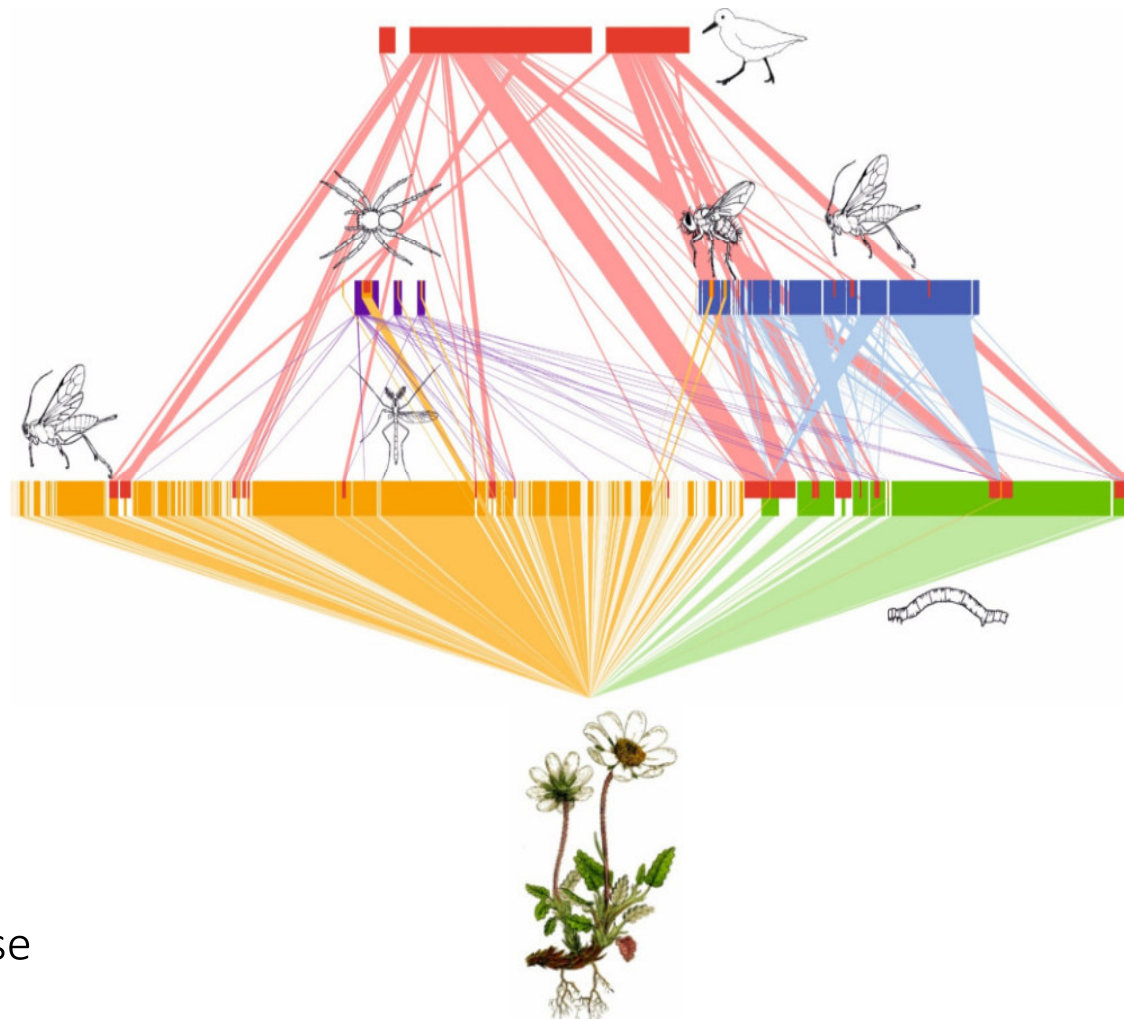


Global patterns

in the species richness, phylogenetic diversity and ecological functioning of the flower-visitor communities of an arcto-alpine plant (*Dryas*)



Tomas Roslin
tomas.roslin@slu.se

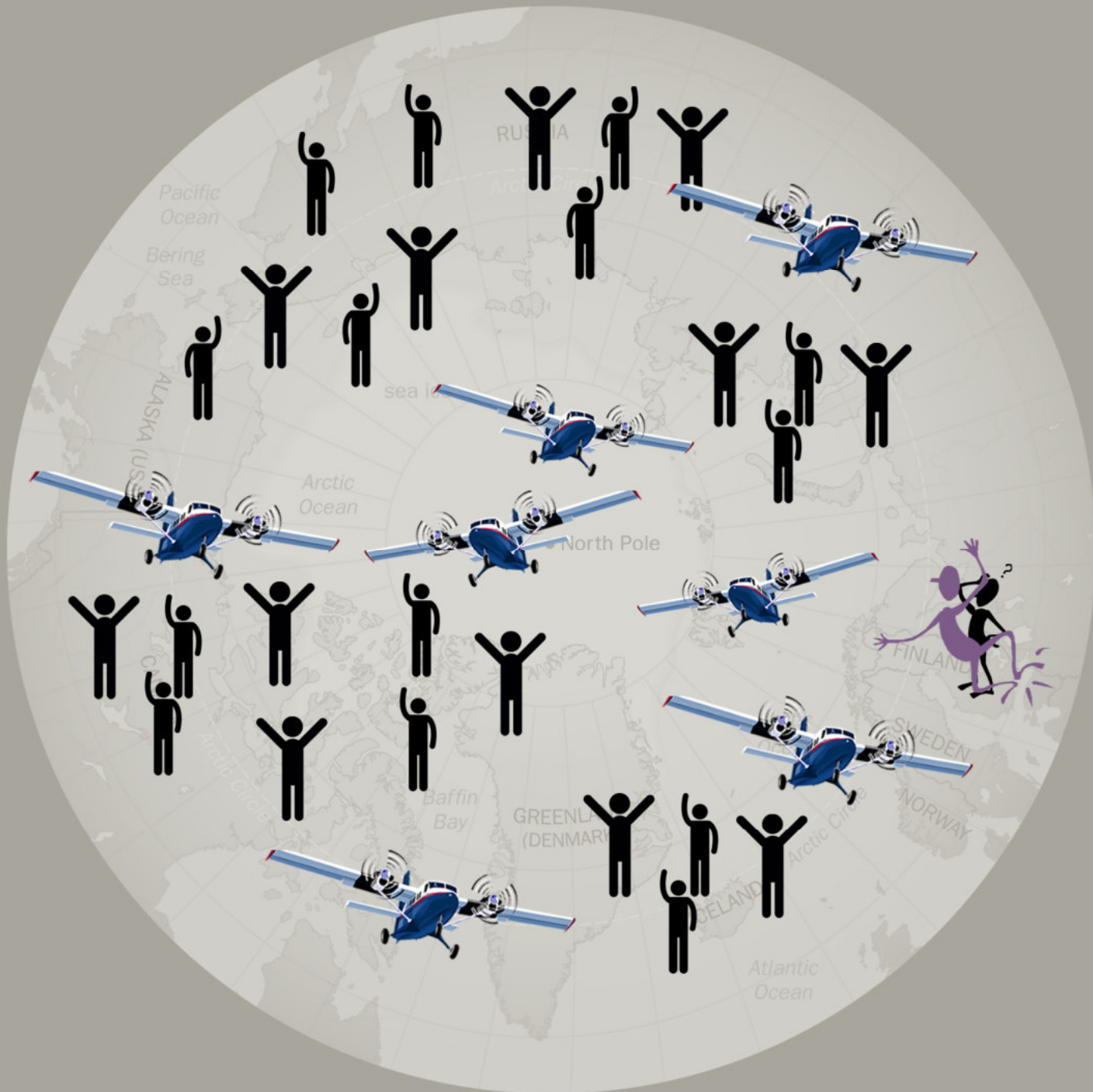
Fig from:
Schmidt et al. 2017.
AMBIO 46, S1: 12–25.



