

Picoeukaryotes (< 3 μm) diversity at a coastal site of the English Channel

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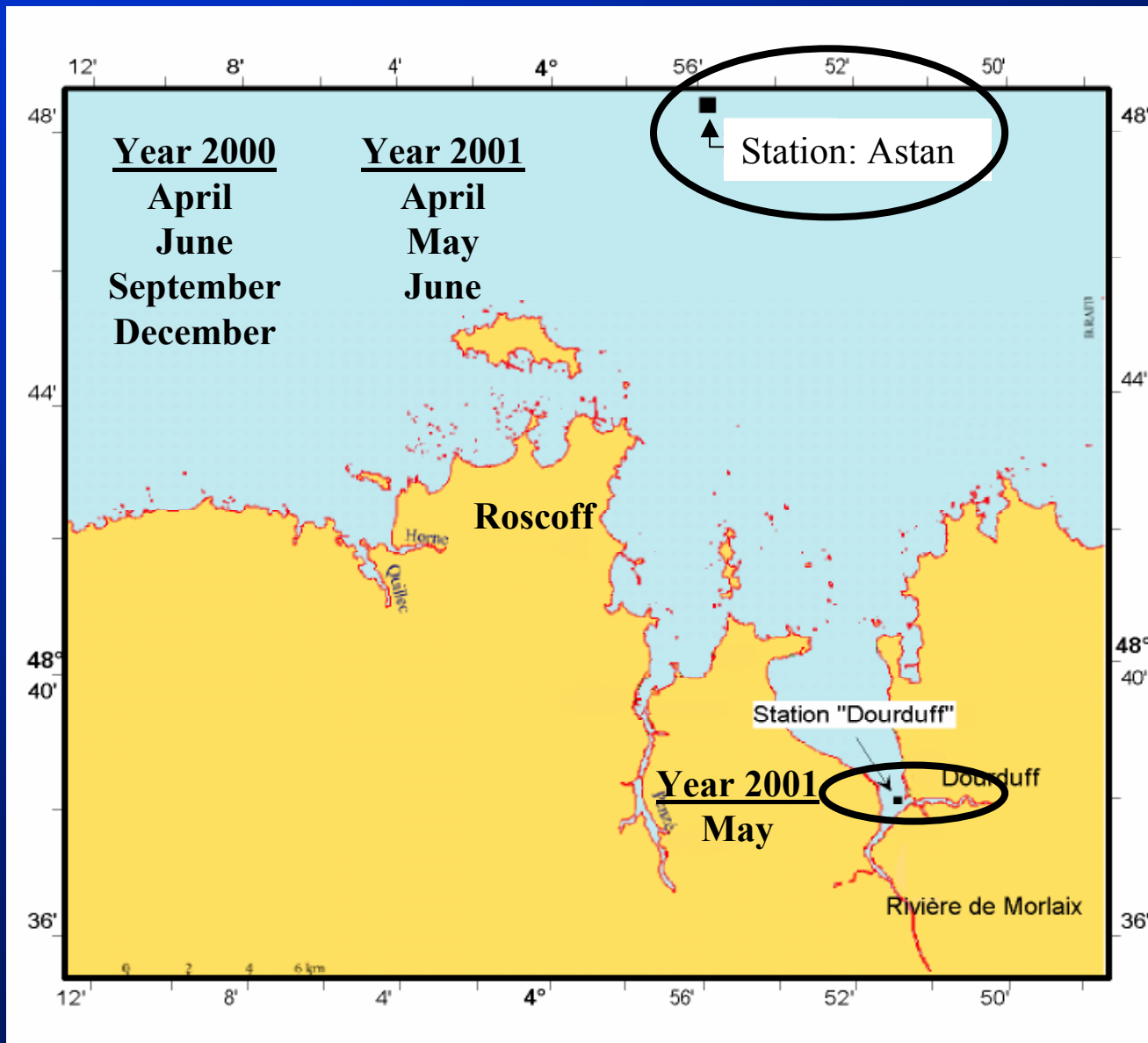
Actual knowledge on Picoeukaryotes (< 3 μm) diversity

