Supplementary Information for **Strong self-regulation and widespread facilitative interactions between groups of phytoplankton** - Barraquand, F. & Picoche, C.

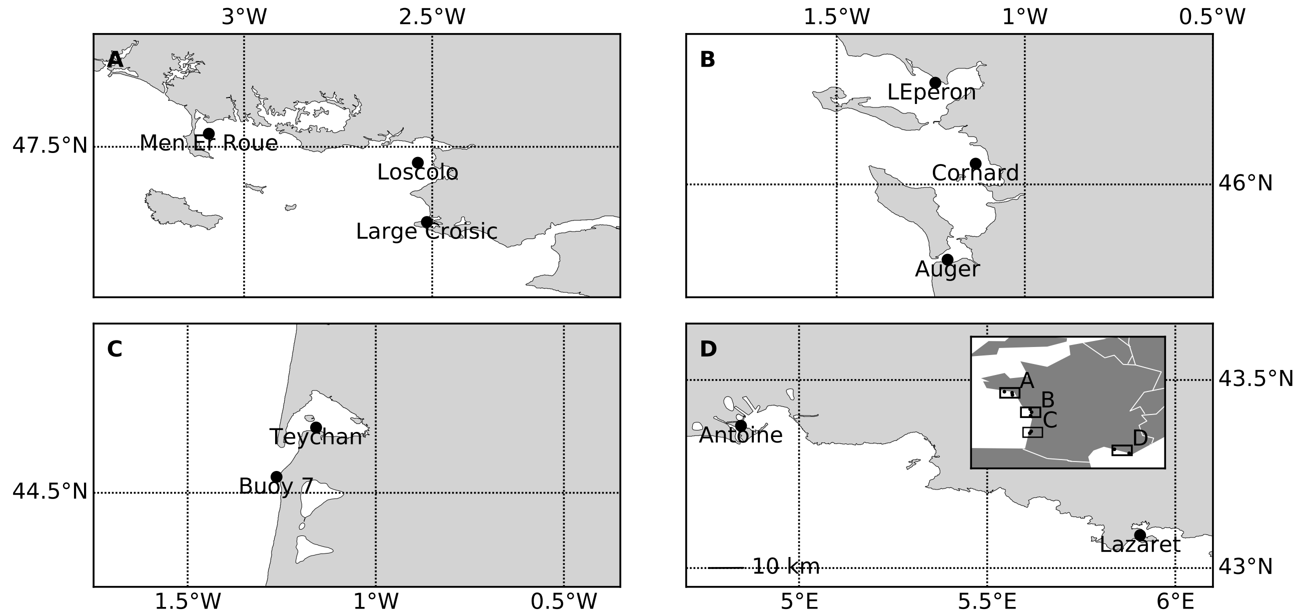

Figure 1: Map of the studied sites

Code	Taxa
AST	Asterionella+Asterionellopsis+Asteroplanus
CHA	Chaetoceros
CRY	Cryptophytes
DIT	Ditylum
EUG	Euglenophytes
GUI	Guinardia
GYM	Gymnodinium+Gyrodinium
LEP	Leptocylindrus
NIT	Nitzschia+Hantzschia
PLE	Pleurosigma+Gyrosigma
PRO	Prorocentrum
PRP	Protoperidinium+Archaeperidinium+Peridinium
PSE	Pseudo-nitzschia
RHI	Rhizosolenia+Neocalyptrella
SCR	Scrippsiella+Ensiculifera+Pentapharsodinium+Bysmatrum
SKE	Skeletonema
THL	Thalassionema+Lioloma
THP	Thalassiosira+Porosira

Table 1: Name and composition of the phytoplanktonic groups used in the paper, based on[1]

Name of site	Location	Region	Number of points?[1]	Mean rainfall	Mean temperature
Men Er Roue	47°32'5" N / 3°5'37" W	Brittany	503		
Loscolo	47°27'27" N / 2°32'18" W	Brittany	463		
Croisic	47°18'0" N / 2°30'51" W	Brittany	500		
L'Eperon	46°16'13" N / 1°14'16" W	Oléron	460		
Cornard	46°3'19" N / 1°7'50" W	Oléron	491		
Auger	45°47'59" N / 1°12"19" W	Oléron	524		
Buoy7	44°32'32" N / 1°15'49" W	Arcachon	311		
Teychan	44°40'25" N / 1°9'31" W	Arcachon	494		
Antoine	43°22'41" N / 4°50'45" E	Mediterranean Sea	539		
Lazaret	43°5'14" N / 5°54'23" E	Mediterranean Sea	512		

Table 2: Attempt of summary for our locations ; should we add the species for each region ?

