

חיים ומוזת בשזנית האלמוגים

צבי דובינסקי, המוני תלמידיו ועמיתיו
הפקולטה למדעי החיים
אוניברסיטת בר אילן
כנס המורים למדעי הסביבה תשע"ג –
חלק א (27.6.13)

1. האם אכן מתרחשים שינויי אקלים?

2. האם יש לשינויים אלו קשר לאדם?

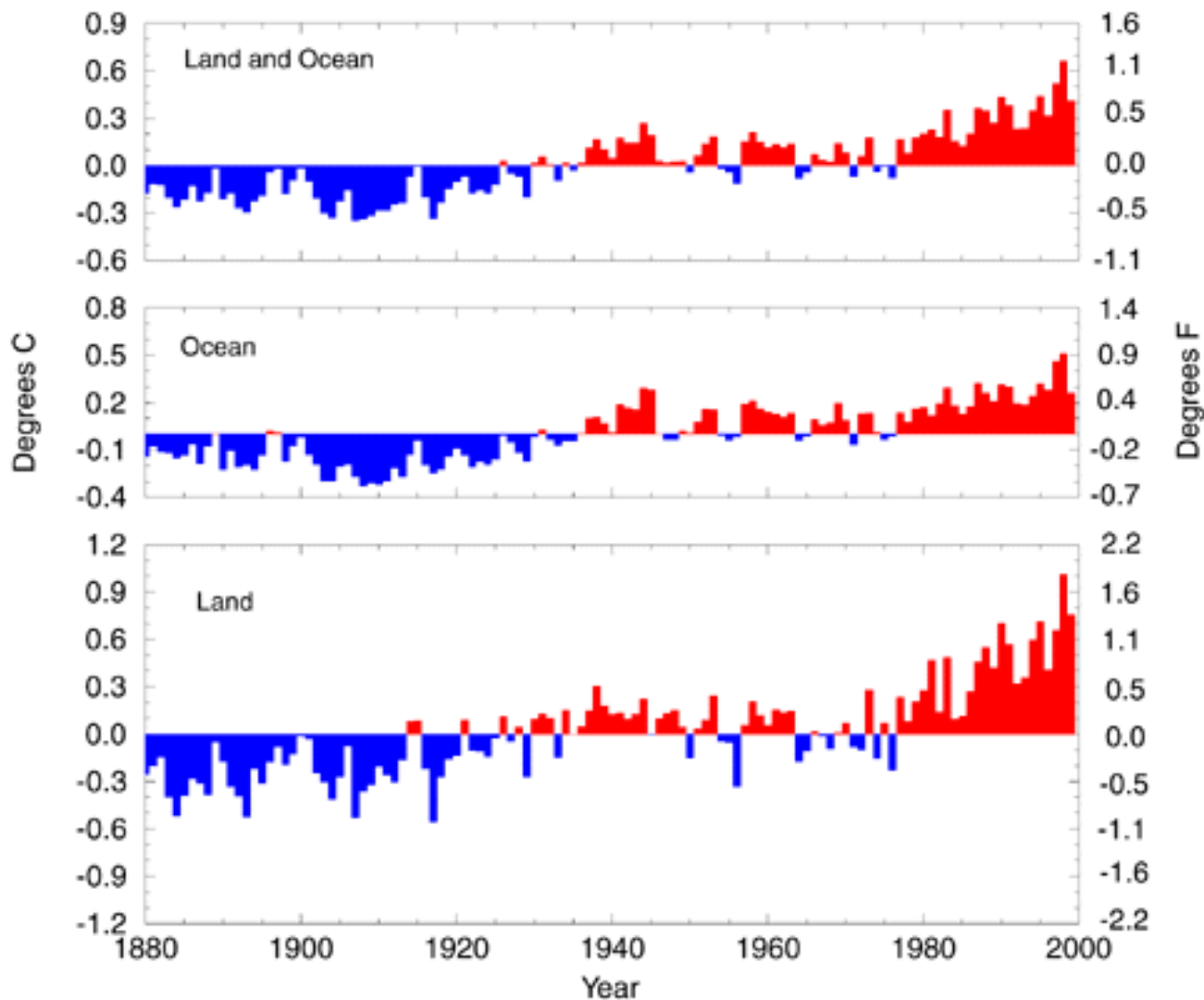
3. מהם אלמוגים?

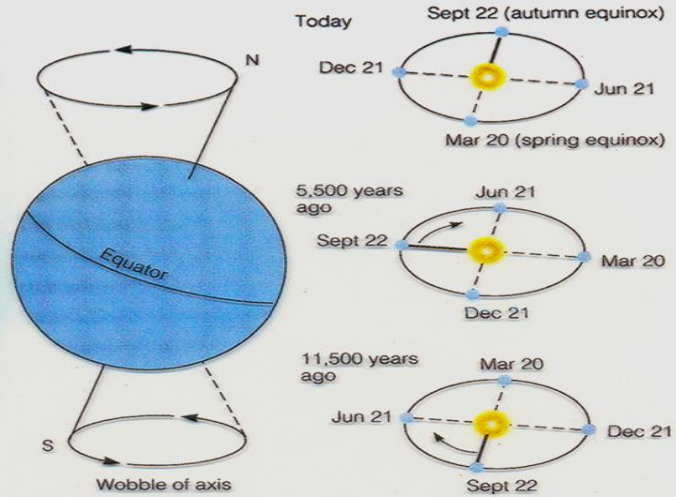
4. האם "אכפת" לאלמוגים משינויי האקלים?



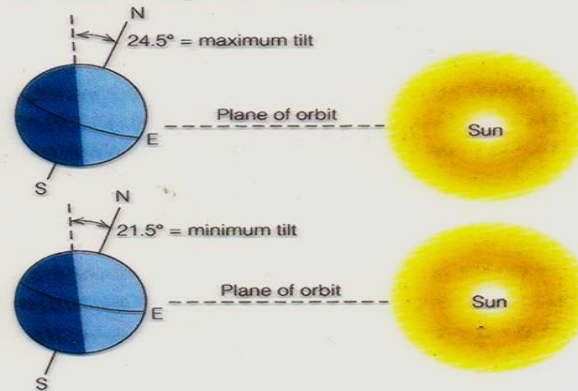
Annual Global Surface Mean Temperature Anomalies

