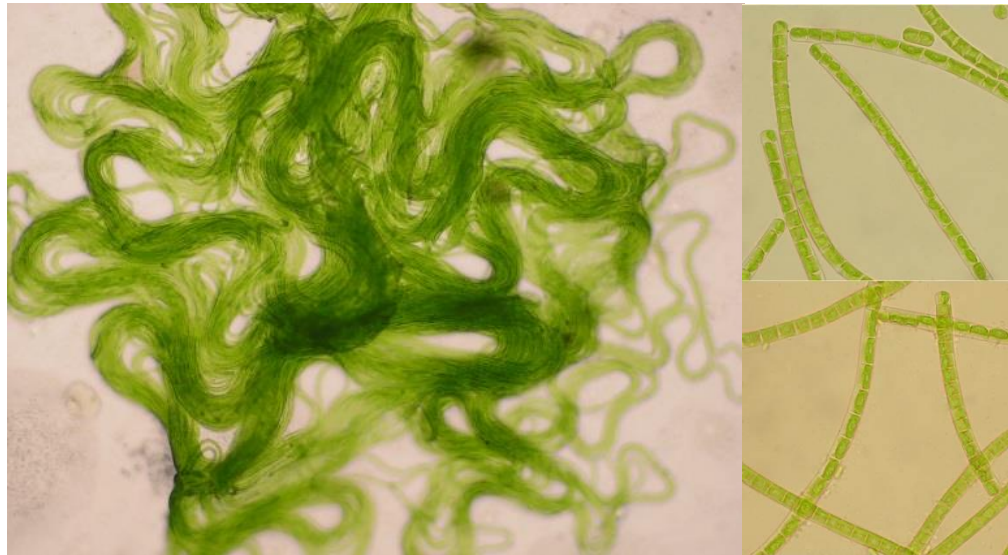


Diversity and dispersal capacities of a terrestrial algal genus *Klebsormidium* (Streptophyta) in temperate and polar regions



David Ryšánek
Charles University in Prague, Botany dept.

Biogeography of protists

Ubiquity model

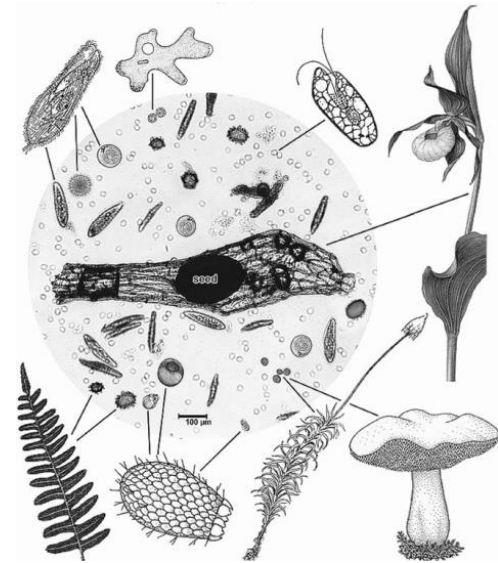
- Cosmopolitan distribution



Finlay (2002)

Moderate endemicity model

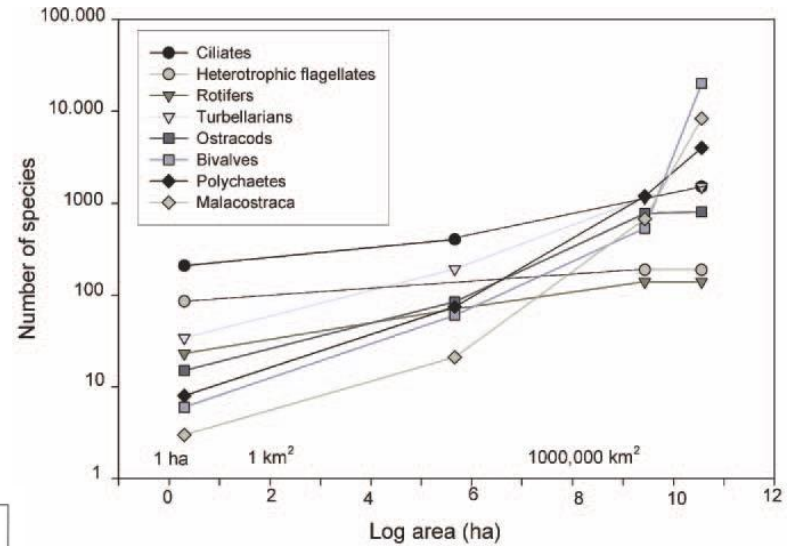
- Limited distribution



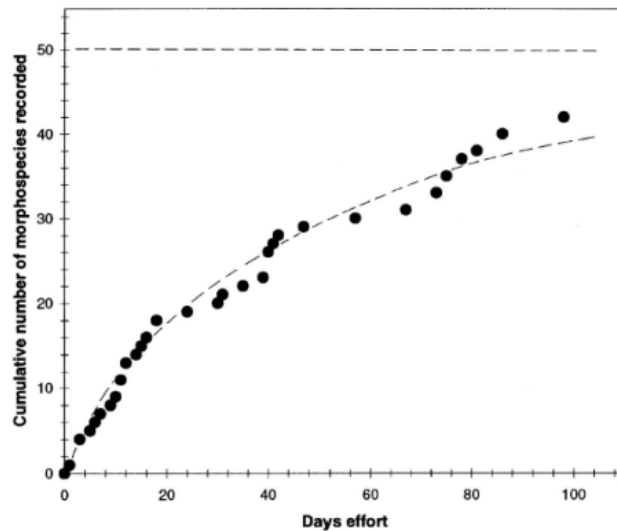
Foissner (2008)

Biogeography of protists ubiquity model

- Huge populations
- Small size < 1mm
- Random distribution
- Local/global diversity
- undersampling



Fenchel a Finlay (2004)



Finlay and Clarke (1999)



Paraphysomonas sp.