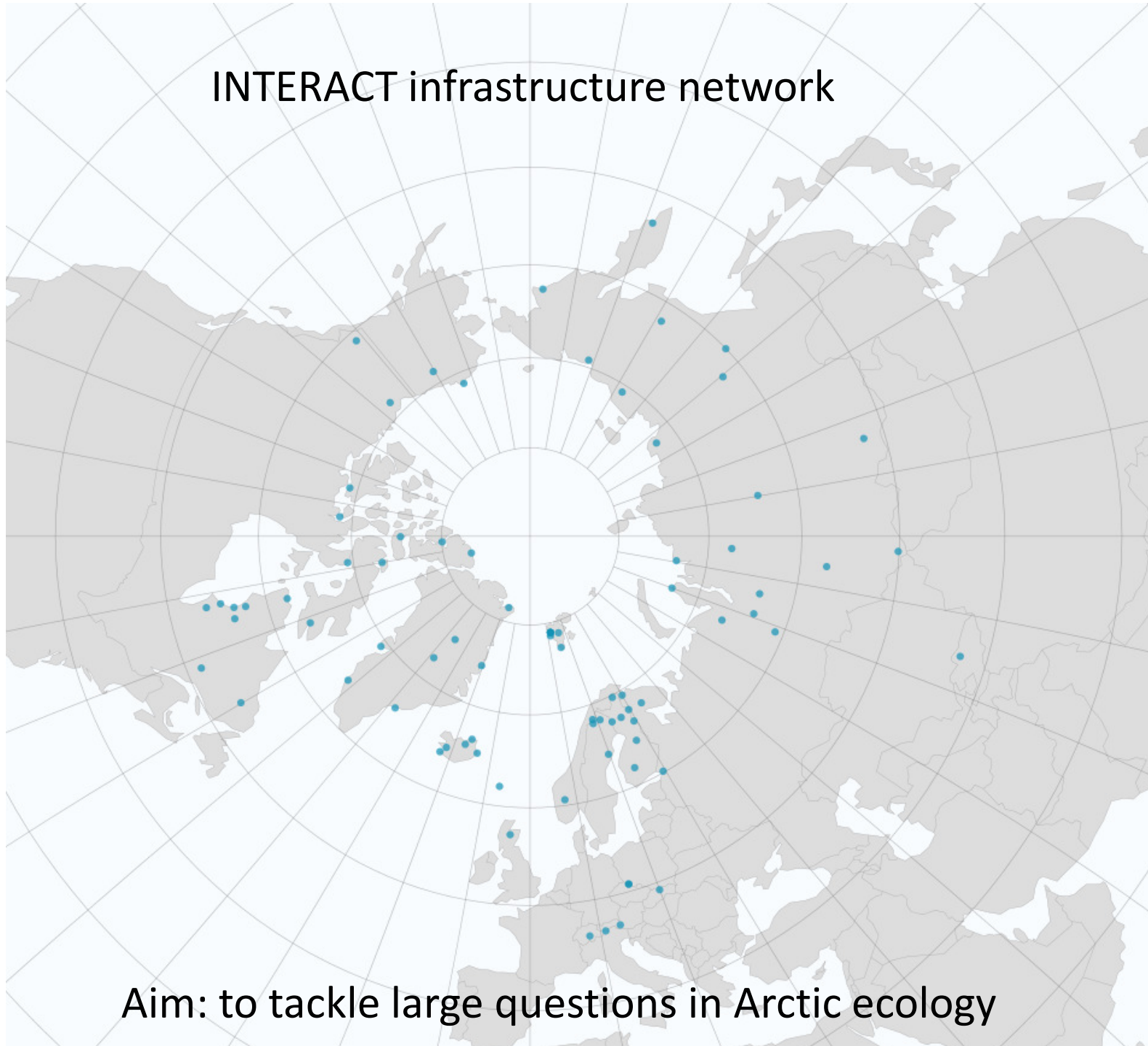
Most interesting things occur at a large spatial scale

- species range shifts
- population trends
- impacts of environmental change, e.g. climate





