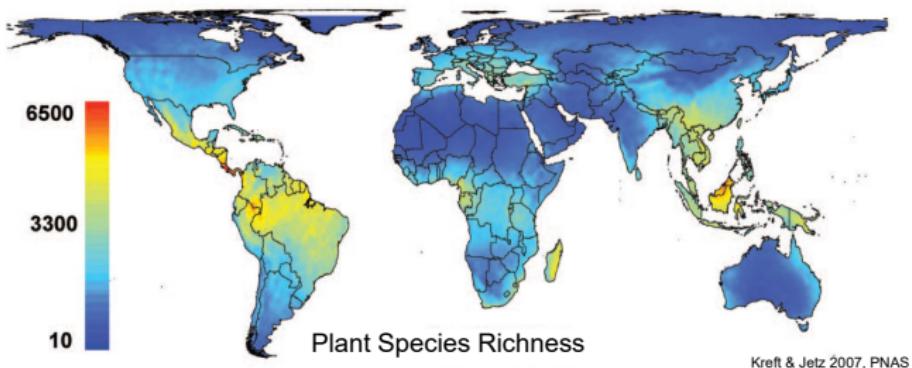
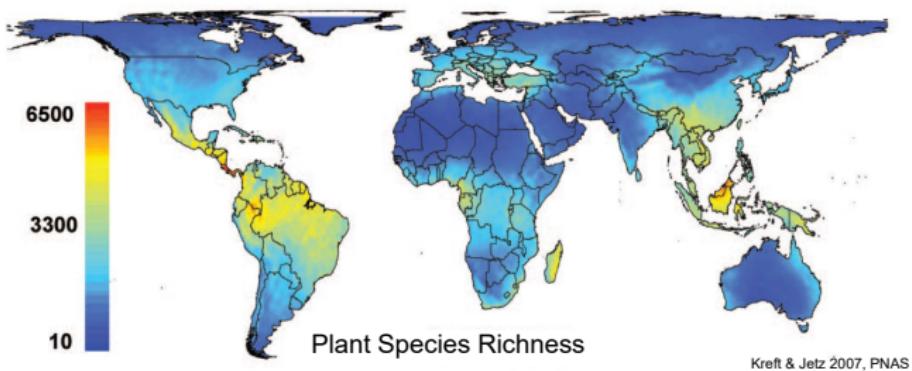


Why are there more species in the tropics?



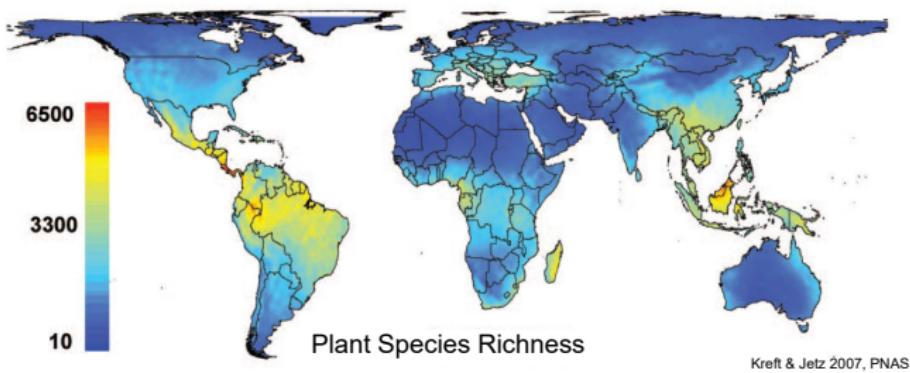
Alyssa R. Cirtwill,
Daniel B. Stouffer & Tamara N. Romanuk

Why are there more species in the tropics?



Envionmental stability? Productivity? Speciation rates?

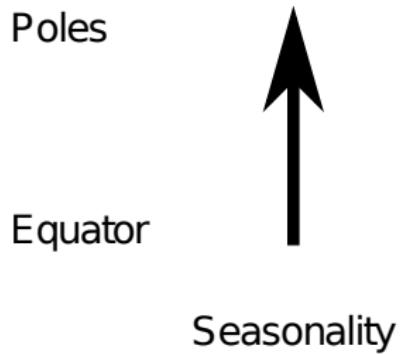
Why are there more species in the tropics?