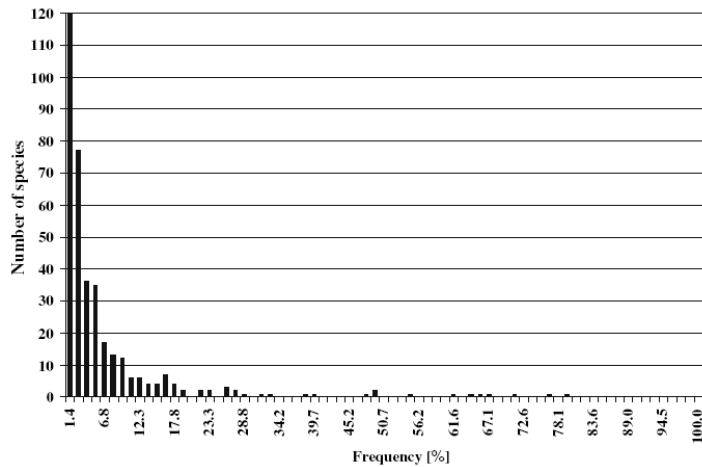


Priest Pot

Biogeography of protists

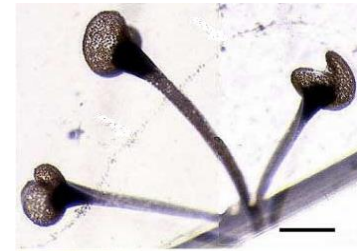
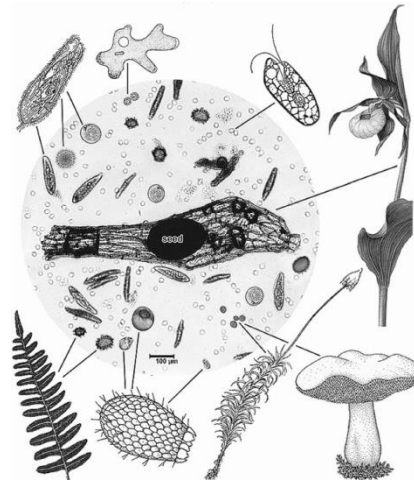
moderate endemicity model

- Flagship species
- Human introduction

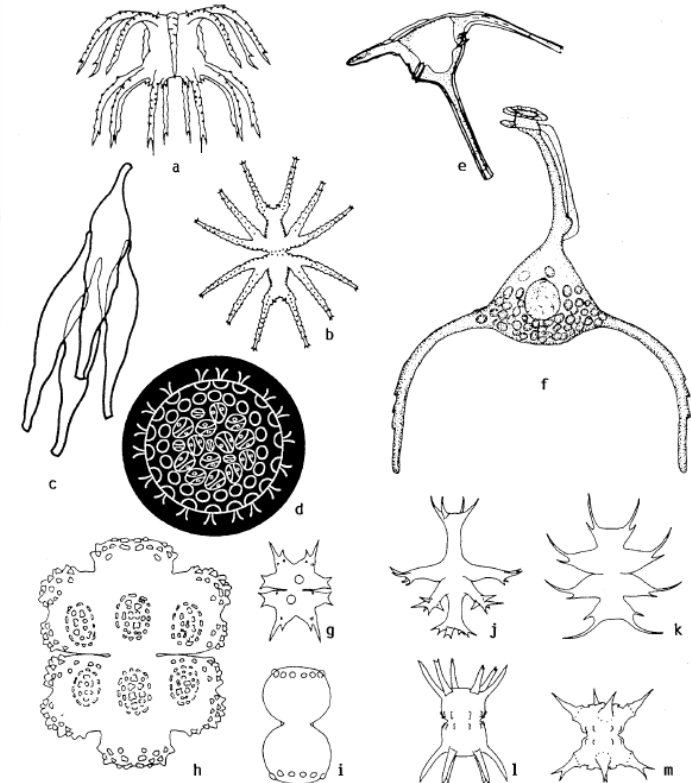


Frequencies of 365 ciliate species in 73 samples from terrestrial habitats of Namibia

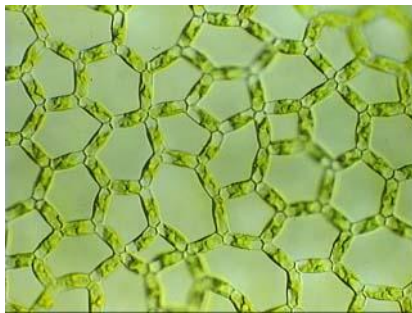
Foissner (2008)



Maristentor dinoferus



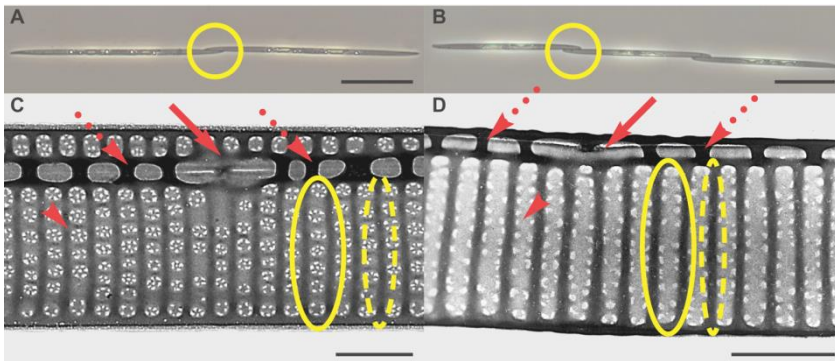
Foissner (2006)



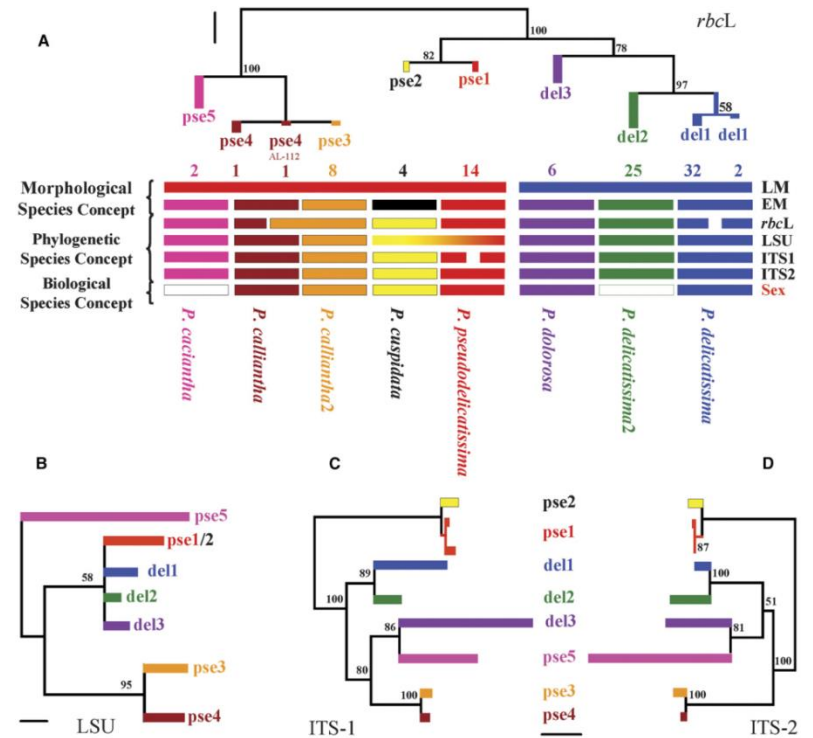
Hydrodictyon sp.

