Why is the predator diversity and prey diversity correlated?

Implications from community assembly processes

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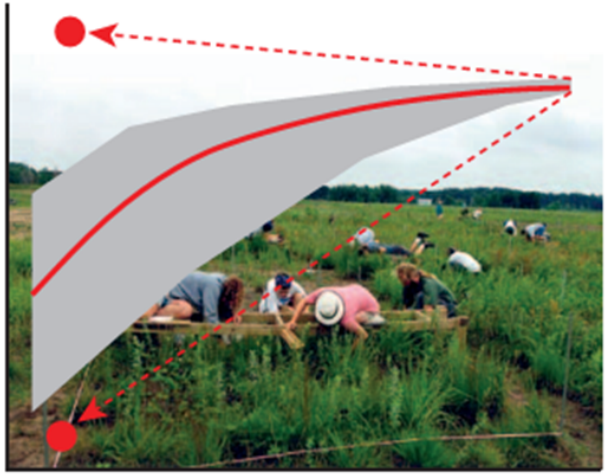
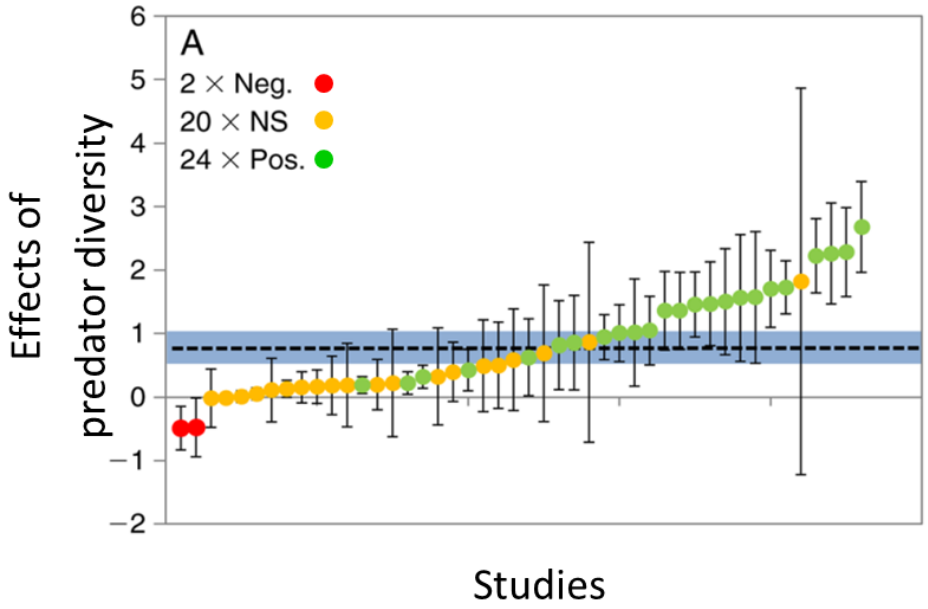
Ecosystem function
(resource capture, biomass production, decomposition, nutrient recycling)



Biological diversity
(variation in genes, species, functional traits)

Cardinale et al. 2012 @ Nature



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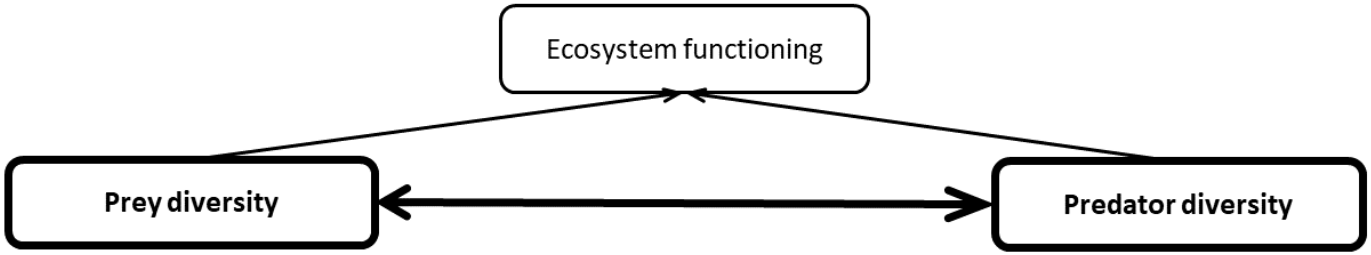
Griffin et al. 2013 @ Ecology