- Culture: ~ 30 picoeukaryote species were described since 1954
- 18S rRNA Gene cloning and sequencing strategy: Astonishing Diversity
 - Pacific Ocean: Moon et al. 2001 (Nature)
 - Antarctic (250-3000m depth): Lopez-Garcia et al. 2001 (Nature)
 - Mediterranean sea, North Atlantic and Antarctic: Diez B. et al. 2001 (AEM)
 - Guaymas Basin hydrothermal vent: Edgcomb et al. 2002 (PNAS)
 - Anoxic sediment from Berkeley Aquatic Park: Dawson et al. 2002 (PNAS)

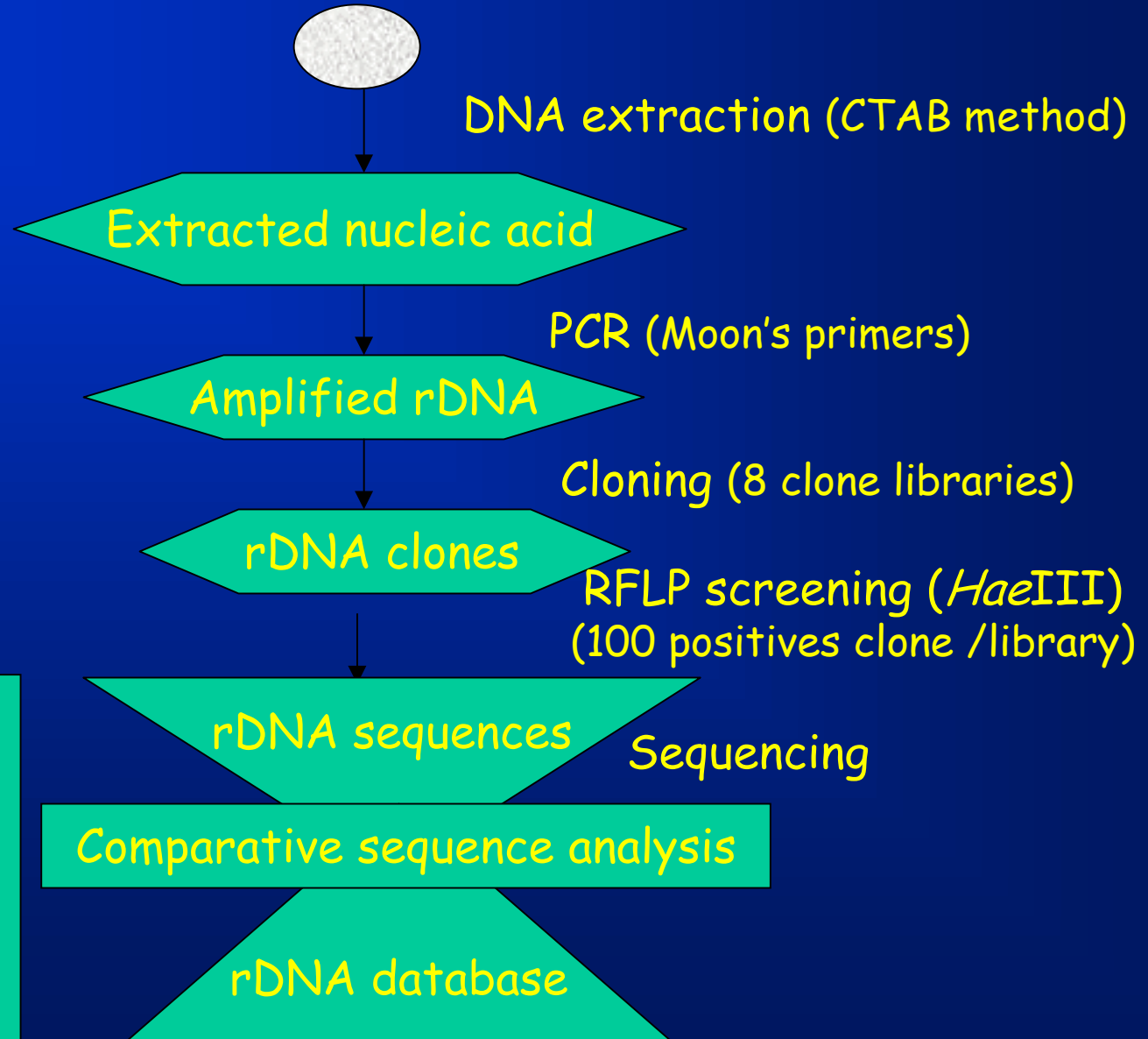
Objectives

- To explore the picoeukaryote diversity in the English Channel
- To study their temporal variability
- To study their spatial variability

