To discuss paper of sequencing data from algae experiment | Kaisermann | 27/06/18

OUT OF THE DARK:
MICROBIAL DIVERSITY AND ACTIVITY IN SOIL INFLUENCED BY LIGHT

Goal 1: Describing the photoautotrophic diversity present in soil in the dark

Goal 2: Determinate whether light affected photoautotrophic, bacterial and fungal community composition.

Hyp 1: Some photoautotrophic taxa consistently respond to light treatment

Hyp 2: Photoautotrophic community affects the composition of the heterotrophic microbial community

Goal 3: Evaluate whether changes in microbial community lead to changes in ecosystem function, e.g. soil respiration, photosynthesis rate, OCS exchange, and CA activity.

Hyp 3: The change in abundance of some taxa will be strongly correlated to the change in ecosystem functions

Goal 1: Describing the photoautotrophic diversity present in soil **in the dark**

Alpha Diversity

- With OTUs table
- Randomly subsampled nb of sequence depending on the lowest number of reads recovered in a single sample (to mitigate the effect of differing sequencing depth across samples)
- Calculate Shannon-Weaver diversity and evenness

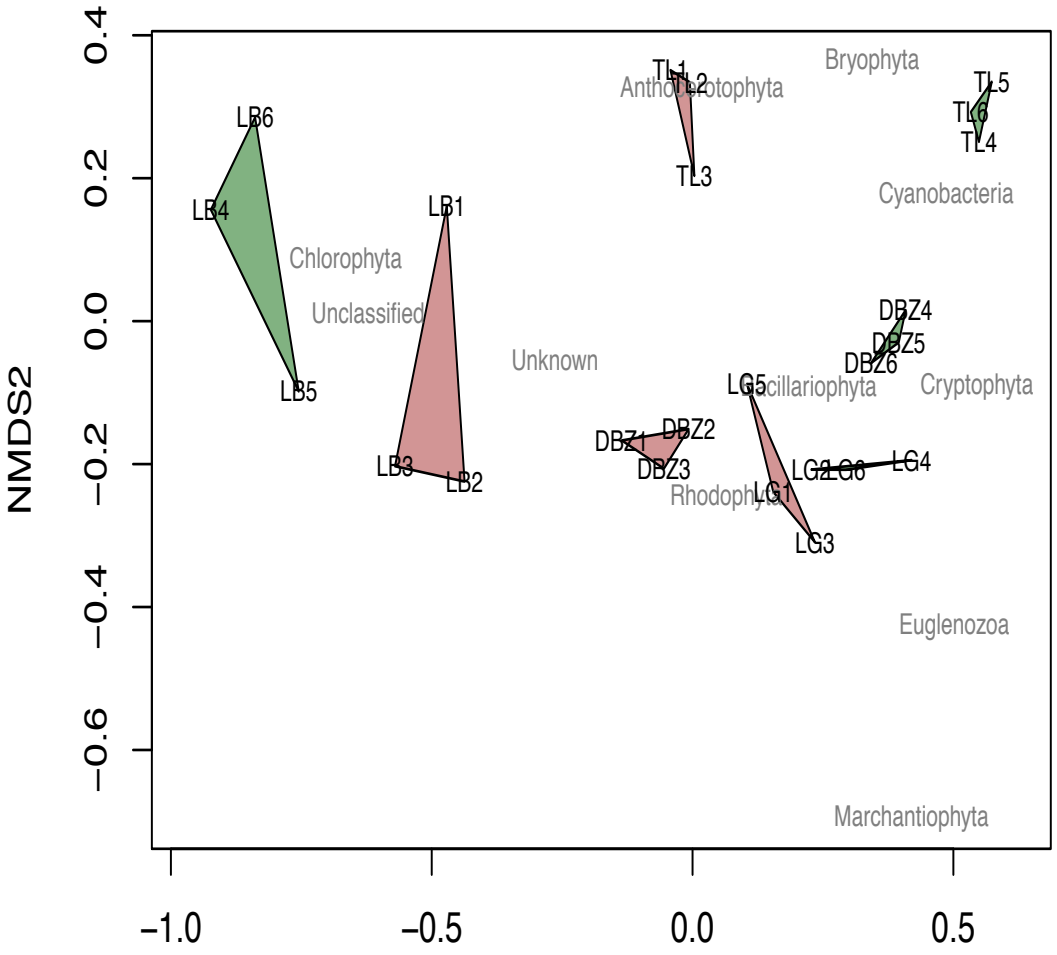
Beta Diversity

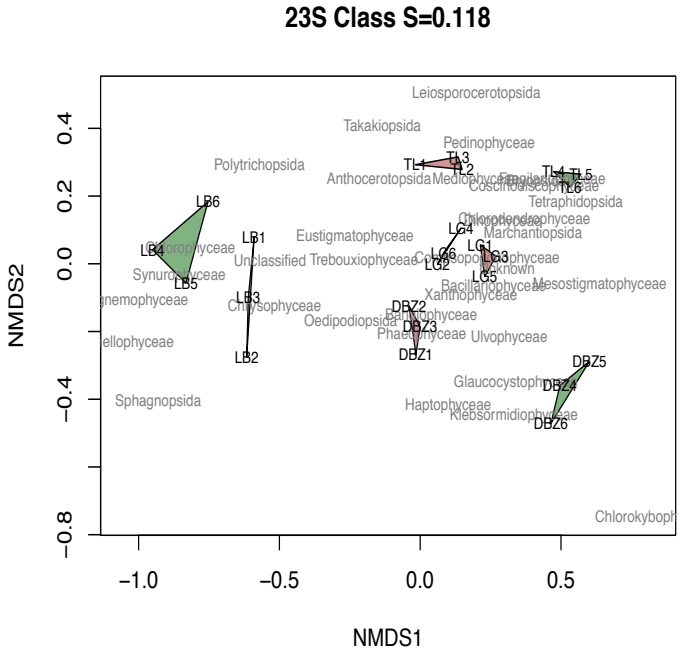
- With OTUs table
- NMDS using Bray-Curtis dissimilarity measure on square root transformed data
- ANOSIM performed
- SIMPER to identify OTUs that contributed most to the dissimilarity