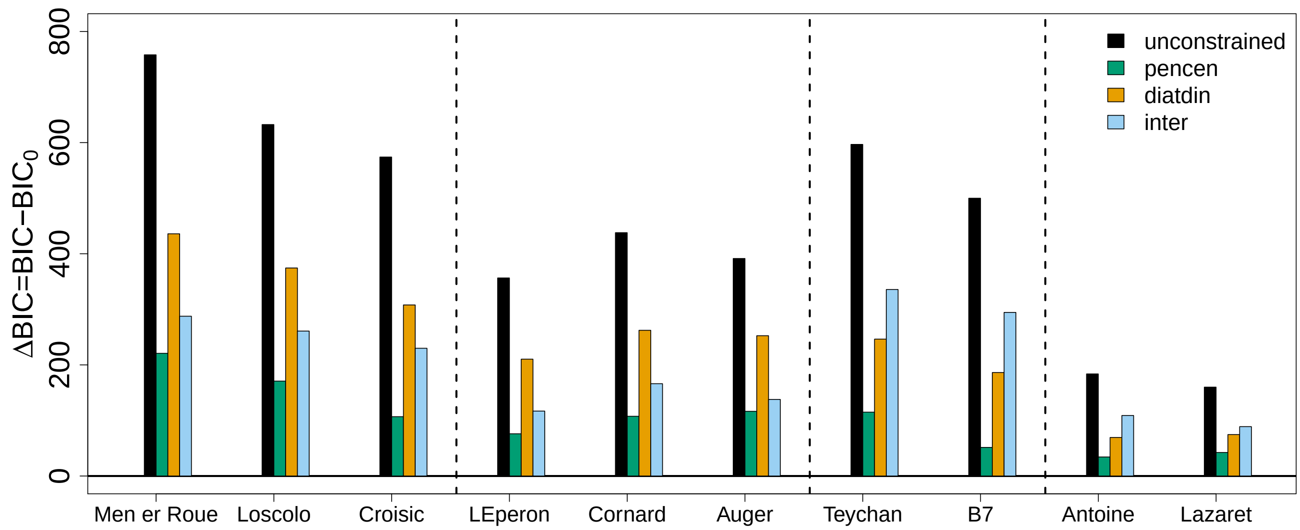

Figure 2: Comparison of BIC with different interaction matrices, compared to the null model (diagonal interaction matrix, allowing only intragroup interactions), for four different sites separated by dashed lines (Brittany, Oléron, Arcachon and Mediterranean Sea) and 10 different subsites. Different interaction matrices may allow all interactions between taxa (unconstrained), only interactions within pennate diatoms, centric diatoms, dinoflagellates, or other phytoplanktonic taxa (pencen), only interactions within diatoms, dinoflagellates or other taxa (diatdin), or only interactions between taxa belonging to these different groups. As model structures (length of the times series taken into account) are different between sites and subsites, groups of bars should not be compared.

