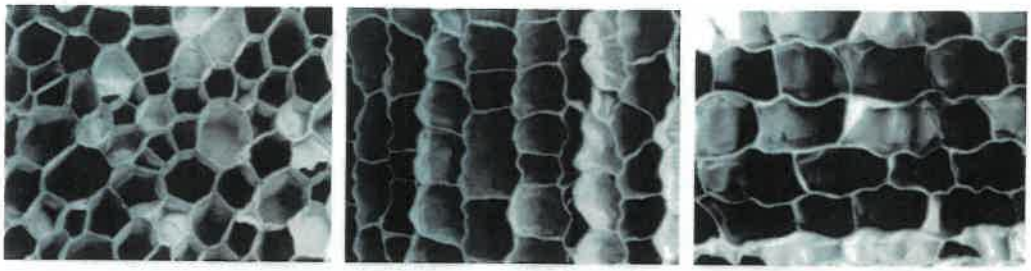
Santolina melidensis (Rodr. Oubiña

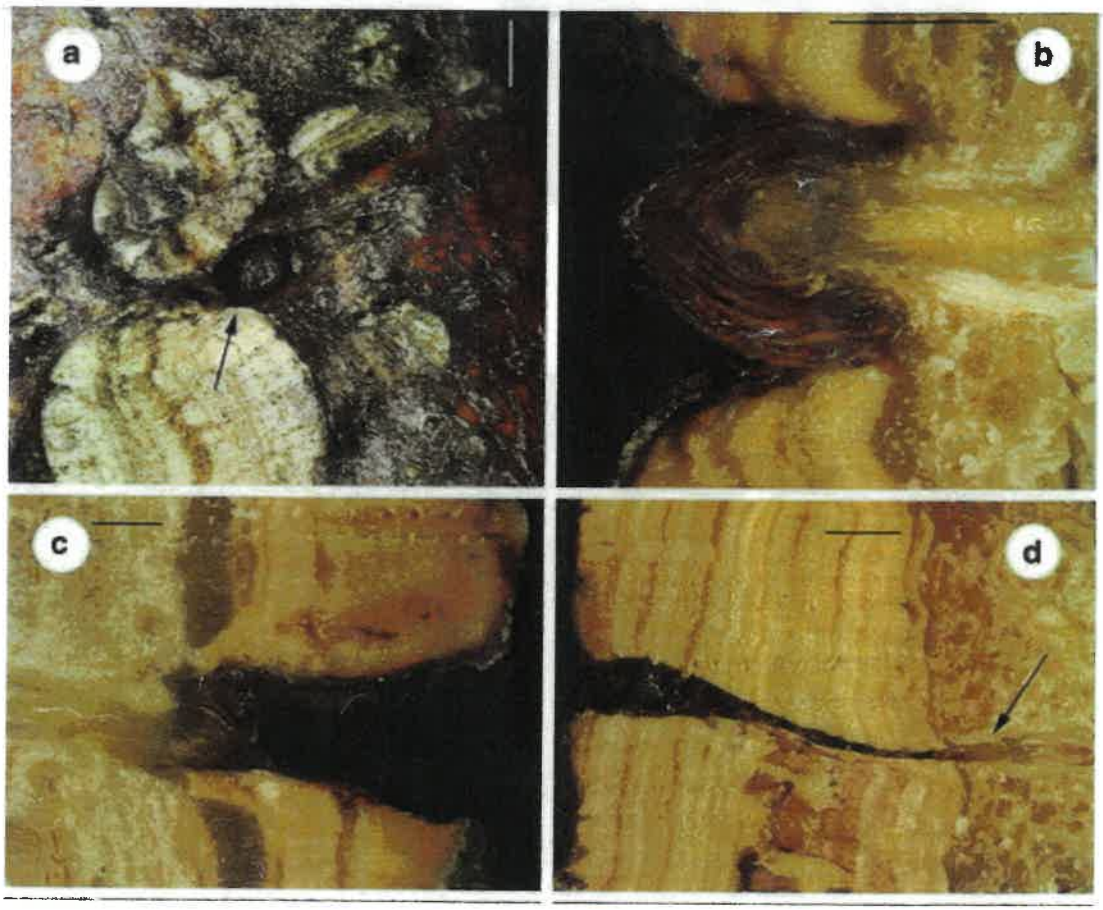


Armeria merinoi

Sagina merinoi

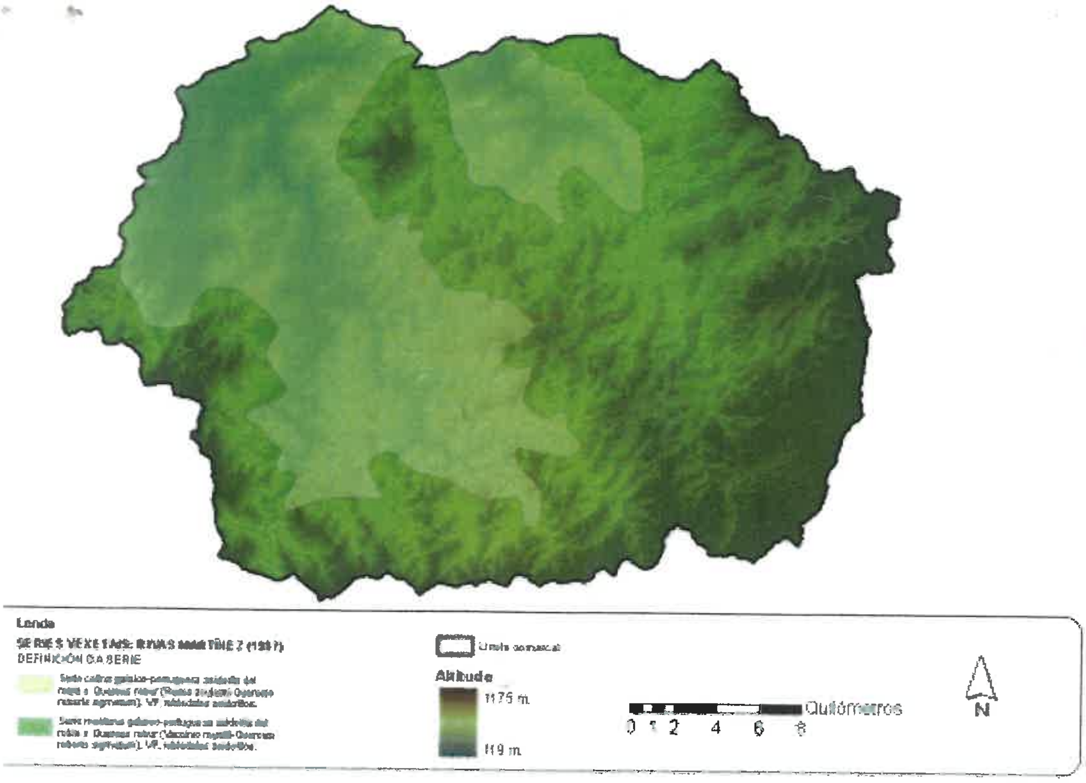
Fotocopias sobreira

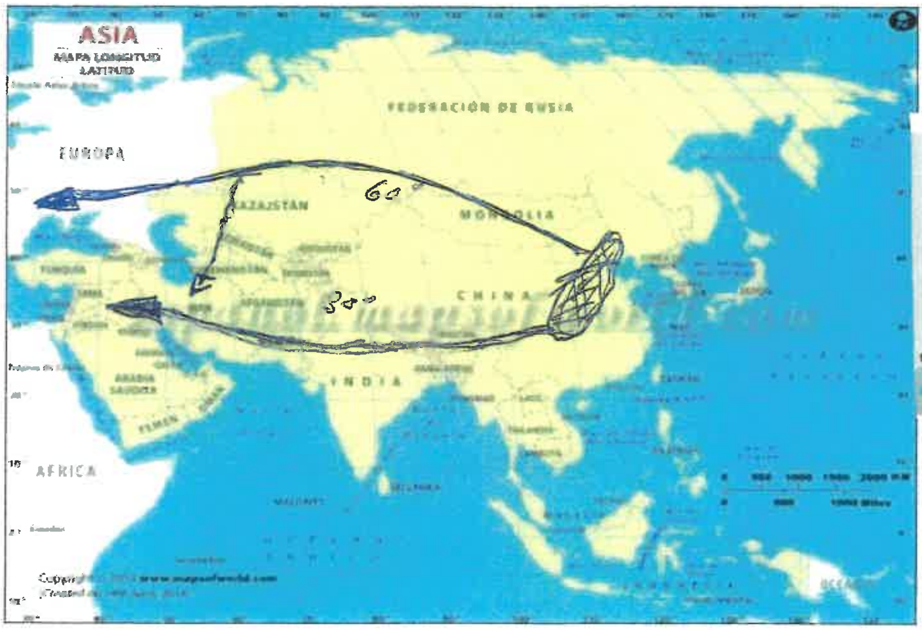


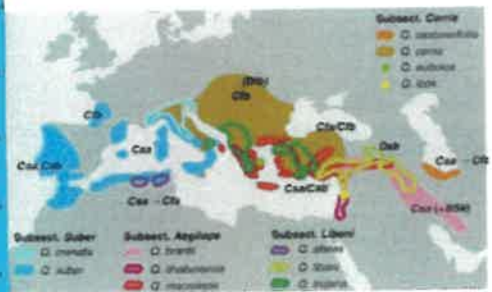


Subasociación Ruscoaculeatum - Quercetum roboris quercetosum. "sobreirais eurosiberianos galegos" (Rouco 1991)