Kristiansen (1996)

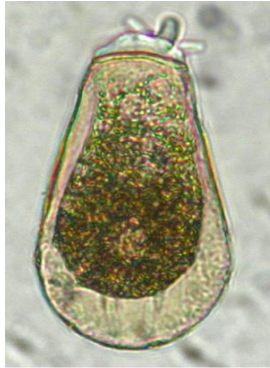
Cryptic diversity of protist



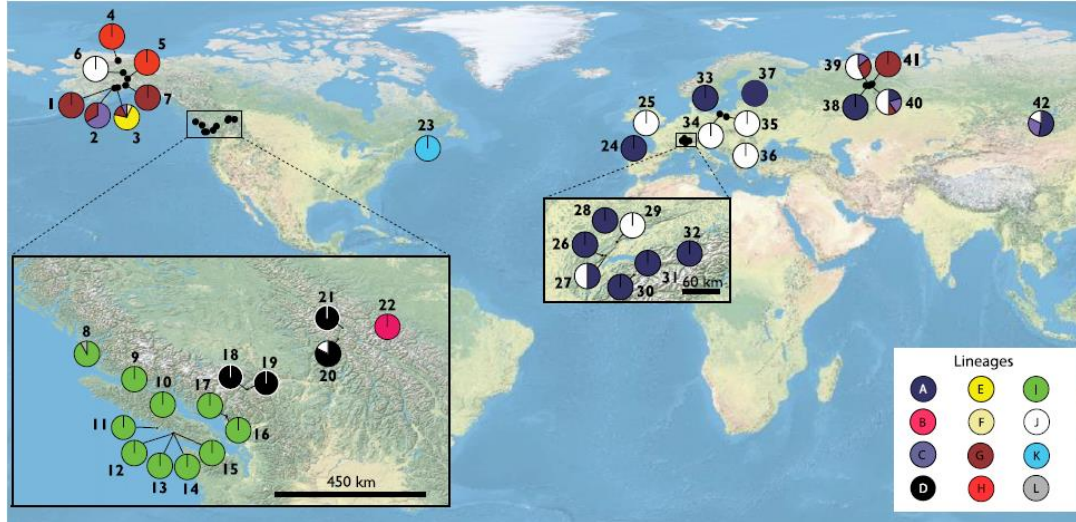
Pseudo-nitzschia calliantha, *Pseudo-nitzschia delicatissima*



Cryptic diversity of protist Phylogeography



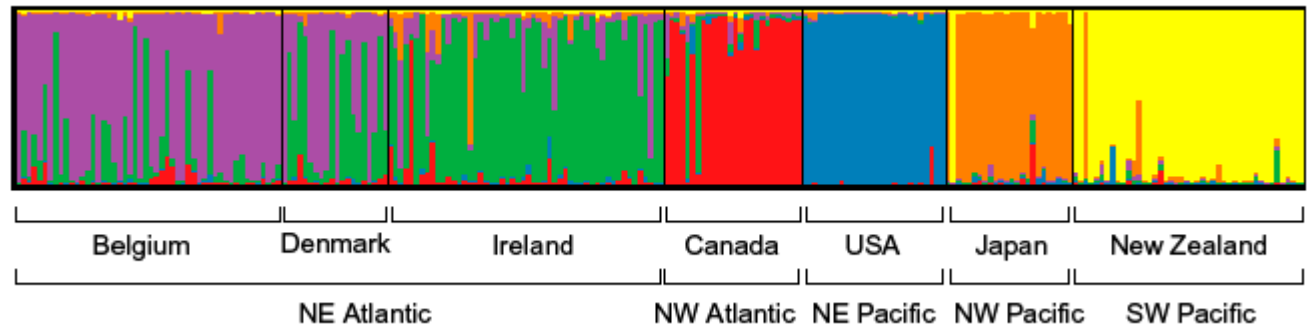
Hyalosphenia papilio



Heger et al. (2014)