[1]From 1996, without linear interpolation

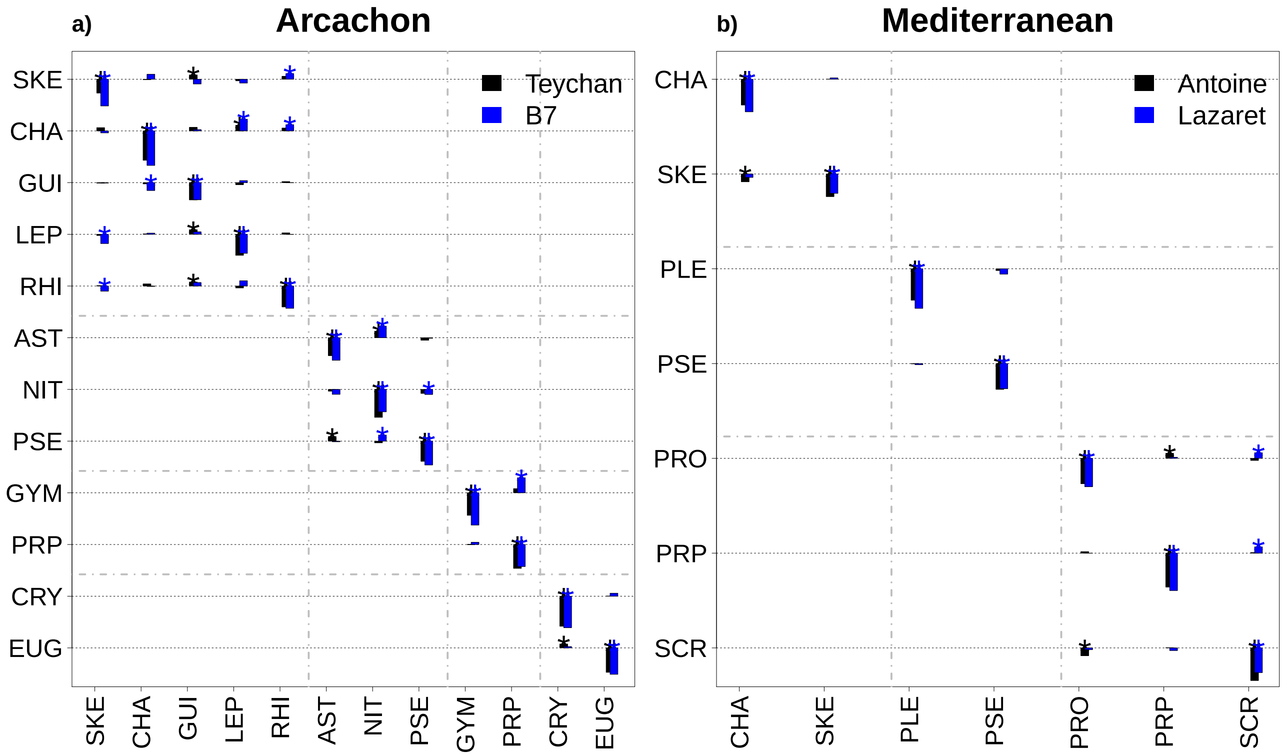

Figure 3: Interaction matrices estimated in Arcachon (a) and in the Mediterranean Sea (b). Only interactions between clades (pennate and centric diatoms, dinoflagellates, other planktonic taxa) are allowed. The figure should be read as taxon i having effect e_{ji} on taxon j. The scale for the coefficient values is given at the bottom left of panel a). 95% significance of coefficients was determined by bootstrapping and is marked by asterisks (*). The identity matrix was subtracted to the interaction matrix ($\mathbf{B}$–$\mathbf{I}$) in order to make effects on growth rates comparable. Composition of planktonic groups is given in Table 1.