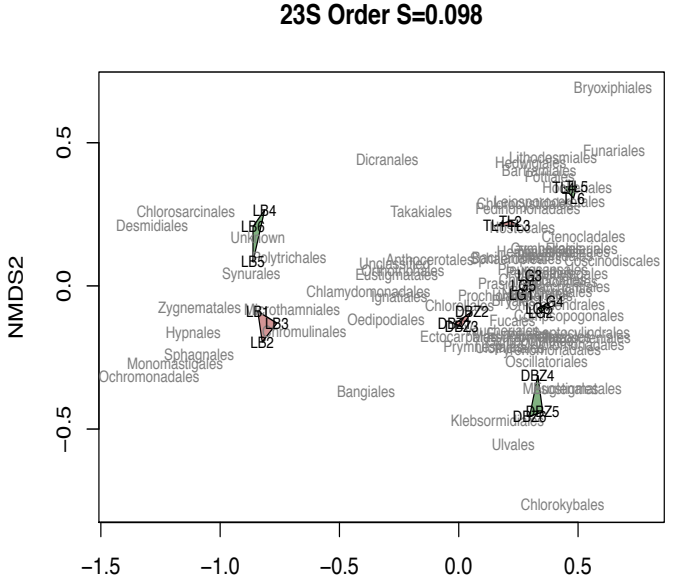
Describe Alpha and Beta Diversity as goal 1
With OTUs table

Goal 2; Hyp 1: Some photoautotrophic taxa consistently respond to **light** treatment

First result based on taxonomic data







Statistic on taxonomic data (23S)

ANOSIM : P value (i.e. significance levels) and a R value (i.e. the strength of the factors on the samples, R value close to 1 indicates high separation between levels of the factor

ANOSIM R (P)	PHYLUM	CLASS	ORDER
Conditioning (DC vs LC)	0.377 (0.001)	0.272 (0.001)	0.221 (0.008)
Site (4 sites)	0.45 (0.001)	0.6 (0.001)	0.708 (0.001)
Treatment (Conditioning x sites)	0.984 (0.001)	0.997 (0.001)	1 (0.001)

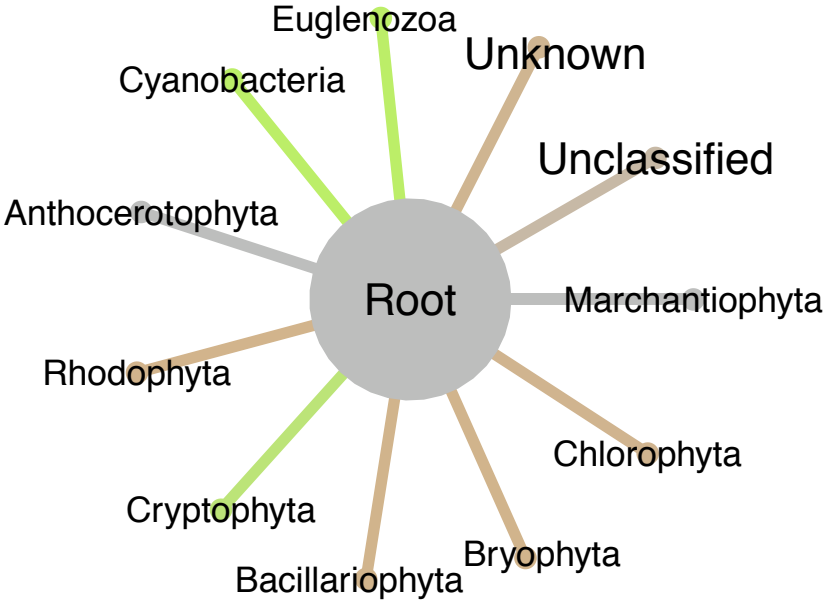
Homogeneity of multivariate dispersion + anova and permutest

Betadisper F (P)	PHYLUM	CLASS	ORDER
Conditioning	5.6 (0.03)	4.2 (0.064)	2.7 (0.11)
Site	3.4 (0.03)	4.2 (0.02)	6.4 (0.003) → LG
Treatment	1.4 (0.25)	1.7 (0.178)	2.02 (0.12)

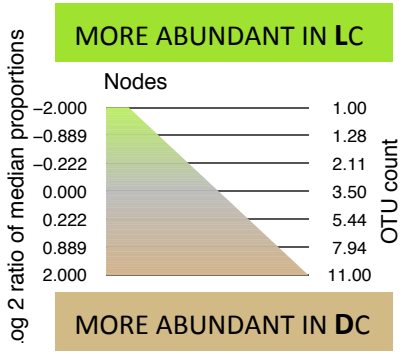
PERMANOVA

ADONIS R (P=0.001 if blank)	PHYLUM	CLASS	ORDER
Conditioning	0.17	0.16	0.14
Site	0.55	0.58	0.62
Conditioning : sites	0.25	0.23	0.32
Treatment	0.97	0.97	0.96

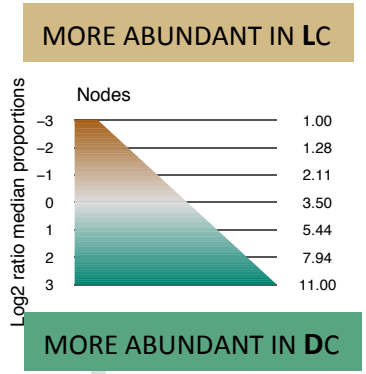
Goal 2; Hyp 1: Some photoautotrophic taxa consistently respond to **light** treatment