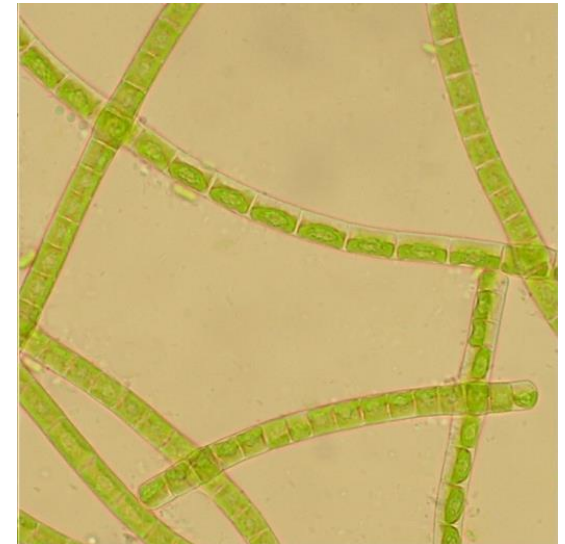
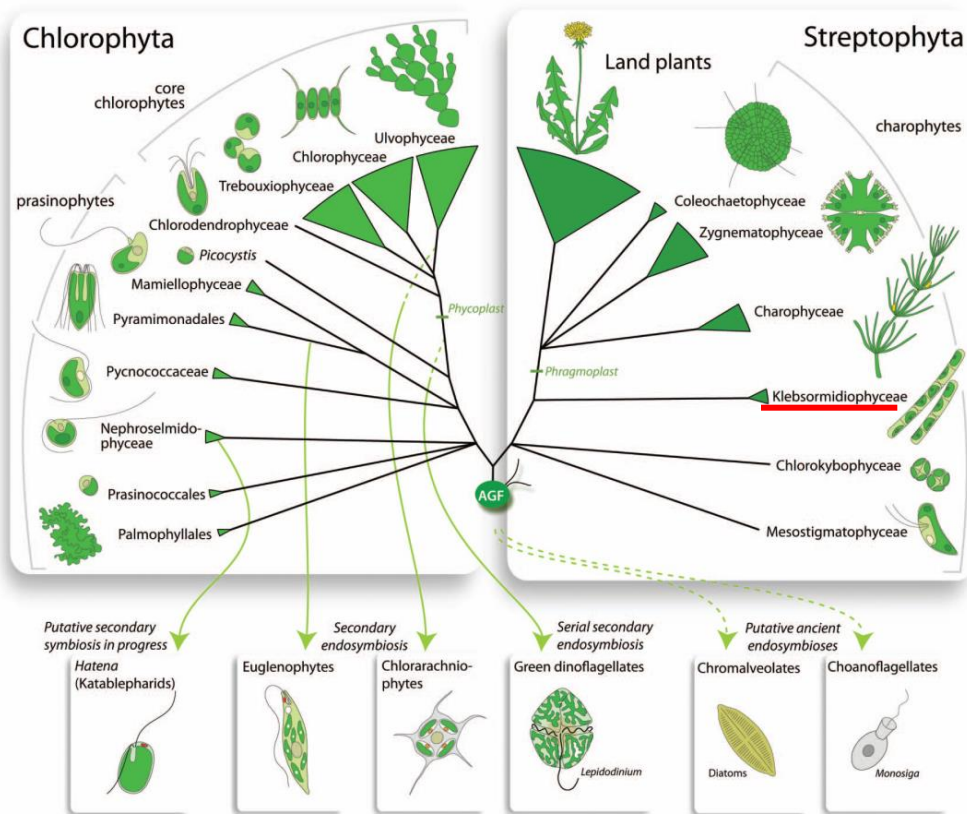
Pseudo-nitzschia pungens



Casteleyn et al. (2010)

genus *Klebsormidium*

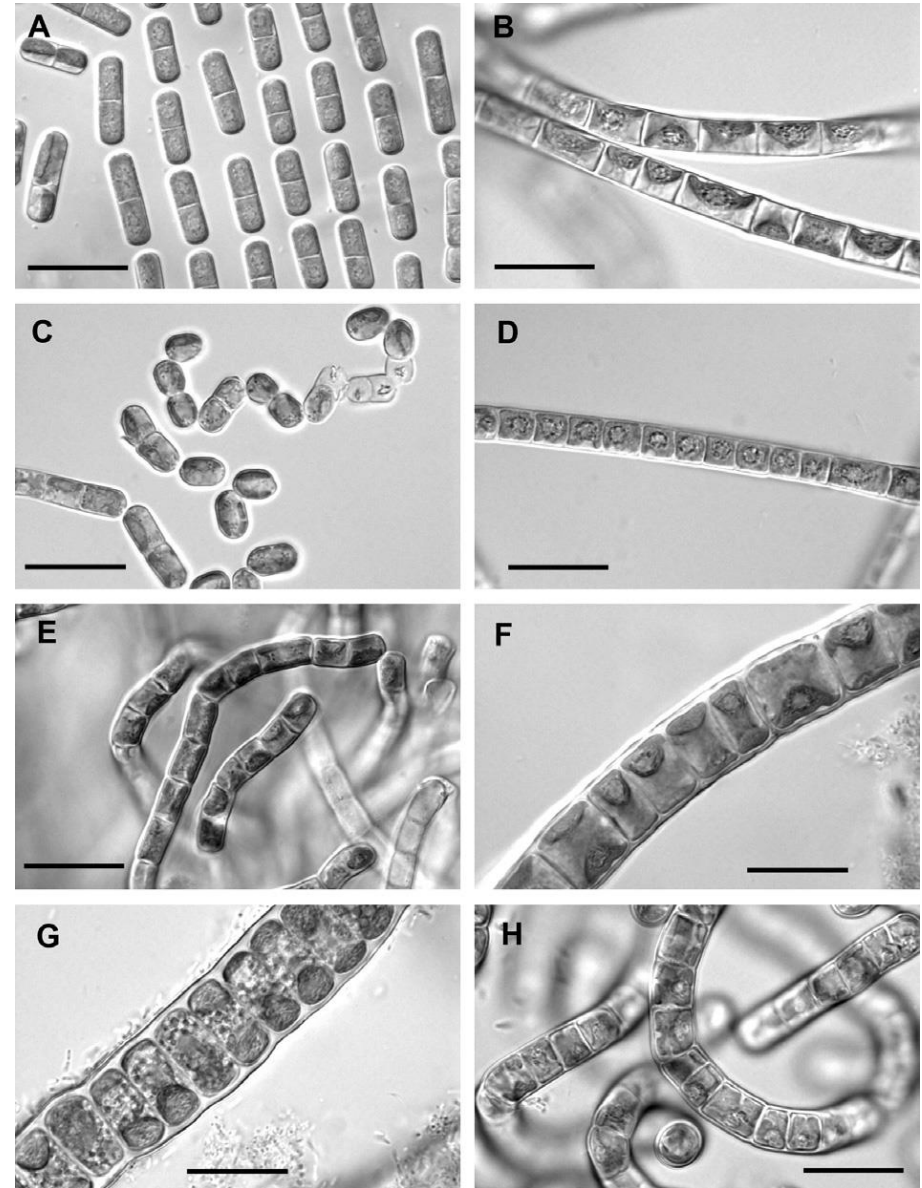
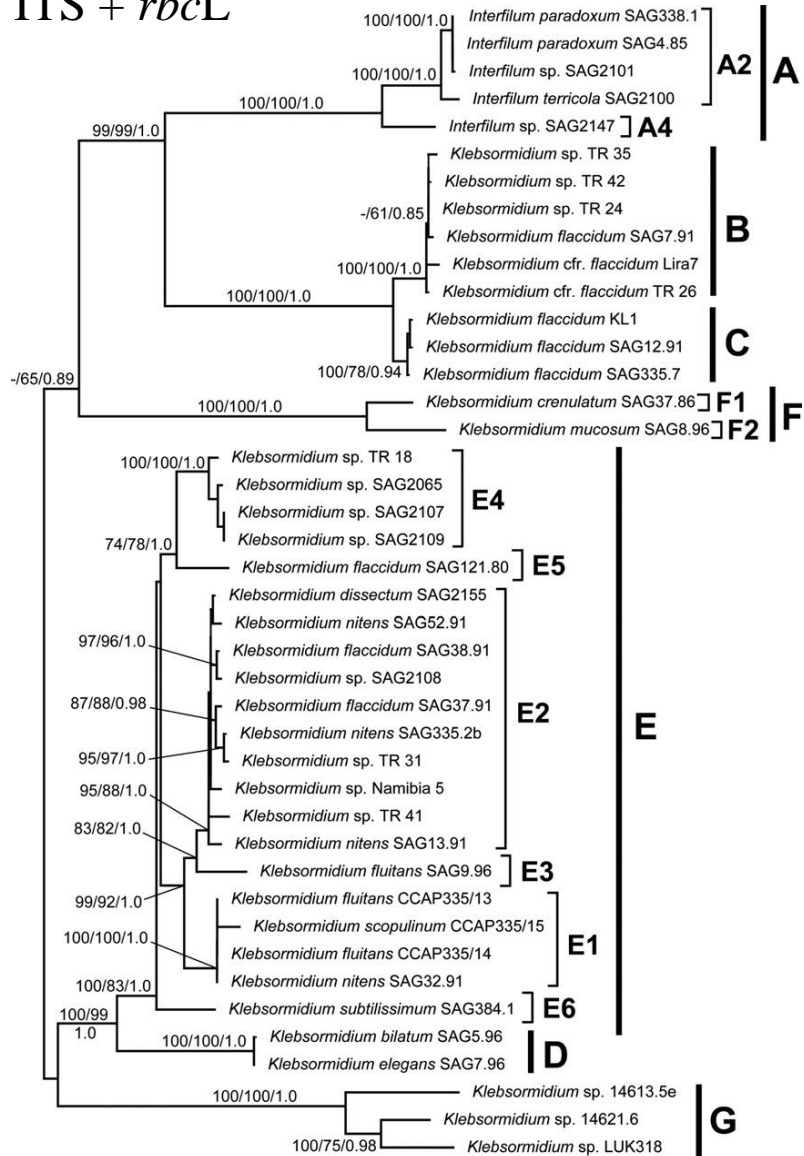
- Streptophyta
- Uniseriate filamentous green algae
- Mainly aeroterrestrial habitats, also freshwater
- Cosmopolitan distribution