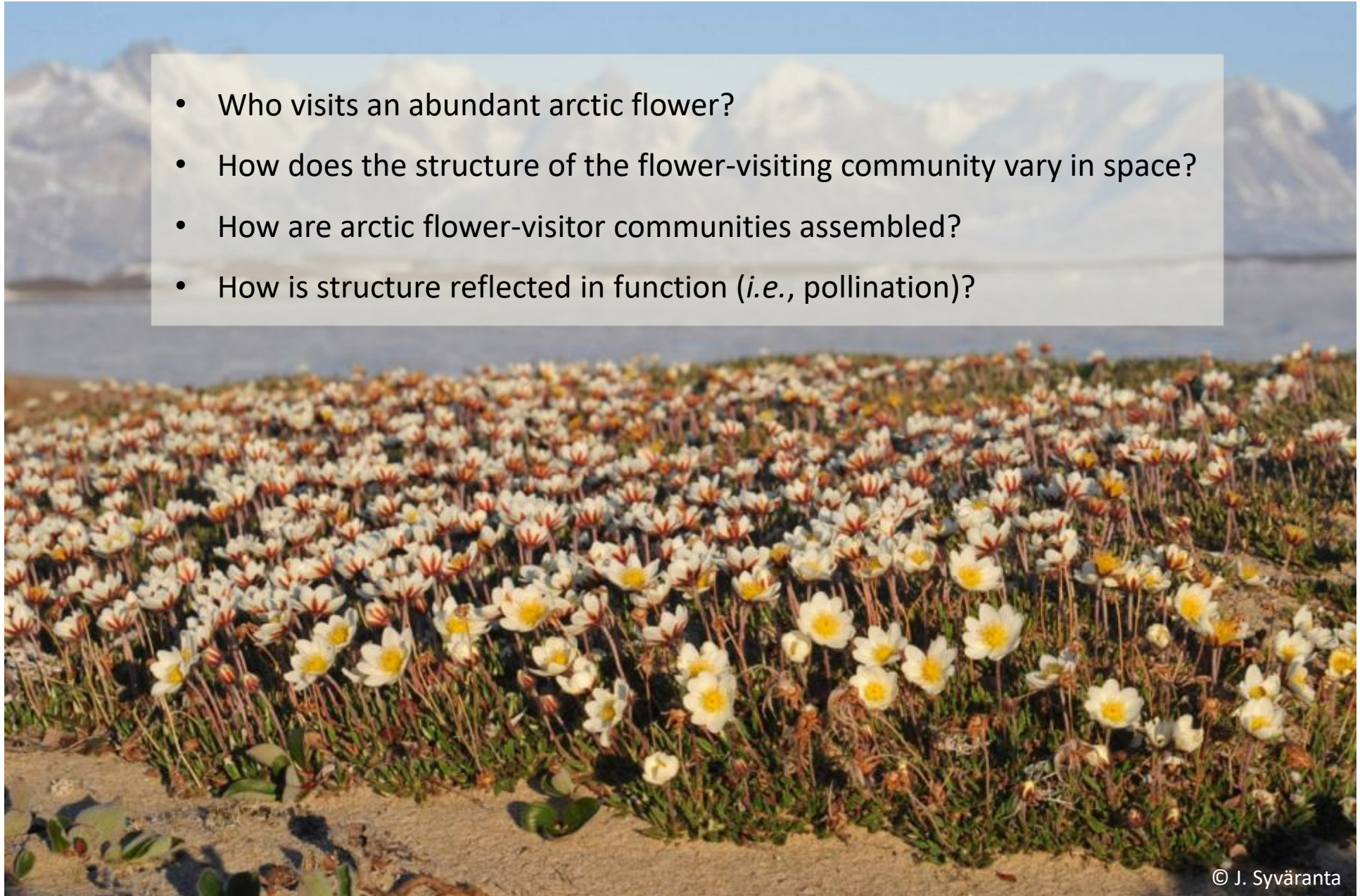
INTERACT infrastructure network



Aim: to tackle large questions in Arctic ecology

Who runs arctic pollination?

- Who visits an abundant arctic flower?
- How does the structure of the flower-visiting community vary in space?
- How are arctic flower-visitor communities assembled?
- How is structure reflected in function (*i.e.*, pollination)?





Photos: Claus Rasmussen

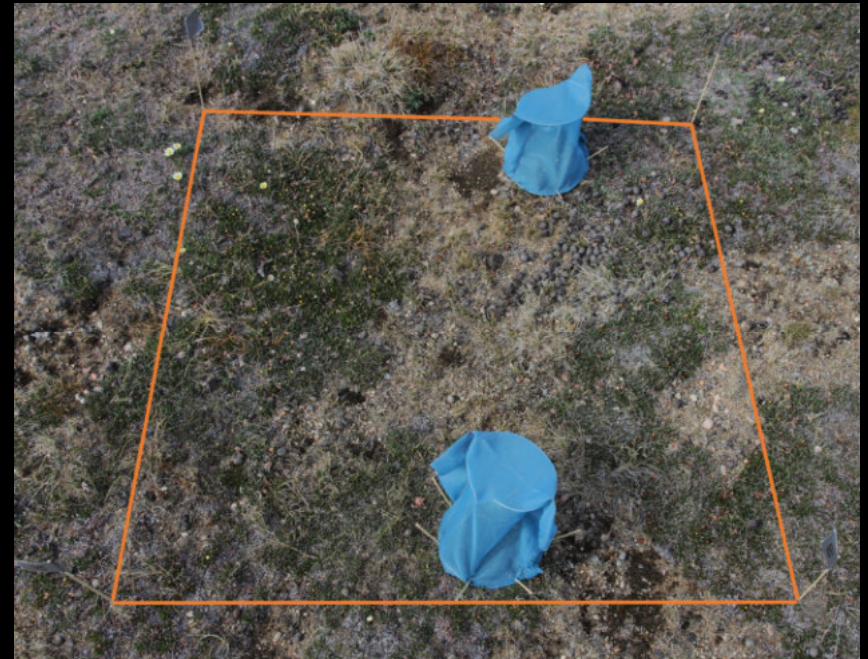


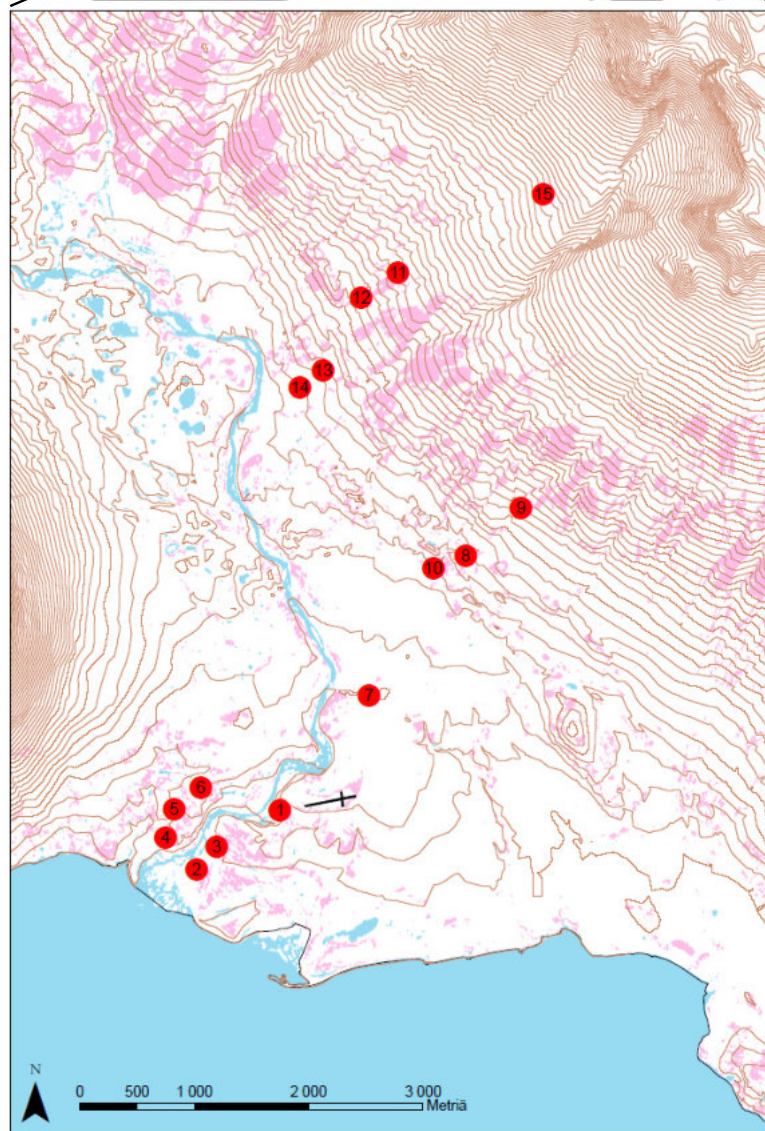
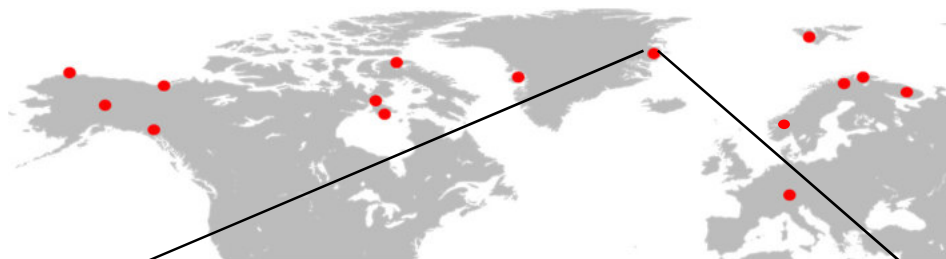
Claus Rasmussen
Zackenbergl 2011

