Comparison of shell structure of two tropical thecosome pteropods (*Creseis acicula* and *Diacavolinia longirostris*) over a 45-year period

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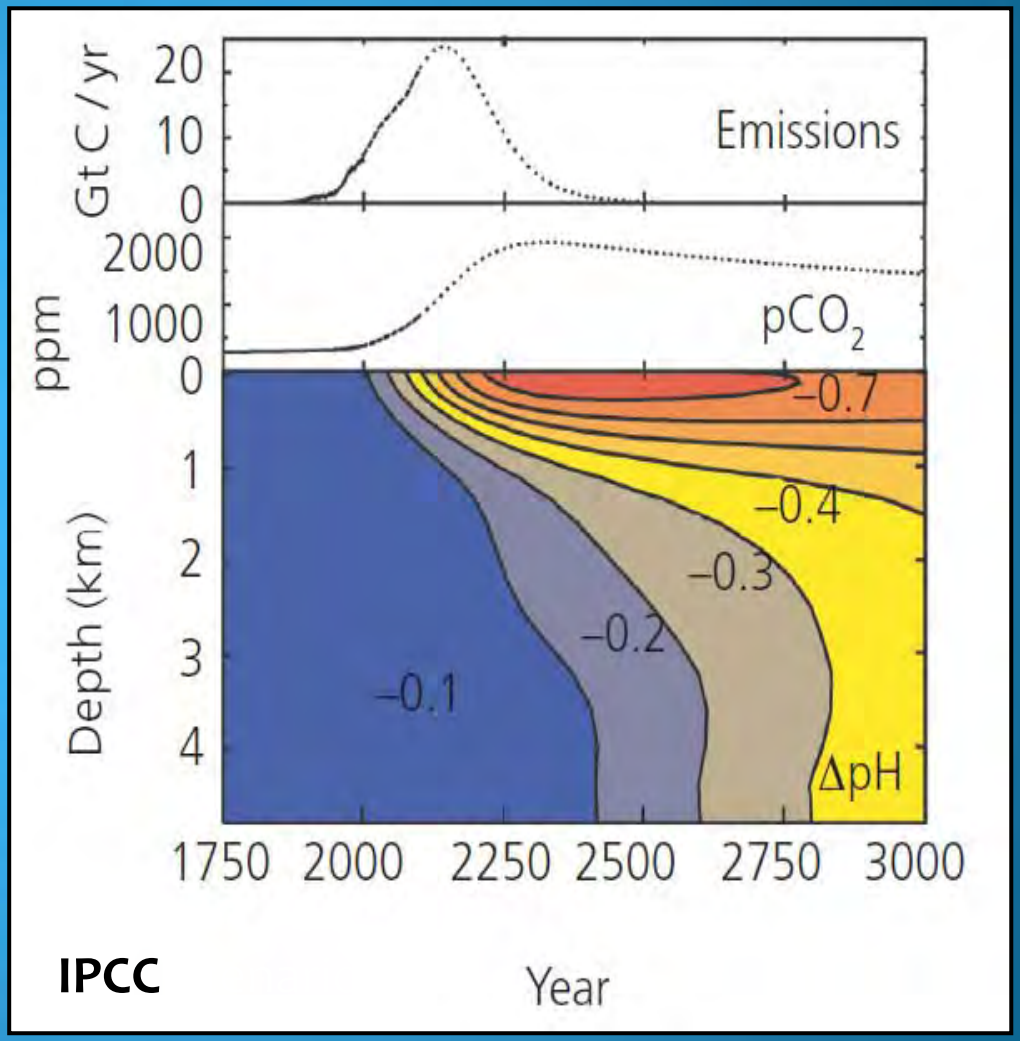
Ocean acidification

Carbon dioxide levels

Surface waters

Latitudinal differences

Saturation horizon

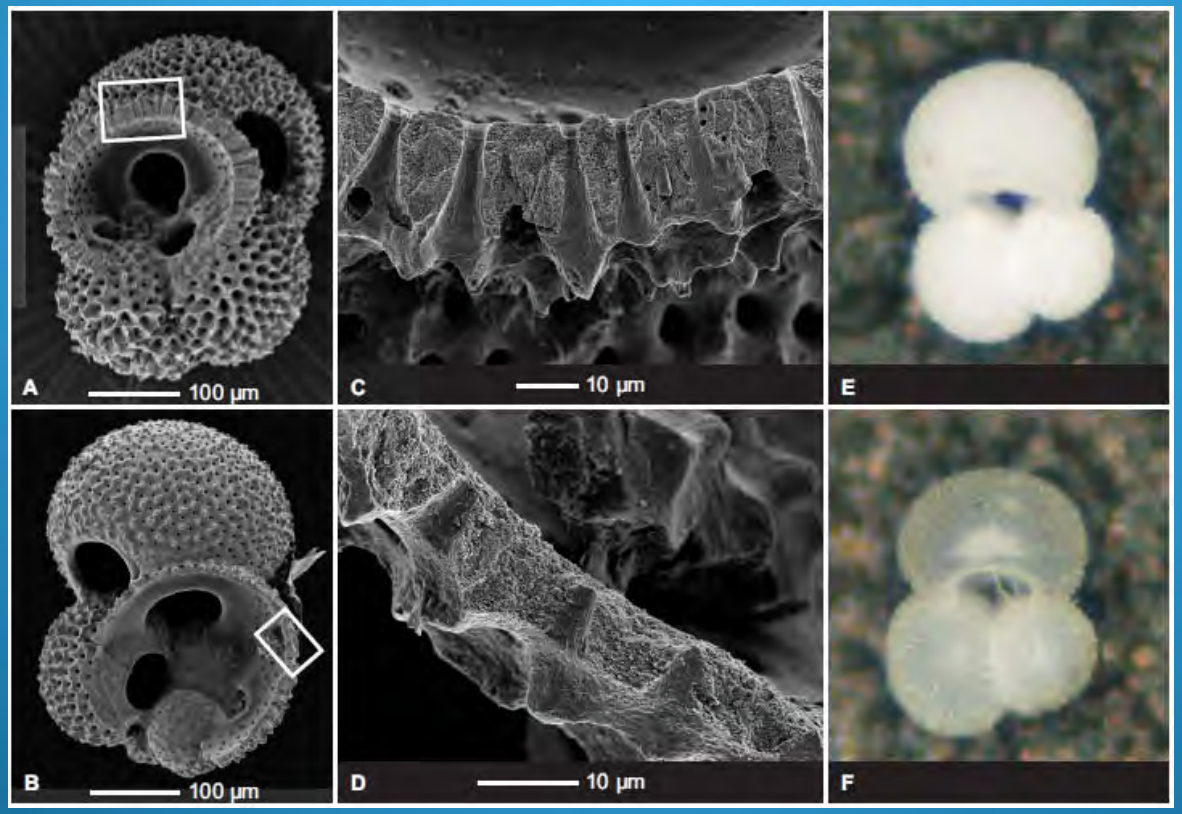


Raven *et al.* (2005)

Calcifying organisms

Aragonite: a form of calcium carbonate (50% more soluble than calcite)

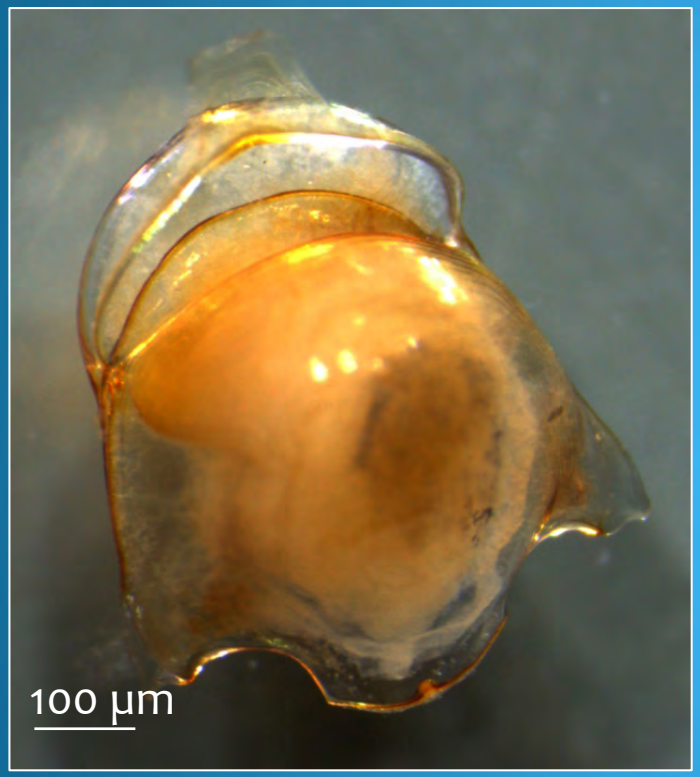
Corals, Echinoderms, Foraminifera



de Moel et al. (2009)

