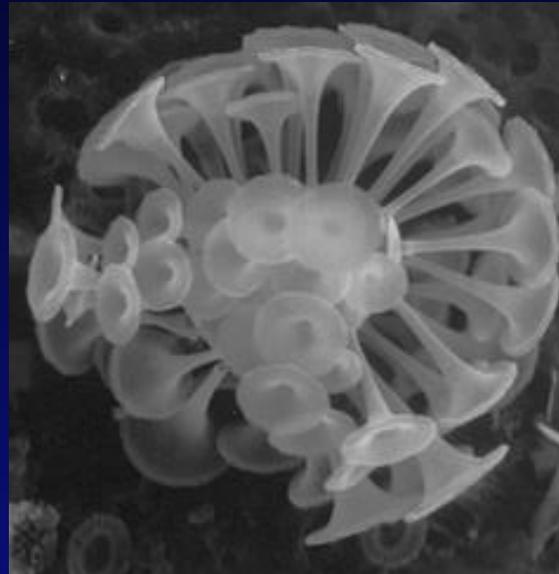


Microalgas Marinhas - do mundo microscópico ao clima global



Áurea Narciso & Manfred Kaufmann

XIII Seminário Regional Eco-Escolas, Câmara de Lobos, 2019



- Inspirar... expirar !
- Inspirar... expirar !
- O oxigénio que estamos a utilizar na nossa respiração é produzido pelo fitoplâncton nos oceanos!
- > 50% do oxigénio existente na atmosfera é produzido pelo fitoplâncton nos oceanos!



Early in Earth's History
the Atmosphere and Oceans Had
Zero Oxygen, High CO₂, Ammonia, Methane, and Intense Radiation.



Through Photosynthesis

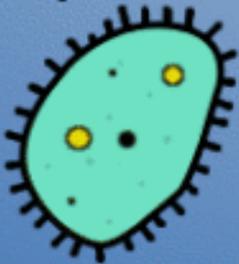
Algae Changed All That.

Algae are Global Players.
Algae Can Repair Our Damaged Ecosystems and Give Us Energy.

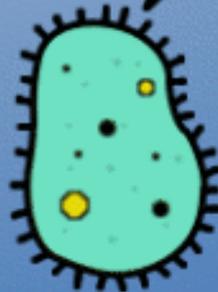
As cianobactérias começaram a libertar
oxigênio há mais de 3000 Ma!

2.5 BILLION YEARS
AGO...

IF WE KEEP
EMITTING OXYGEN,
WE COULD CAUSE
A CATASTROPHIC
CHANGE IN THE
ATMOSPHERE.



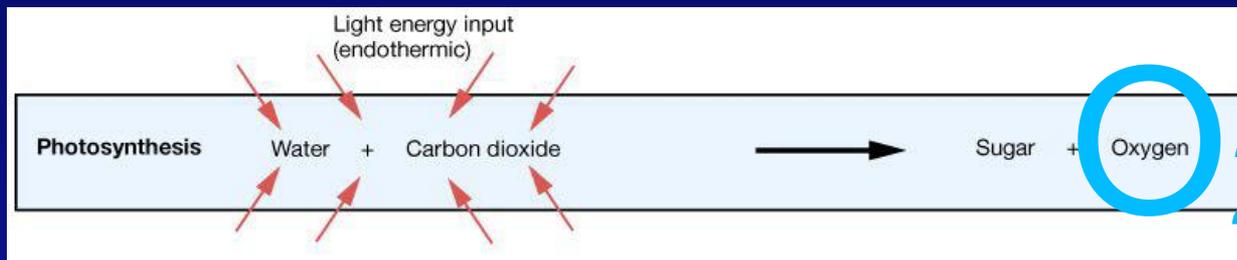
NONSENSE!
THE EARTH IS TOO BIG
AND WE ARE
TOO INSIGNIFICANT
TO HAVE ANY EFFECT
ON IT.
DROP YOUR CHEAP
ALARMISM ALREADY!