National Climatic Data Center/NESDIS/NOAA

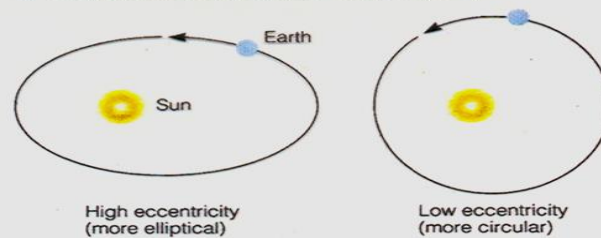


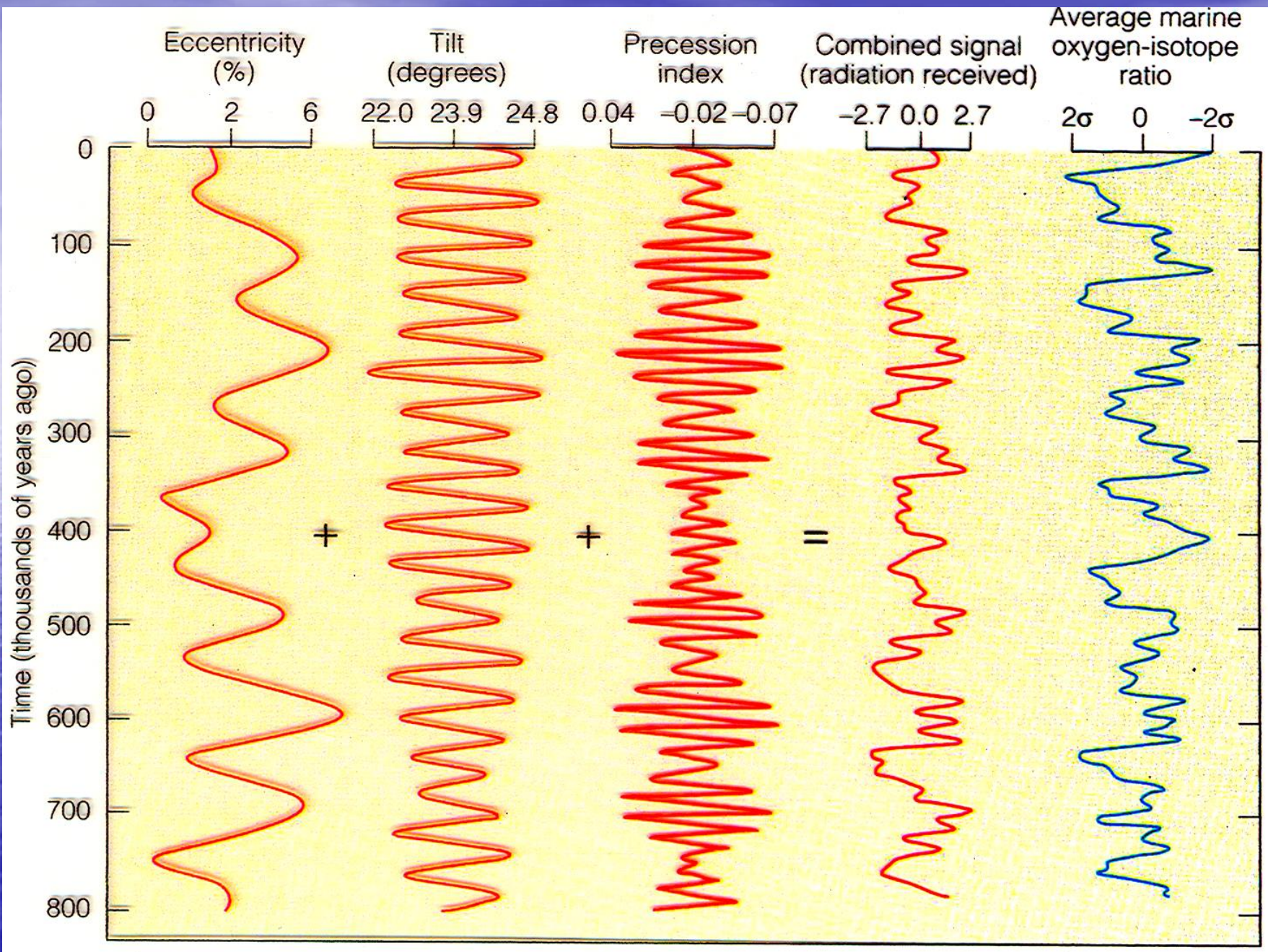


B. Tilt of the axis (period = 41,000 years)



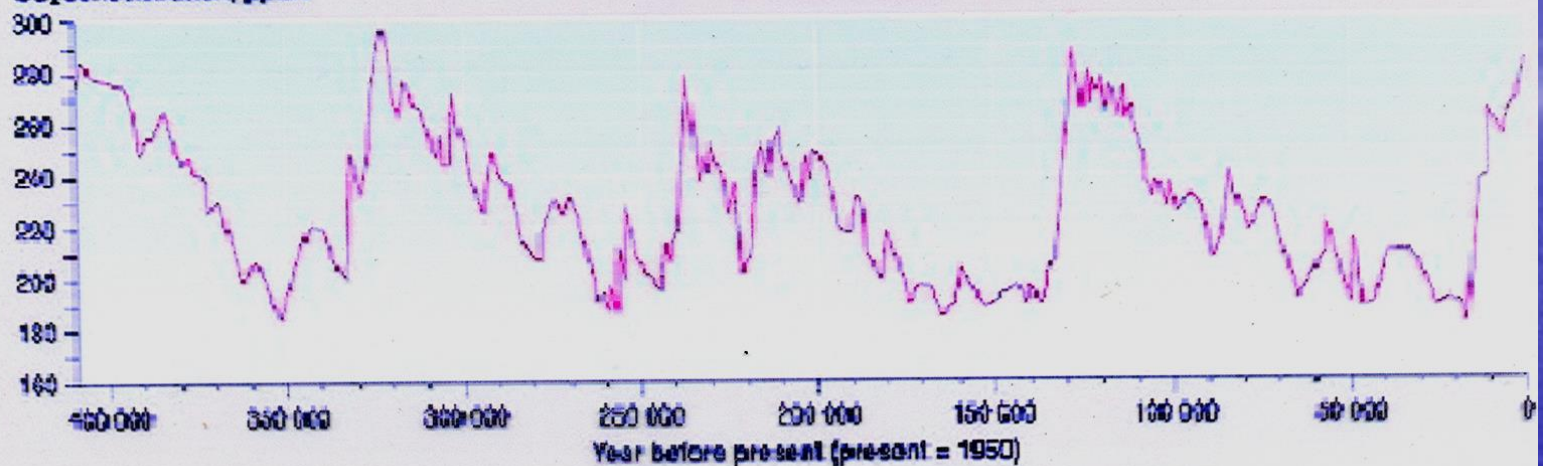
C. Eccentricity (dominant period = 100,000 years)



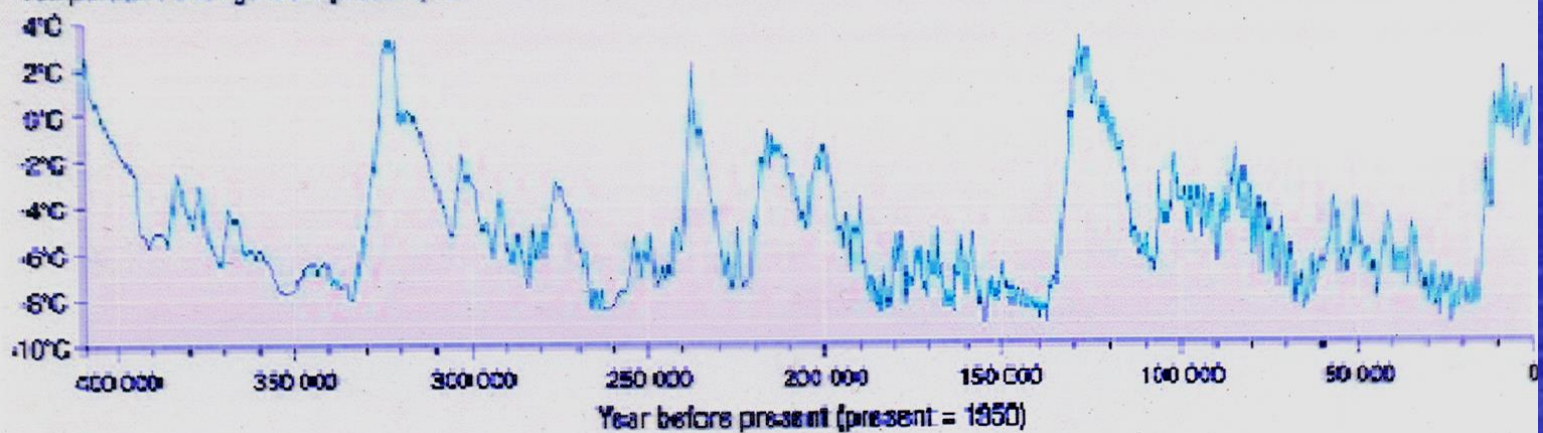


Temperature and CO₂ concentration in the atmosphere over the past 400 000 years (from the Vostok ice core)