Latitude-Niche Breadth Hypothesis

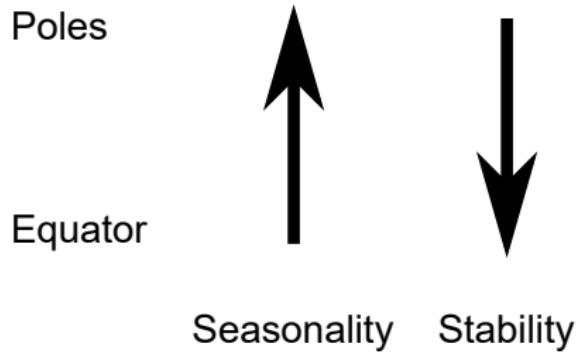
Envionmental stability? Productivity? Speciation rates?

Latitude-Niche Breadth Hypothesis



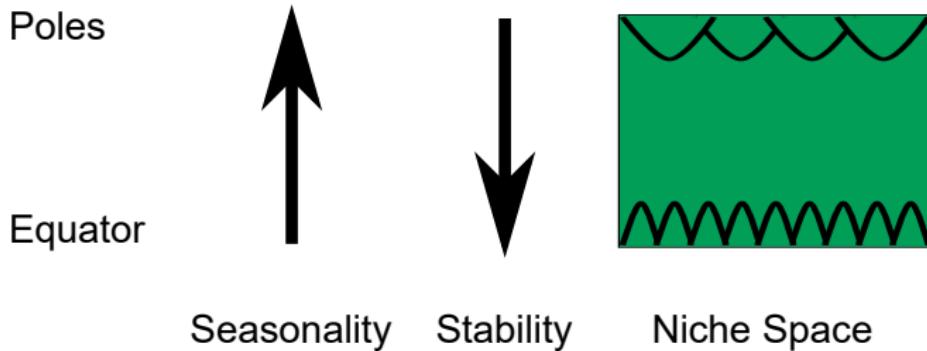
Vazquez, D.P. & Stevens, R.D. 2004. The latitudinal gradient in niche breadth: concepts and evidence. *Am. Nat.*

Latitude-Niche Breadth Hypothesis



Vazquez, D.P. & Stevens, R.D. 2004. The latitudinal gradient in niche breadth: concepts and evidence. *Am. Nat.*

Latitude-Niche Breadth Hypothesis



Vazquez, D.P. & Stevens, R.D. 2004. The latitudinal gradient in niche breadth: concepts and evidence. *Am. Nat.*

Alternatively ...

Poles

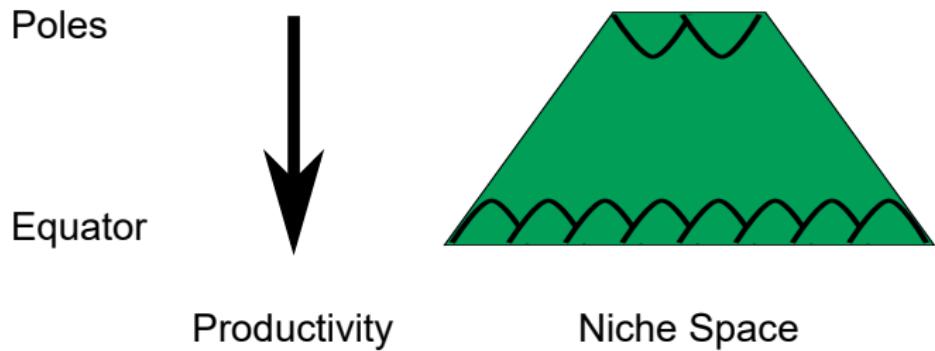


Equator

Productivity

Davies *et. al.* 2007. Productivity alters the scale dependence of the diversity-invasibility relationship. *Ecology*.