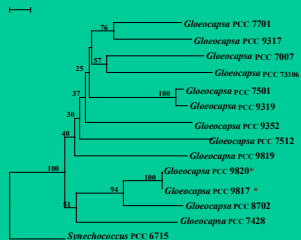
Sampling strategy



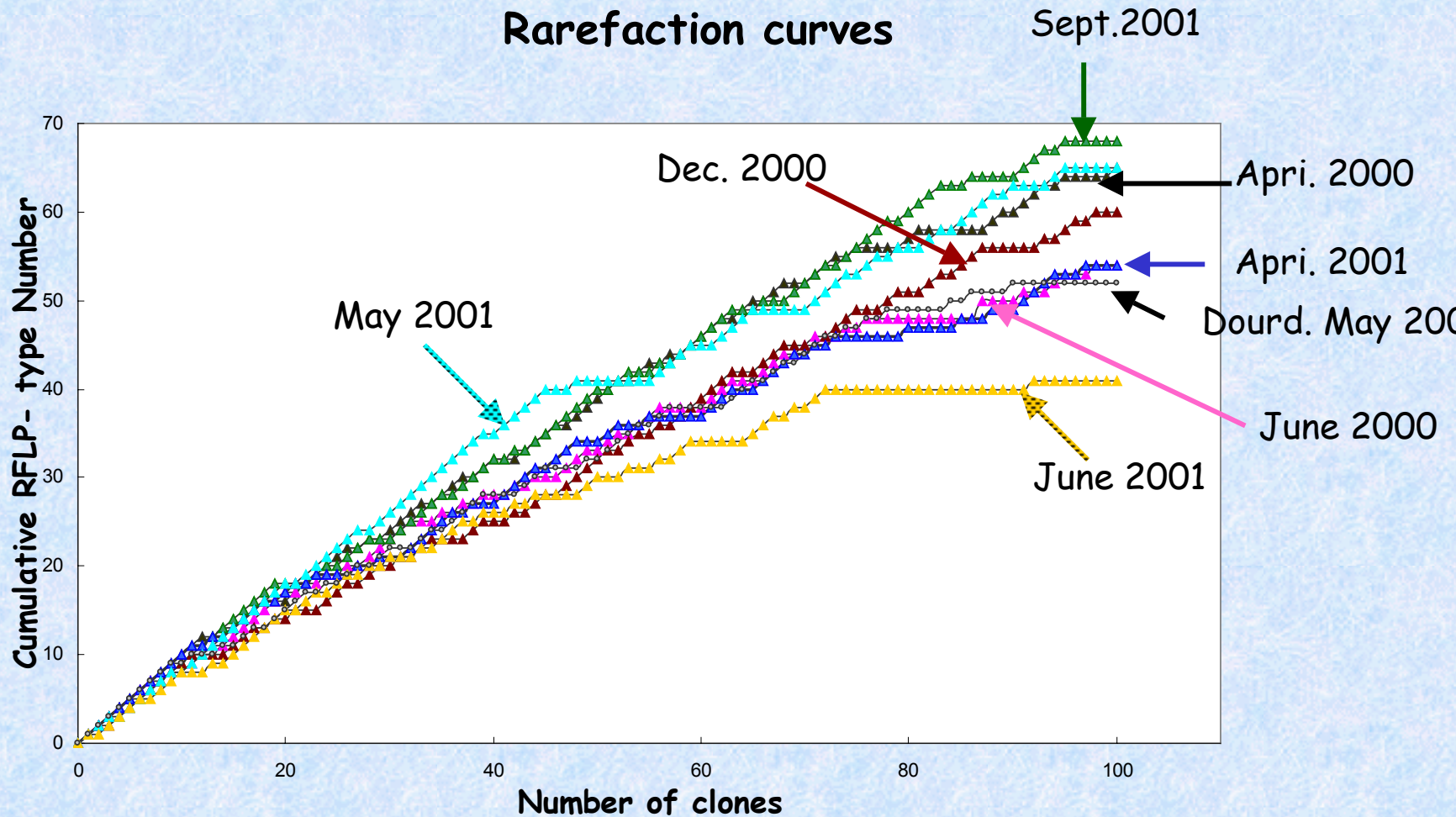
Environmental sample (pre-filtration and filtration)