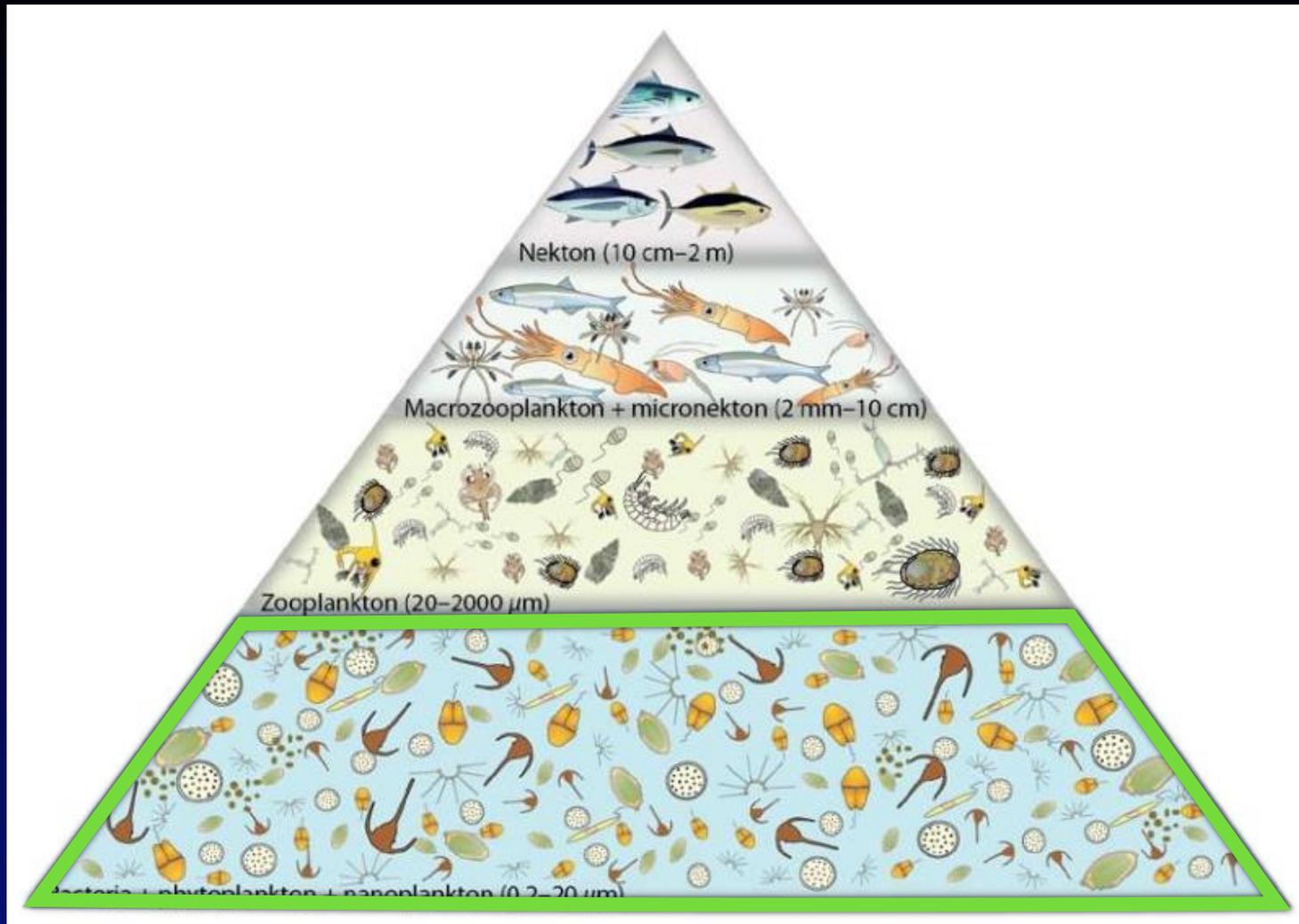


Há 2500 Ma...

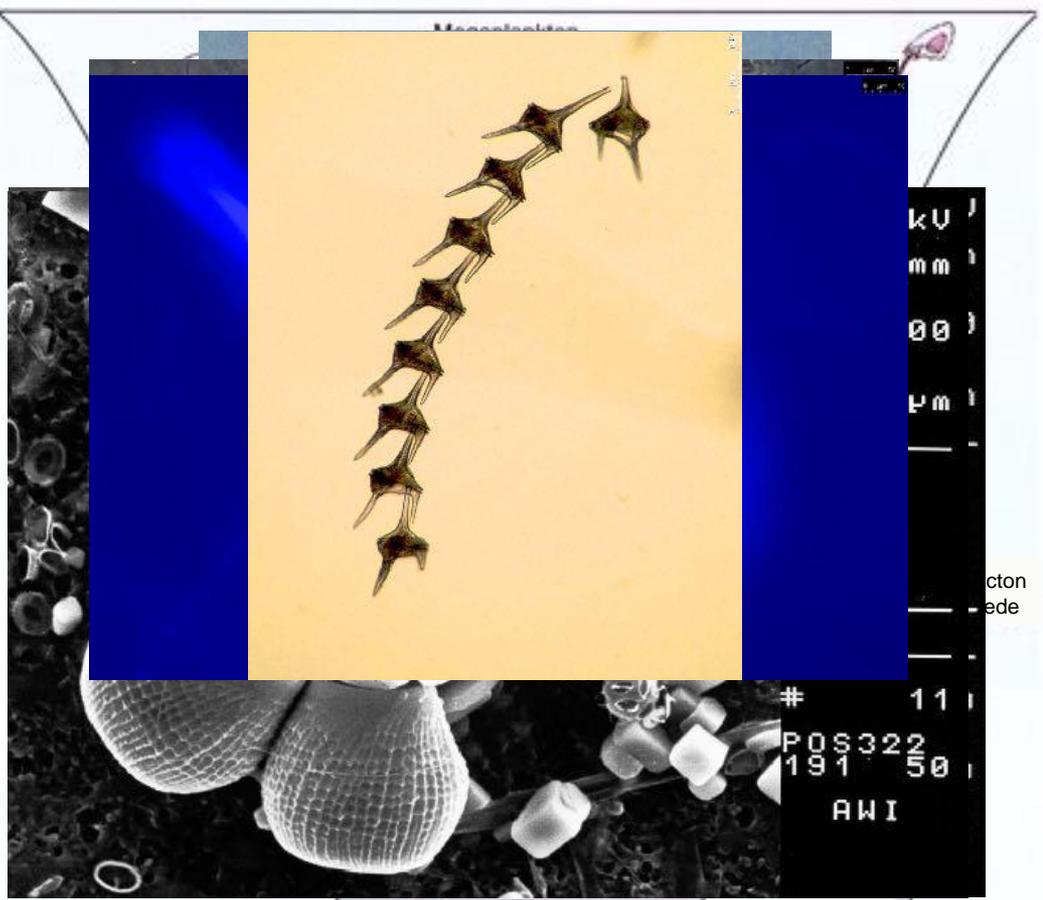
duas cianobactérias na
conversa...