Leliaert et al. (2012)

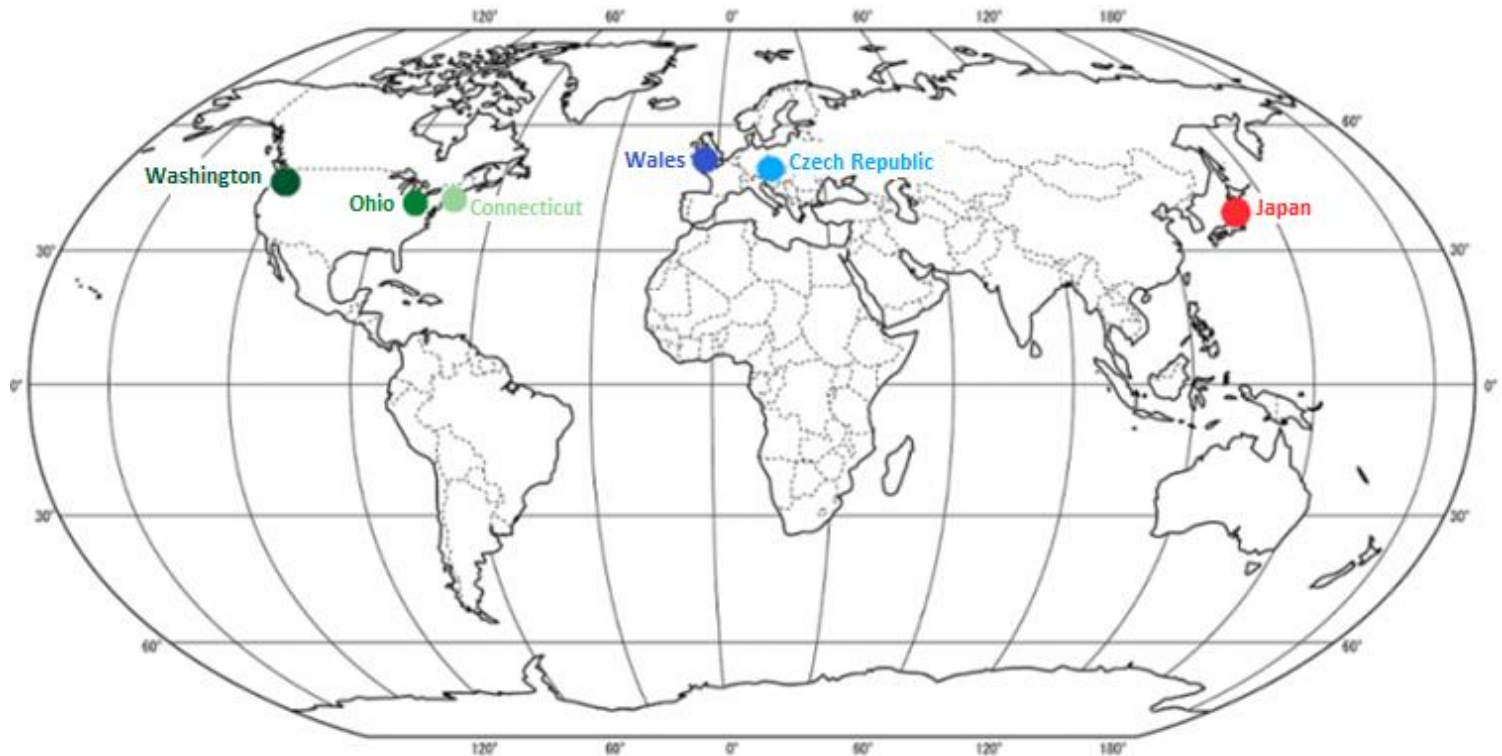
Cryptic diversity of genus *Klebsormidium*

ITS + *rbcL*



Biogeography of genus *Klebsormidium* in temperate zone

- 3 continents (Asia, Europe, North America)
- 6 localities: 2-4 sampling places
- Total: 15 samples
- 186 strains
- *rbcL*