Pteropods

Diacavolinia longirostris



Pelagic molluscs

Hydrological water mass indicators

Food for commercially important fish

Help regulate ocean's carbonate system

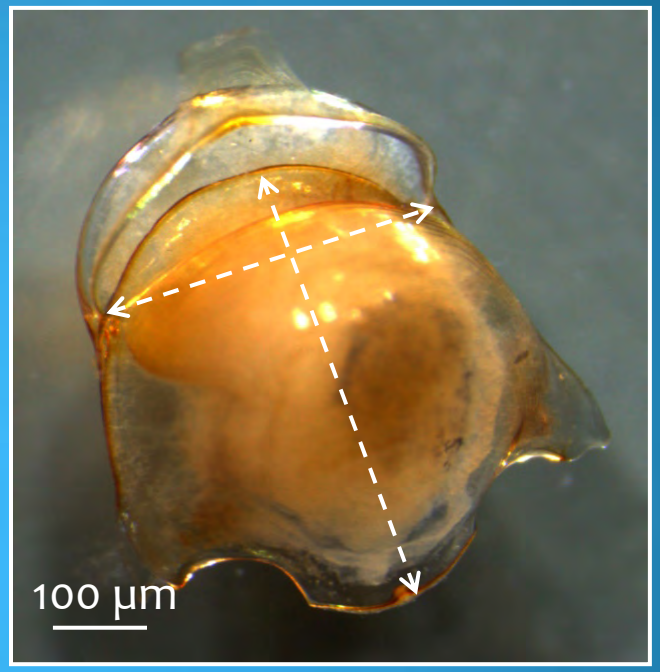
Lack of knowledge

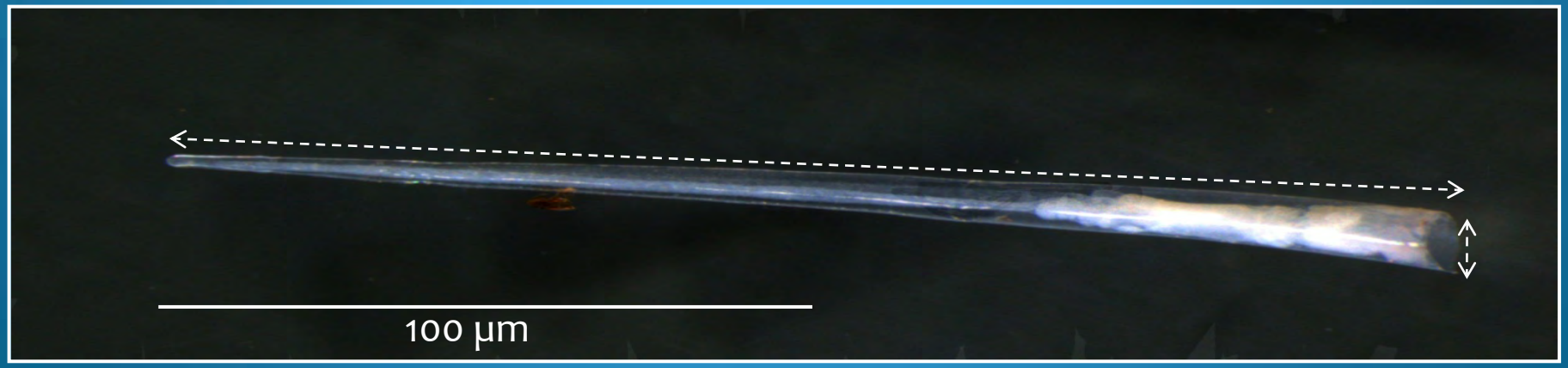
Creseis acicula

Sampling

Shell morphology

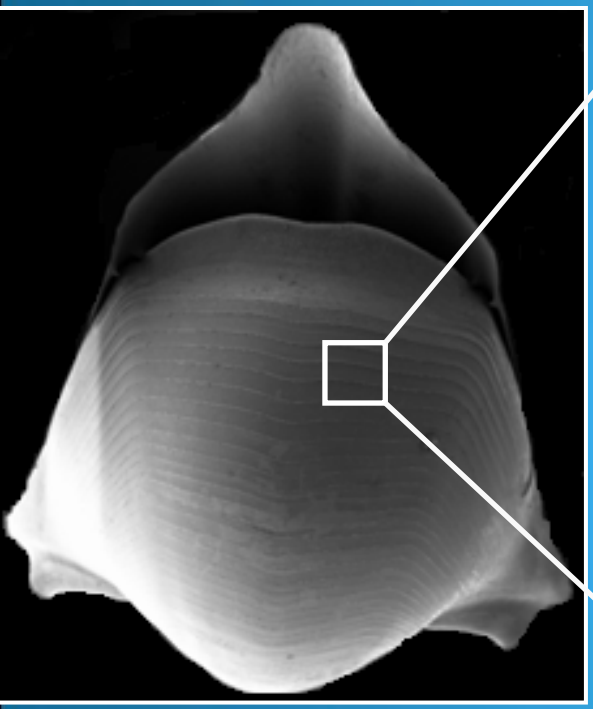
Morphological changes over time?

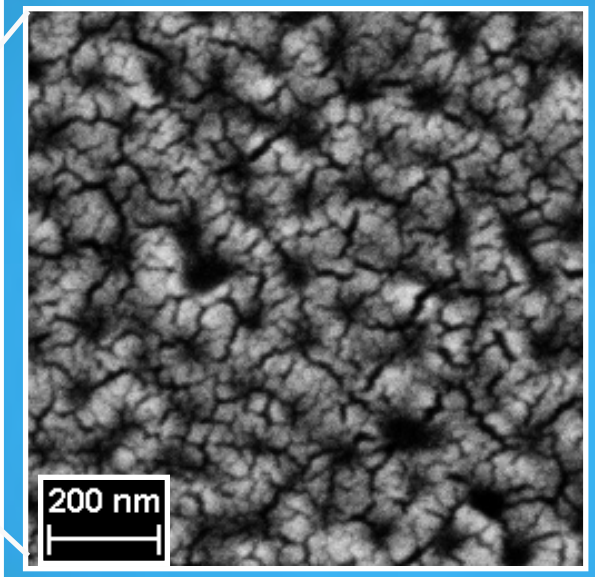


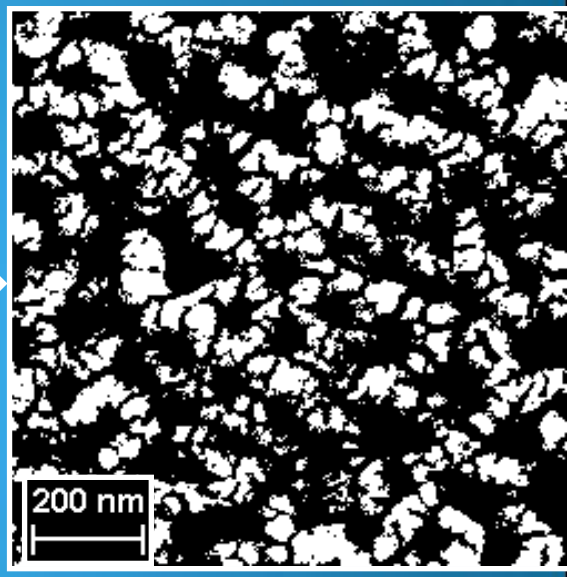


Shell porosity

Porosity changes over time?



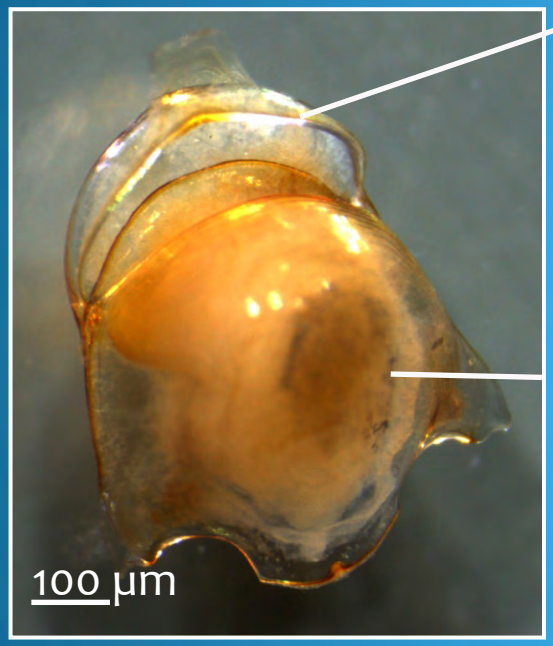




Pixel count

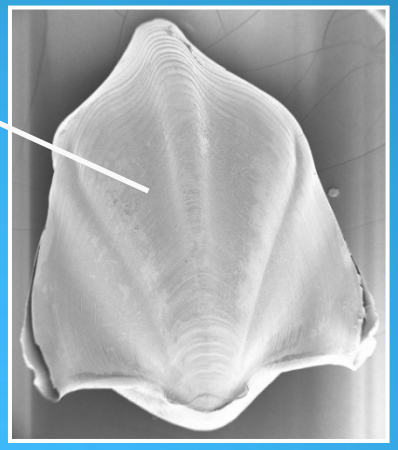
Results in % of black pixels per 100 nm²