preocupadas com o
impacto da sua
emissão de oxigénio
no planeta...





“A biomassa vegetal produzida em cada dia dava para construir uma prancha de 30 cm largura, 7 cm espessura cobrindo a distância entre a Terra e a Lua.” (Andersen 2005)



megaplâncton
(20-200 cm)

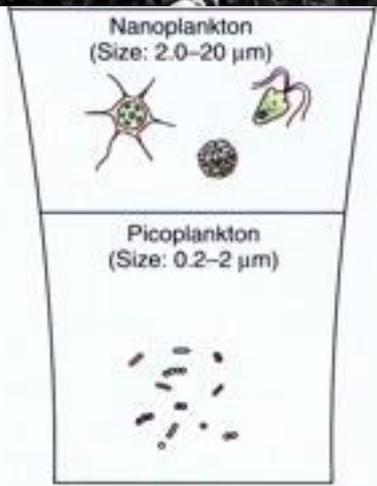
macroplâncton
(2-20 cm)

mesoplâncton
(0,2-20 mm)

microplâncton
(20-200 µm)

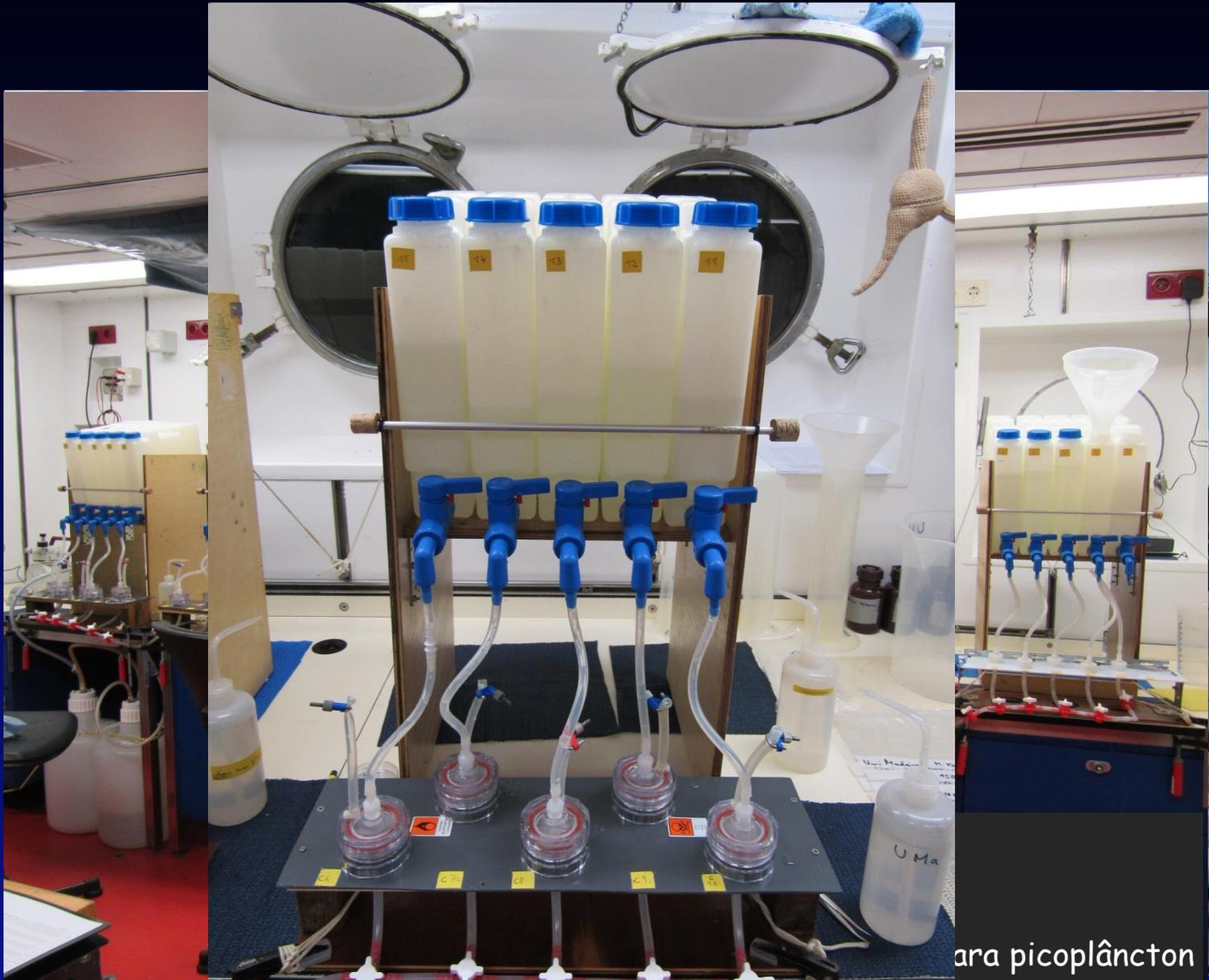
nanoplâncton
(2-20 µm)