CO₂ concentration, ppmv



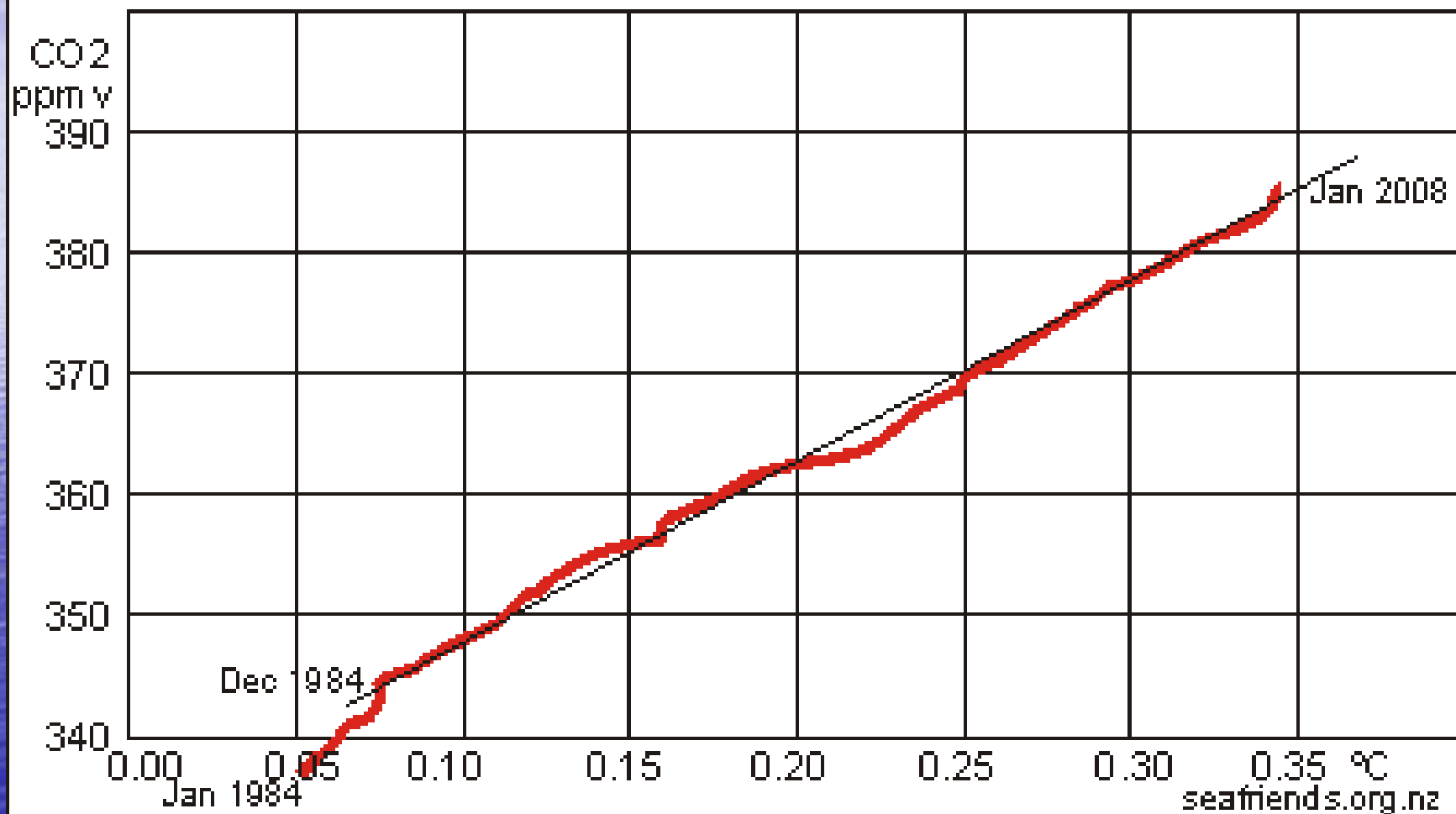
Temperature change from present, °C



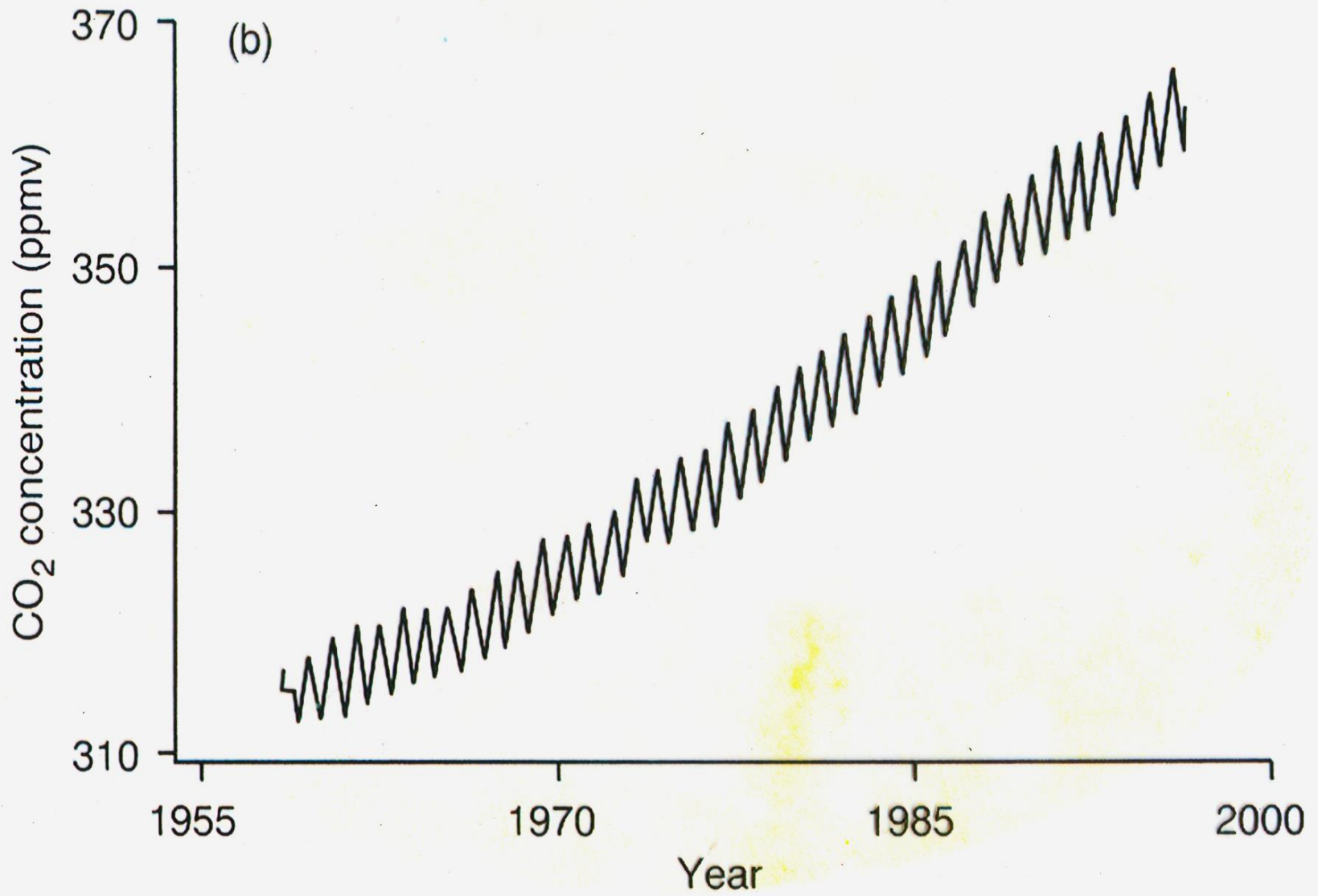
relationship between ocean temperature and atmospheric CO2

Atmospheric CO2 in ppmv from Mauna Loa 12-month moving average and temperature from global average temperature anomaly, 21-year moving average, as measured by satellite, Jan 1980- May 2008.

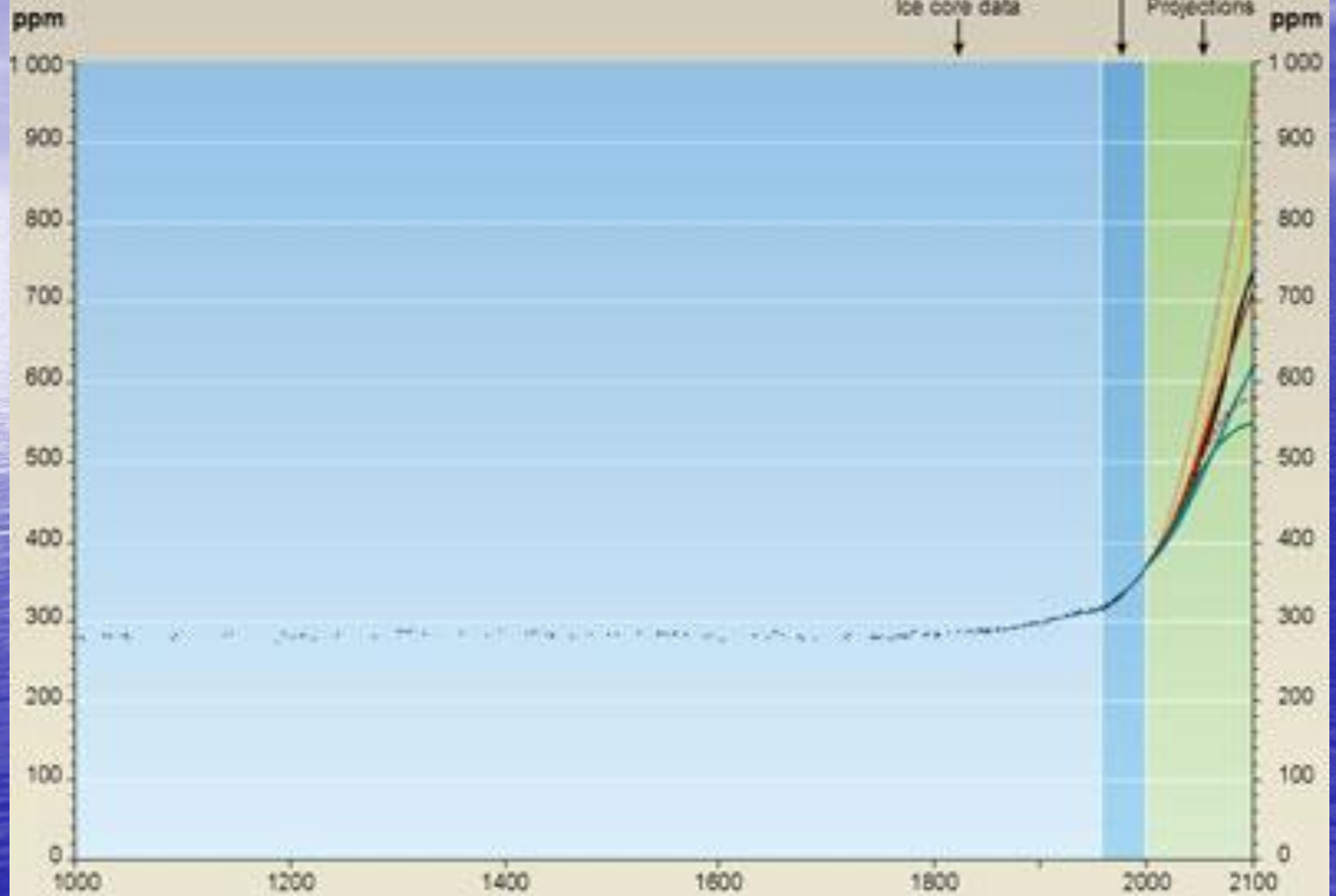
Source: Lance Endersbee Feb 2008.