Phylogenetic identification



RFLP Analysis of environmental clone libraries



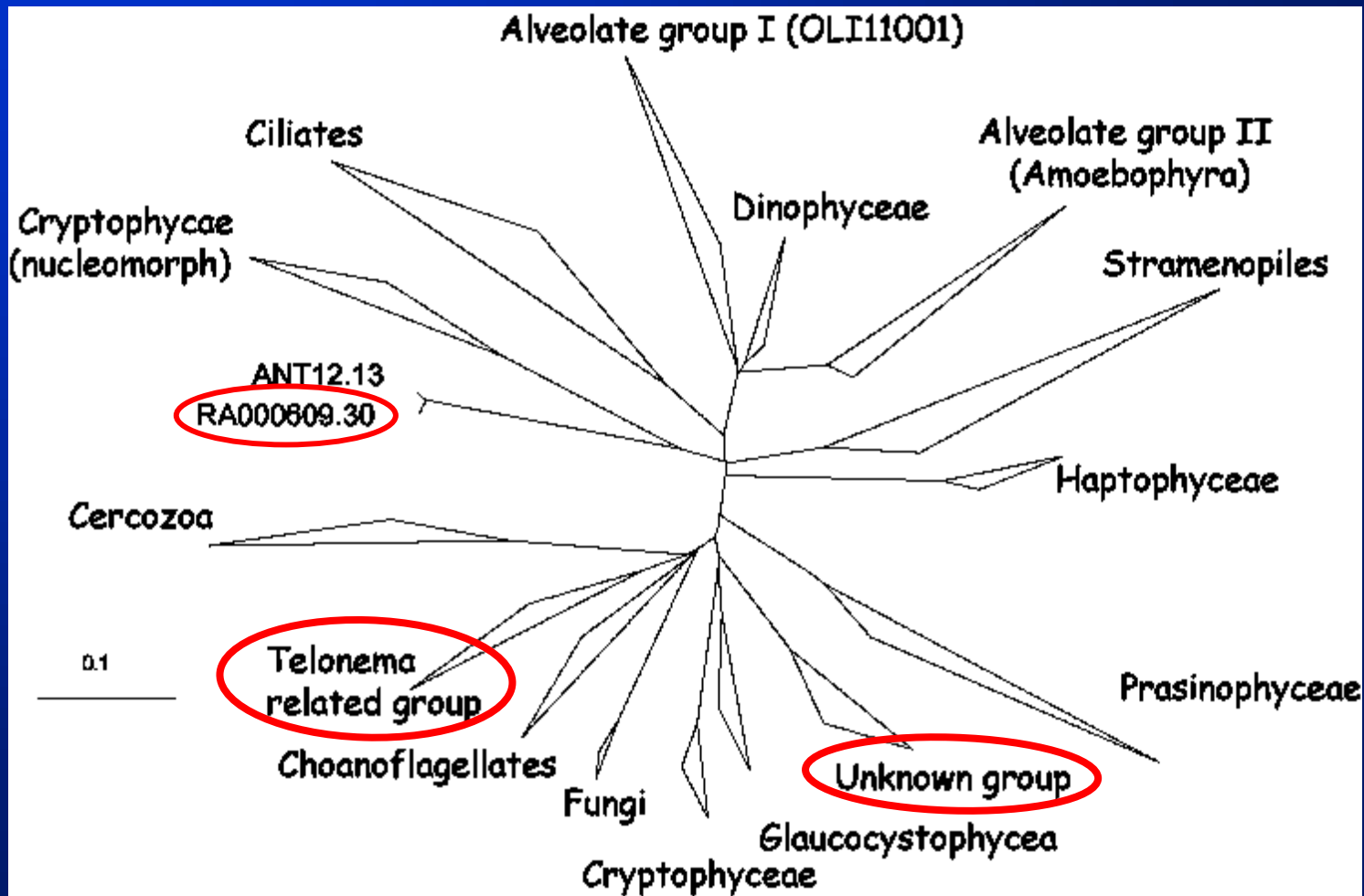
RFLP-Analysis of environmental clone libraries