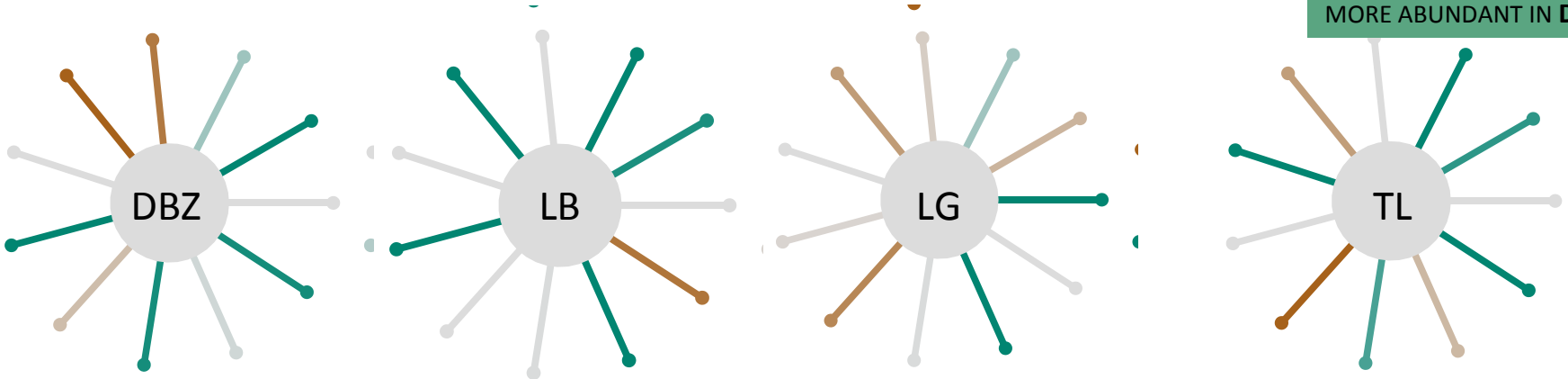


At phylum level, the abundance of **Cyanobacteria**, **Cryptophyta**, and **Euglenozoa** increased with light conditioning …



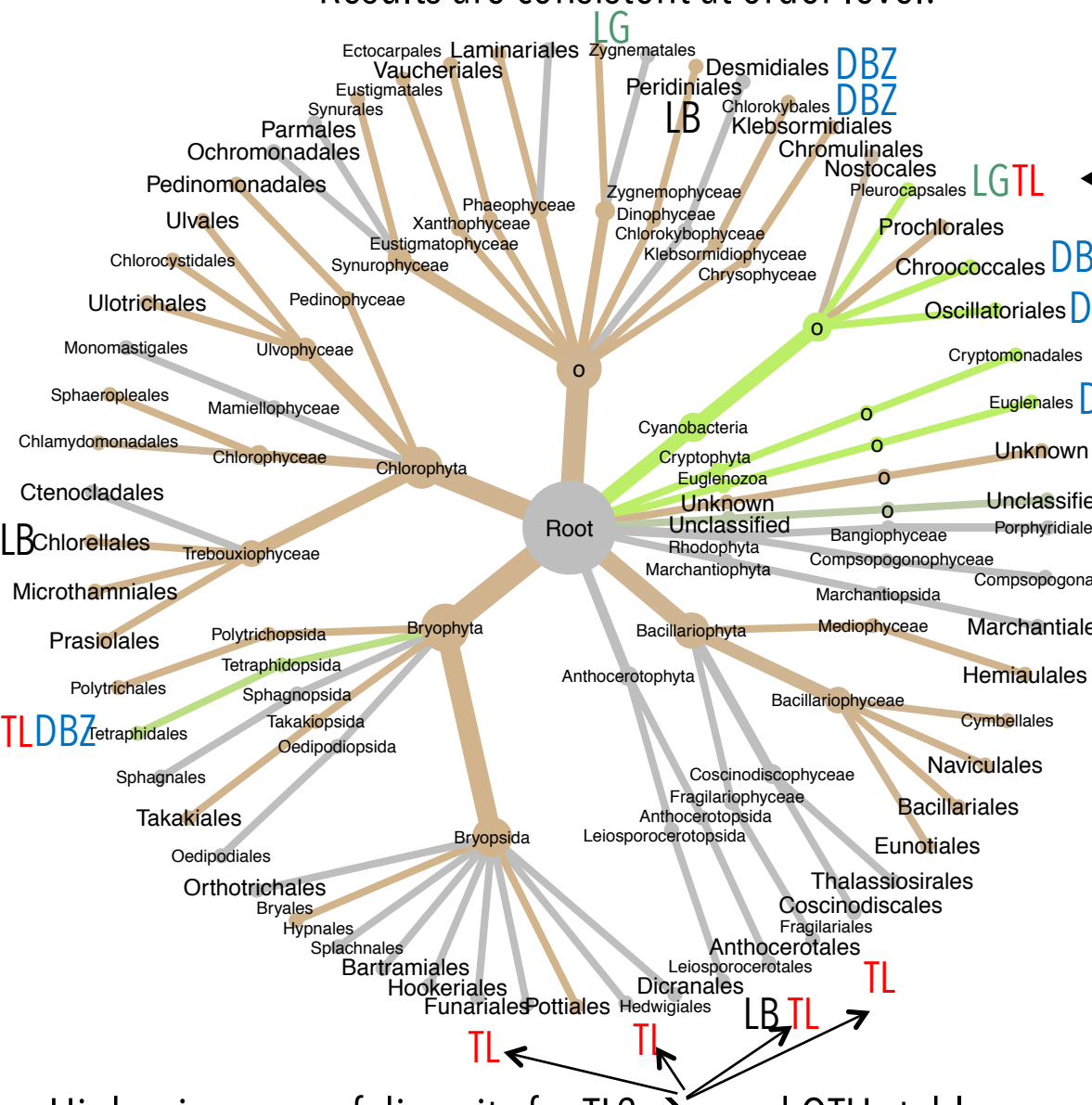
… but there are specific effects depending on soil type, in particular the response of LB soil is totally different (increase of chlorophyta only)





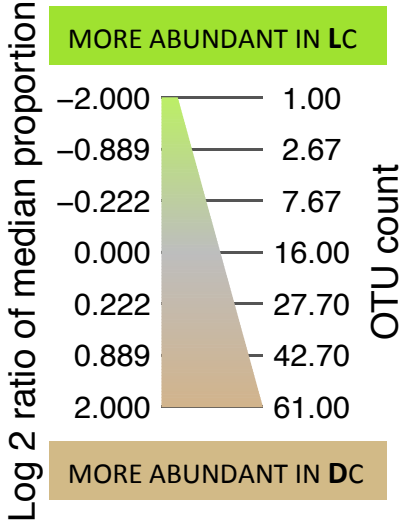
Goal 2; Hyp 1: Some photoautotrophic taxa consistently respond to **light** treatment

Results are consistent at order level.