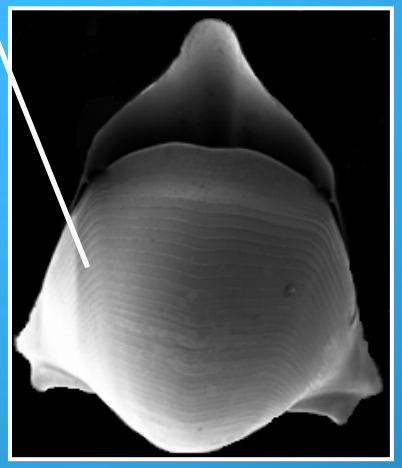
Elemental analysis

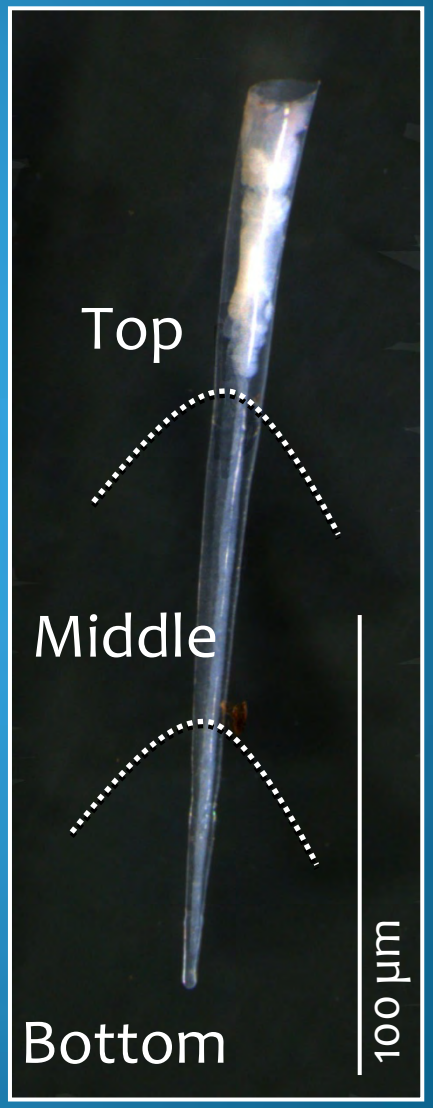


Dorsal part

Ventral part





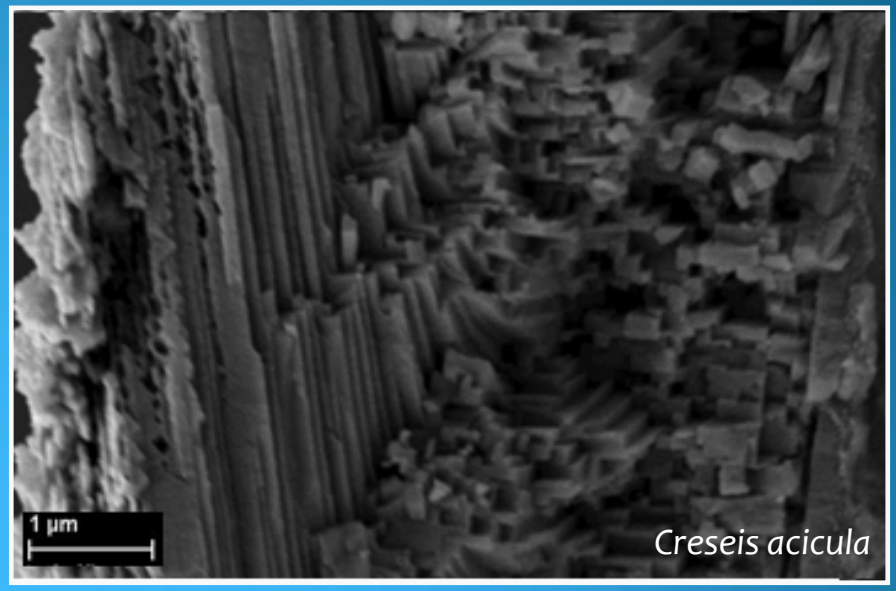


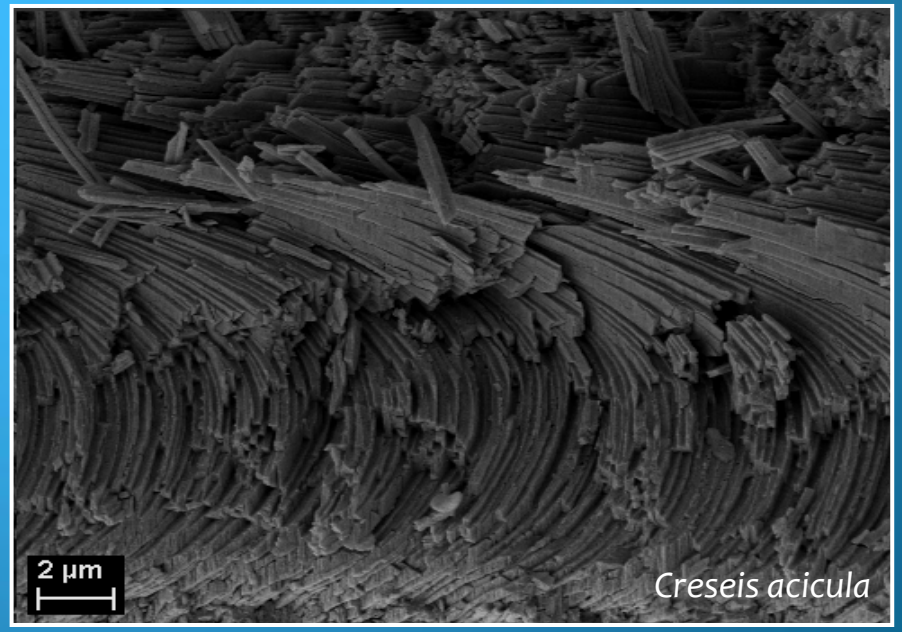
Shell Structure

Crossed lamellar structure

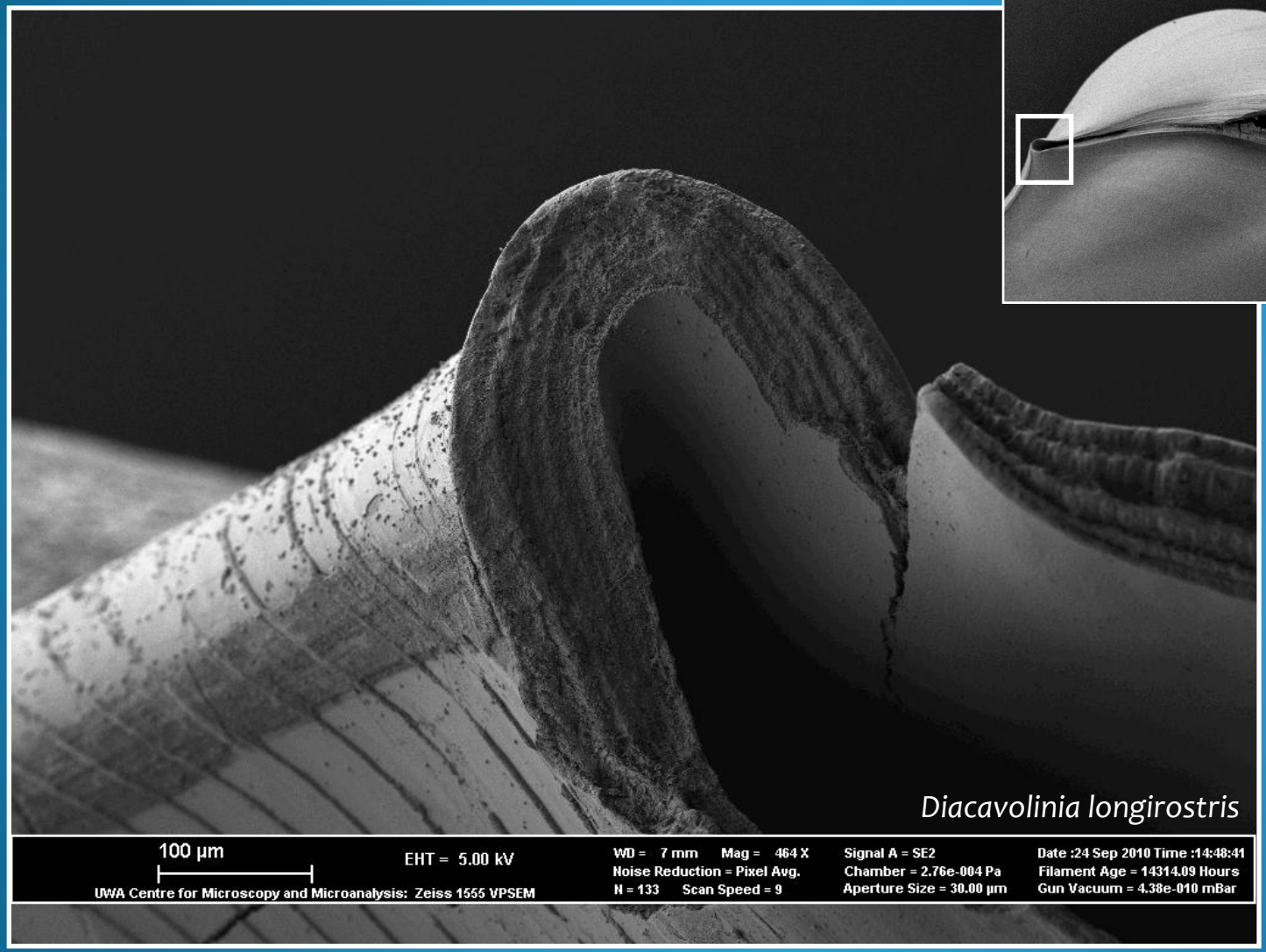
Strong curvature

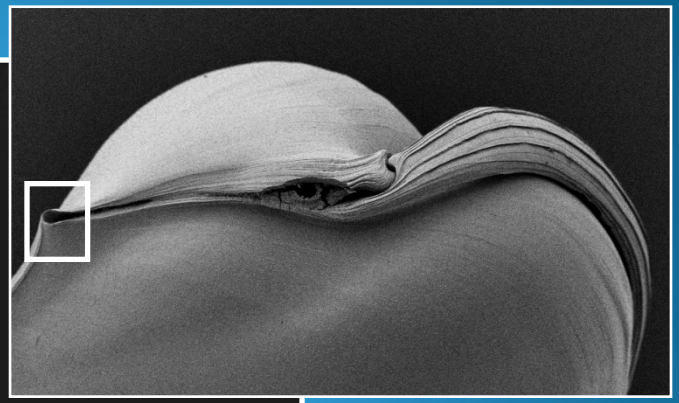
Constant over the period