picoplâncton
(0,2-2 µm)



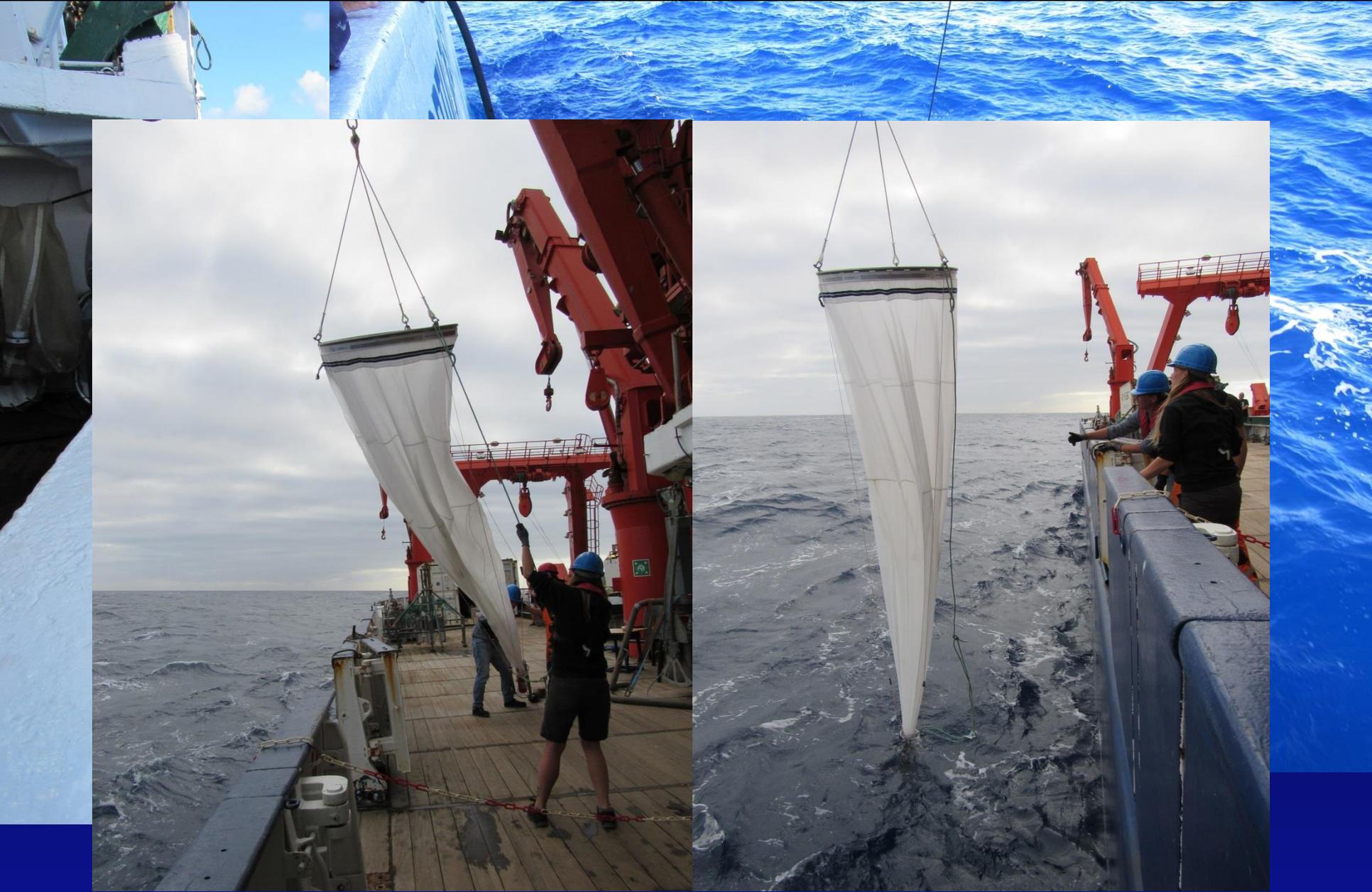
1 µm = 0,001 mm

Amostragem #1



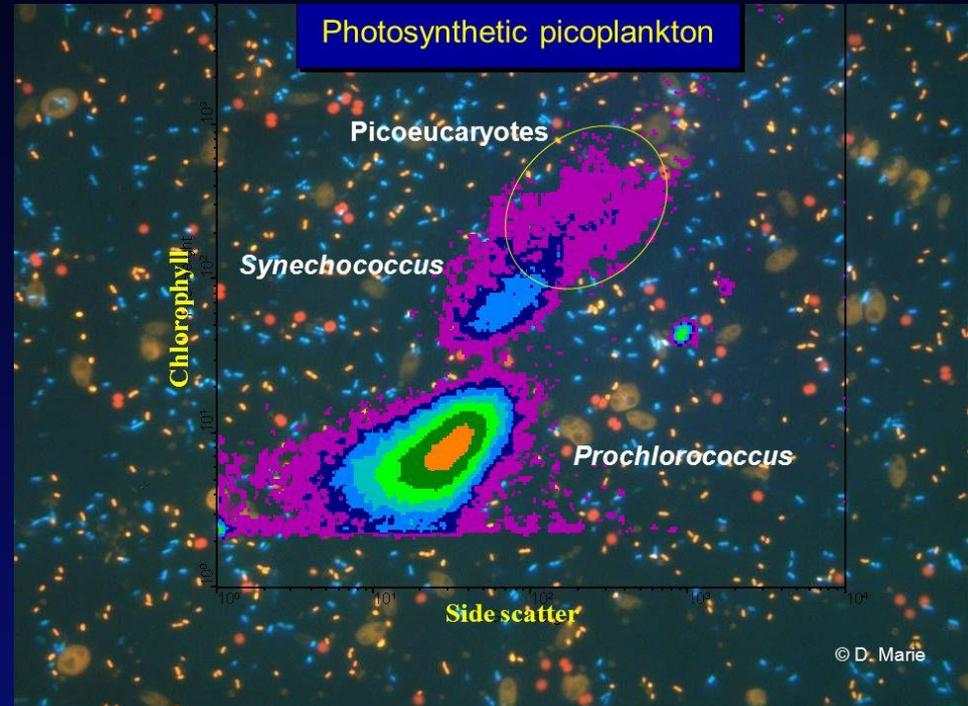
ara picoplâncton

Amostragem #2



Metodologia #1

picoplâncton



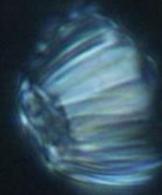
- Citometria de fluxo

Metodologia #2