The effects of predator diversity and prey diversity are coufounded

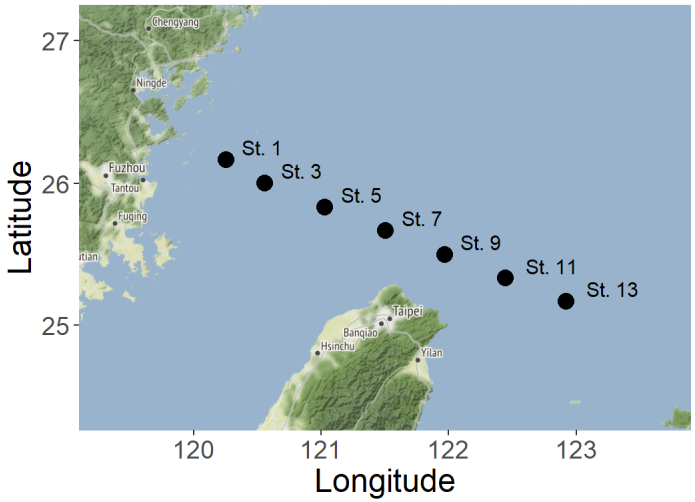


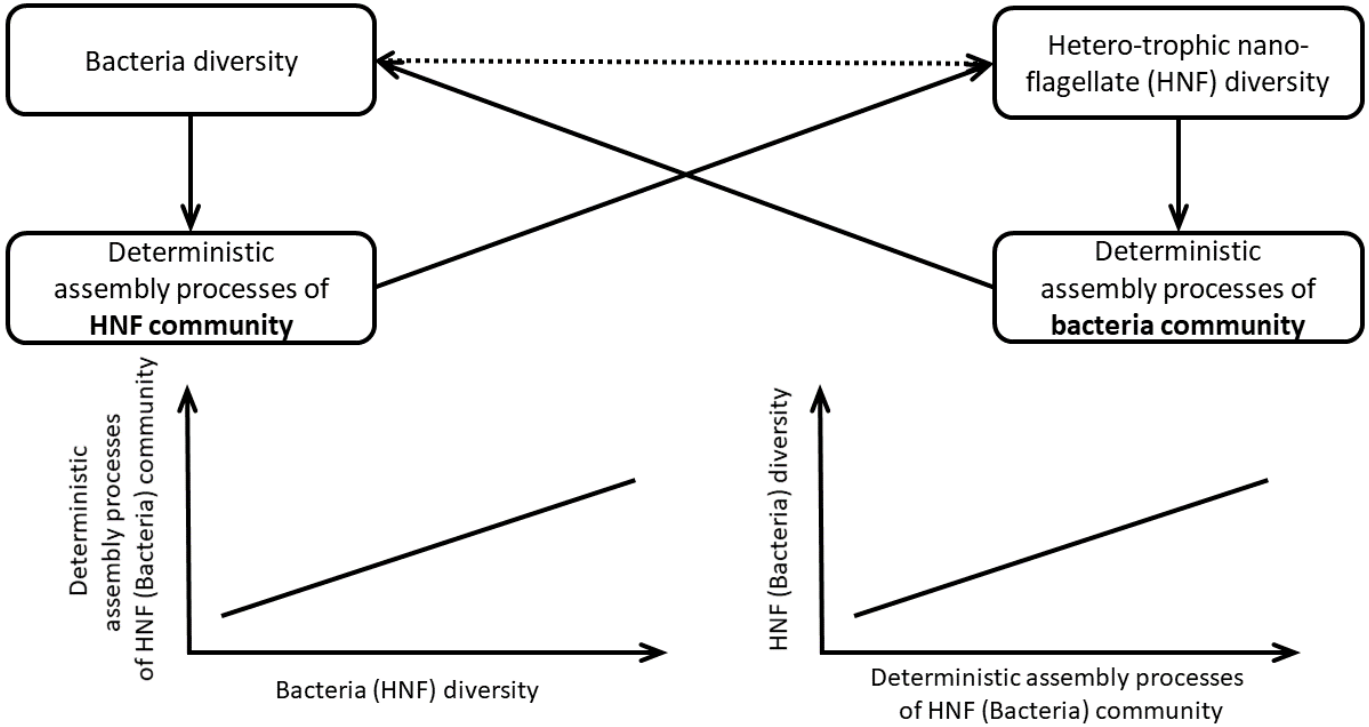
Why is the predator α diversity and prey α diversity correlated?