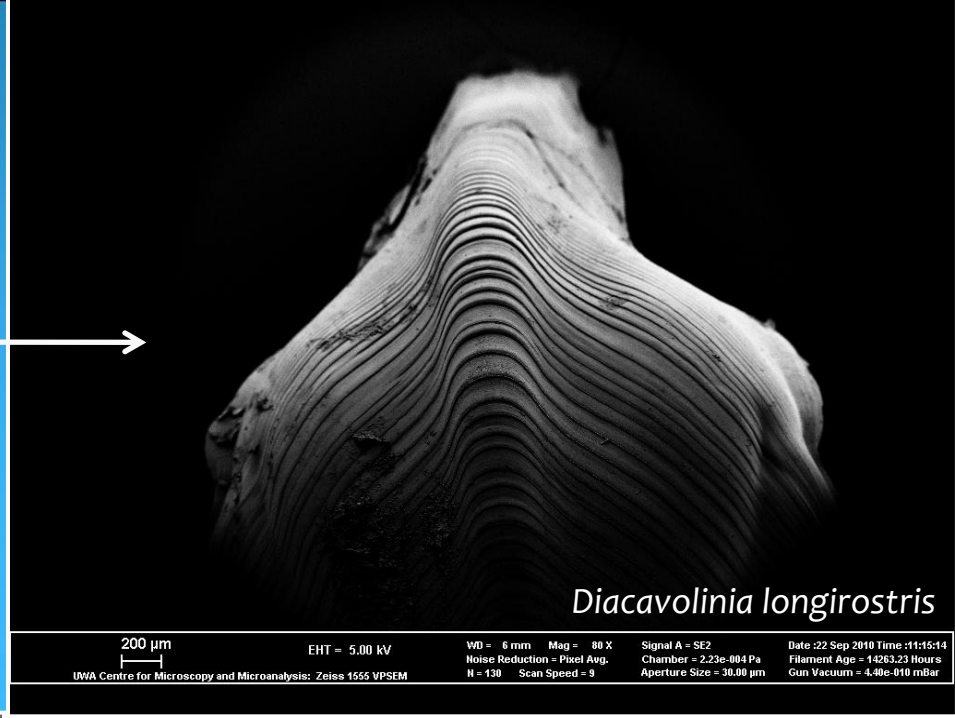
Layers

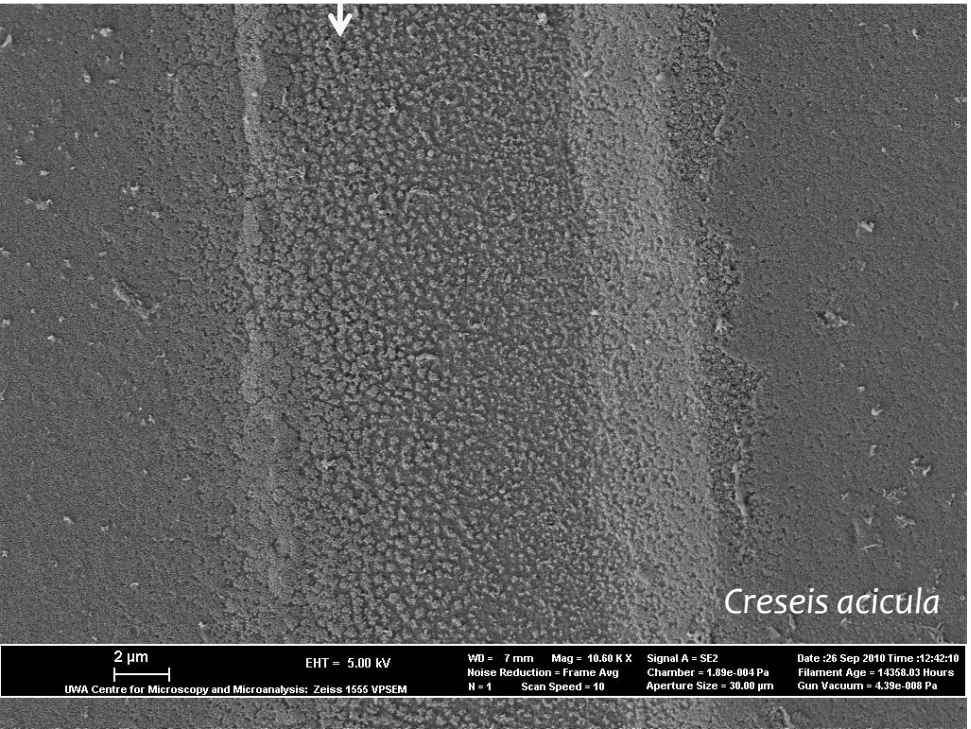

Diacavolinia longirostris
100 µm
EHT = 5.00 kV
UWA Centre for Microscopy and Microanalysis: Zeiss 1555 VPSEM
WD = 7 mm Mag = 464 X
Noise Reduction = Pixel Avg.
N = 133 Scan Speed = 9
Signal A = SE2
Chamber = 2.76e-004 Pa
Aperture Size = 30.00 µm
Date :24 Sep 2010 Time :14:48:41
Filament Age = 14314.09 Hours
Gun Vacuum = 4.38e-010 mBar