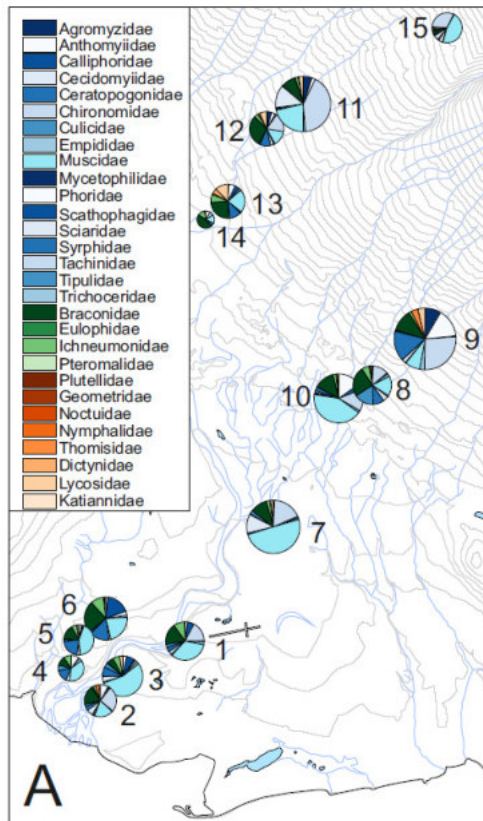


Tiusanen *et al.* 2016. Proc B



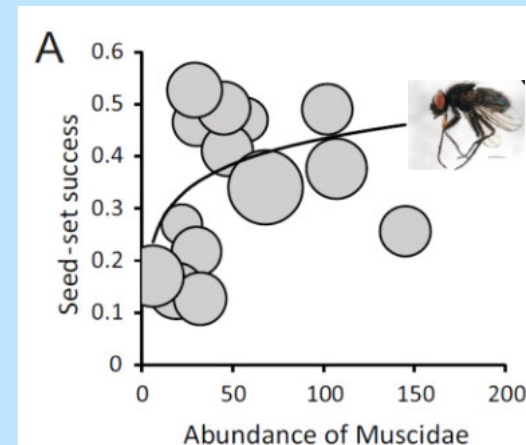




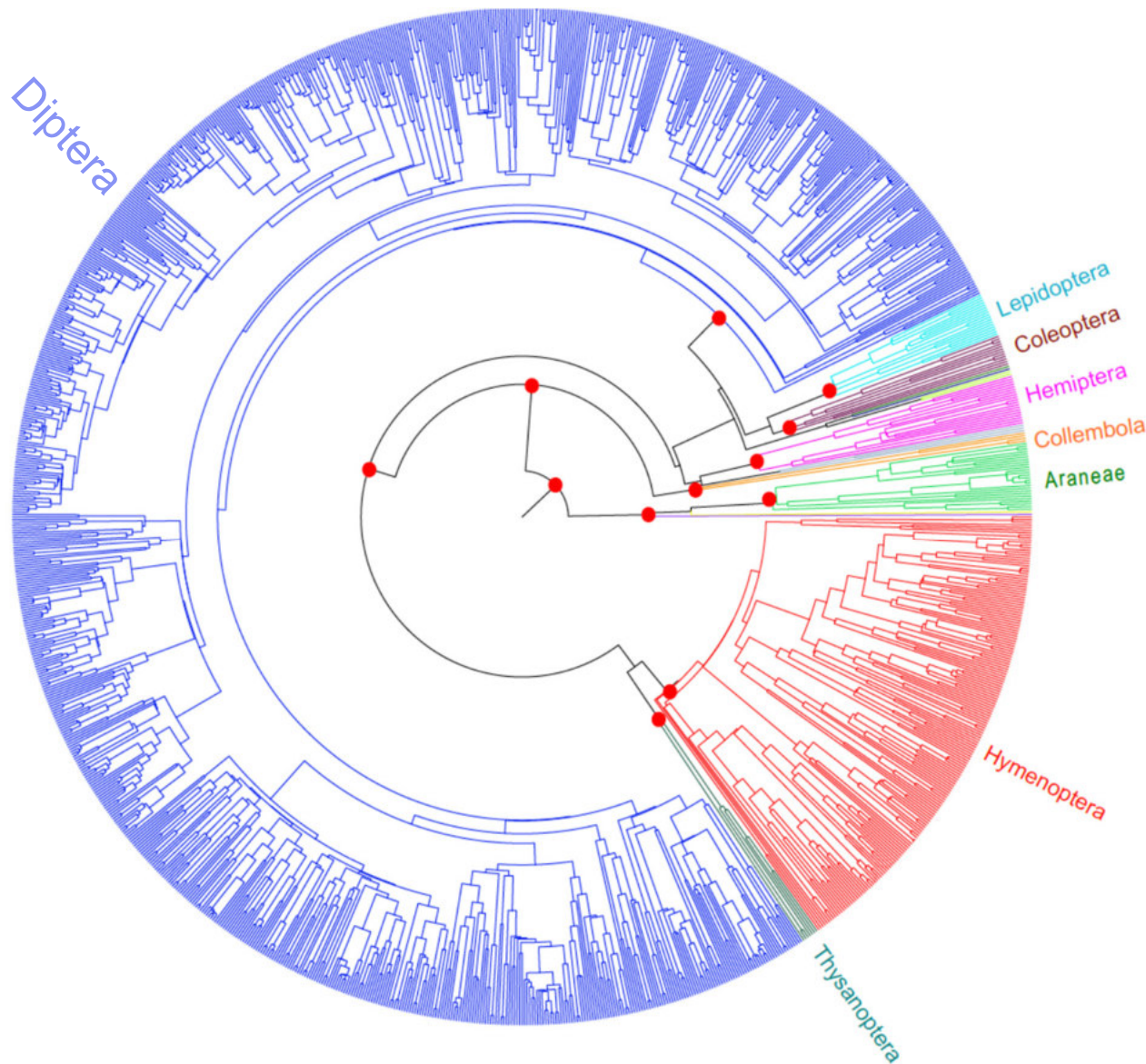


Local scale

- n=8504 flower visitors
- 177 BINs
- 2/3 of all spp encountered at ZAC
- Seed set determined by abundance of key functional group