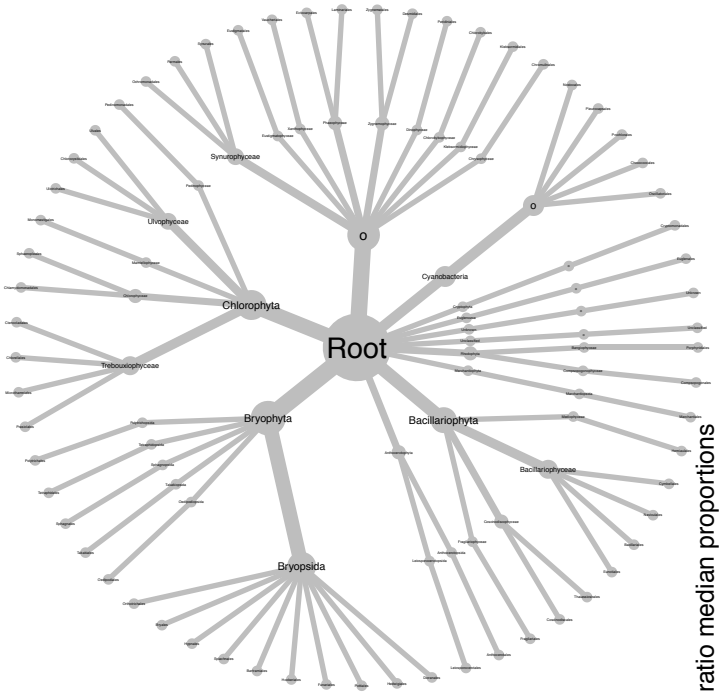
Generalist responsive taxa ?