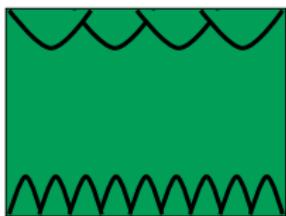
Alternatively ...



Davies *et. al.* 2007. Productivity alters the scale dependence of the diversity-invasibility relationship. *Ecology*.

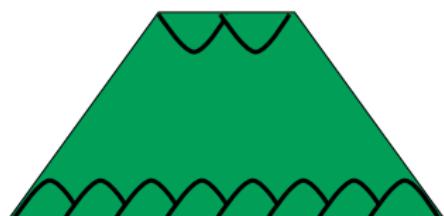
Does niche breadth vary with latitude?

Version 1



Greater specialisation
in the tropics

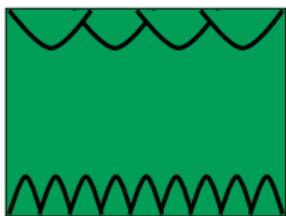
Version 2



Similar specialisation
at all latitudes

Does niche breadth vary with latitude?

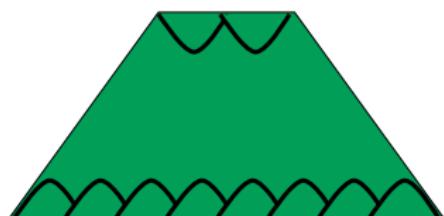
Version 1



Greater specialisation
in the tropics

Fewer prey per species
in the tropics

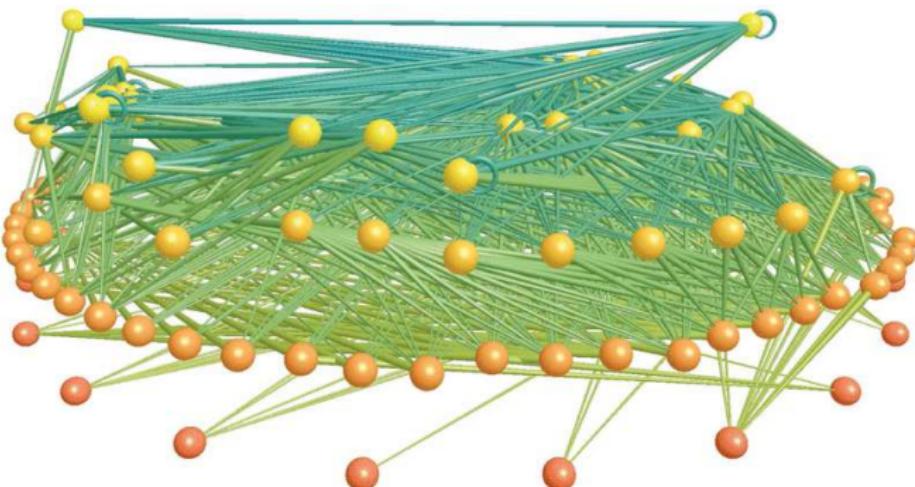
Version 2



Similar specialisation
at all latitudes

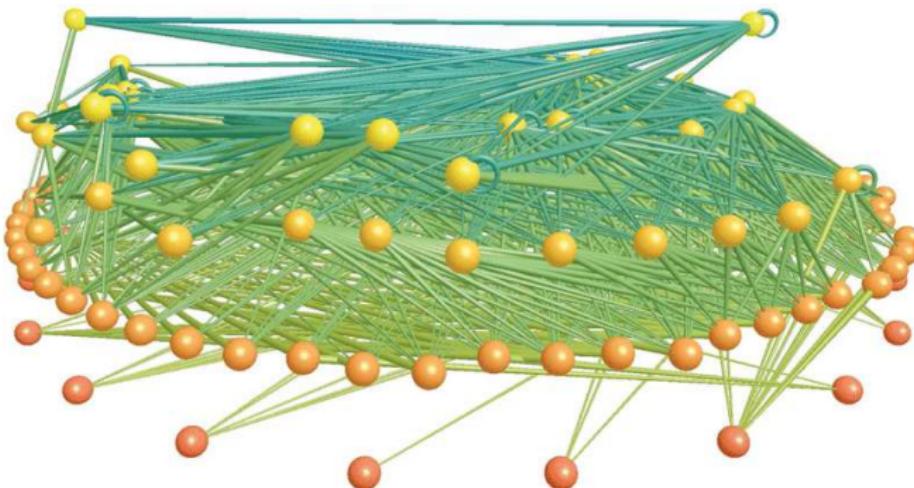
Equal prey per species
at all latitudes

Does niche breadth vary with latitude?