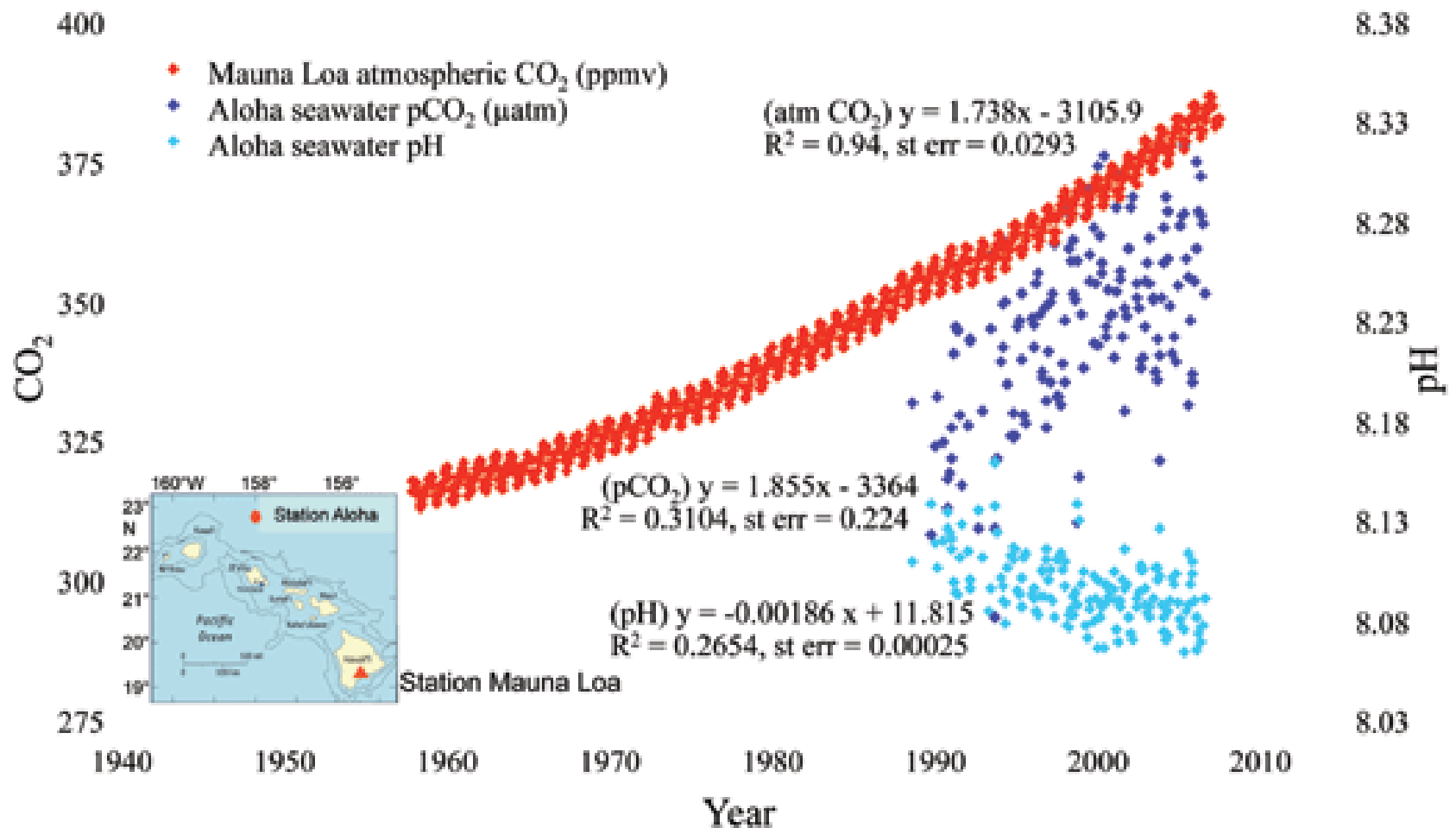
Years BP

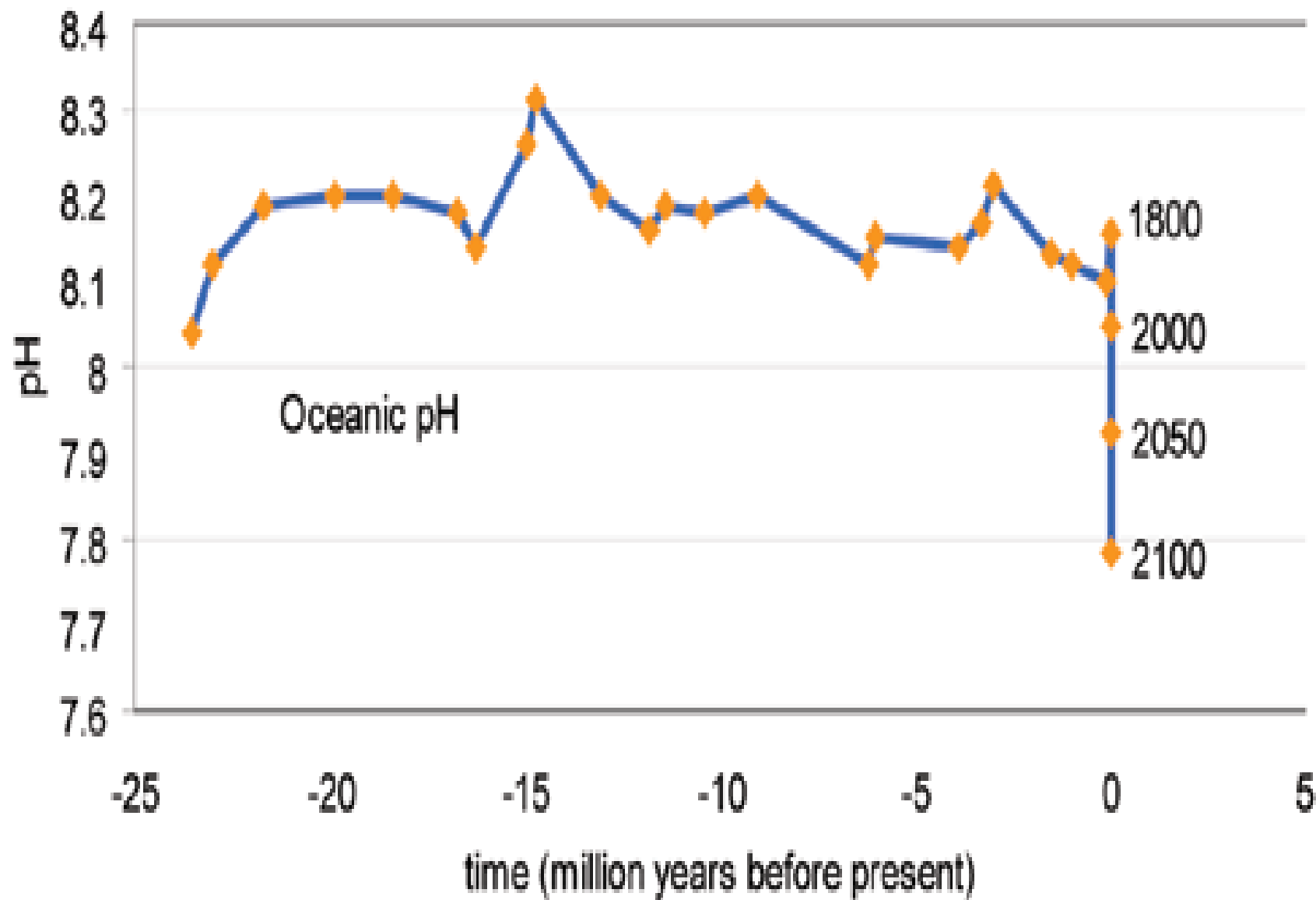


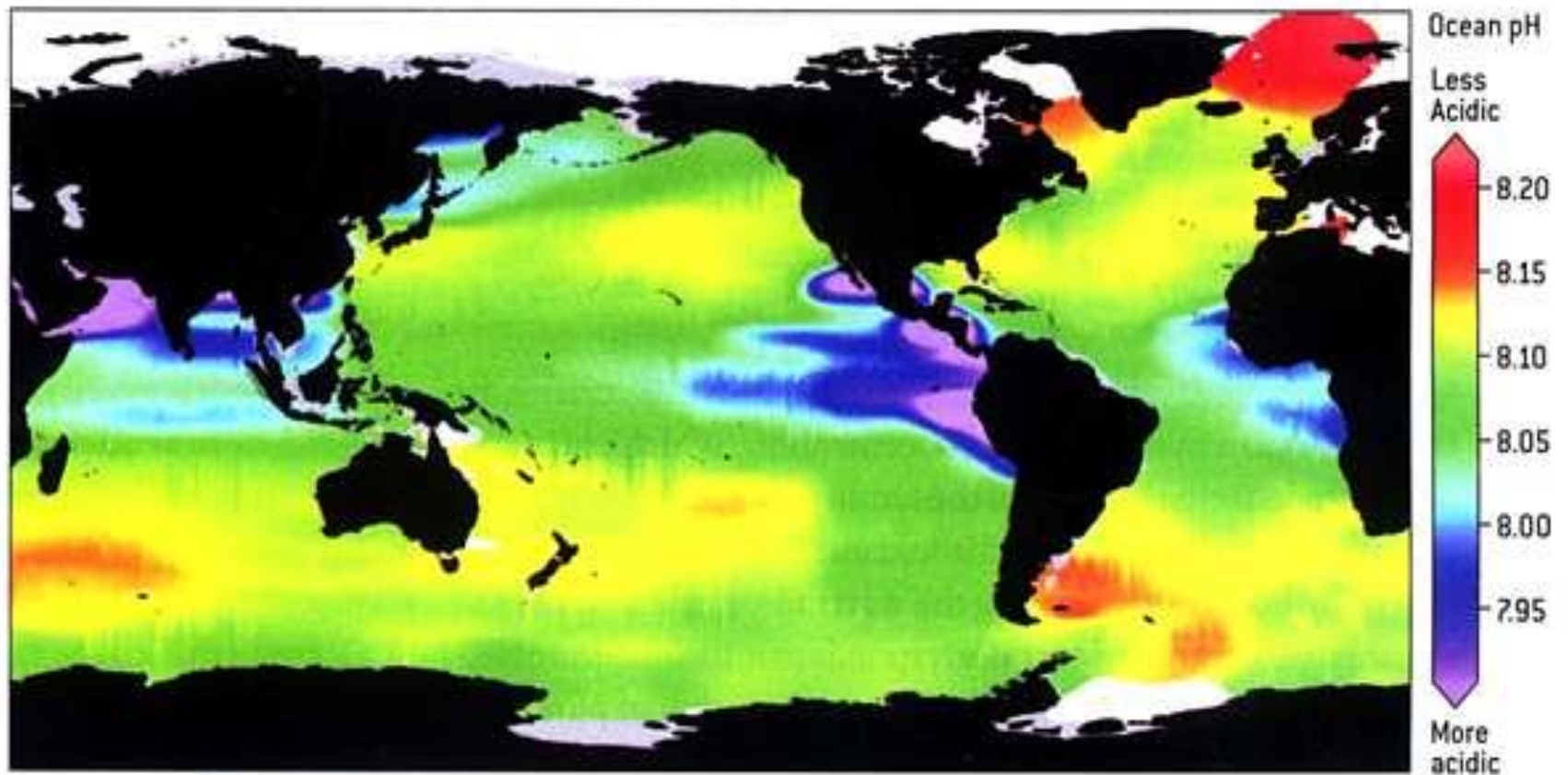
Past and future CO₂ atmospheric concentrations



CO₂ Time Series in the North Pacific Ocean







Ocean pH

Source: Scott C Doney, SciAm March 2006

Reefs are:

wave-resistant

biogenic

calcium carbonate

marine structures

Formed by:

Polychaets

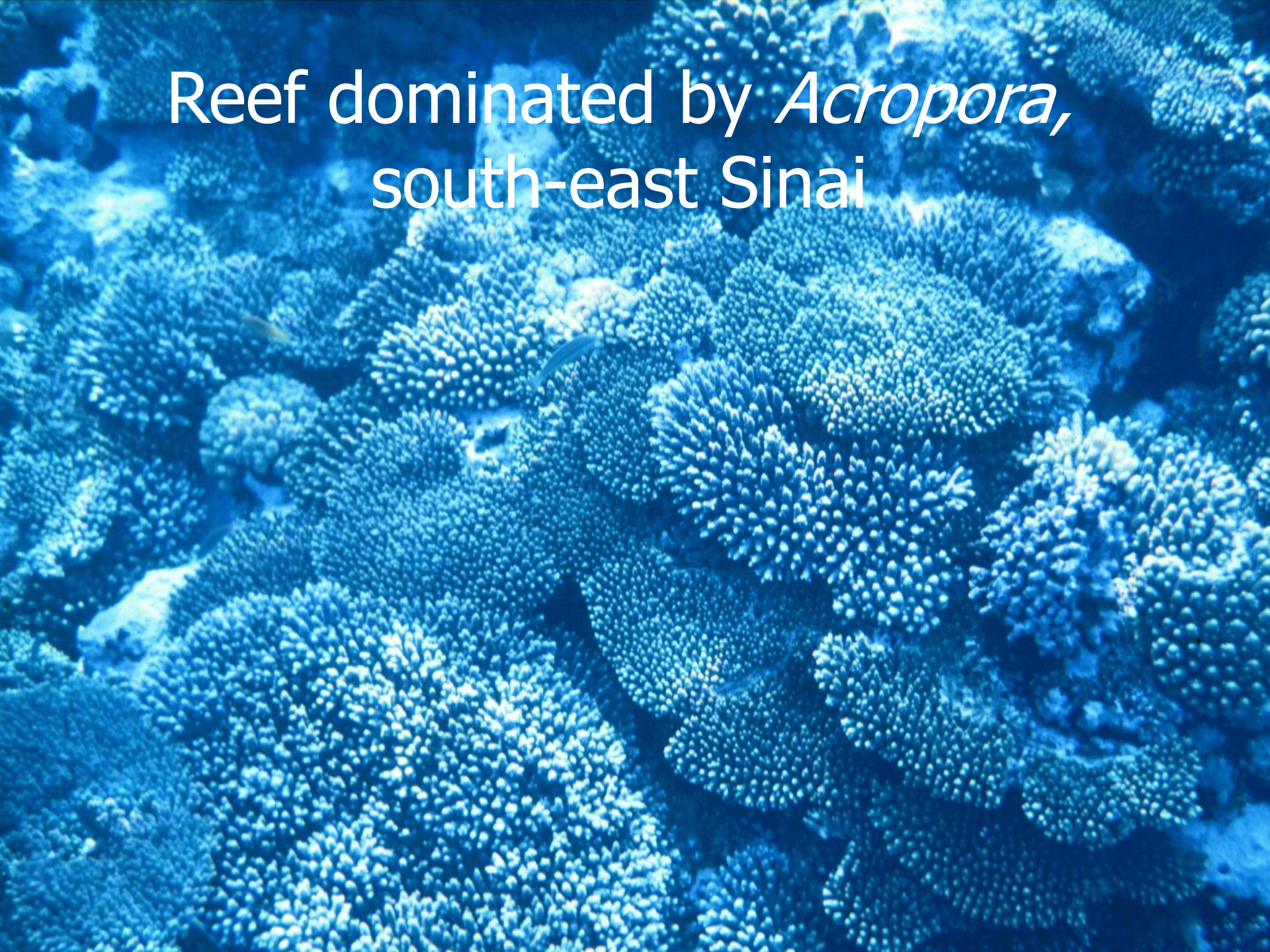
Oysters

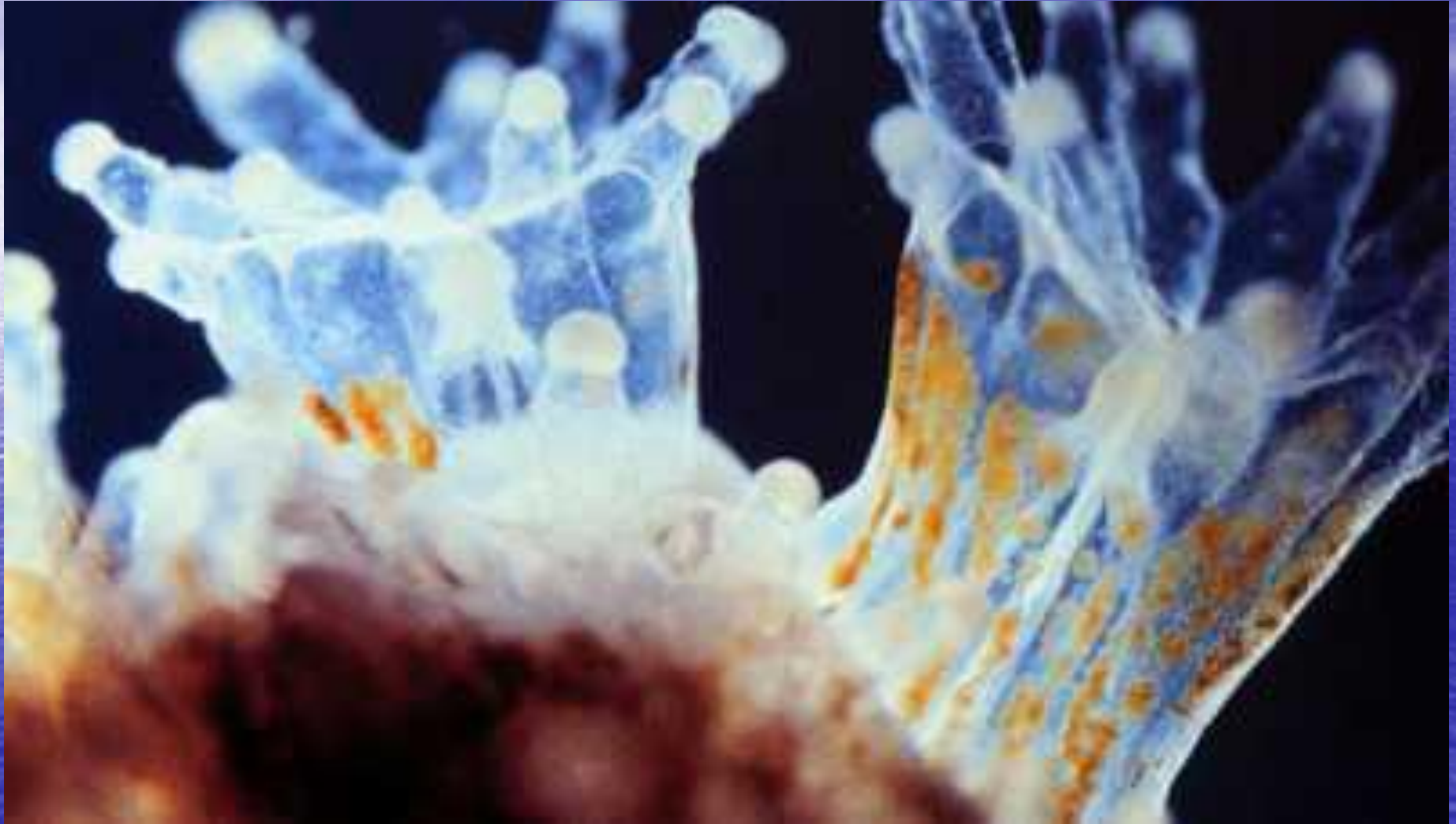
Vermetid gastropods

Calcareous algae

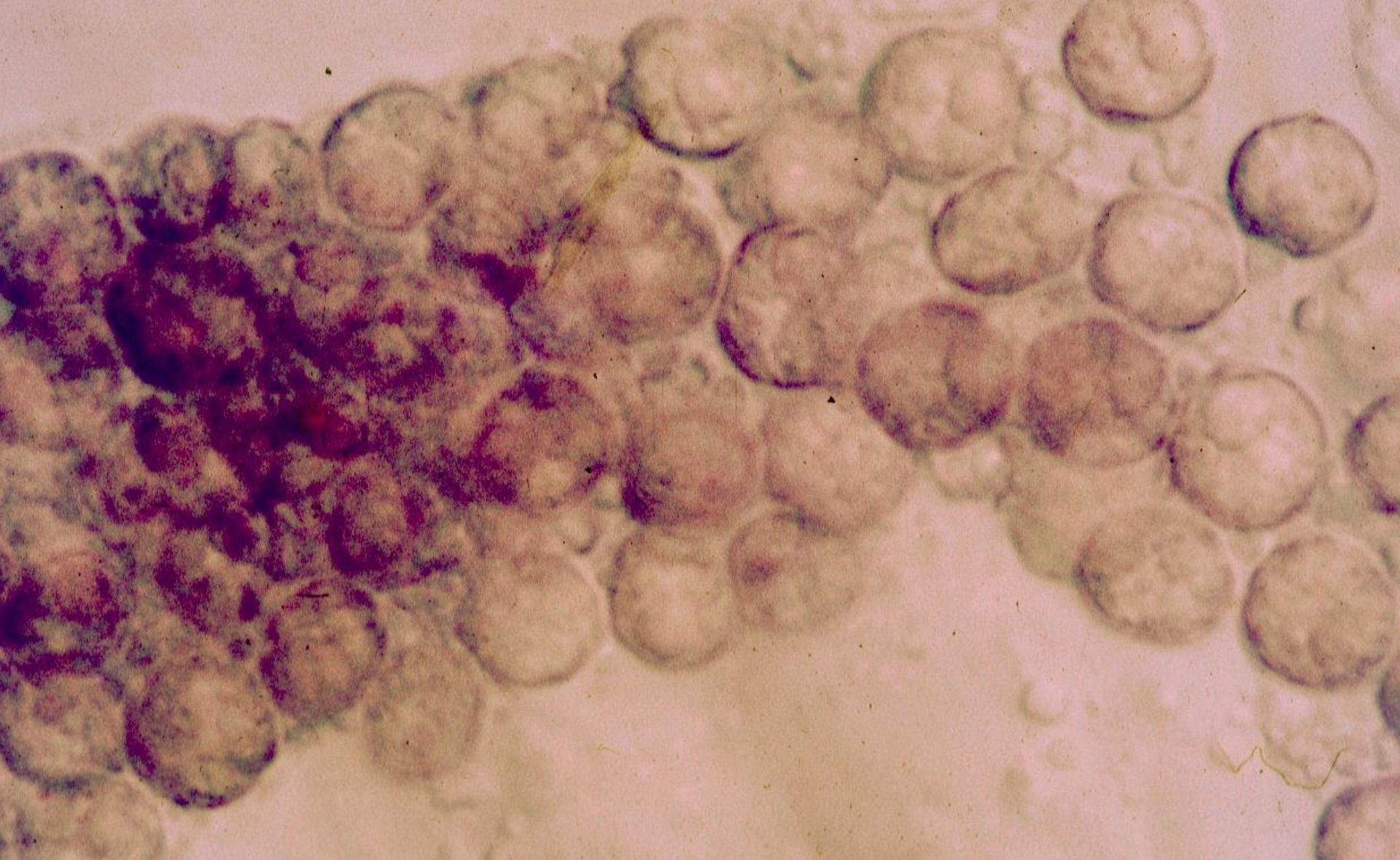
Corals

Reef dominated by *Acropora*,
south-east Sinai









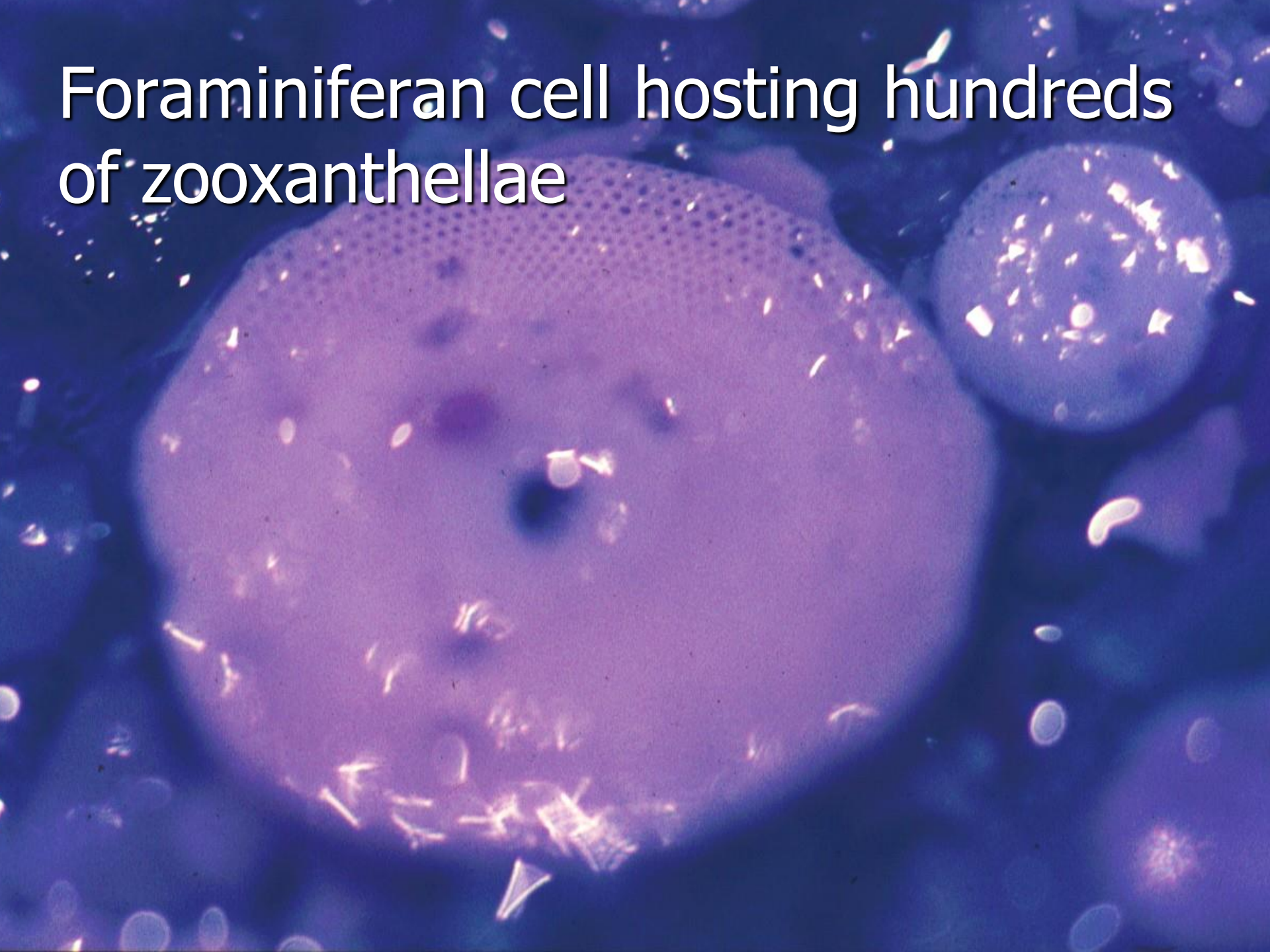
Zooxanthellae in coral tentacle

Red Sea reef
surrounded by
“Blue water”

Why are “blue
deserts”
blue?



Foraminiferan cell hosting hundreds of zooxanthellae