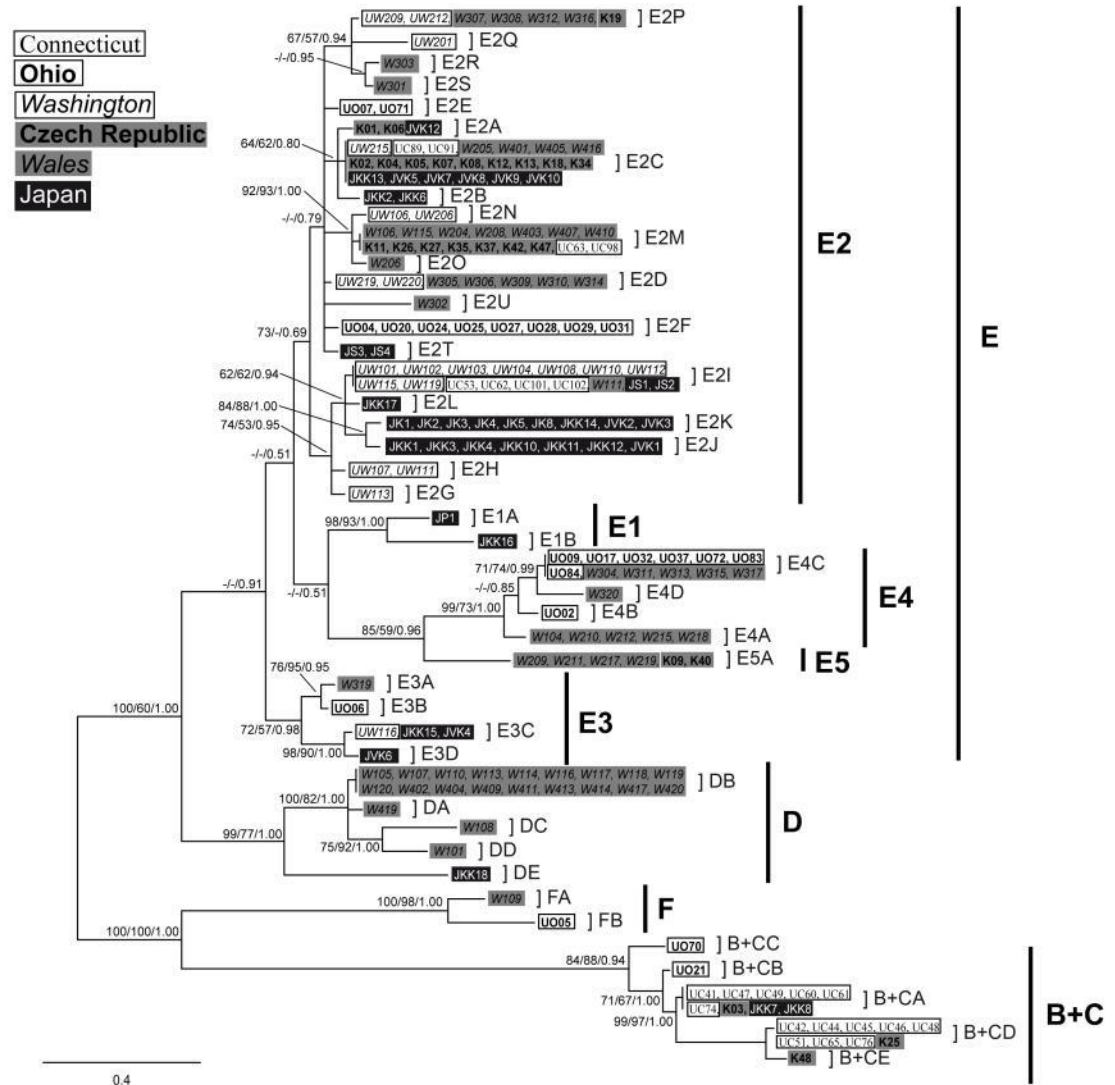


Ryšánek, D., Hřčková, K., Škaloud, P. (2015): Global ubiquity and local endemism of free-living terrestrial protists: phylogeographic assessment of the streptophyte alga *Klebsormidium*. *Environmental Microbiology*.

Biogeography of genus *Klebsormidium* in temperate zone

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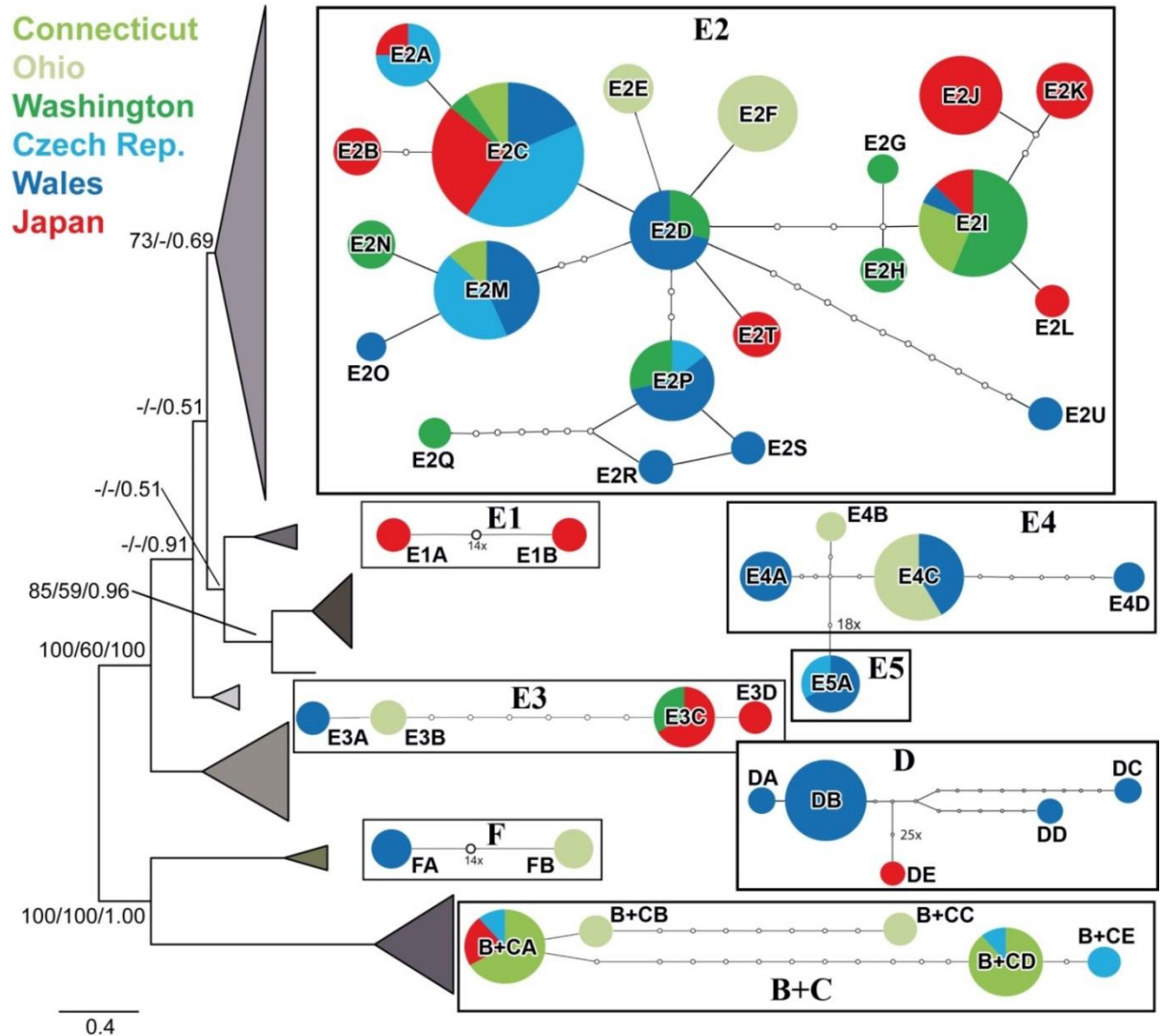
Localities	Number of strains
Connecticut	22
Ohio	22
Washington	21
Czech Rep.	24
Wales	63
Japan	38