Clone library	Date	# of RFLP types	Coverage value (%)
Astan	12 April 2000	65	35
	9 June 2000	54	46
	7 Sept 2000	68	32
	19 Dec 2000	60	40
	12 April 2001	54	46
	16 May 2001	65	35
	13 June 2001	41	59
Dourduff	17 May 2001	52	48

* 100 positives clones were screened by RFLP for each clone library

* Coverage value (C) = $1 - n/N$,
(n = number of RFLP type; N = number of clone analysed)

Sequence Analysis of environmental clone libraries



Schematic tree

Phylotype

OTU with similarity $\geq 98\%$

OTU

OTU

OTU

Clones $\geq 99.5\%$
sequence simil.

Diversity inside the groups

Groups	# phylotypes	# OTUs
Prasinophyceae	9	28
Cryptophyceae	6	22
Prymnesiophyceae	3	6
Cercozoa	19	25
Choanoflagellates	5	6
Stramenopiles	26	40
Dinophyceae	7	11
Alveolate group I	4	7
Alveolate group II	25	42
Ciliates	23	38
Unknown group	6	12
<i>Telonema</i> related group	4	8
Total	137	245

• OTUs : Clones with similarity $\geq 98\%$ and $< 99,5\%$

• Phylotypes : OTUs with similarity $< 98\%$

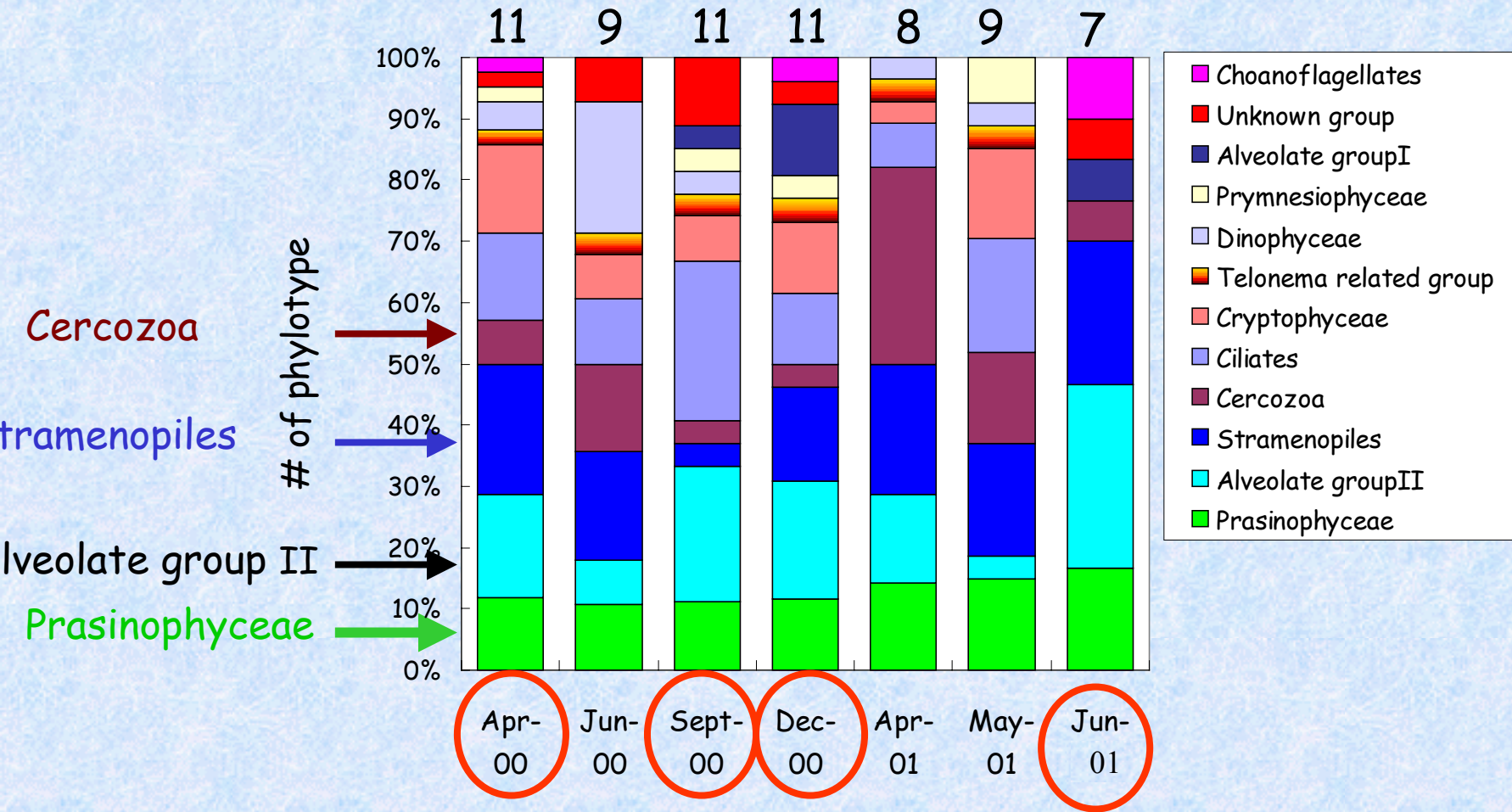
Diversity : Phototrophs vs heterotrophs

Groups	# Phylotypes	# OTUs
Heterotrophs	108	164
Phototrophs	21	83

Heterotrophs are more diverse at « phylotype level » than phototrophs (Vaulot et al 2002)

Phototrophs seem to be more diverse at « OTUs level » than phylotype level»