Growth lines

'*smooth*' vs ribbed



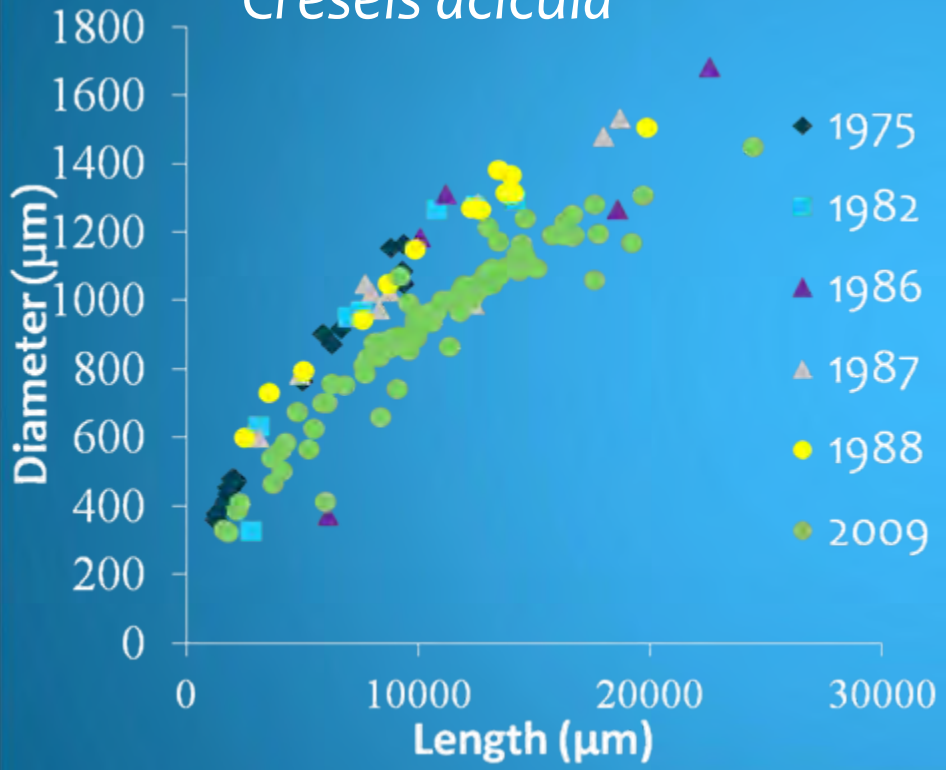


Interval between 2 growth lines = 1 day's growth

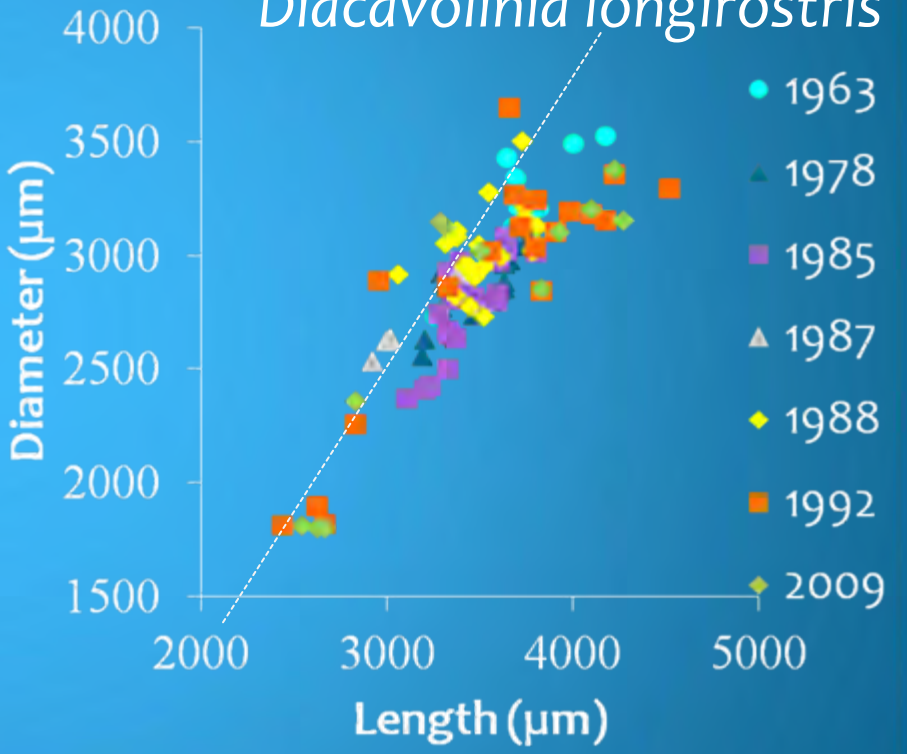
Shell size

Annual comparison

Creseis acicula

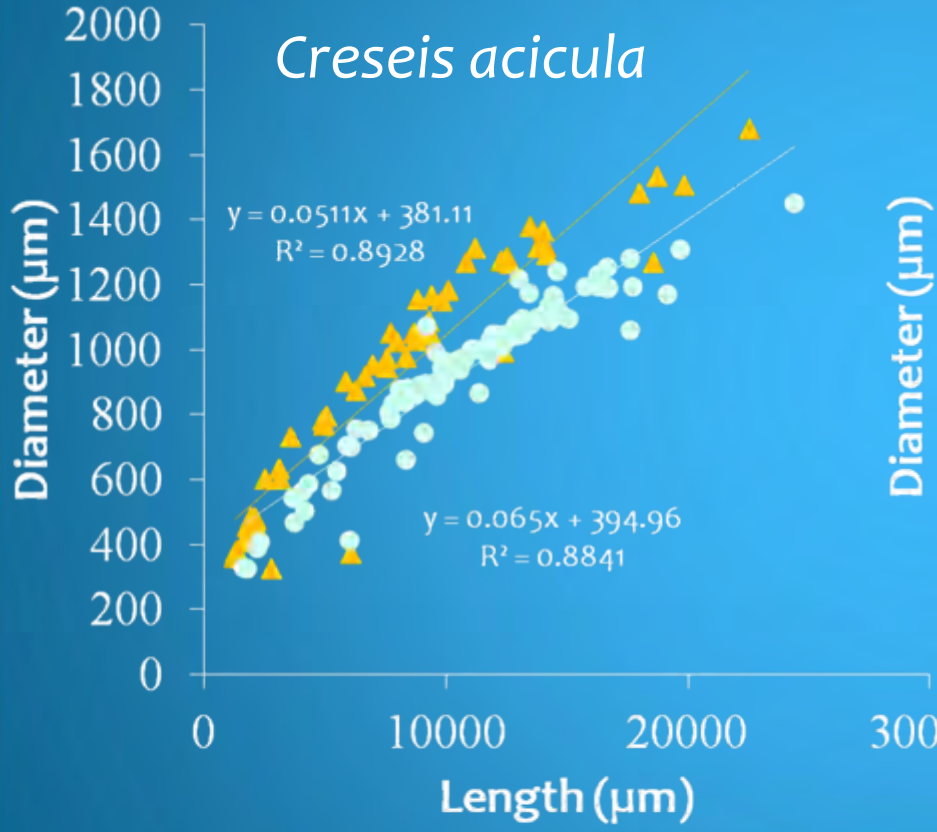