Hypothesis:

The predator-prey α diversity relationship would be driven by **the strength of deterministic assembly processes**.

- Predator : hetero-trophic nano-flagellate
- Prey : bacteria
- Deterministic assembly processes : non-random processes / environmental filtering and/or other species interactions (e.g. predation)



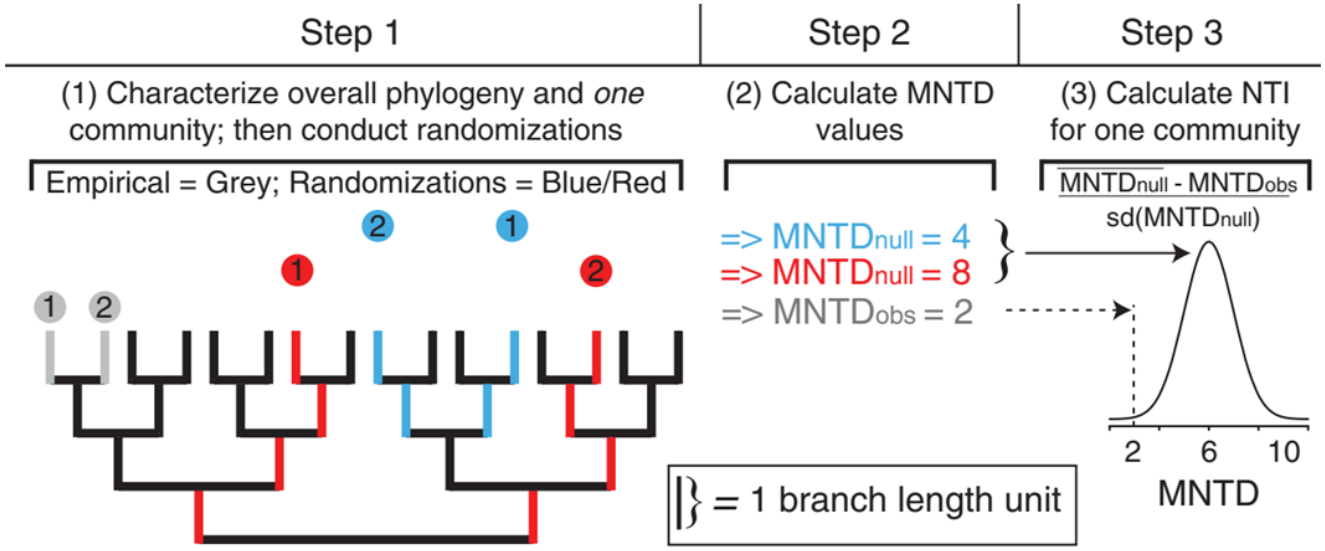

Bacteria diversity
Hetero-trophic nano-flagellate (HNF) diversity
Deterministic assembly processes of **HNF community**
Deterministic assembly processes of **bacteria community**
Deterministic assembly processes of HNF (Bacteria) community
Bacteria (HNF) diversity
HNF (Bacteria) diversity
Deterministic assembly processes of HNF (Bacteria) community