Picoeukaryote Temporal variability at Astan site

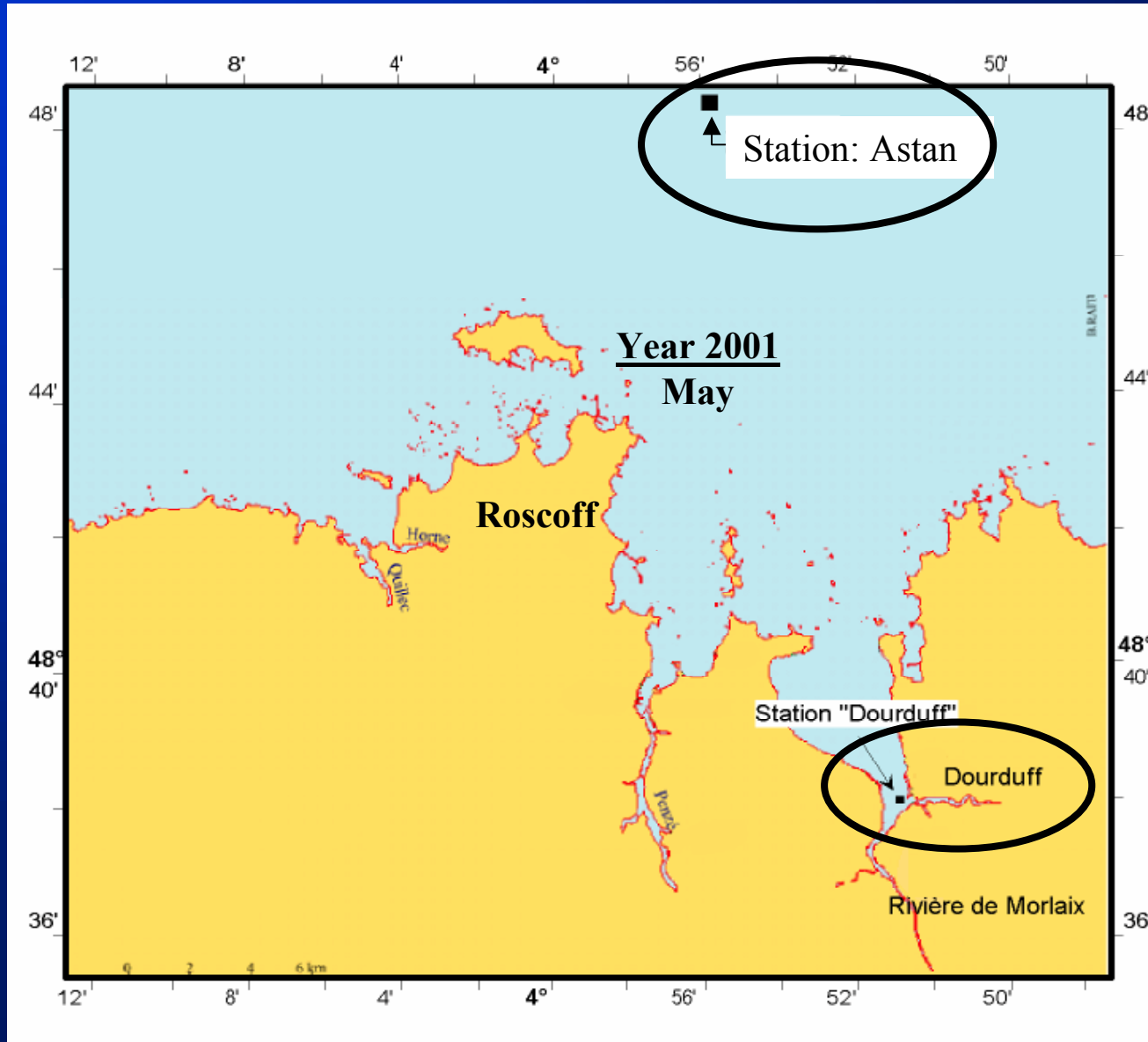


Phylotype appearing a single date

Group	2000				2001		
	Apr	Jun	Sept	Dec	Apr	May	Jun
Alveolate groupII	4	1	3	4	2		6
Stramenopiles	5	3	1	2	1	1	5
Cercozoa	2	3			5	2	2
Prasinophyceae		1		1			
Ciliates	1		2	2		1	
Cryptophyceae	1	1					
<i>Telonema</i> related group		1	1			1	
Dinophyceae		4			1		
Prymnesiophyceae			1			1	
Alveolate groupI				1			1
Unknown group			2				2
Choanoflagellates				1			2

Among 137 phylotypes recovered at Astan, 82 appeared at a single date

Picoeukaryote diversity : Astan (Offshore) vs Dourduff (Estuarie)



Group	# Phylotype	
	Astan (May 2001)	Dourduff (May 2001)
Prasinophyceae	4	4
Cryptophyceae	4	-
Prymnesiophyceae	2	-
Cercozoa	4	-
Choanoflagellates	-	1
Stramenopiles	5	1
Dinophyceae	1	1
Alveolate groupII	1	1
Ciliates	5	13
<i>Telonema</i> related group	1	-

• Picoeukaryote community was more diverse at Astan site than Dourduff (9 phylogenetic groups against 6)