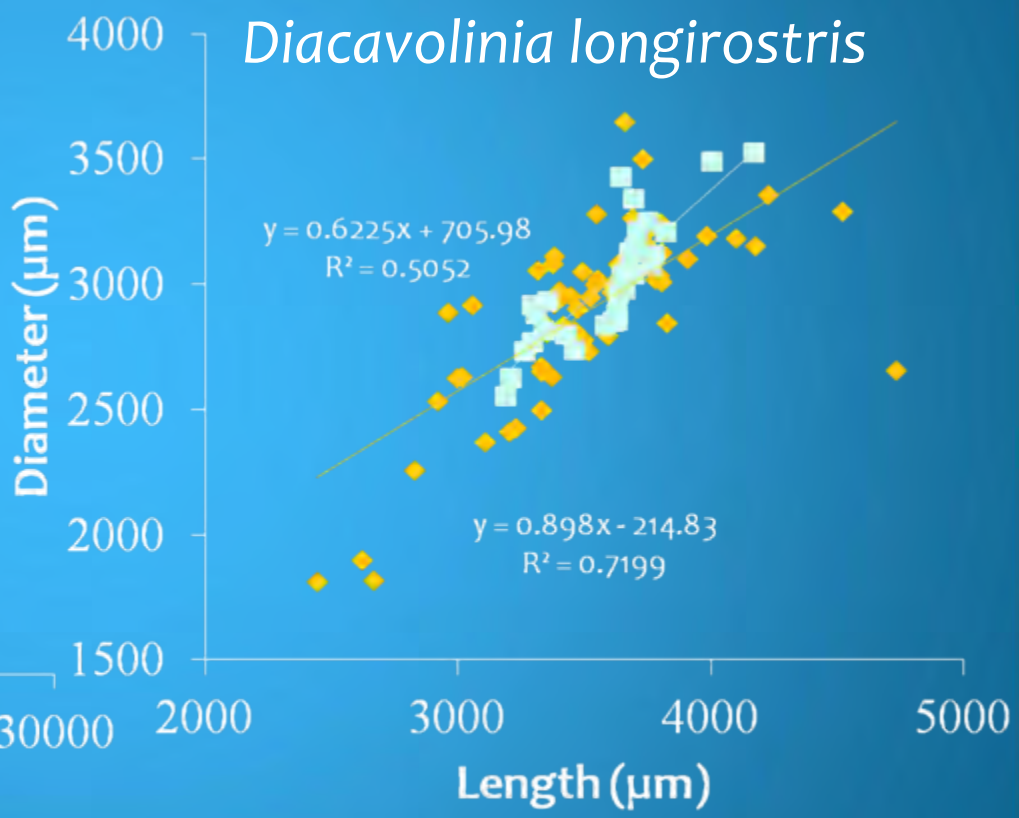
Diacavolinia longirostris



Shell size

Geographical comparison



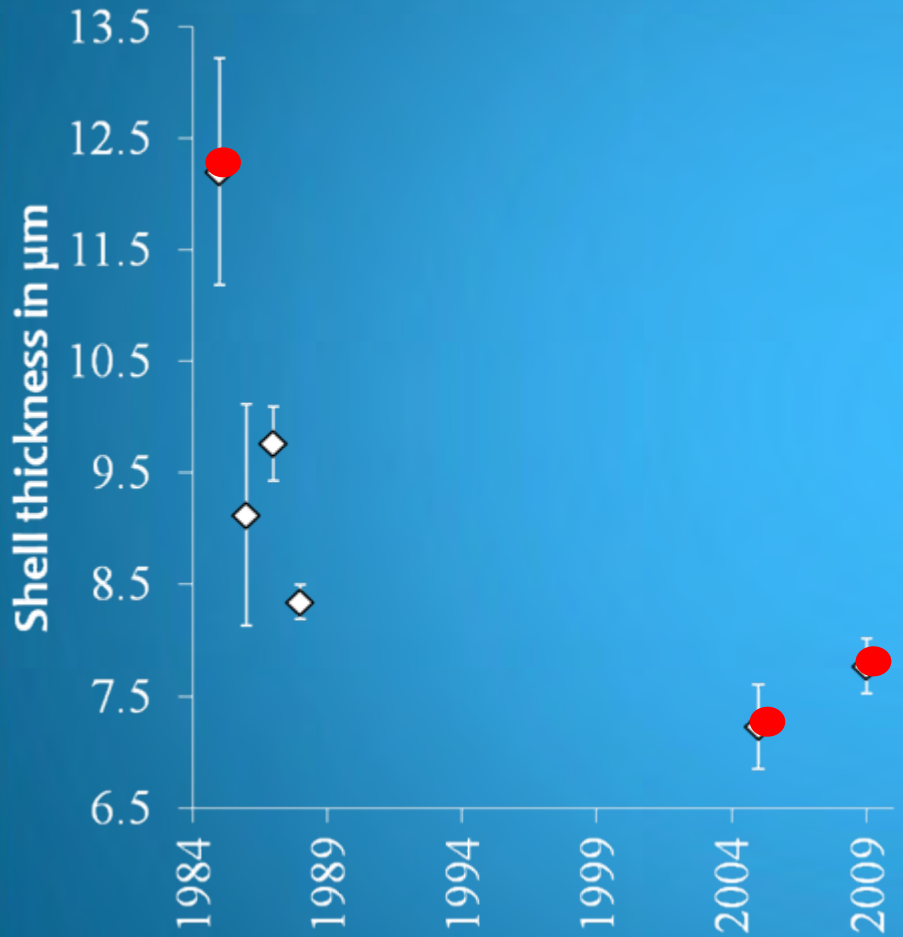


▲ EAST ● WEST

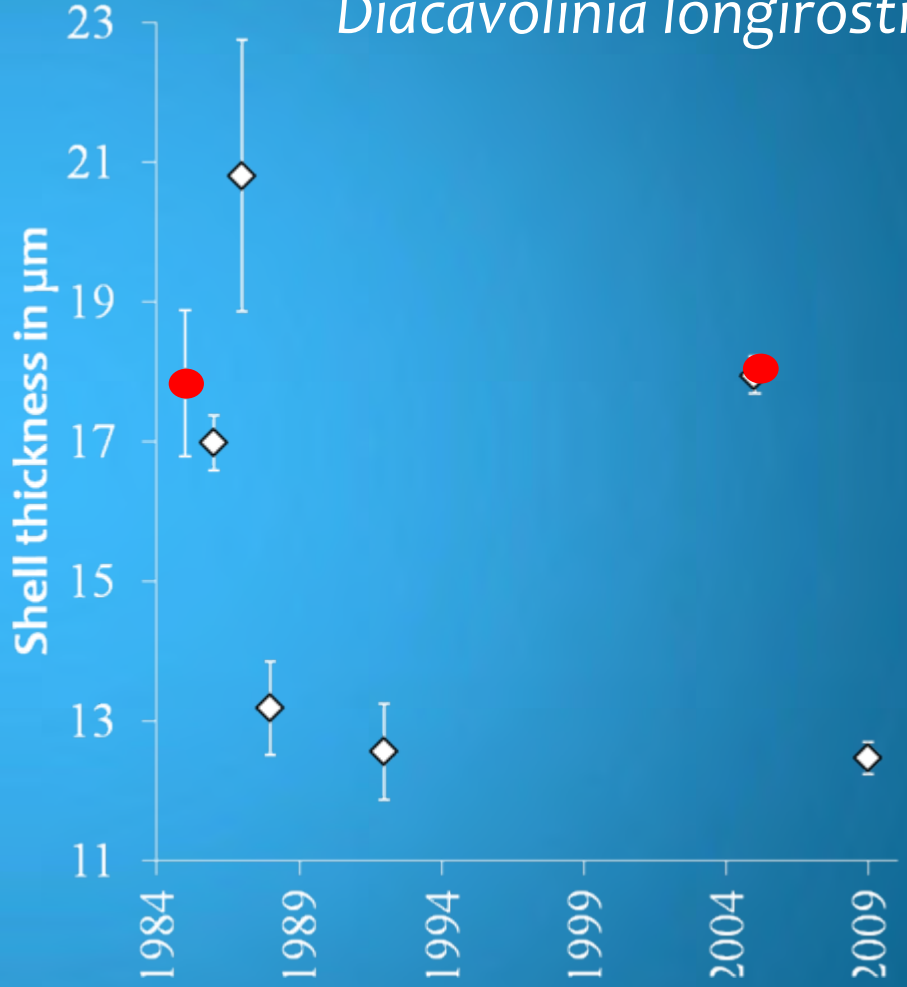
— Linear (EAST) — Linear (WEST)