Deterministic assembly processes

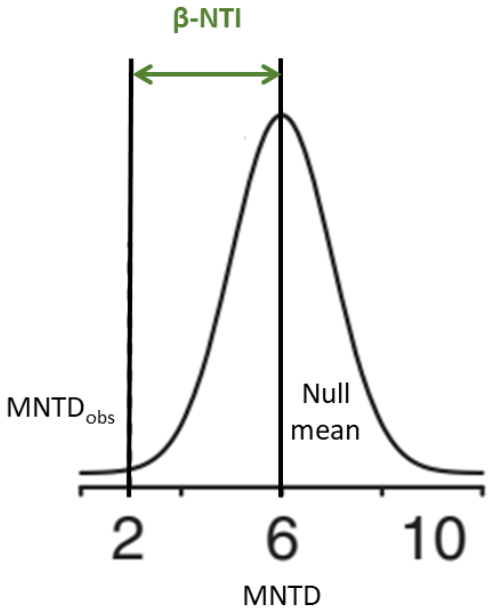
- Indicated by between-assemblage **N**earest **T**axon **I**ndex (βNTI), which is calculated from mean nearest taxon distance ($\beta MNTD$)
- Between community dissimilarity

$$\beta NTI = \frac{\beta MNTD_{obs} - \overline{\beta MNTD_{null}}}{sd(\beta MNTD_{null})}$$

, where $\beta MNTD_{null}$ is the null distribution of between-assemblage mean nearest taxon distance.