Ciliates were more diverse at Dourduff than Astan

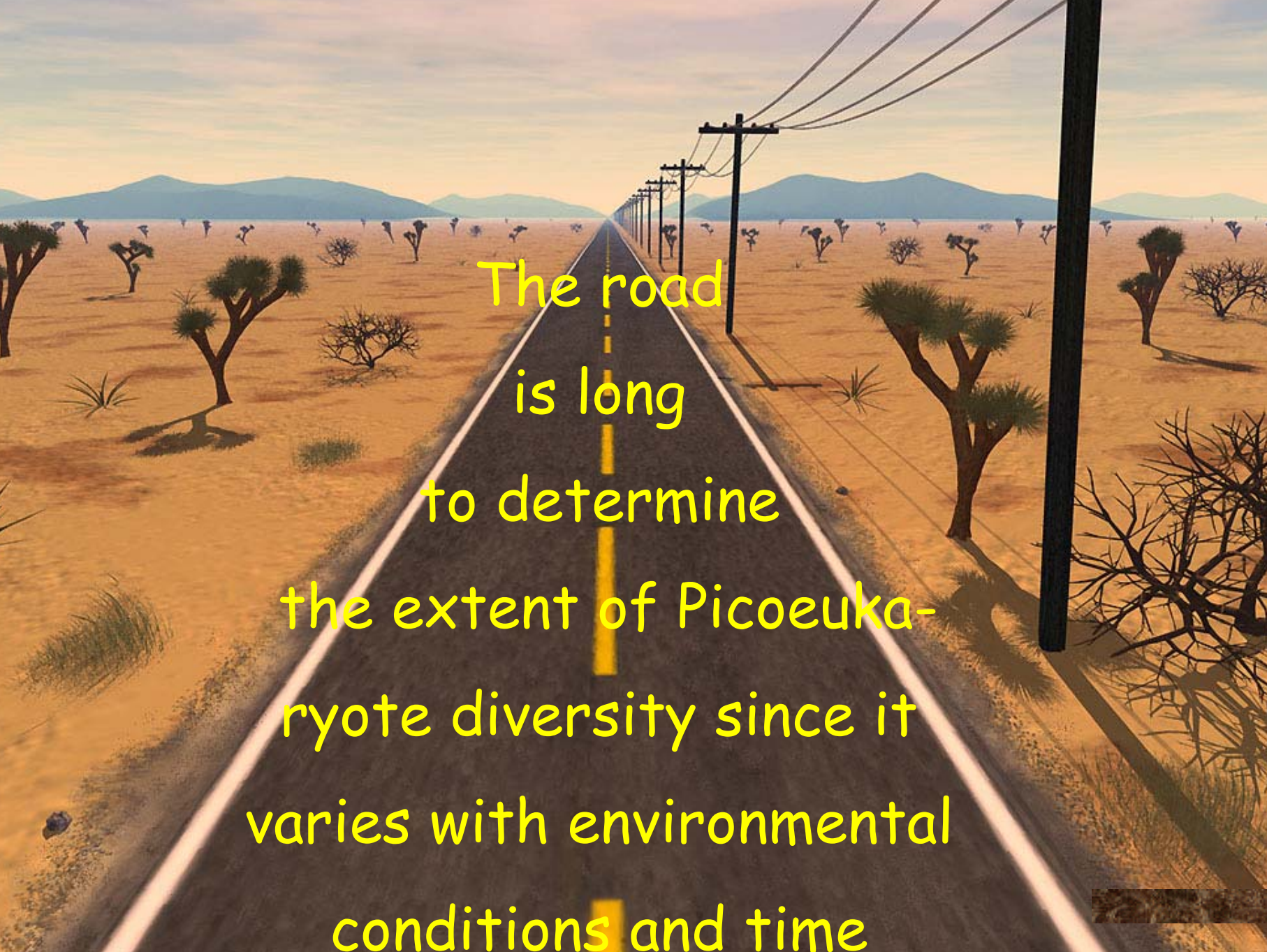
43 % of phylotypes were present in both sites

~ 60 % of Phylotypes are ubiquitous



Conclusion

- Recent studies showed high Picoeukaryote Diversity in different areas and at different Depths
- In our study we showed high Picoeukaryote Diversity at the same site and at Different Dates

A long, straight asphalt road with a yellow dashed center line and white edge lines stretches from the foreground into the distance. The road is flanked by a sandy desert landscape dotted with various types of Joshua trees. On the right side of the road, a series of utility poles with power lines runs parallel to the road. In the far distance, a range of low mountains is visible under a clear sky. The overall scene is brightly lit, suggesting a sunny day.

The road
is long
to determine
the extent of Picoeuka-
ryote diversity since it
varies with environmental
conditions and time

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