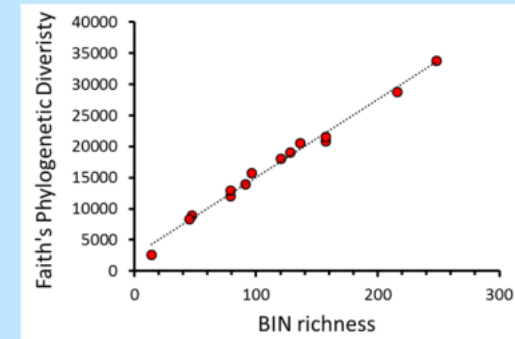


Tiusanen et al. 2016. Proc B



Single community

- BIN richness
- Chao1 (tot BIN richness)
- Faith's Phylogenetic Diversity (residuals)



- Mean pairwise phylogenetic distance

Pairwise comparisons

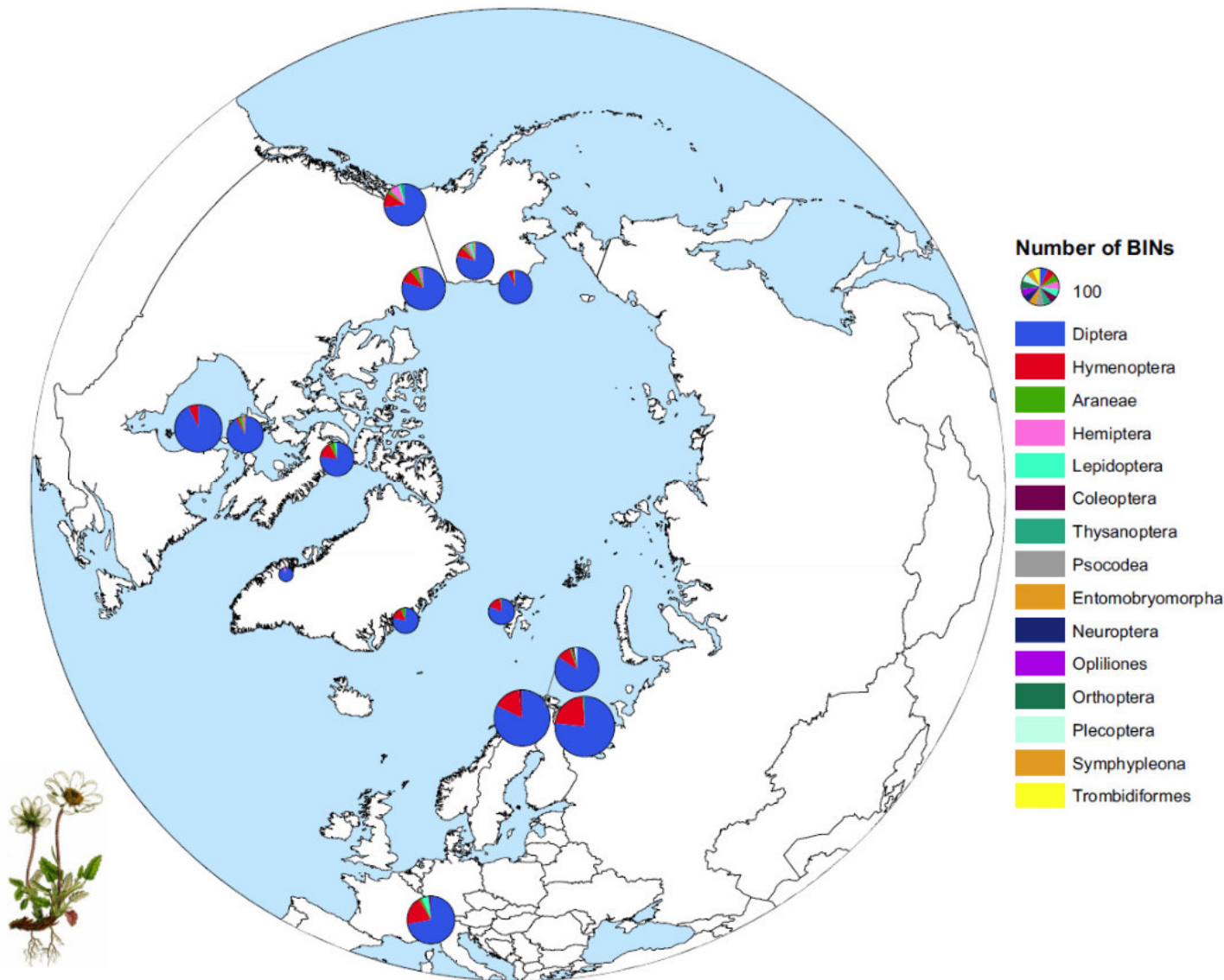
- MNND (mean nearest neighbour distance)