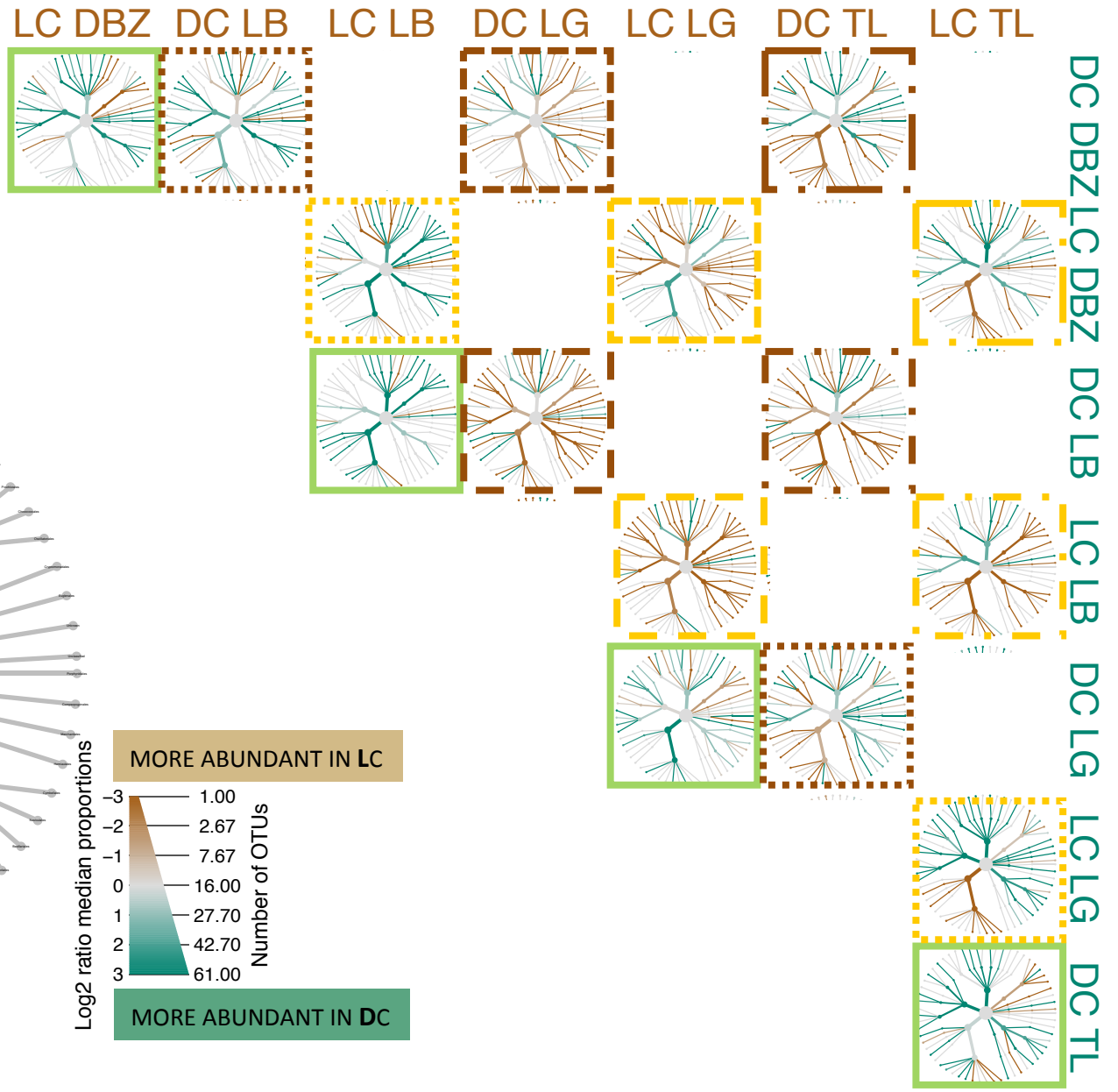
Silty soils with CN=10



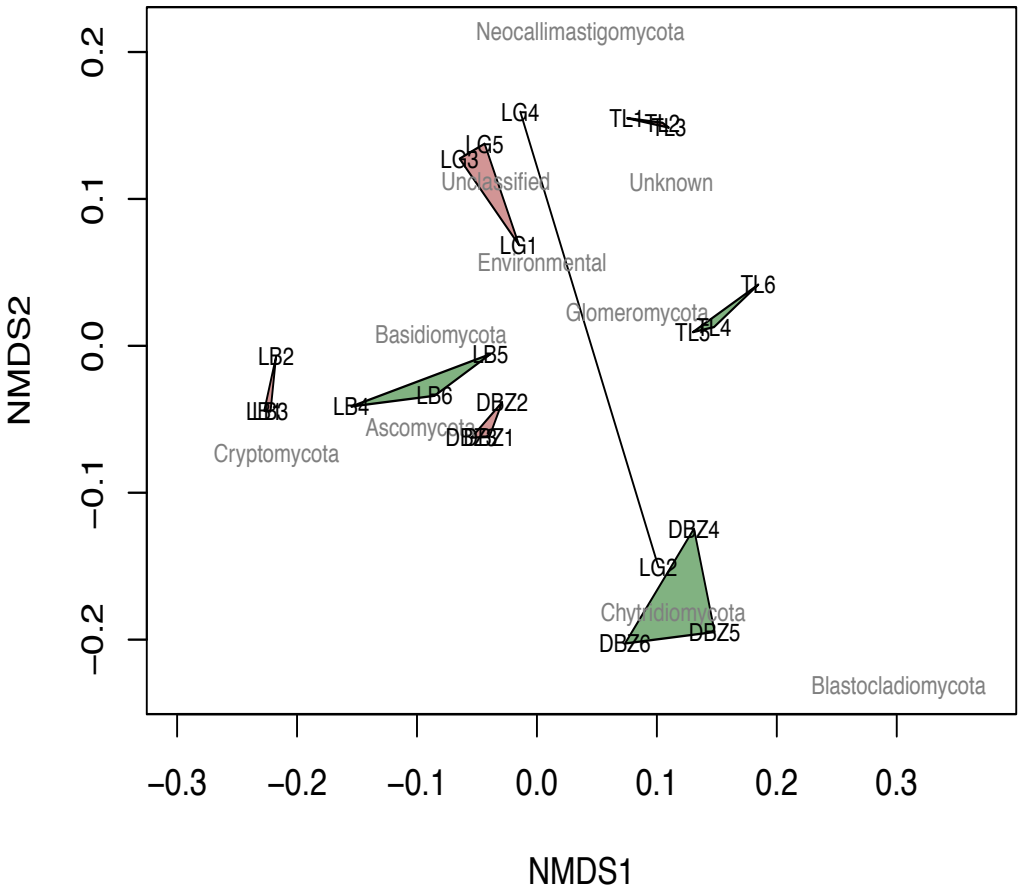
Higher increase of diversity for TL? → need OTUs table

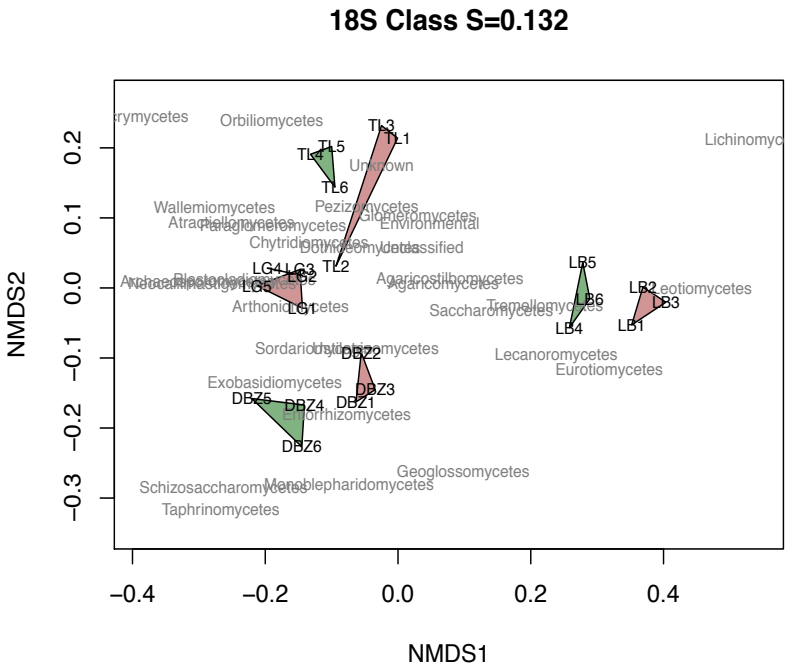
Goal 2; Hyp 1: Some photoautotrophic taxa consistently respond to light treatment

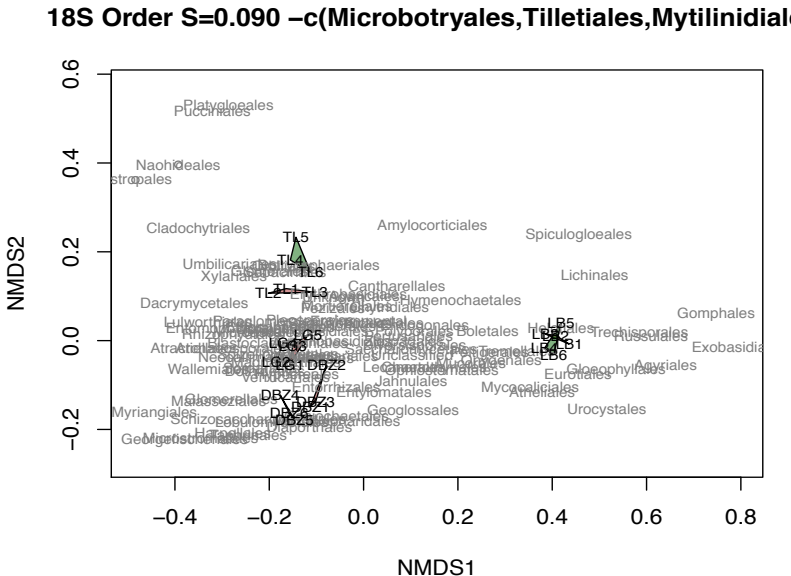




Taxo for Fungal community







Statistic on taxonomic data (18S)

Homogeneity of multivariate dispersion + anova and permutest

Betadisper F (P)	PHYLUM	CLASS	ORDER
Conditioning	1.87 (0.19)	1.7 (0.2)	1.23 (0.28)
Site	3.38 (0.04) → LB-DBZ	4.7 (0.01) LB-DBZ	5.5 (0.006) LB-DBZ et LB-TL
Treatment	0.57 (0.76)	0.58 (0.76)	1.4 (0.28)

ANOSIM : P value (i.e. significance levels) and a R value (i.e. the strength of the factors on the samples, R value close to 1 indicates high separation between levels of the factor