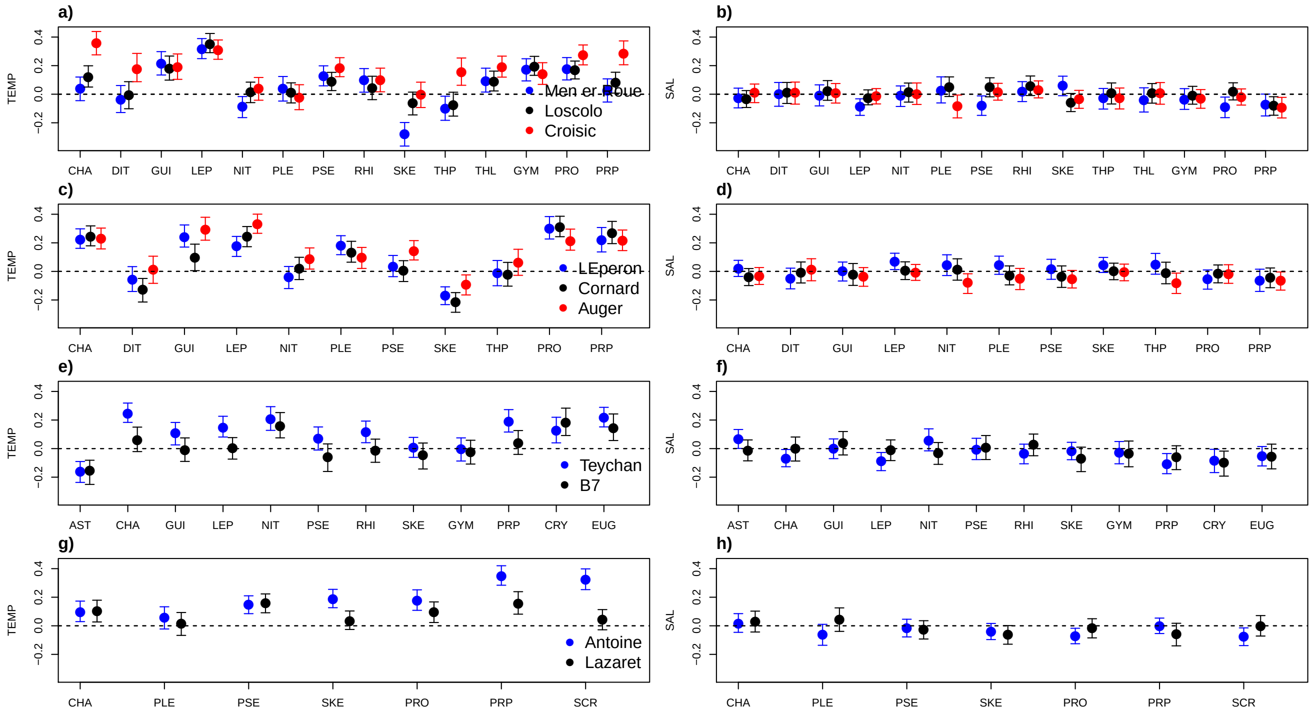

Figure 4: Effect of abiotic variables (temperature, TEMP or salinity, SAL) on phytoplankton group in Brittany (a, b), Oléron (c, d), Arcachon (e, f) and in the Mediterranean Sea (g, h). Each color corresponds to a different site. Error bar corresponds to the 95% confidence interval around the estimated coefficient. All variables were normalized before estimation.