Biogeography of genus *Klebsormidium* in temperate zone

- 3 continents, 6 localities
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Localities	Number of strains
Connecticut	22
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Klebsormidium in polar habitats

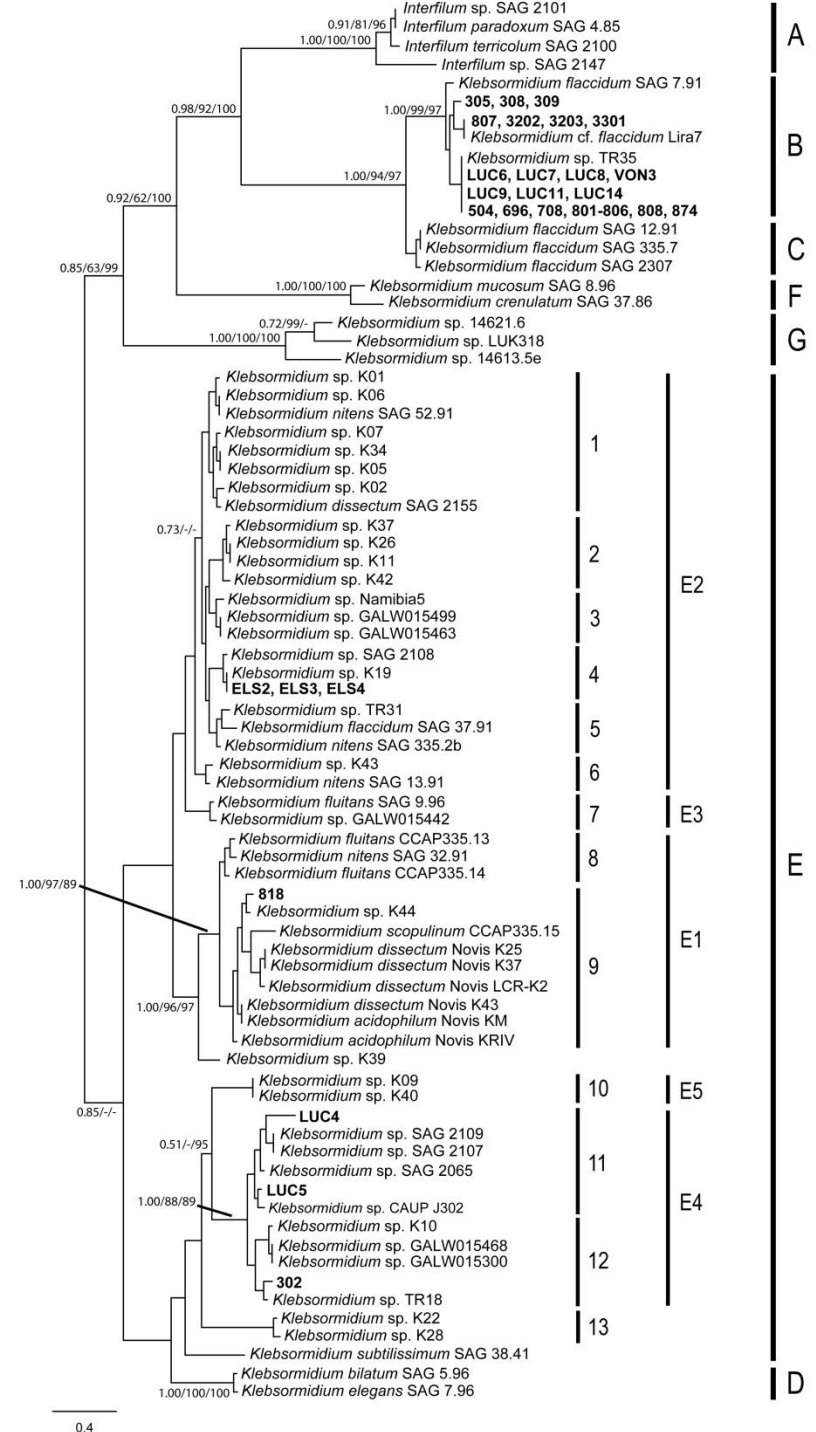
- from 1989 to 2014
- 12 expeditions (6 arctic and 6 Antarctic)
- 526 samples
- 32 strains