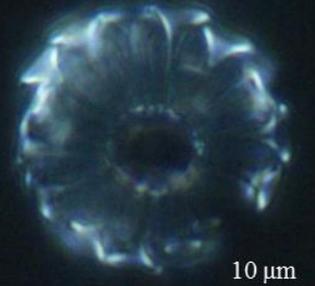
nanoplâncton

➤ *G. flabellatus*



10 μm

➤ *D. tubifera*



10 μm

➤ *F. profunda*

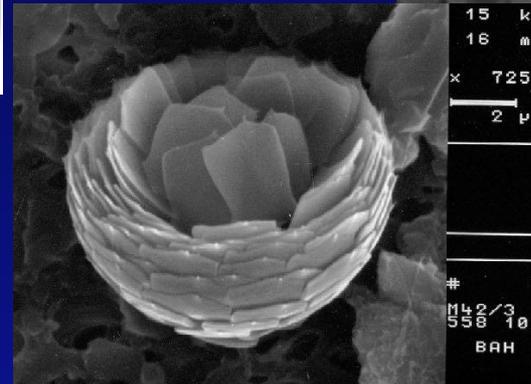
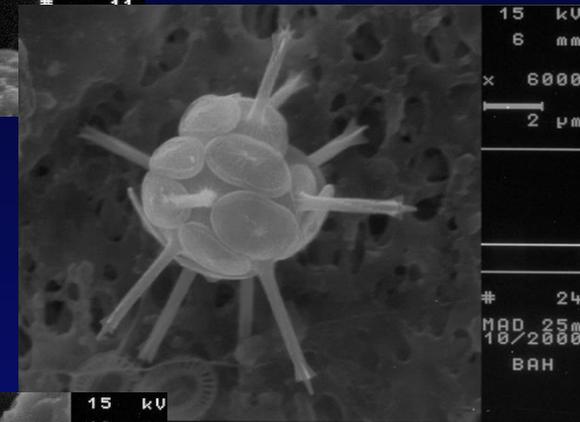
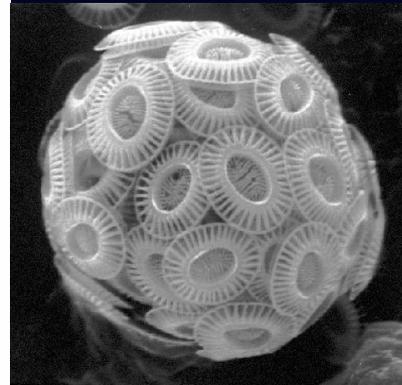


10 μm

- Identificação e contagem através de microscopia óptica com luz polarizada.