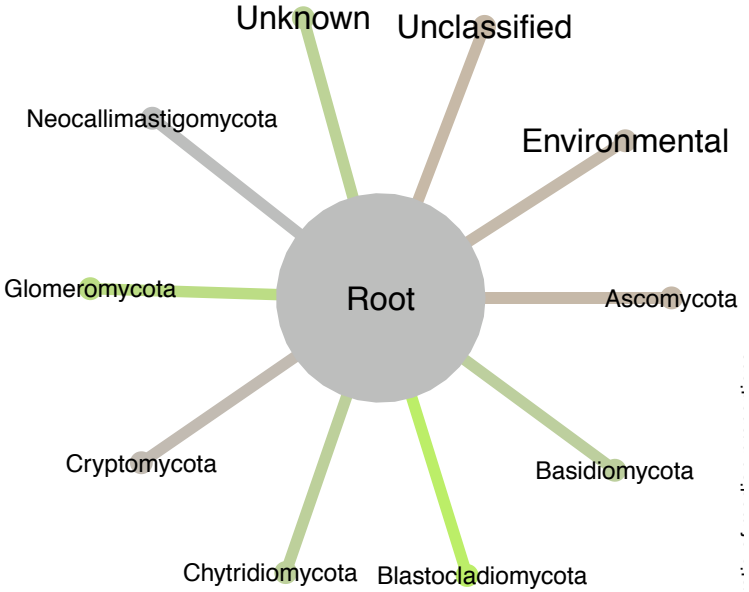
ANOSIM R (P=0.001 if blank)	PHYLUM	CLASS	ORDER
Conditioning (DC vs LC)	0.07 (0.138)	0.06 (0.134)	0.027 (0.261)
Site (4 sites)	0.687	0.894	0.963
Treatment (Conditioning x sites)	0.818	0.951	0.946

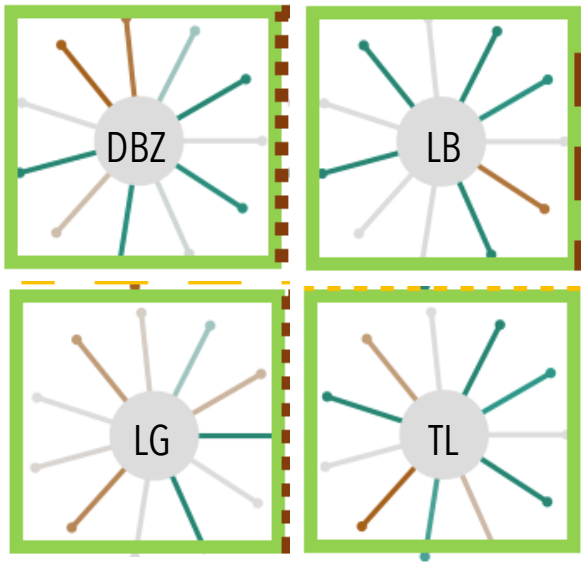
PERMANOVA

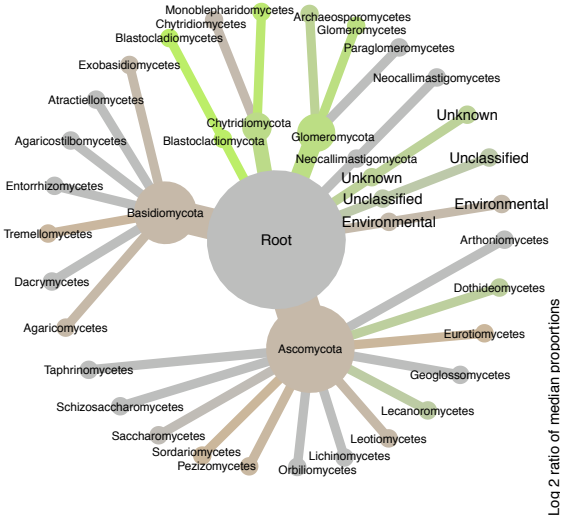
ADONIS R2 (P=0.001 if blank)	PHYLUM	CLASS	ORDER
Conditioning	0.12	0.08	0.05
Site	0.64	0.76	0.77
Conditioning : sites	0.12	0.07 (0.003)	0.07 (0.01)
Treatment	0.89	0.91	0.91

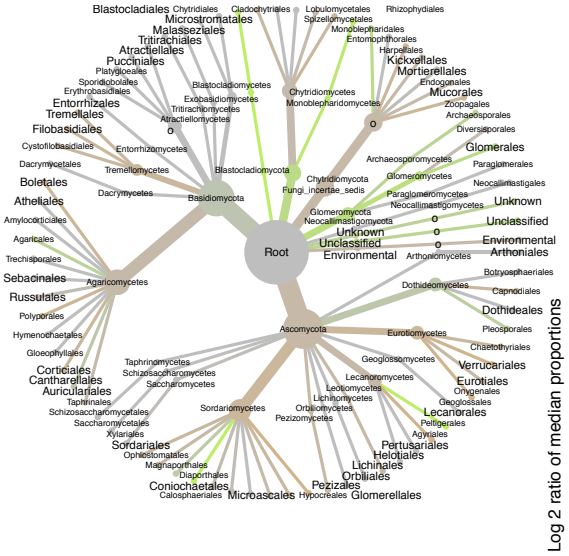
Goal 2: **Hyp 2**: Light affects the composition of the heterotrophic microbial community