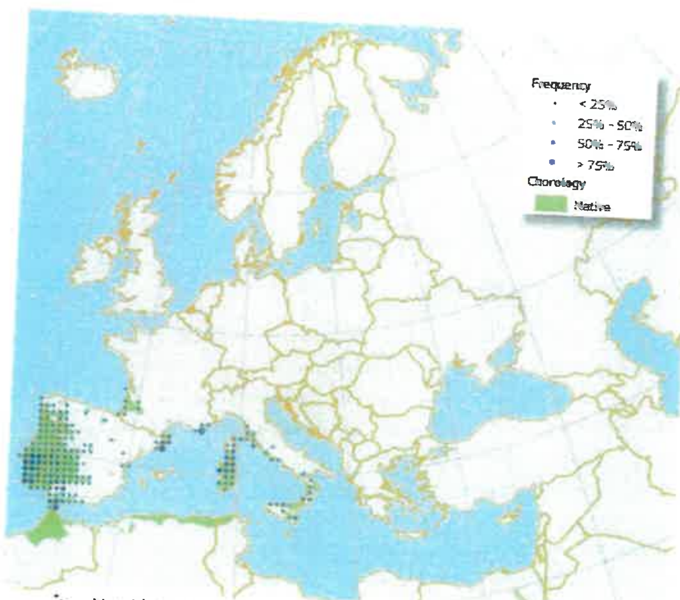
7 secciones Quercus. 3 en Galicia - Ilex → acebo
Quercus → carballos
Cerris → sobreira, carballo anano







• 6 "cuadrillas" 3-4 persoas 10.000 kg por persoa
• Hai no ZEC máis de 300.000 sobreiras
• A parcela A Zarra da Pena (20 Ha) da uns 15.000 € cada 10 anos
• 1962 fin actuador. Comezo explotación cortiza. Aparece a seca e o chancro escfo. No 2.000 diagnosticase o "decaemento do carballo" (oak decline



Map 1: Plot distribution and simplified chorology map for *Quercus suber*.


Gradients
Sulfide
Oxygen
Low
Aerobic
High
Anaerobic
Zonation
Photosynthetic bacteria
Purple non-sulfur bacteria
Purple sulfur bacteria
Green sulfur bacteria
Sulfate reducing bacteria