The zooxanthellate jellyfish
Cassiopea andromeda



The hydrocorallian *Millepora dichotoma*, Red Sea



What are the benefits of the symbiotic association zooxanthellae-coral to

A. Host?

Energy-rich photosynthate translocated from the zooxanthellae

B. Symbionts?

Essential nutrients, mostly nitrogen and phosphorus compounds, from host's metabolic wastes

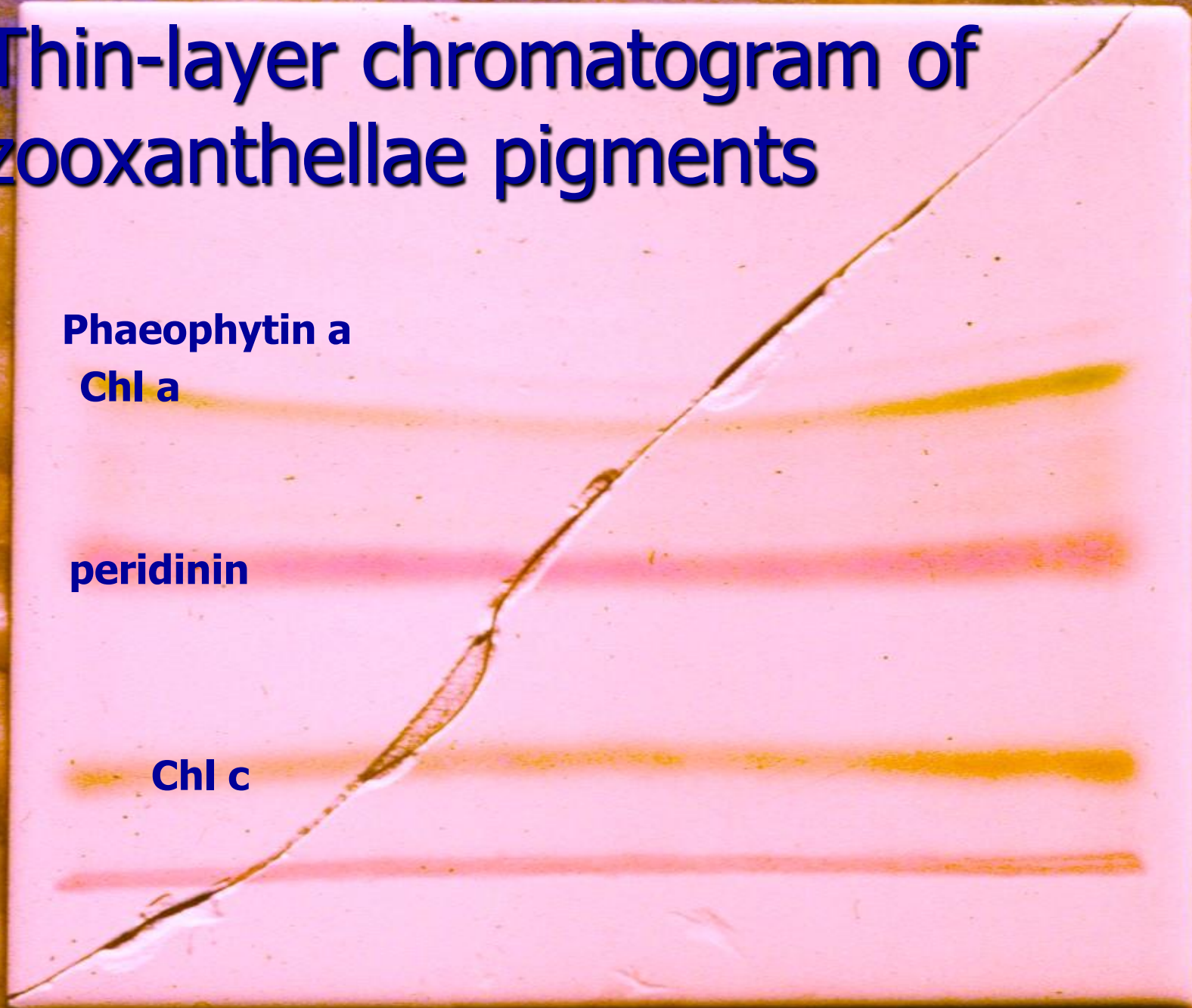
Thin-layer chromatogram of zooxanthellae pigments