Shell thickness

Creseis acicula

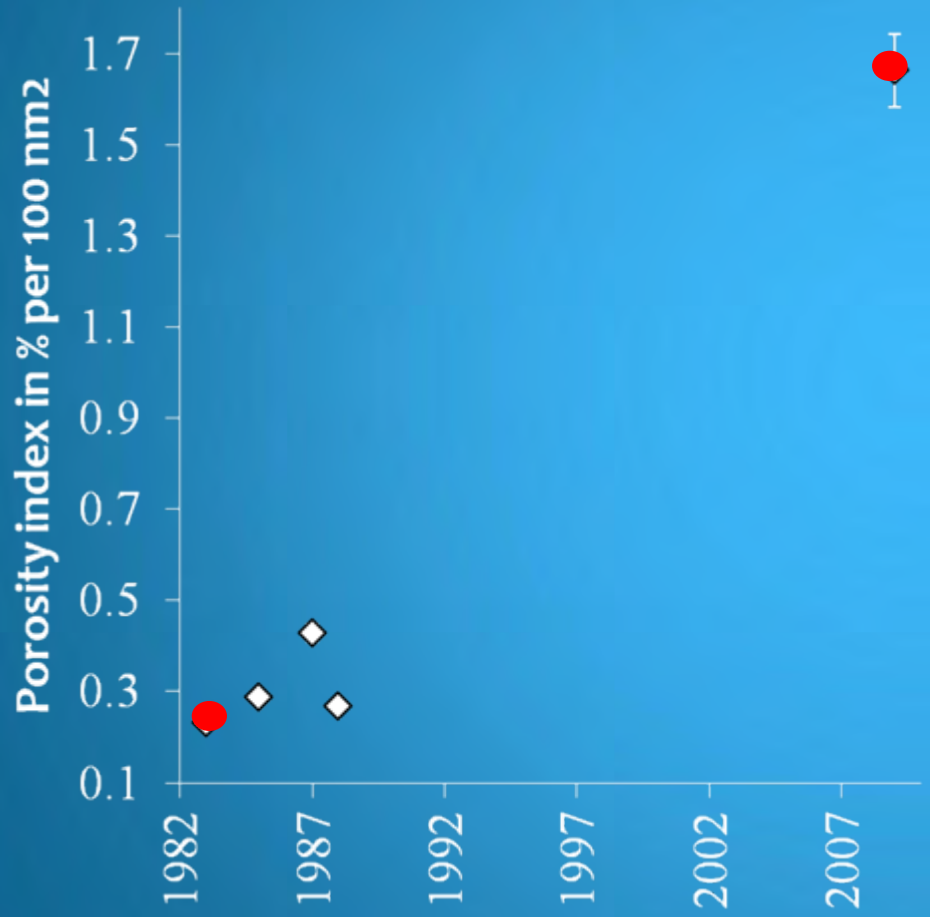


Diacavolinia longirostris

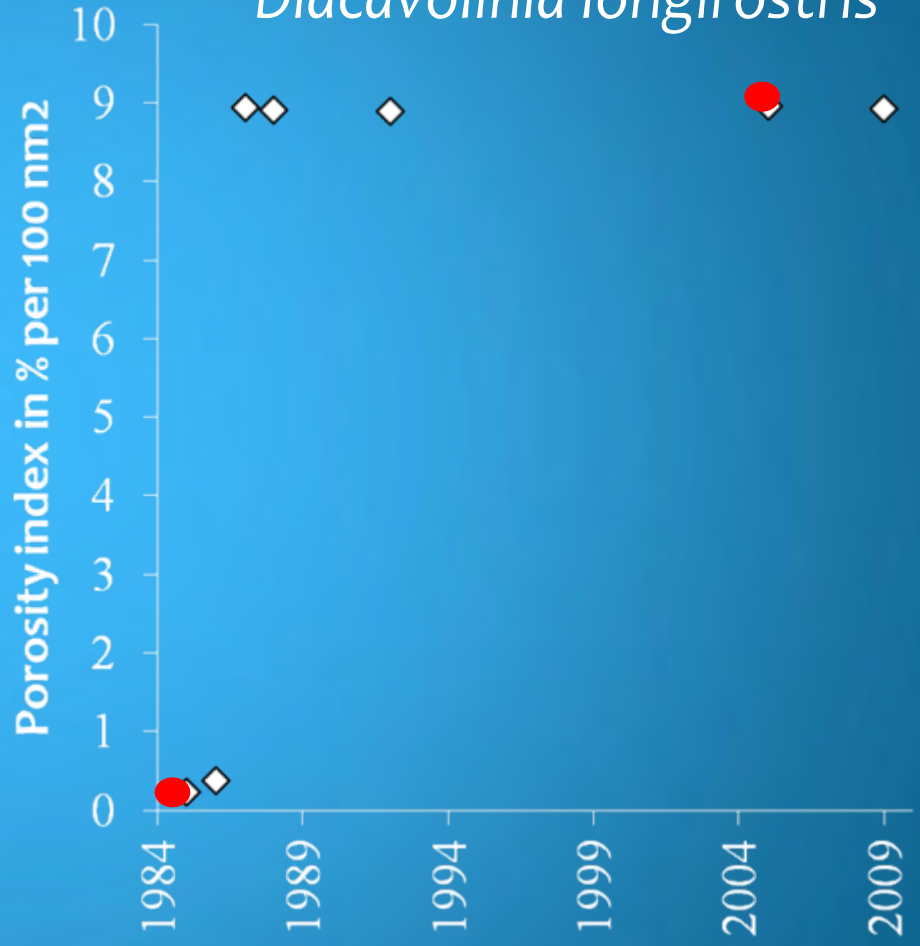


Porosity index

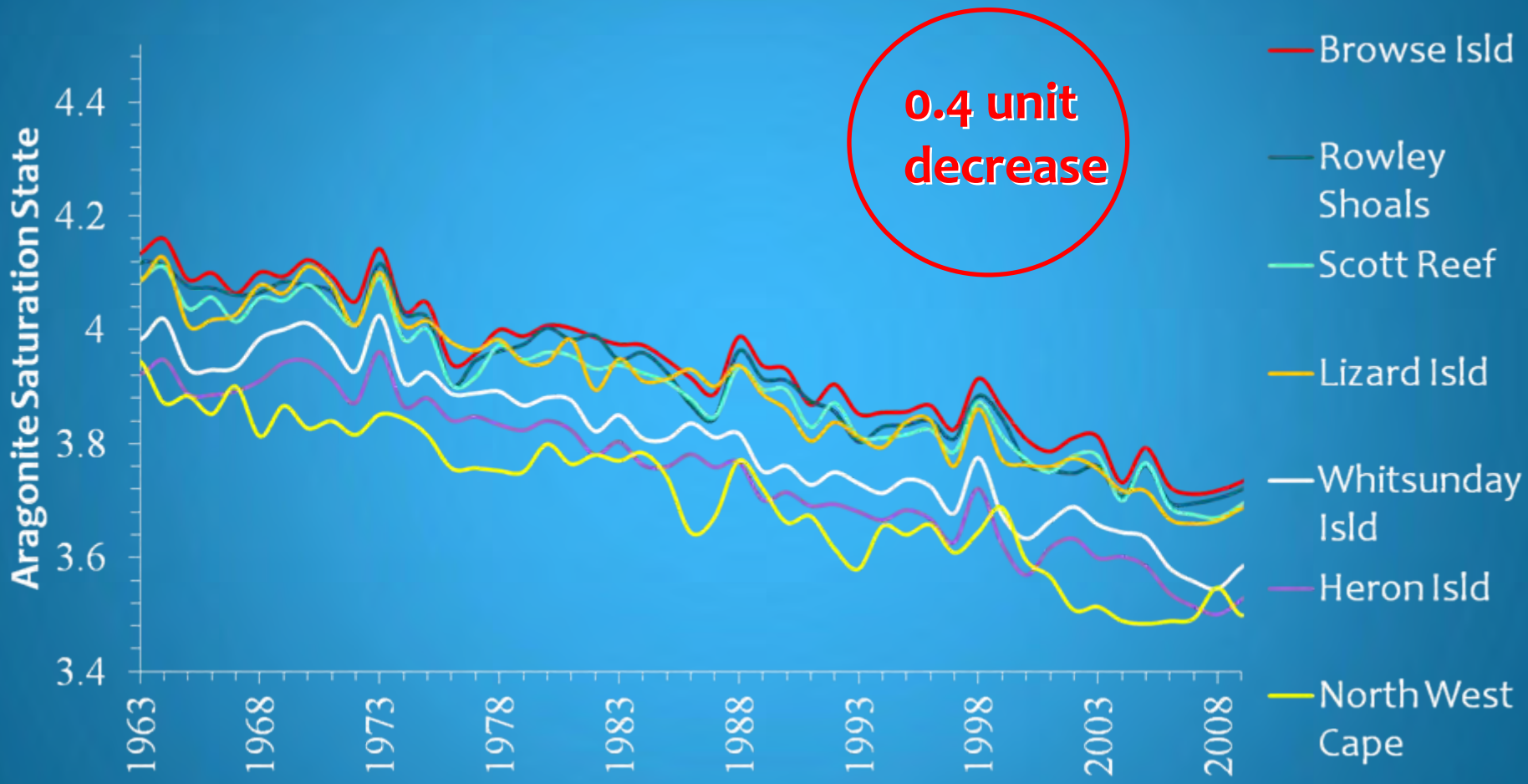
Creseis acicula

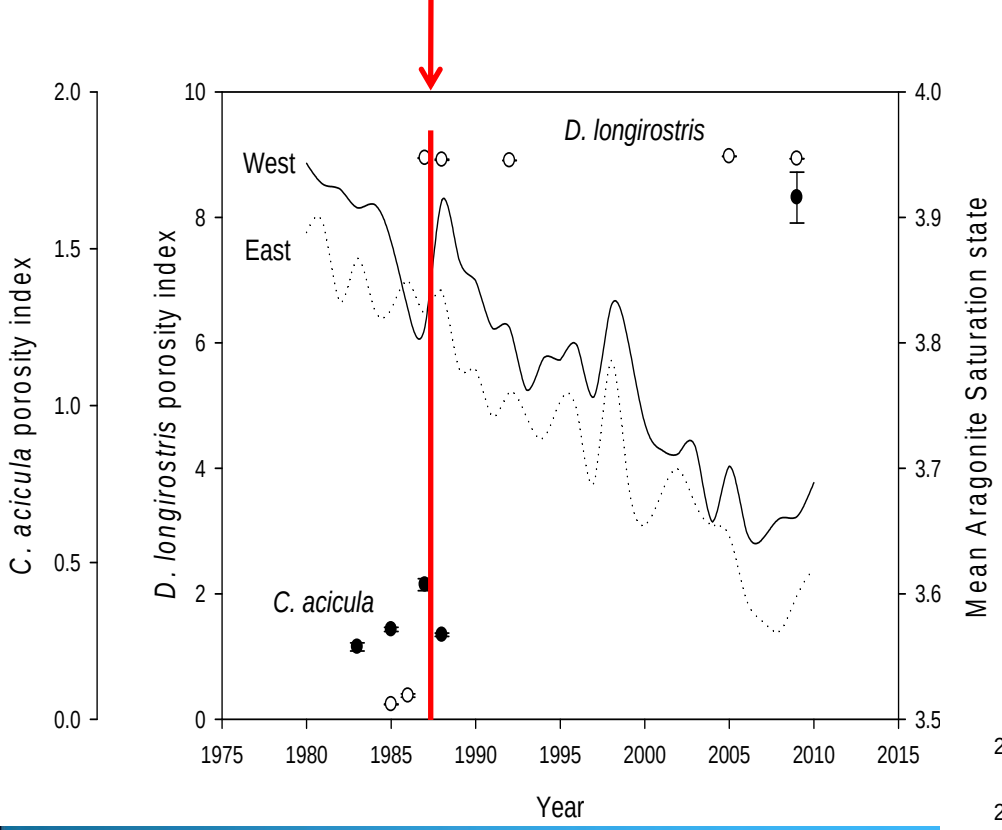


Diacavolinia longirostris



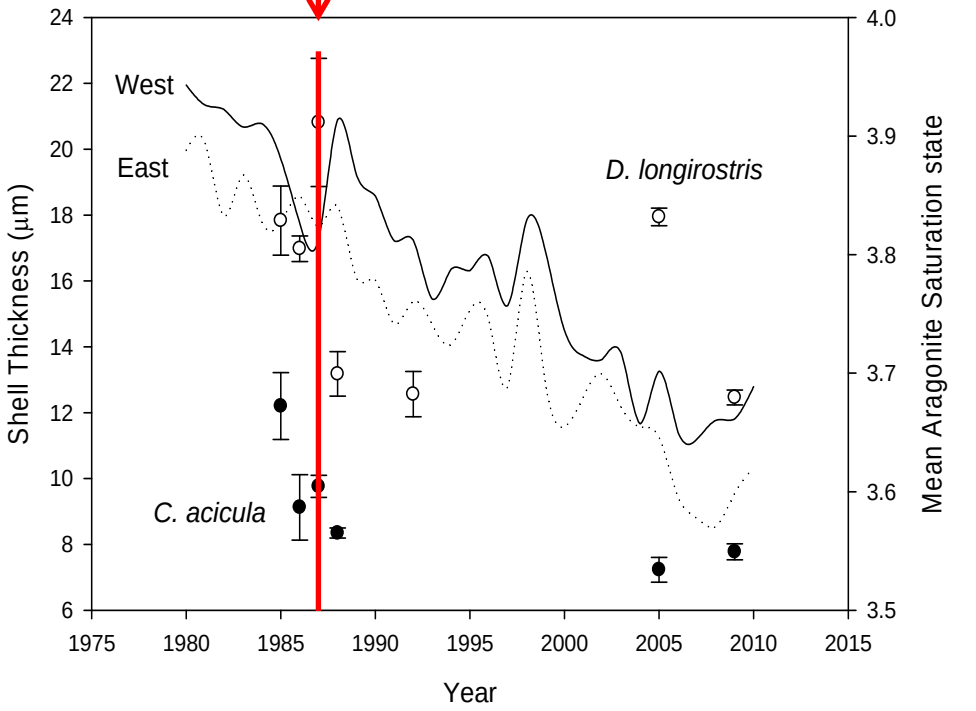
Ωaragonite


0.4 unit decrease
Aragonite Saturation State
4.4
4.2
4
3.8
3.6
3.4
1963
1968
1973
1978
1983
1988
1993
1998
2003
2008
Browse Isld
Rowley Shoals
Scott Reef
Lizard Isld
Whitsunday Isld
Heron Isld
North West Cape