Software: BEAST

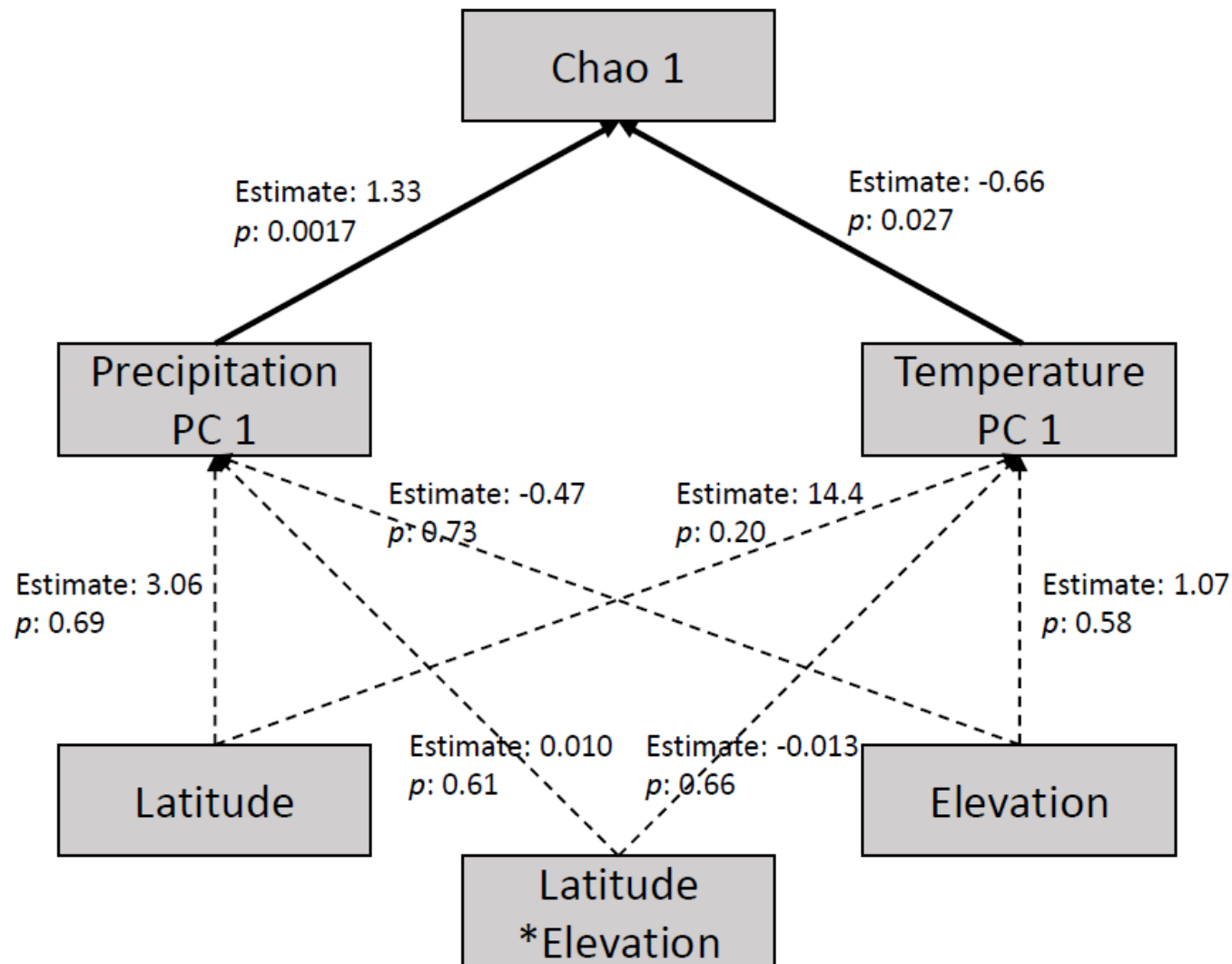
Picante (R)

Global material

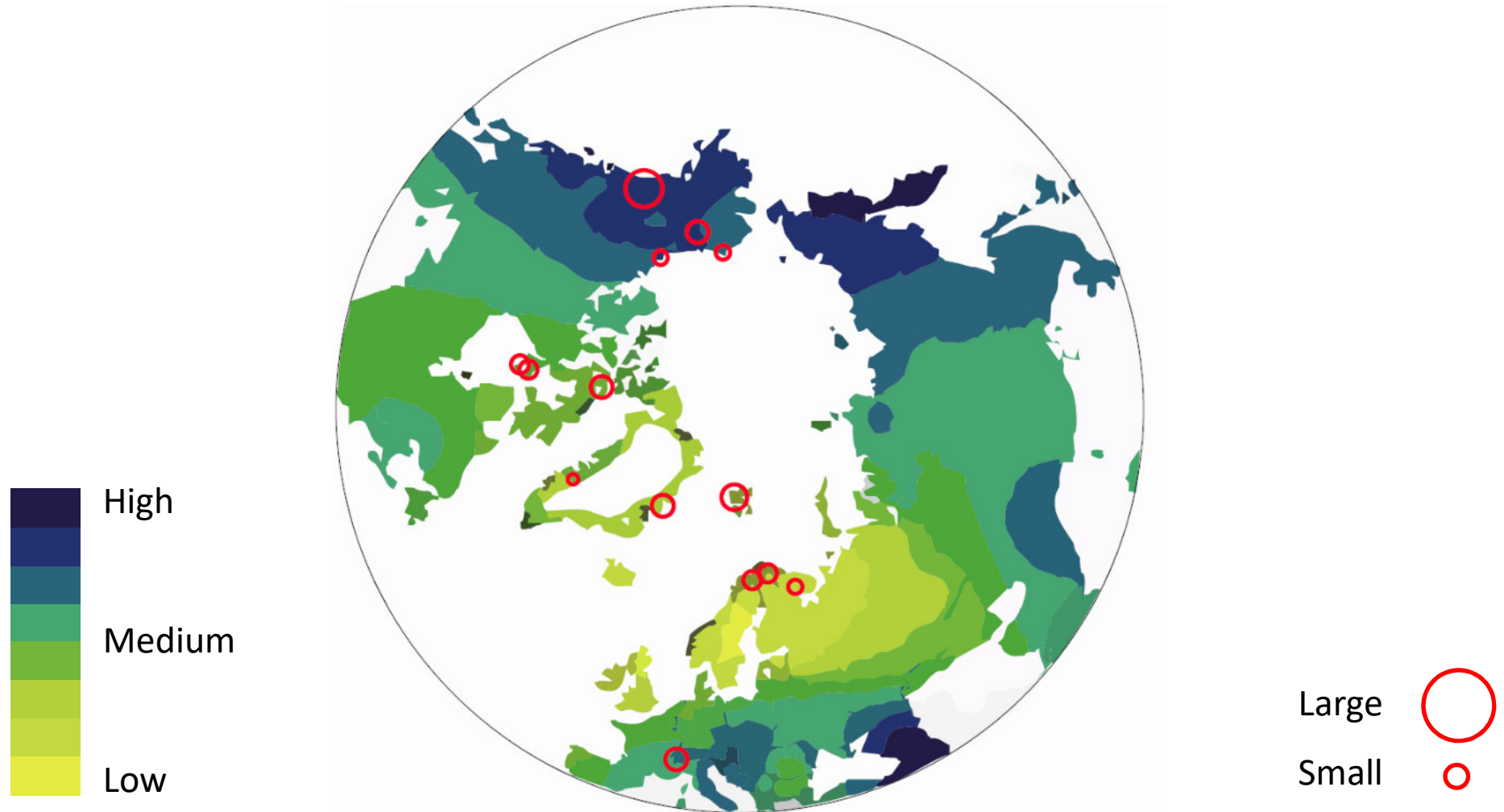
- 17 sites, 9 countries
- 35,000 flower visitors
- 21,086 sequenced
- 19,632 successful
- 1,218 BINs
- *Enormous* variation in community associated with single plant



What constrains BIN richness?