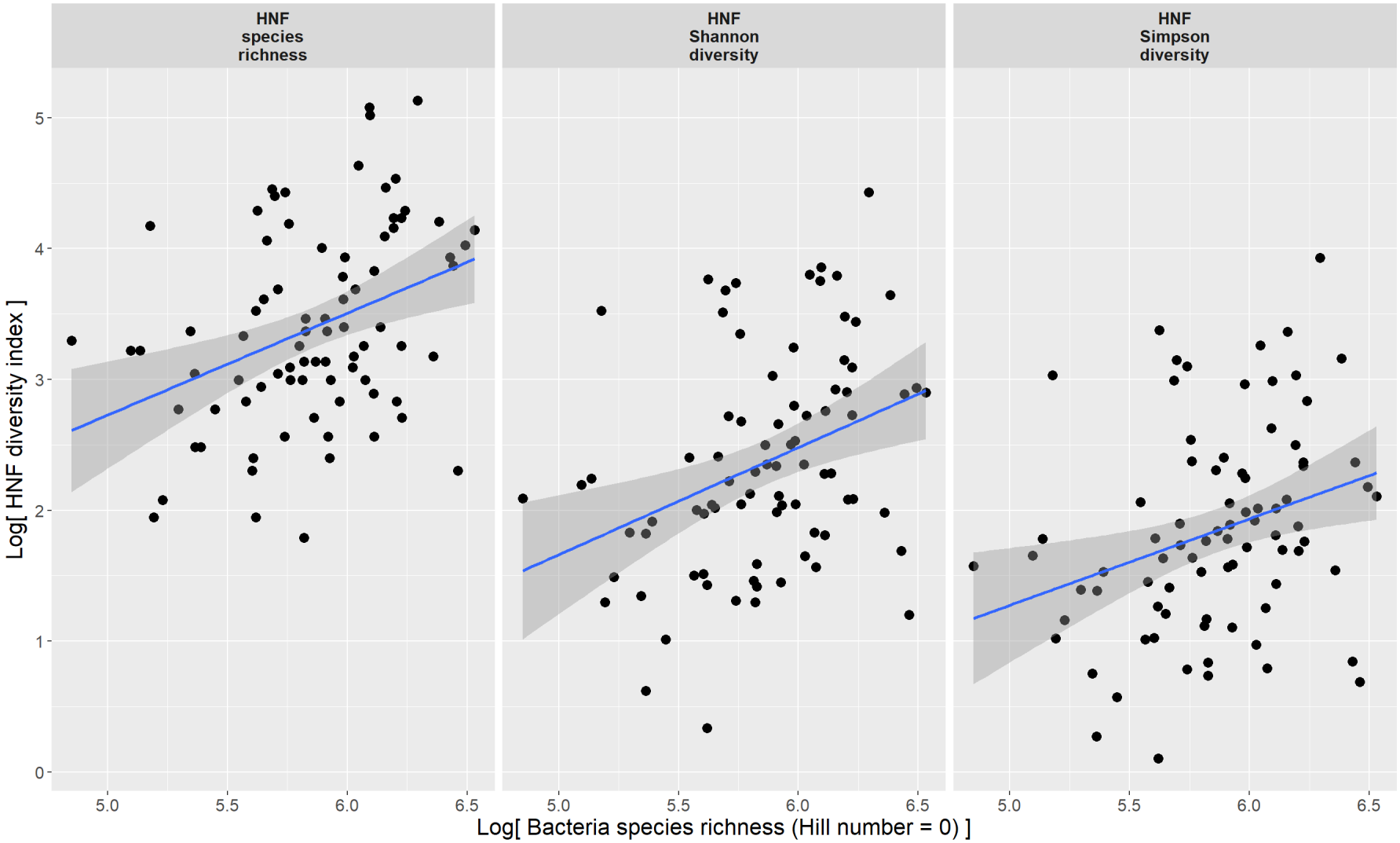


Stegen et al. 2012 @ ISME

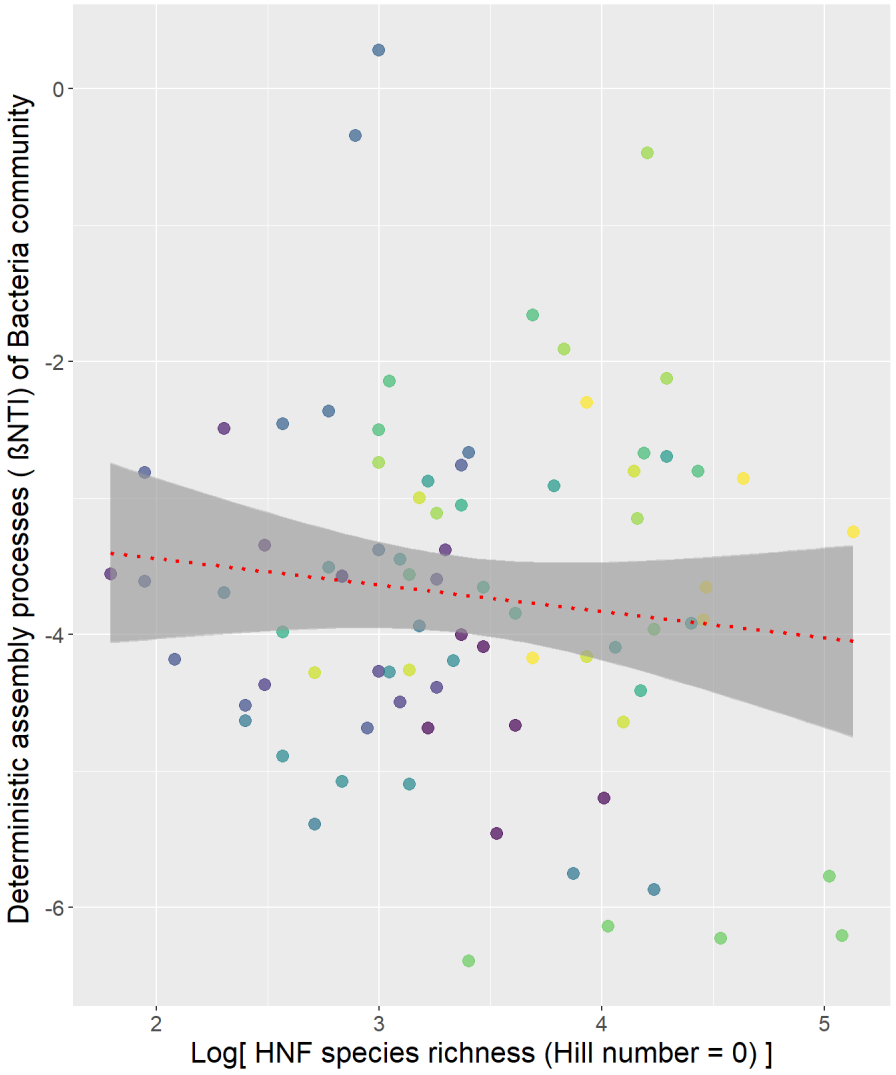


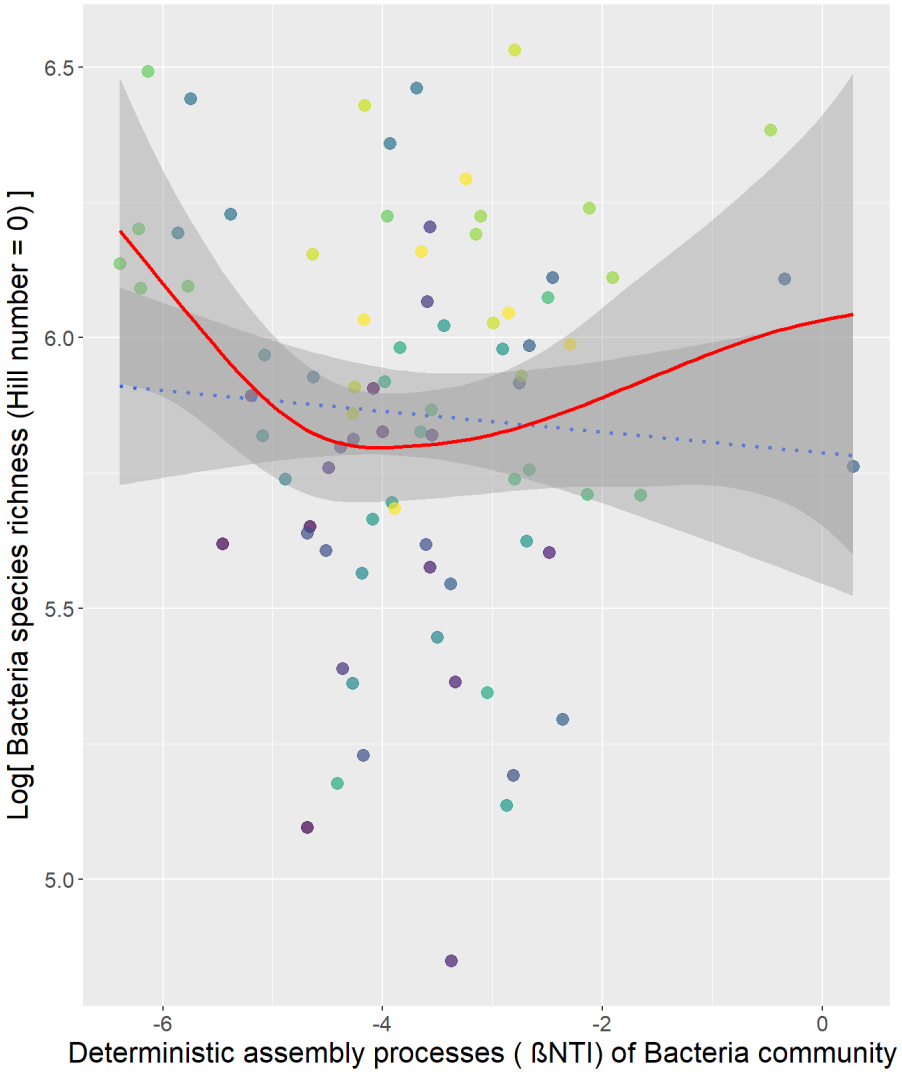
- The more βNTI deviated from the null, the stronger the deterministic assembly processes is.
- negative βNTI implies homogeneous selection
- positive βNTI implies divergent selection