Phaeophytin a

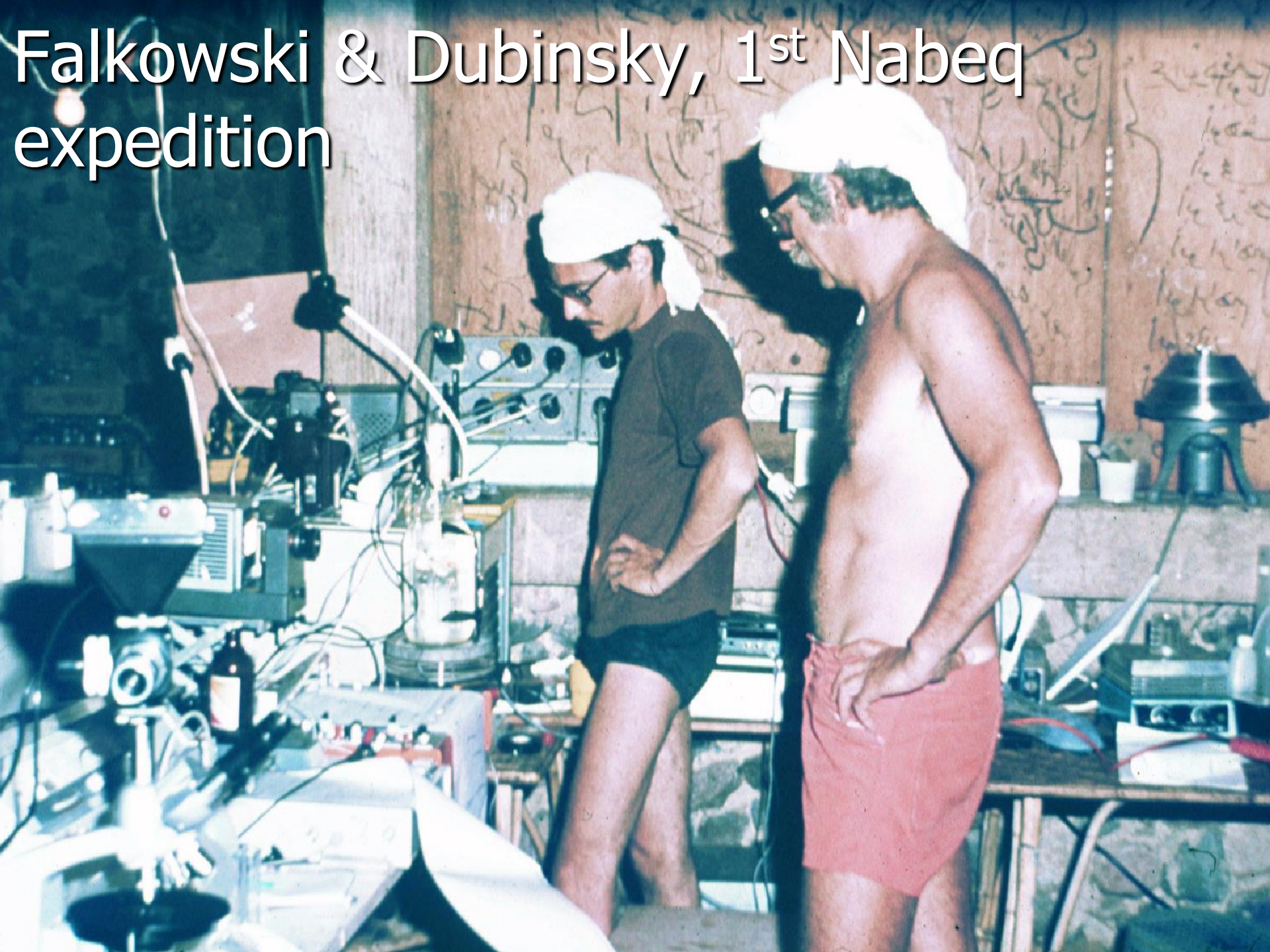
Chl a

peridinin

Chl c



Falkowski & Dubinsky, 1st Nabeq expedition



מדינת ישראל
משרד המשפטים

מדינת ישראל

דואר רשמי





Stylophora pistillata at 70m





Low light

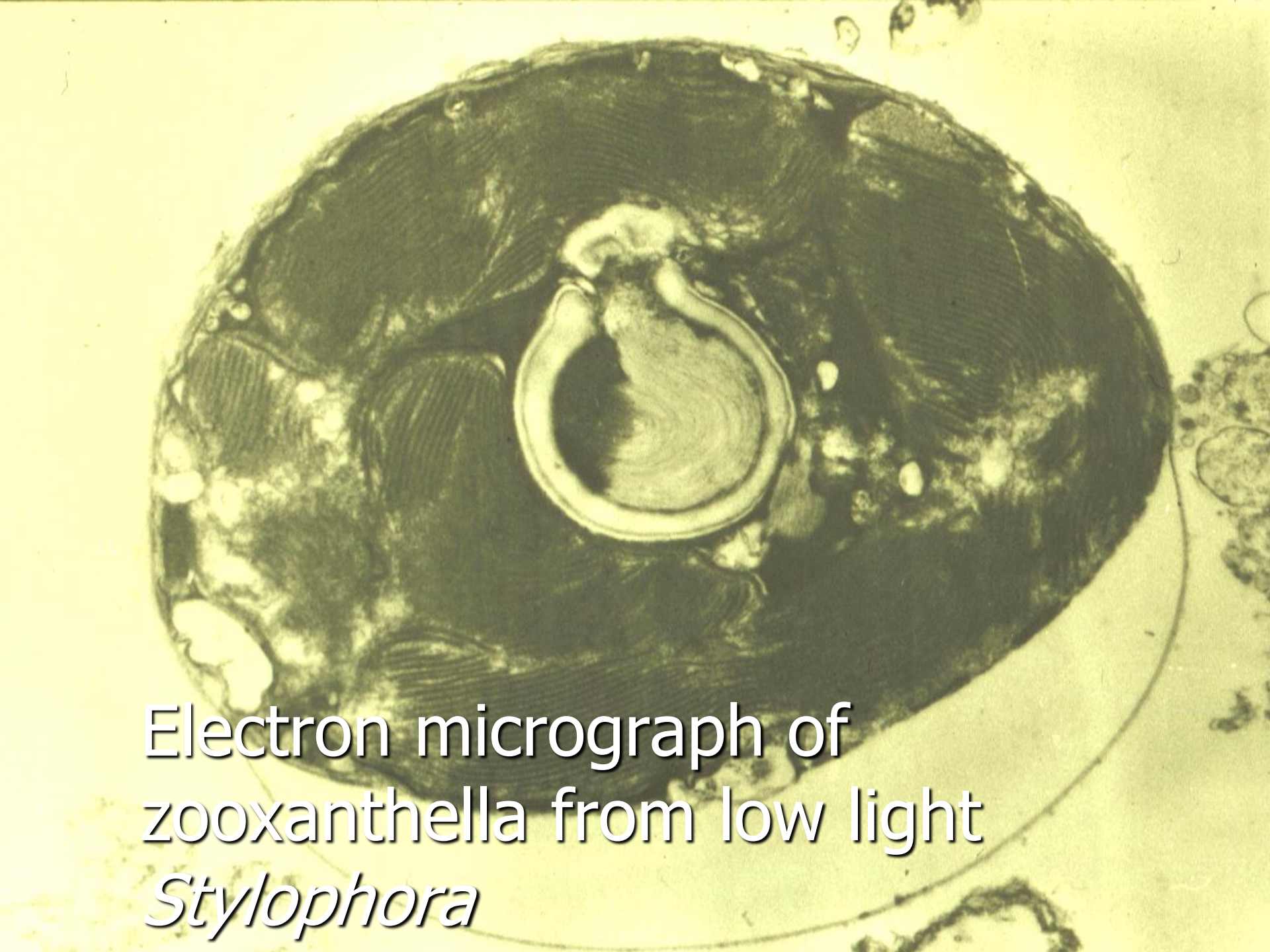


High light

Stylophora pistillata

High and low light acclimation in *Stylophora pistillata* zooxanthellae

Parameter Treatment	$\mu\text{g ch } a \text{ cm}^{-2}$	$10^6 \text{ cells cm}^{-2}$	$\text{pg ch } a \text{ cell}$
HL	3.6 ± 1.1	1.7 ± 0.3	2.2 ± 0.3
LL	14.2 ± 4	1.6 ± 0.1	8.3 ± 0.5
LL/HL	3.9	1.1	3.7



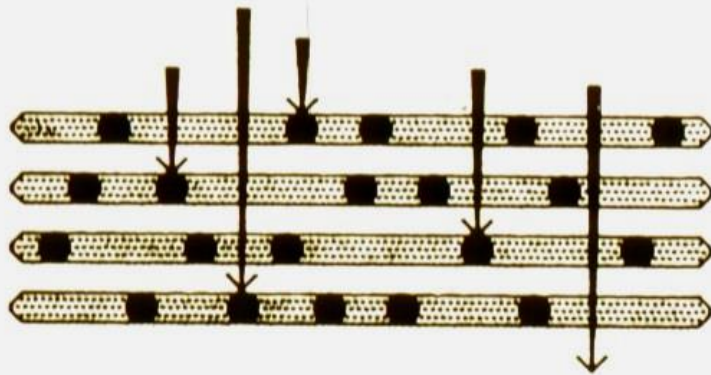
Electron micrograph of
zooxanthella from low light
Stylophora

Electron micrograph of
zooxanthella from high light
Stylophora



Photoacclimation strategy

Low Light



High Light