How are arctic pollinator communities assembled?



Extrapolated genetic diversity based on
AFLP variation in 17 arctic–alpine plant species

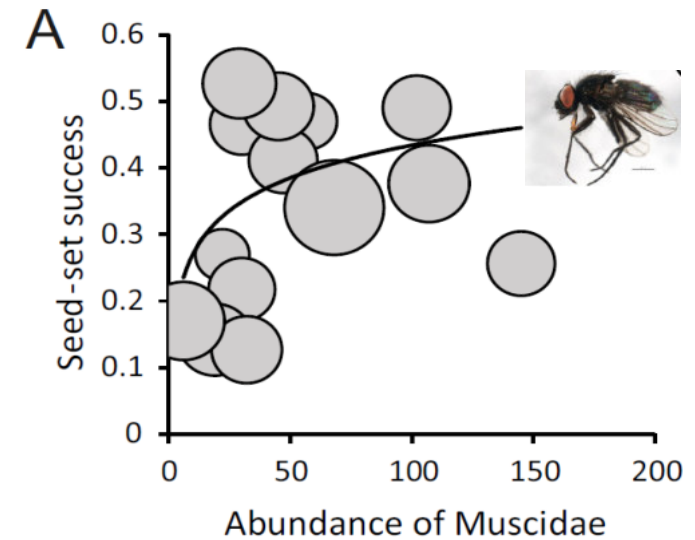
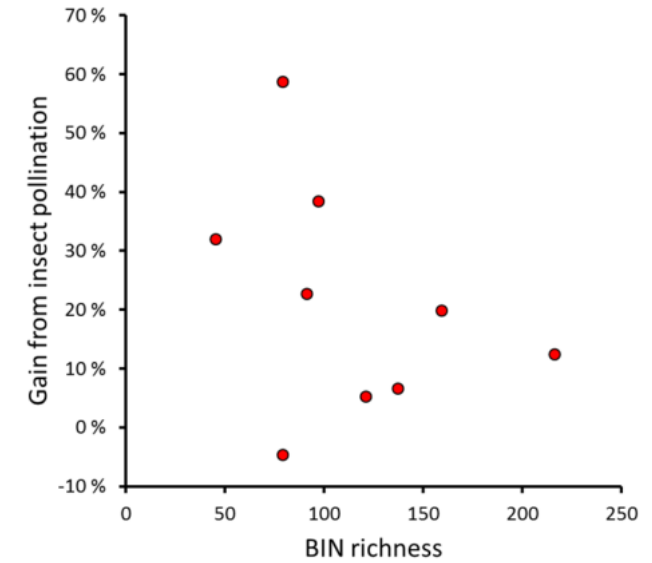
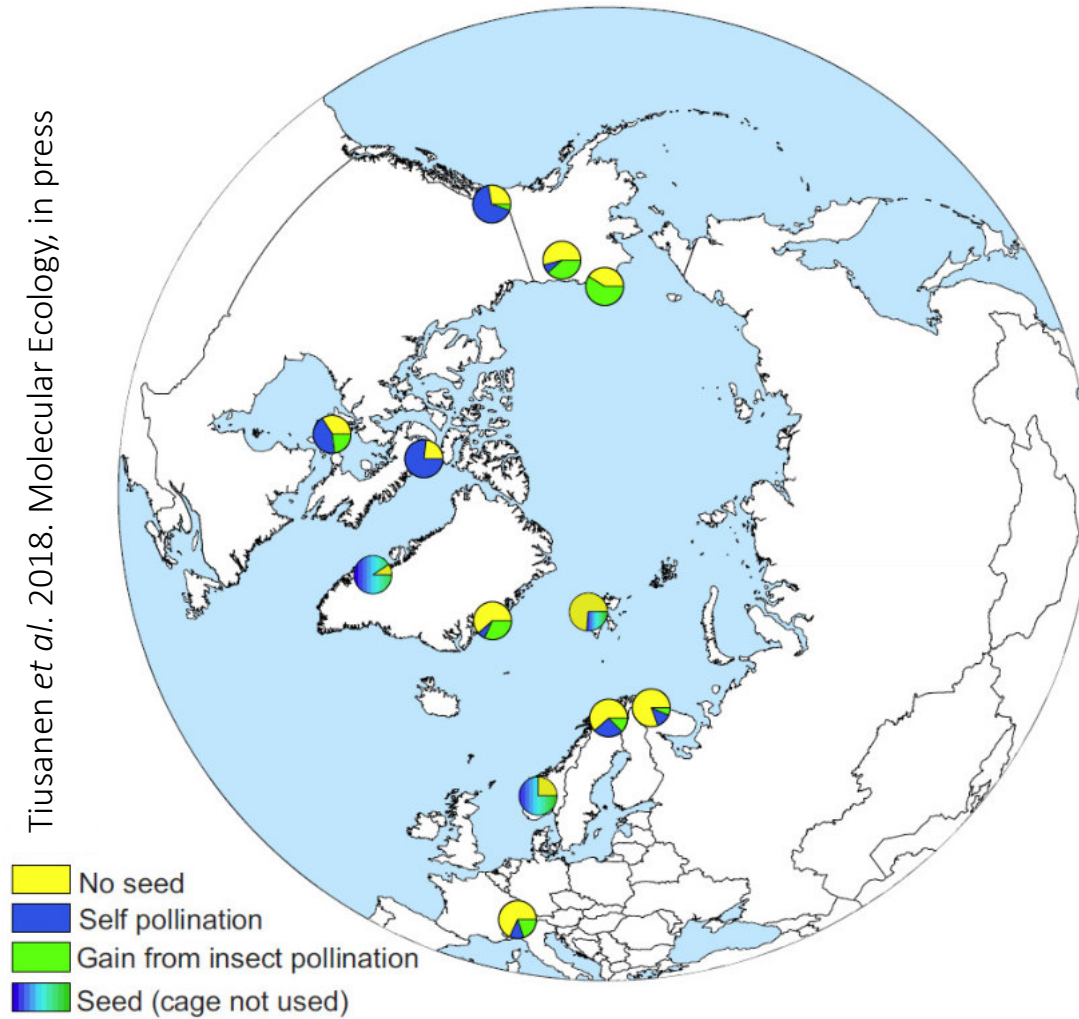
Eidesen et al. *New Phytologist* (2013) 200: 898–910

Mean pairwise phylogenetic
distance weighted by abundance

Tiusanen *et al.* 2018. *Molecular Ecology*, in press

How is structure reflected in function?