No significant effect of light treatment on fungal composition









MORE ABUNDANT IN **LC**

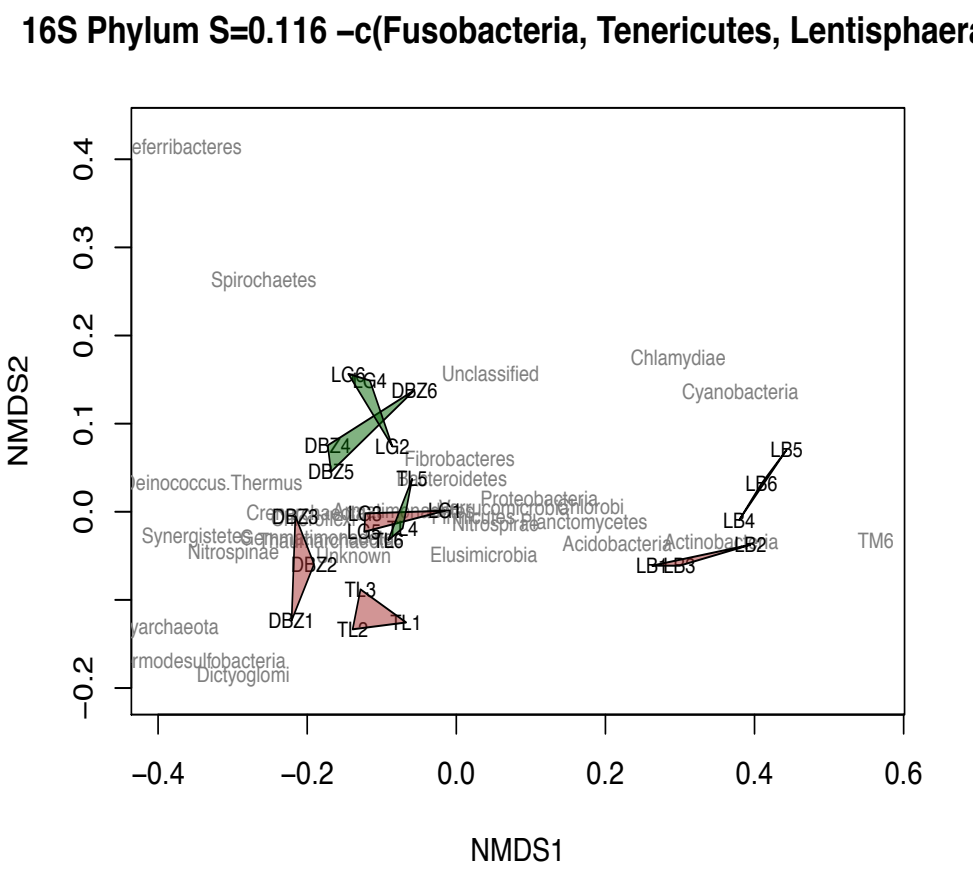
Nodes

−2.000	1.00
−0.889	3.17
−0.222	9.67
0.000	20.50
0.222	35.70
0.889	55.20
2.000	79.00

OTU count

MORE ABUNDANT IN **DC**

Statistic on taxonomic data (16S)

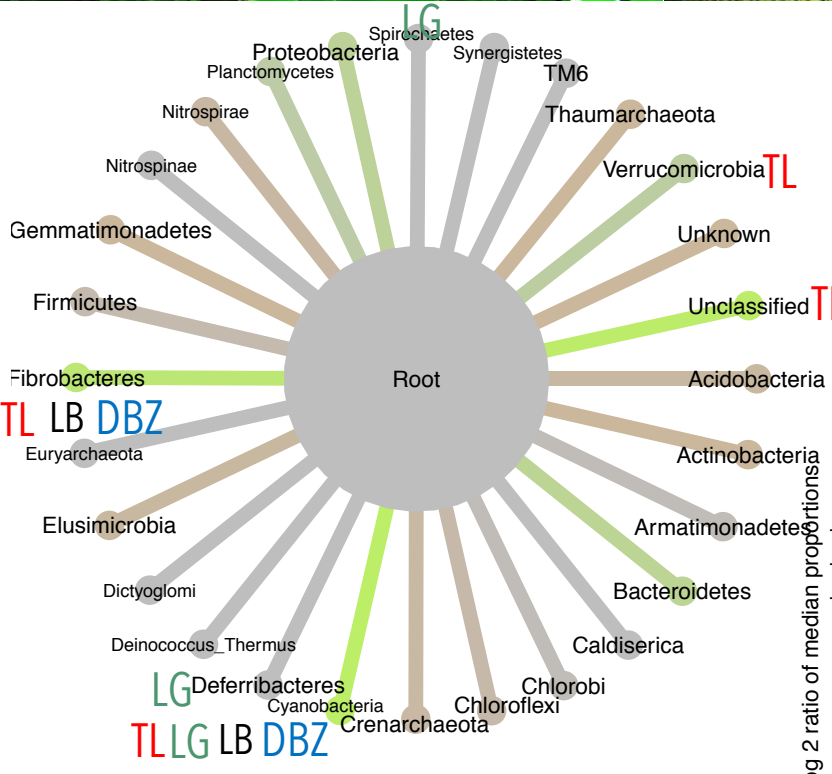


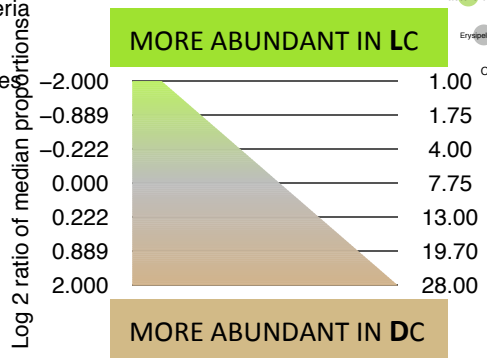
ANOSIM R (P=0.001 if blank)	PHYLUM	CLASS	ORDER
Conditioning (DC vs LC)	0.244 (0.01)	0.169 (0.02)	0.178 (0.02)
Site (4 sites)	0.739	0.796	0.85
Treatment (Conditioning x sites)	0.979	0.978	0.98

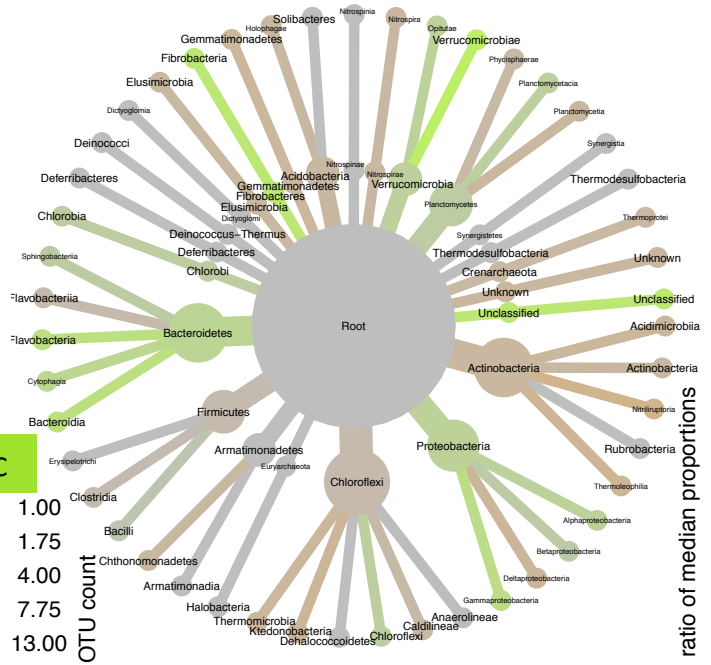
Betadisper F (P)	PHYLUM	CLASS	ORDER
Conditioning	0.23 (0.64)	0.06 (0.79)	0.21 (0.6)
Site	1.79 (0.18)	2. (0.08)	1.78 (0.18)
Treatment	0.57 (0.77)	0.8 (0.56)	0.86 (0.55)