Metodologia #3

nanoplâncton

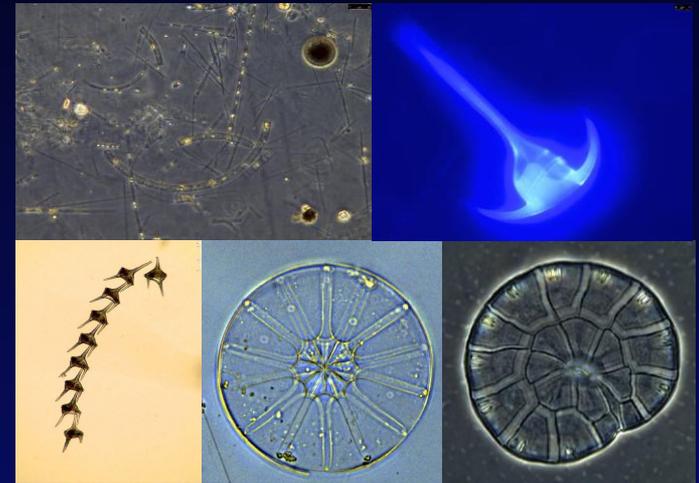


- Identificação e contagem através de MEV.

Metodologia #4



microplâncton



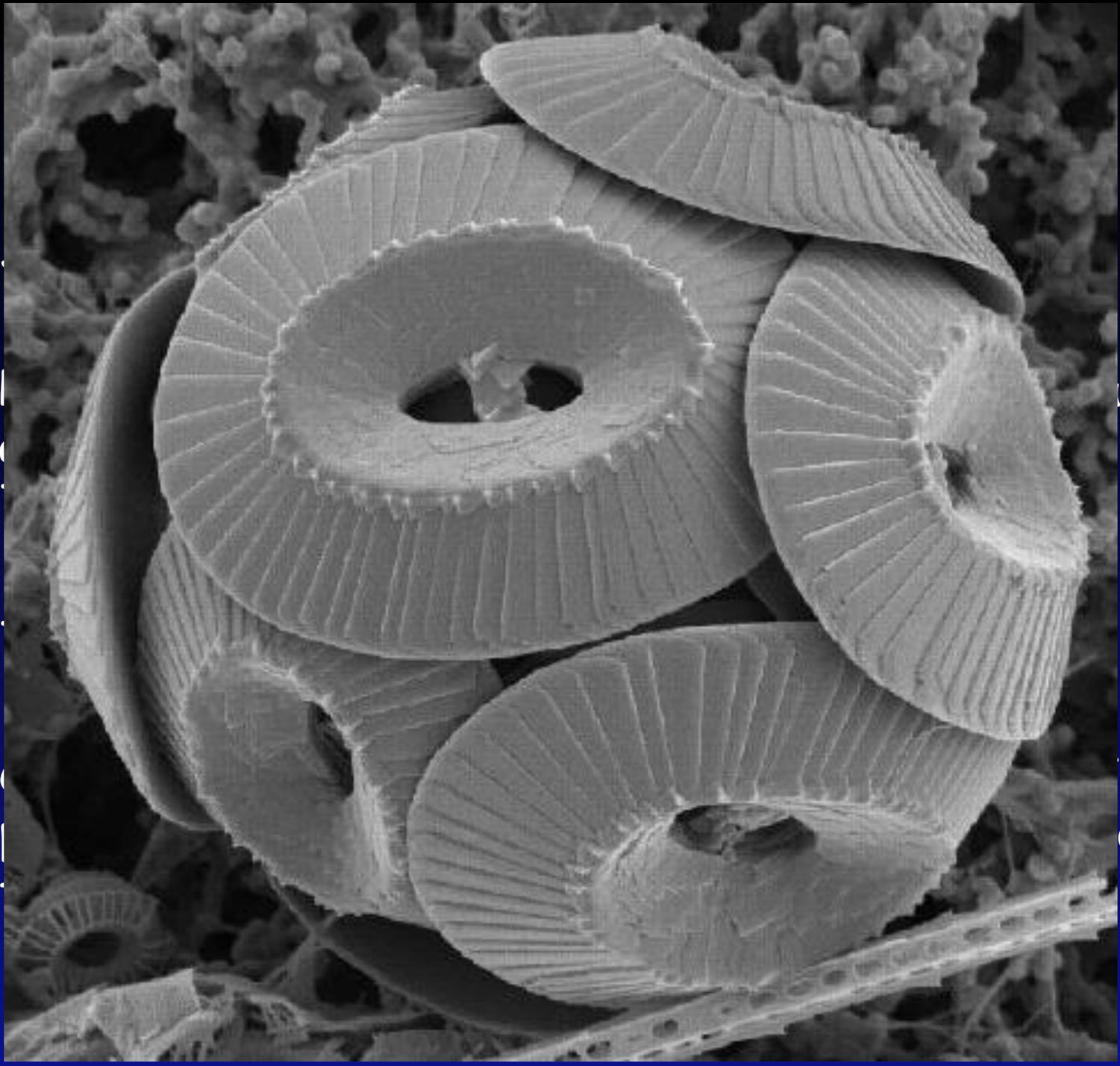
- Identificação e contagem através de microscopia óptica invertida.
 - Método de Utermöhl