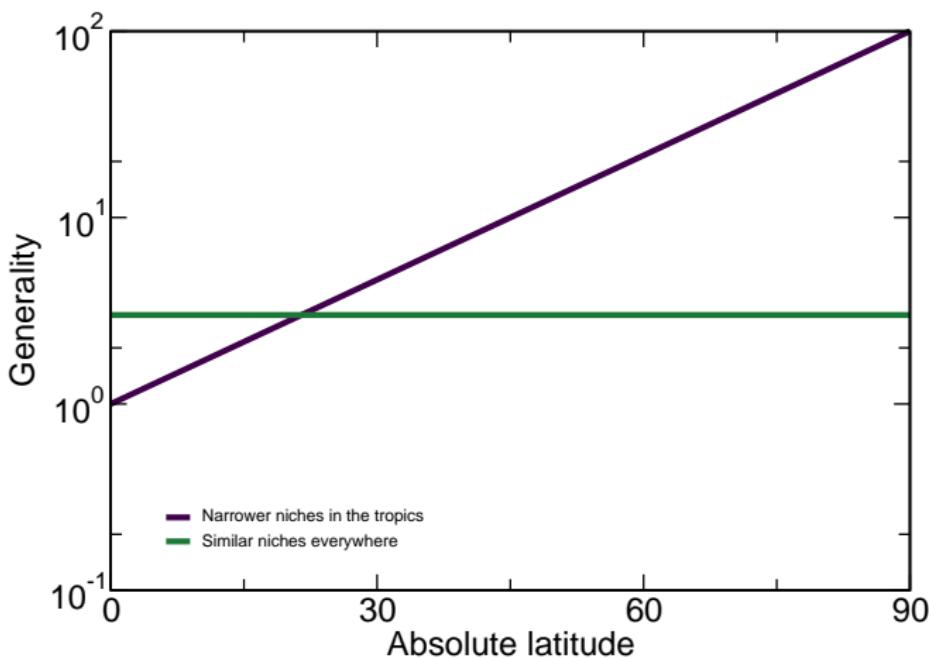
195 food webs
0-78° (absolute latitude)

Does niche breadth vary with latitude?

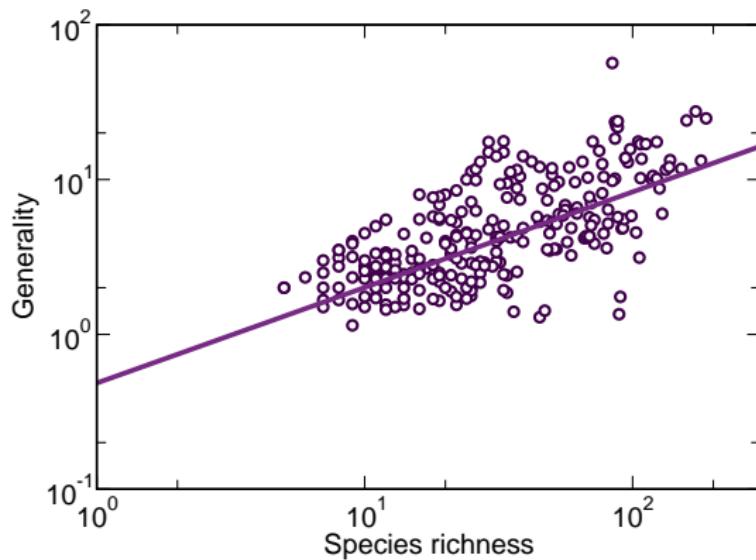


195 food webs
 $0\text{--}78^\circ$ (absolute latitude)
Mean generality (**G**)

Does niche breadth vary with latitude?