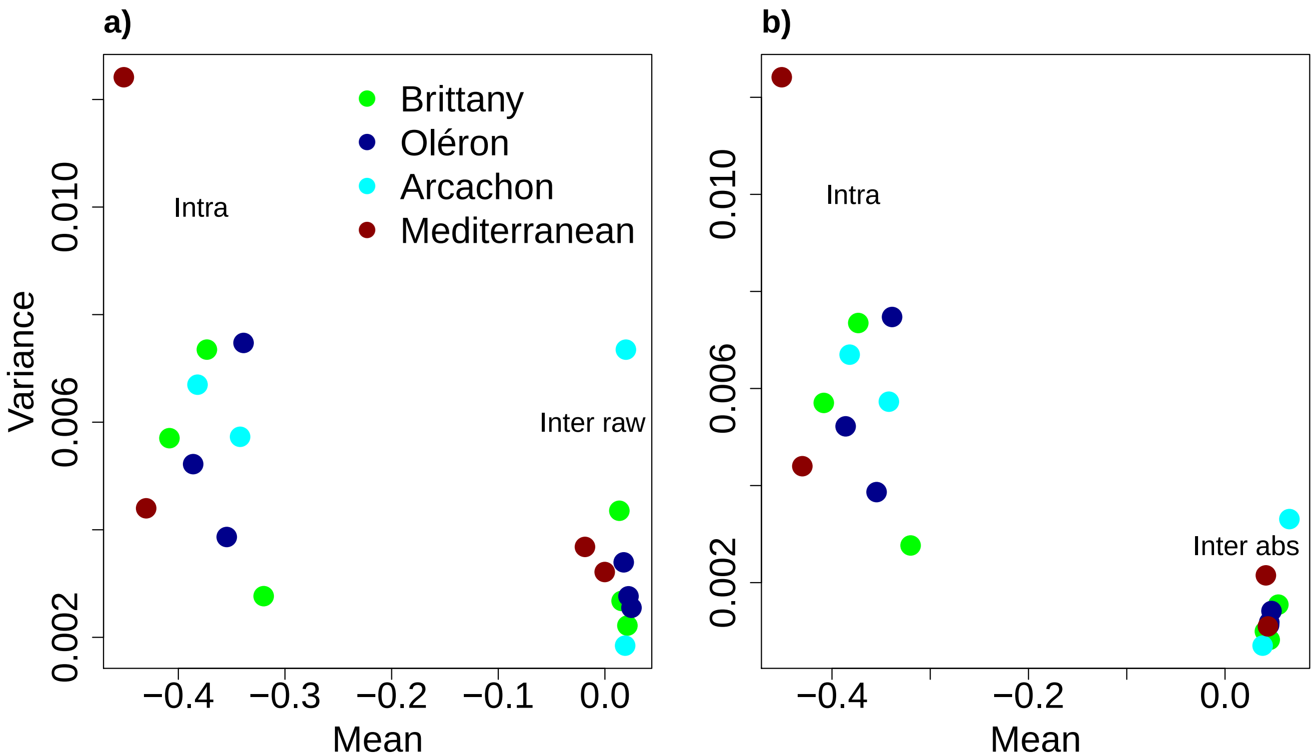

Figure 5: Variance of the coefficient in the interaction matrix (**B**–**I**), as a function of their mean, for 10 sites in 4 regions, with a model allowing interactions only within clads (see above). The mean-variance relation was either computed with raw values of intergroup interactions (a) or absolute values of the intergroup coefficients (b). Intragroup coefficients were not modified.

References for the meta-analysis

Code	Ref	Dimension	Type of organisms	System
Griffiths2015_Phyto1	[2]	7	Phytoplankton	Coastal site
Griffiths2015_Phyto2	[2]	7	Phytoplankton	Offshore site
Huber2006_Phyto	[3]	10	Phytoplankton	Lake
Huber2006_Ciliate	[3]	10	Ciliates	Lake
Ives1999_Zoo1	[4], conditional least square estimate	9	Zooplankton	Lake
Ives1999_Zoo2	[4], total least square estimate	9	Zooplankton	Lake
Ives2003_Plank1	[5]	4	Plankton	Lake
Ives2003_Plank2	[5]	4	Plankton	Lake with high planktivory
Ives2003_Plank3	[5]	4	Plankton	Lake with low planktivory
Klug2000_Phyto	[6]	2	Phytoplankton	Lake
Klug2000_Zoo	[6]	3	Zooplankton	Lake
Klug2001_TaxoAlgae	[7]	5	Taxonomic groups of plankton	Lake
Klug2001_MorphoAlgae	[7]	4	Functional groups of plankton	Lake
Lindegren2009_Fish	[8]	3	Fish	Baltic Sea
Vik2008_LynxHare	[9]	2	Lynx/Hare	Terrestrial
Yamamura2006_Insects	[10]	3	Insects	Terrestrial

Table 3: References used [TO COMPLETE]

References

[1] T. Hernández Fariñas, C. Bacher, D. Soudant, C. Belin, and L. Barillé. Assessing phytoplankton realized niches using a French national phytoplankton monitoring network. *Estuarine, coastal and shelf science*, 159:15–27, 2015.

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[3] V. Huber and U. Gaedke. The role of predation for seasonal variability patterns among phytoplankton and ciliates. *Oikos*, 114(2):265–276, 2006.

[4] A.R. Ives, S.R. Carpenter, and B. Dennis. Community interaction webs and zooplankton responses to planktivory manipulations. *Ecology*, 80(4):1405–1421, 1999.

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