1.

2.

3.

4.



nos
no

nas
odo

De que forma estas microalgas exercem impacto sobre o clima ?

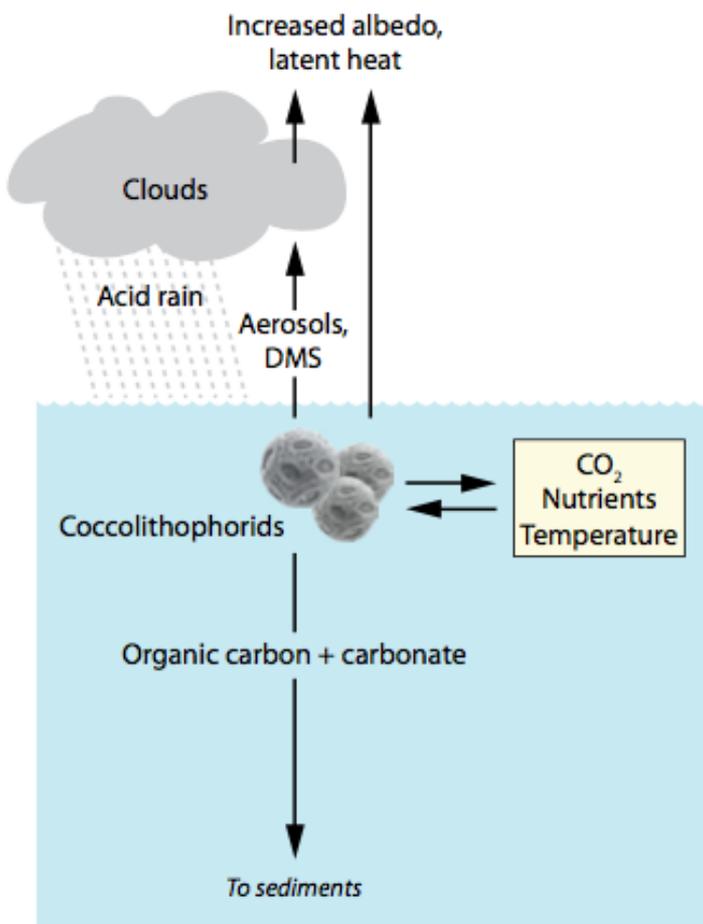
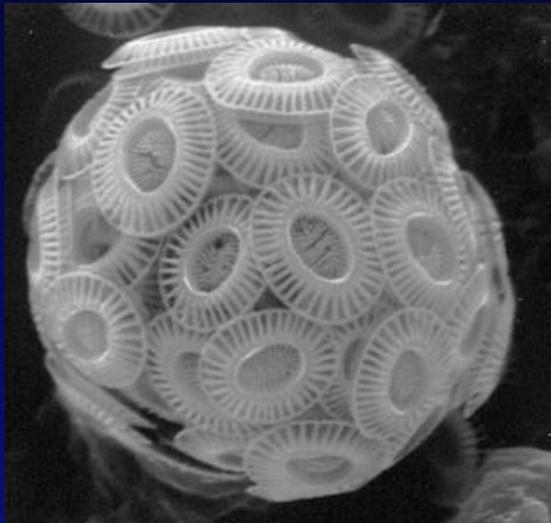


Figure 10.16 Blooms of *Emiliania huxleyi* and other coccolithophorids can have important effects on Earth's climate.