Tiusanen et al. 2018. Molecular Ecology, in press

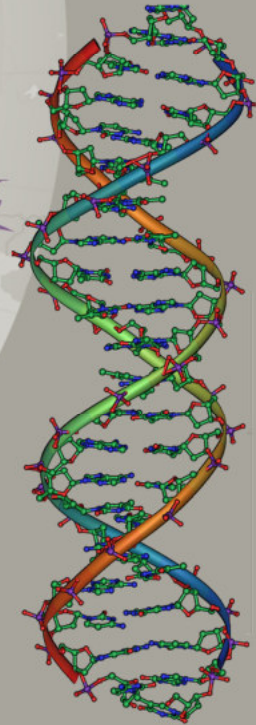
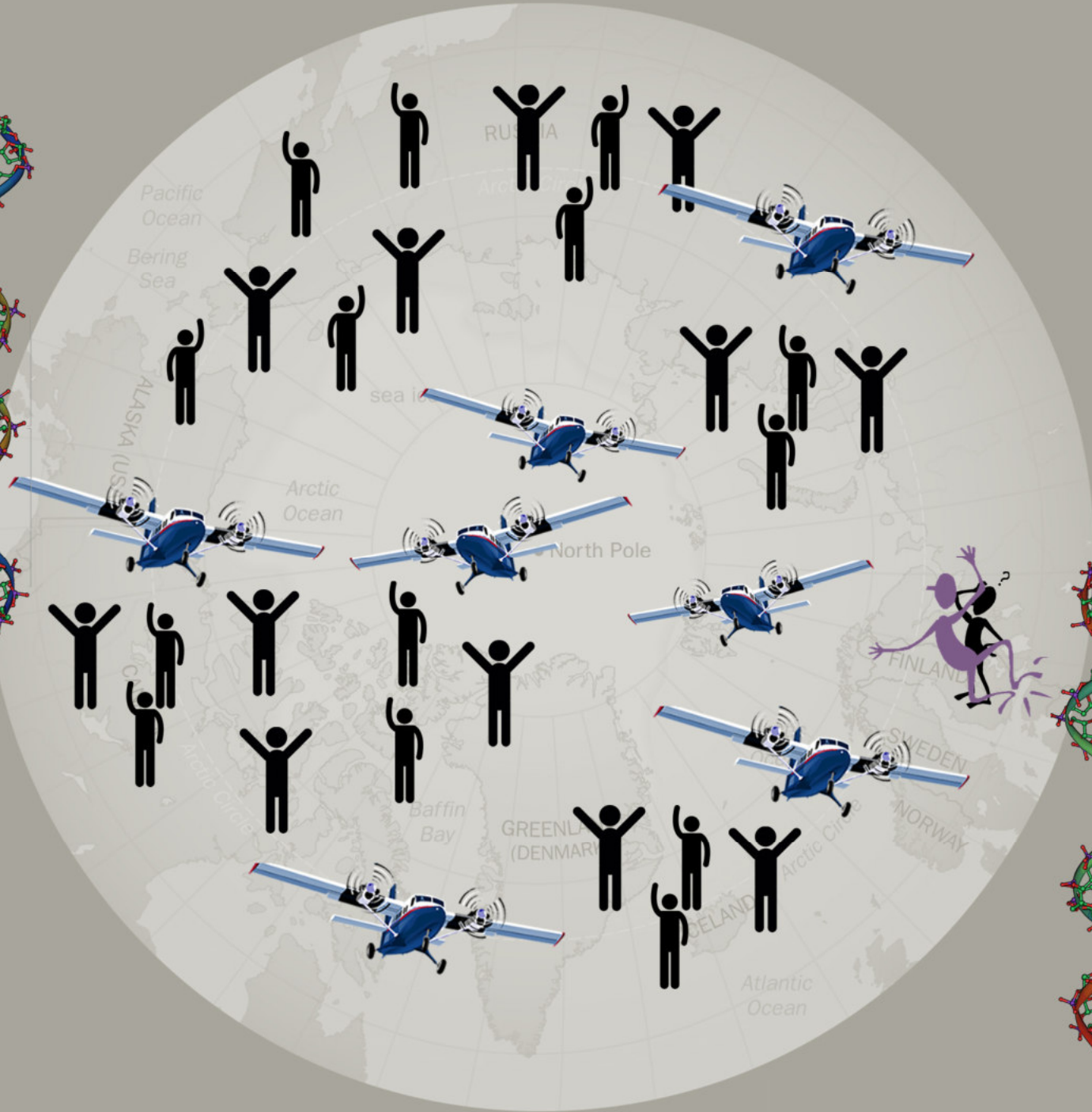
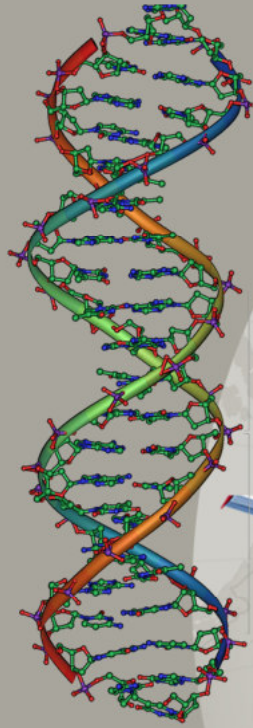


"Naive" BEF relations overridden by other impacts

Who runs arctic pollination?

- Who visits an abundant arctic flower?
 - >1200 BINs; *Dryas* ties together the full ecosystem
- How does the structure of the flower-visiting community vary in space?
 - Very much so; high α and β -diversity
- How are arctic flower-visitor communities assembled?
 - BIN richness forced by precipitation
 - Composition molded by complex phylogeographic processes
- How is structure reflected in function(*i.e.*, pollination)?
 - Single species dominate functioning at small scale; causes idiosyncratic patterns at large scale

Tiusanen *et al.* 2018. Molecular Ecology, in press



A photograph of a bright blue sky filled with large, puffy white clouds. The clouds are scattered across the frame, with some appearing closer and more detailed, while others are further away. The lighting suggests a sunny day, with the clouds catching the light and creating soft shadows.

Ultimately, the limit is set by
our own imagination

Acknowledgements



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