Bacteria-HNF α diversity relationships

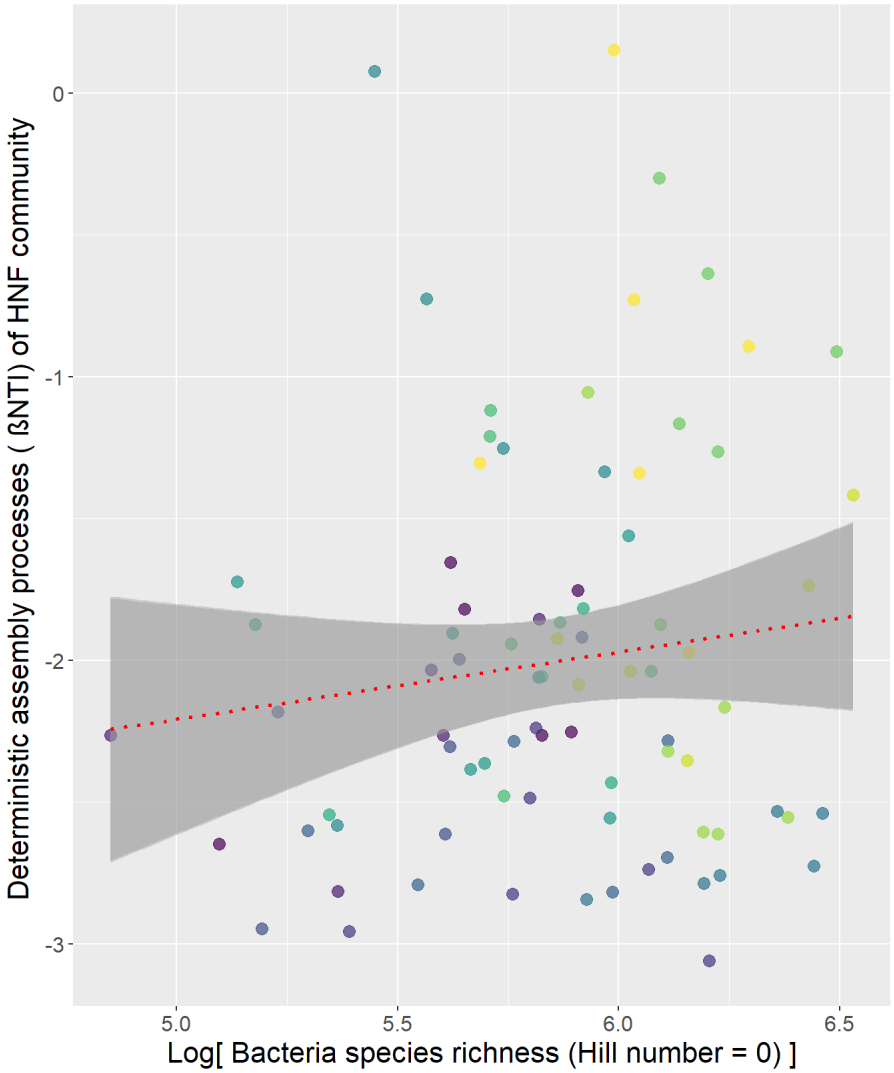


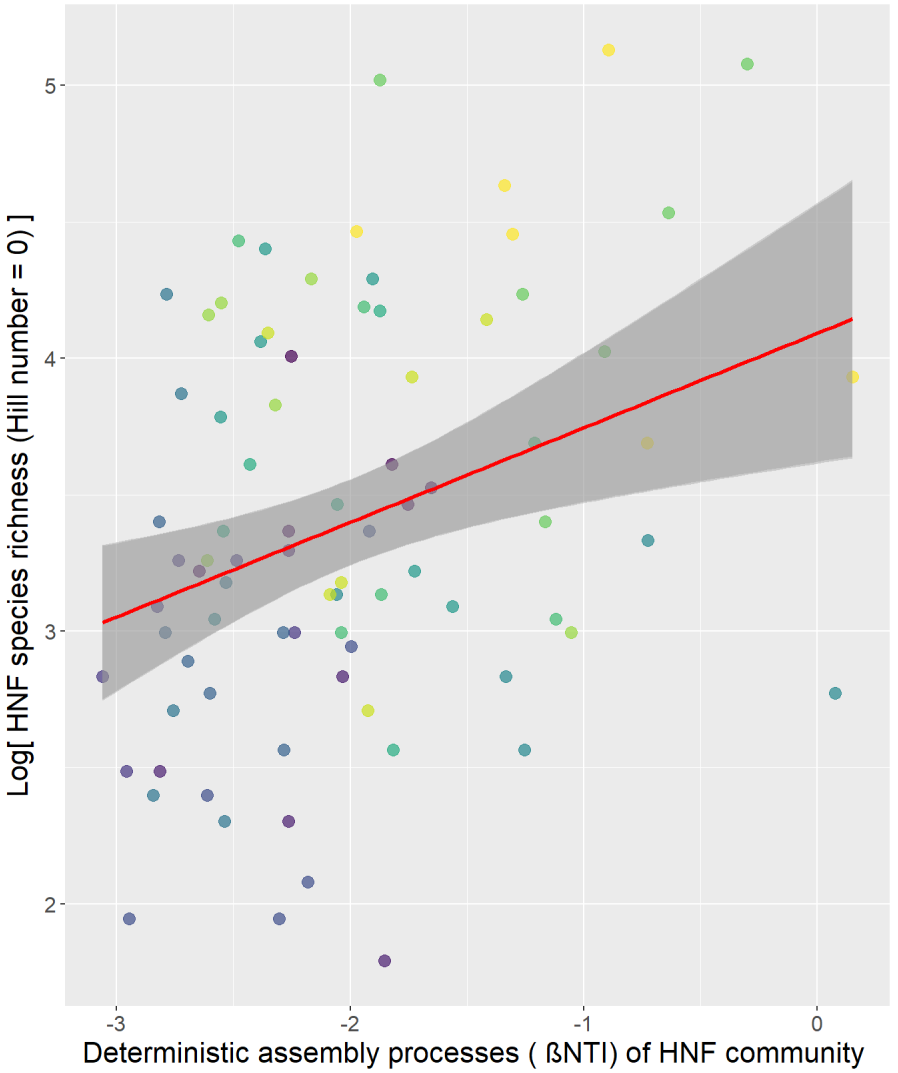
HNF α diversity $\rightarrow$ bacteria βNTI $\rightarrow$ bacteria α diversity





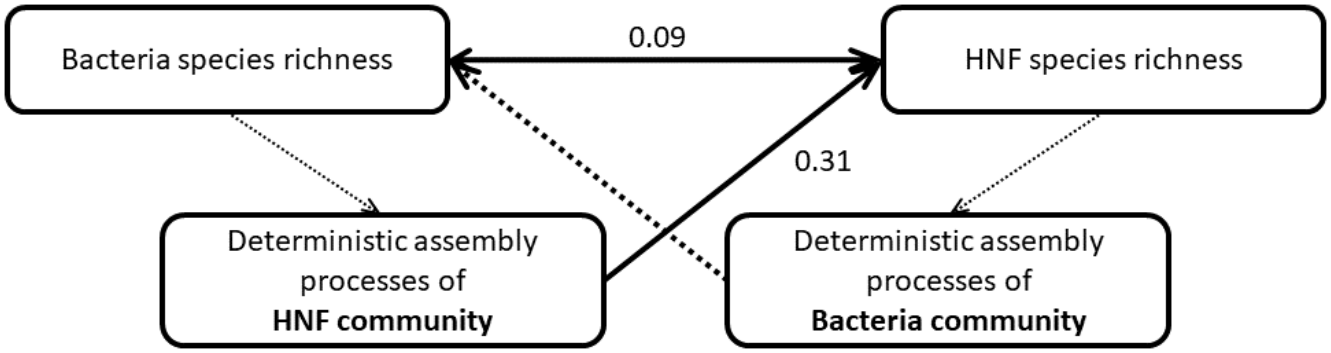
Bacteria α diversity $\rightarrow$ HNF βNTI $\rightarrow$ HNF α diversity





- Community assembly processes are not associated with the other trophic level.
- Some deterministic processes **decreases** both predator and prey α diversity.

Path model


Bacteria species richness
0.09
HNF species richness
0.31
Deterministic assembly processes of **HNF community**
Deterministic assembly processes of **Bacteria community**

βNTI might be more informative to β diversity…future work