Year/month	Number of samples	Number of strains	Localities
2014/08	26	16	Svalbard
2010/02	34	0	Maritime Antarctica, King George Island, Admiralty Bay
2009/01	33	1	Maritime Antarctica, James Ross
2008/08	28	3	Svalbard
2007/01	10	1	Sweden
2004/08	16	1	Svalbard
2003/12-2004/01	49	2	Maritime Antarctica, King George Island, Admiralty Bay
2002/12-2003/01	54	3	Maritime Antarctica, King George Island, Admiralty Bay
2002/05	50	3	Svalbard
1992/12-1993/01	105	0	Maritime Antarctica, Elephant Island
1991/03	9	2	Canada, Nunavut
1989/12-1990/01	112	0	Maritime Antarctica, King George Island, Admiralty Bay
total:	526	32	

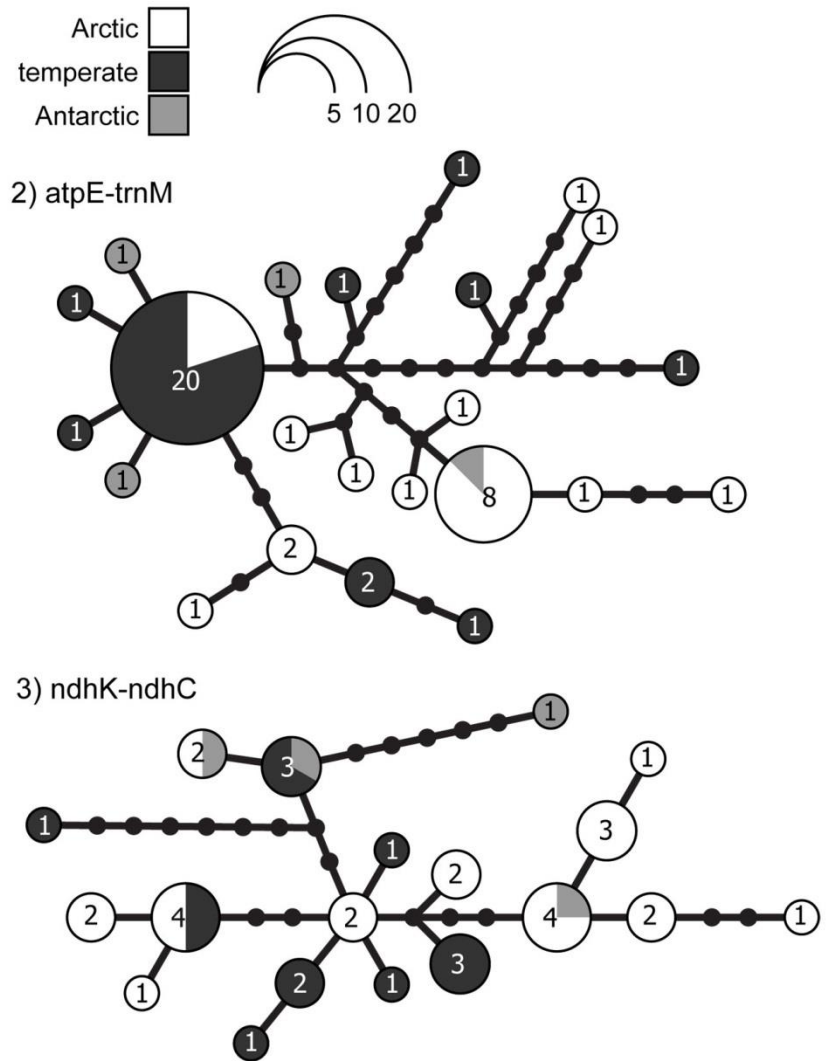
Klebsormidium in polar habitats

- from 1989 to 2014
- 12 expeditions (6 arctic and 6 Antarctic)
- 526 samples
- 32 strains (25 strains clade B)
- *rbcL*



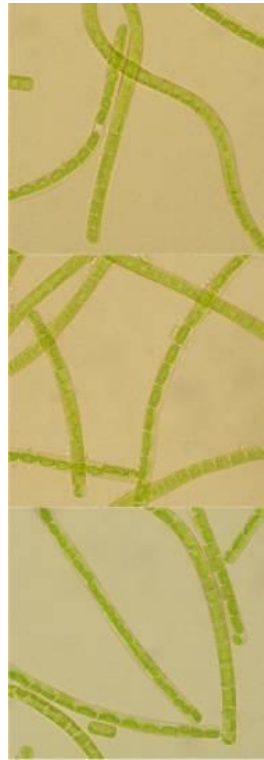
Population differentiation of the superclade B strains

- 21 Arctic
- 4 Antarctic
- 26 temperate strains
- Two highly variable plastid-encoded spacers
 - *atpE* – *trnM* (691bp)
 - *ndhK* – *ndhC* (698bp)

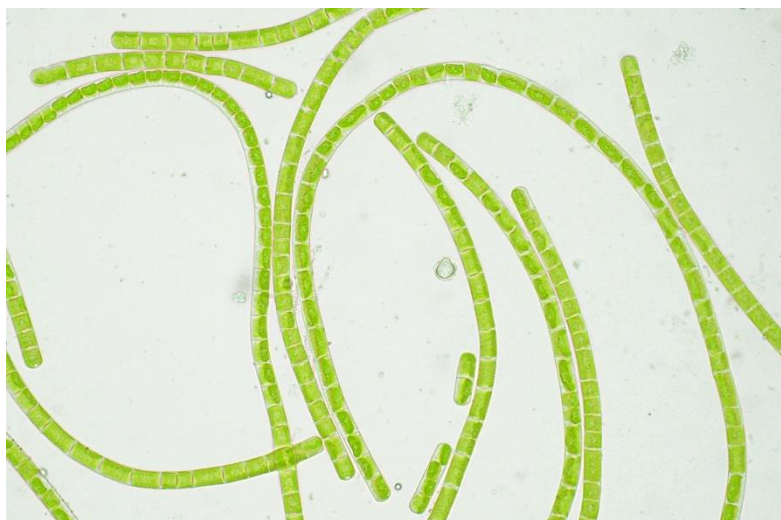


Conclusions

- We demonstrated an unlimited dispersal and intensive gene flow within one of the inferred lineages (superclade B)
- Majority of *Klebsormidium* clades showed rather a limited distribution
- We detected a significant decrease of species richness towards the poles



Thank you for your
attention



Acknowledgements:

Pavel Škaloud

Josef Elster

Lubomir Kovačik

Kristýna Hřčková



AKTION
Czech Republic - Austria



GAUK 259564