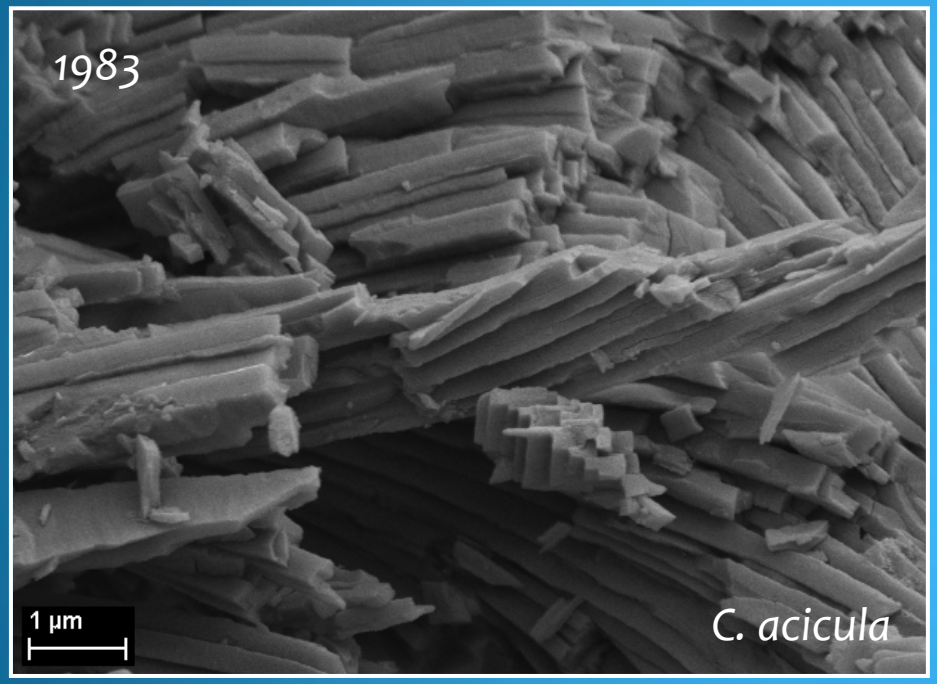


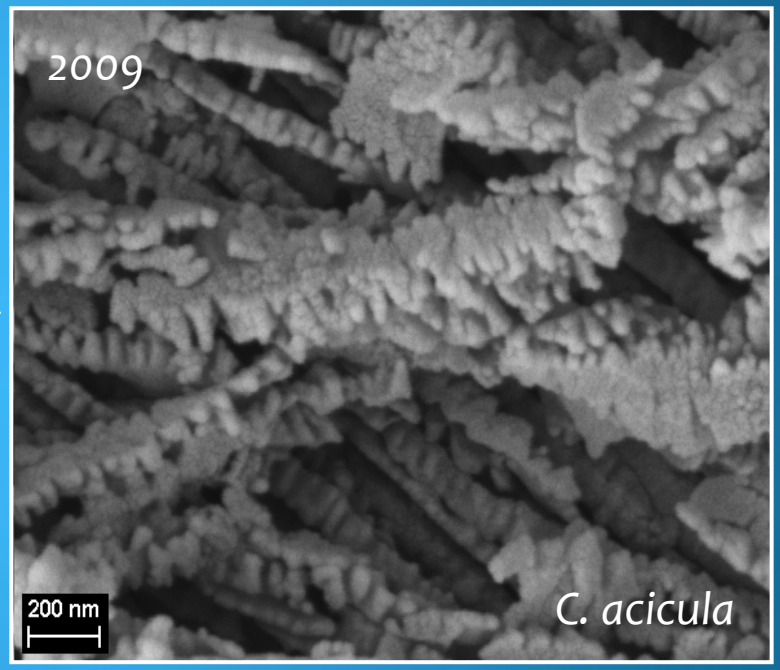
1986-1987 ?

Threshold between ~ 3.80 & ~3.84 in the level of Ω_{arag}



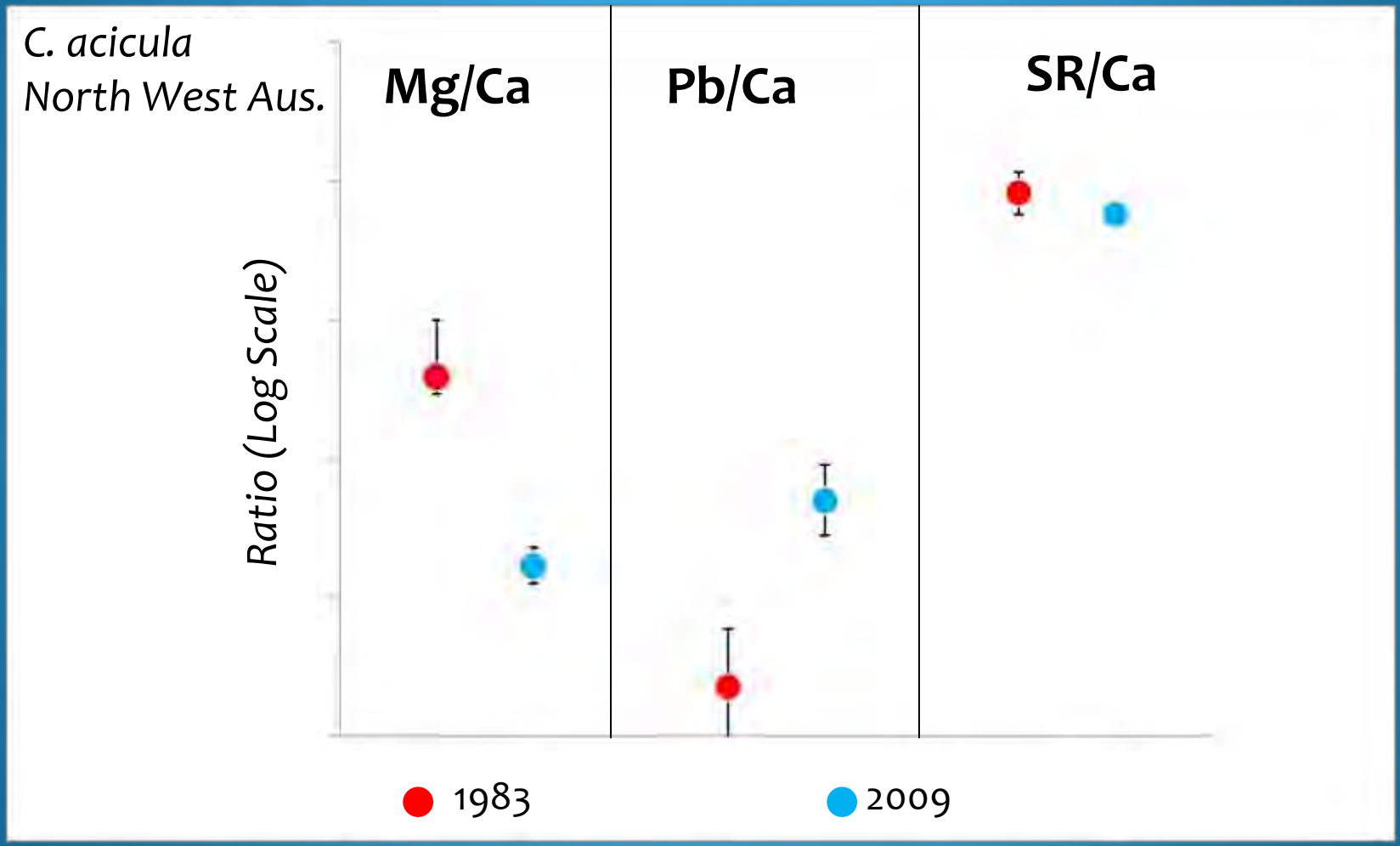
Crystal morphology





Well defined crystals to degraded crystalline structure

Elemental ratios



Summary

First experiment on tropical pteropods: SEM, shell structure, shell composition

Possible Ωarag threshold (~3.80)

Ambiguous results

There are other factors to take into account before making any strong conclusions

Future work...