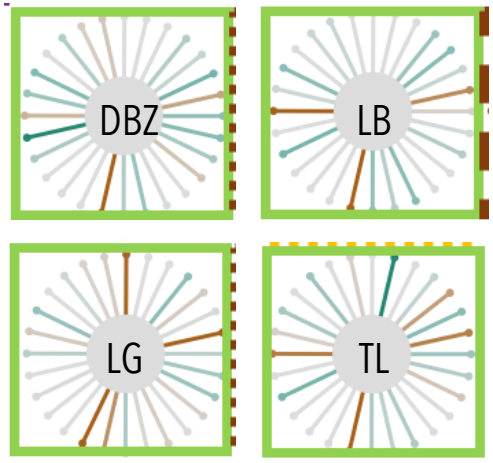
ADONIS R2 (P=0.001 if blank)	PHYLUM	CLASS	ORDER
Conditioning	0.13	0.09	0.07
Site	0.76	0.75	0.81
Conditioning : sites	0.05 (0.013)	0.06	0.04 (0.04)
Treatment	0.94	0.92	0.93

Goal : Title



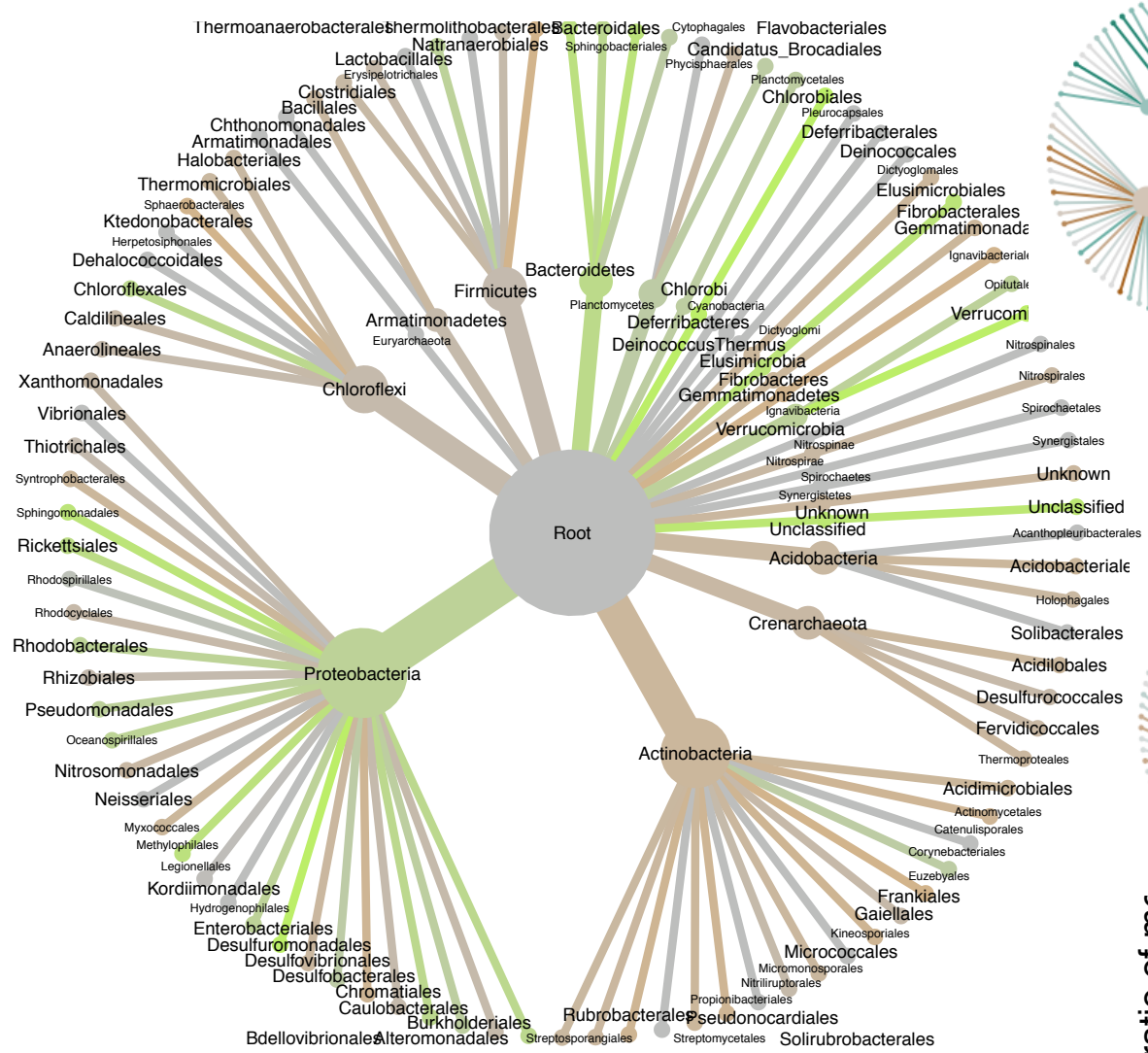


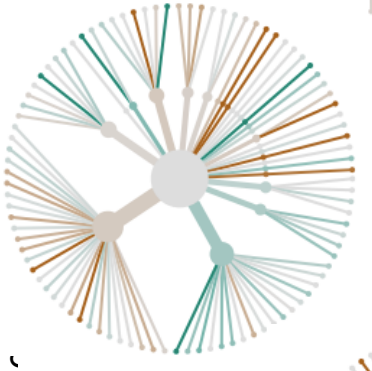




Light increase cyanobacteria,Bacteroi detes, proteobacteria and fibrobacteres

Goal : Title





Log 2 ratio of m