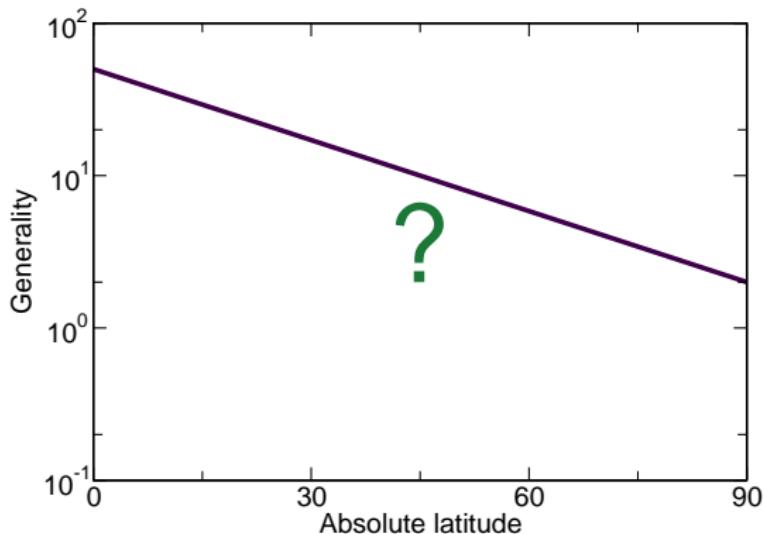


Niche breadth varies with species richness

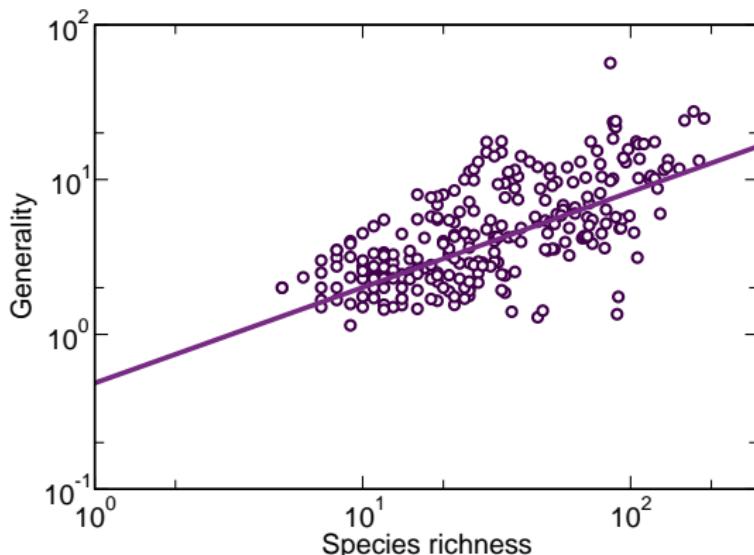


$$G \approx aS^b$$

Does niche breadth vary with latitude?

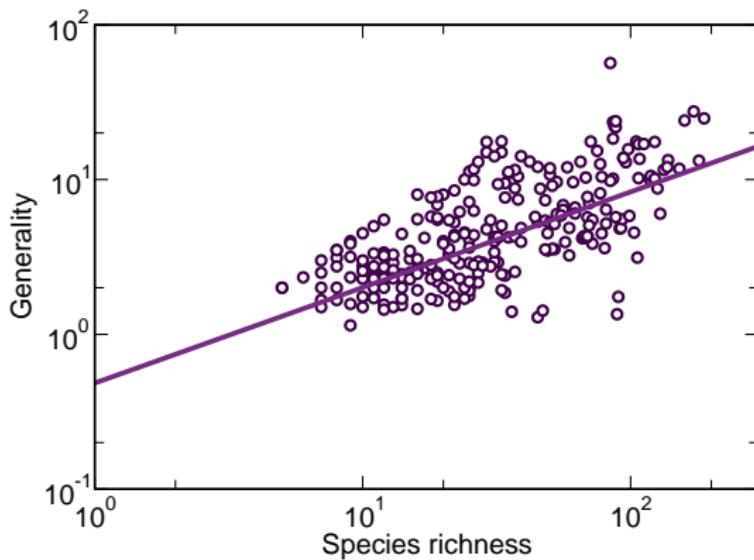


Does latitude affect scaling?