- Intervêm no ciclo do carbono
 - fixação do carbono orgânico através da fotossíntese
 - formação de carbonato de cálcio
 - transporte para os fundos dos oceanos e deposição, fazendo parte do arquivo sedimentar
- Intervêm no ciclo do enxofre
 - libertação de DMS (dimetilsulfureto)
 - DMS na atmosfera constitui núcleos para formação de nuvens
 - aumento da radiação reflectida

Proliferação maciça de *Emiliana huxleyi* visível do espaço



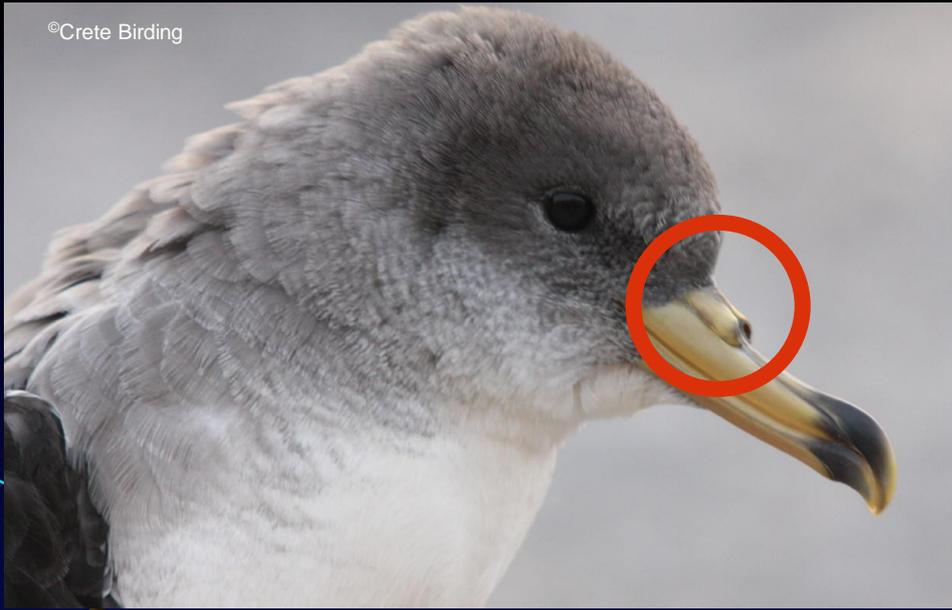
± 15 μm



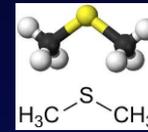
NASA

> 10 000 000 células / l

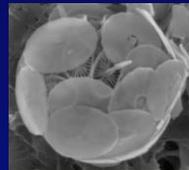
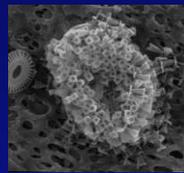
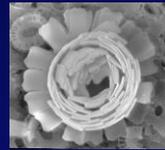
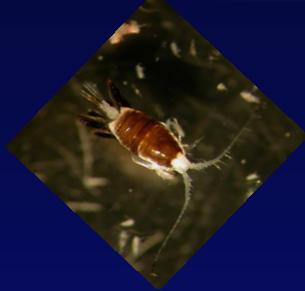
©Crete Birding

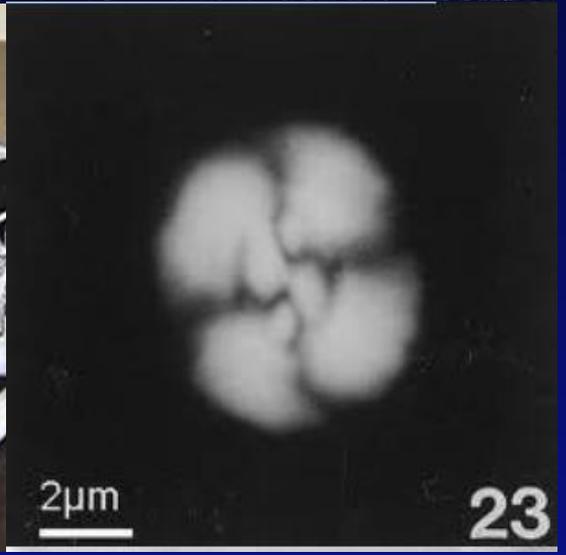


WindBirds.eu



DMS





Princípio do *Atualismo* ou das *Causas Atuais*

- A ecologia dos organismos atuais serve de chave para a interpretação dos requisitos ecológicos de organismos pretéritos;
- As exigências ambientais de organismos fósseis são as mesmas de organismos atuais que lhes estão aparentados.

Obrigada!



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