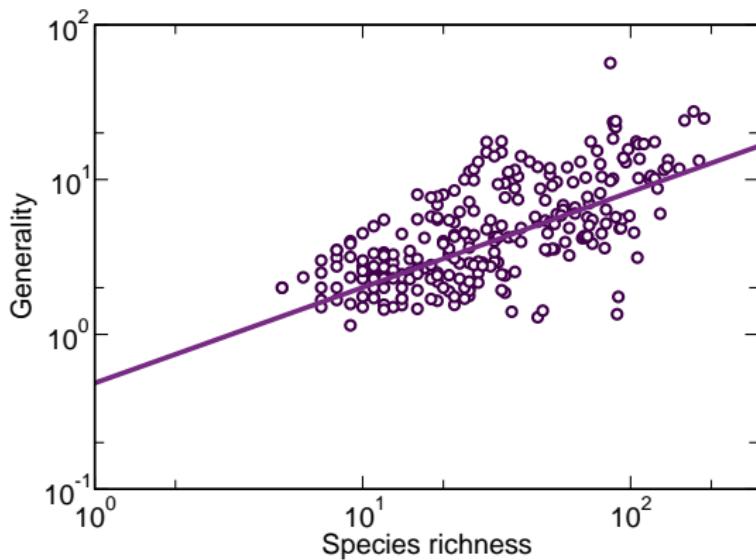
$$G \approx aS^b$$

Does latitude affect scaling?



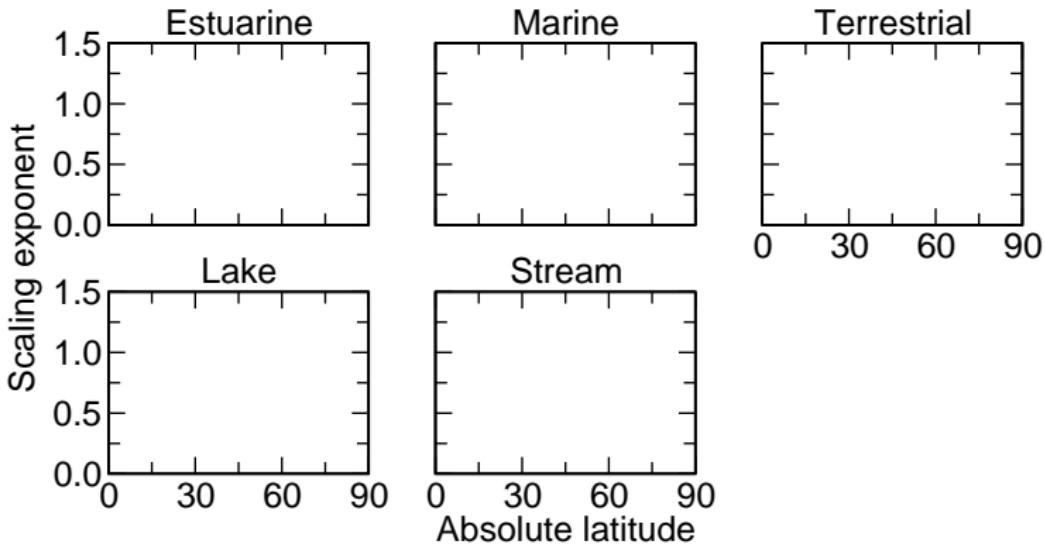
$$G \approx aS^{b_0 + b_1 \text{Latitude}}$$

Does latitude affect scaling?



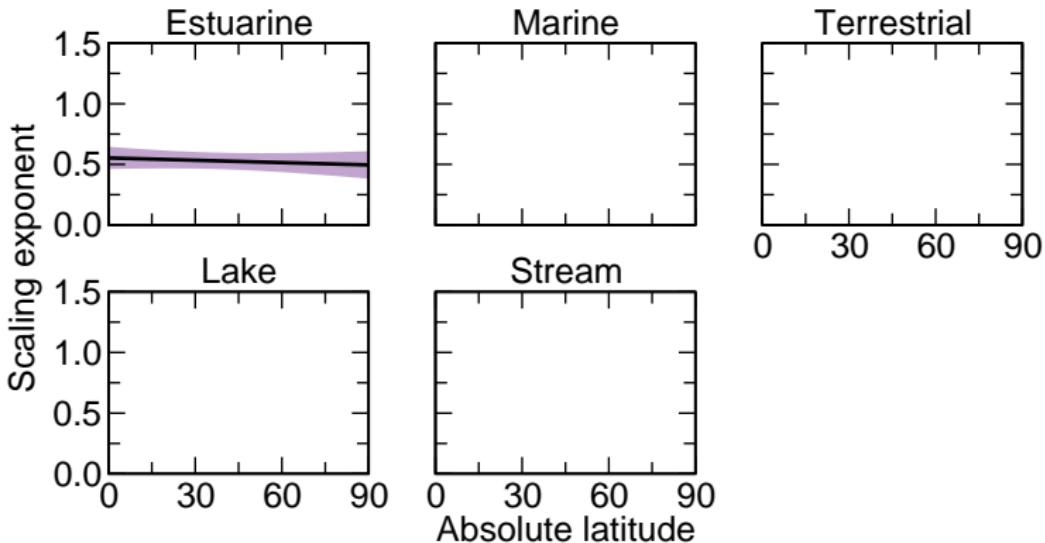
$$G \approx aS^{b_0 + b_1 \text{Latitude} + b_2 \text{Ecotype} + b_3 \text{Latitude:Ecotype}}$$

Does latitude affect scaling?



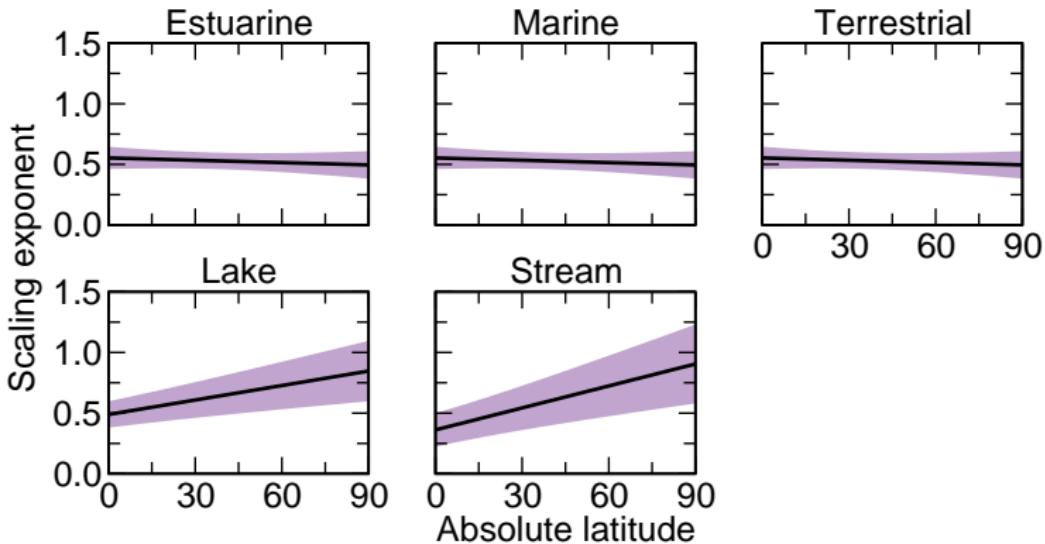
$$b_0 + b_1 \text{Latitude} + b_2 \text{Ecotype} + b_3 \text{Latitude : Ecotype}$$

Does latitude affect scaling?



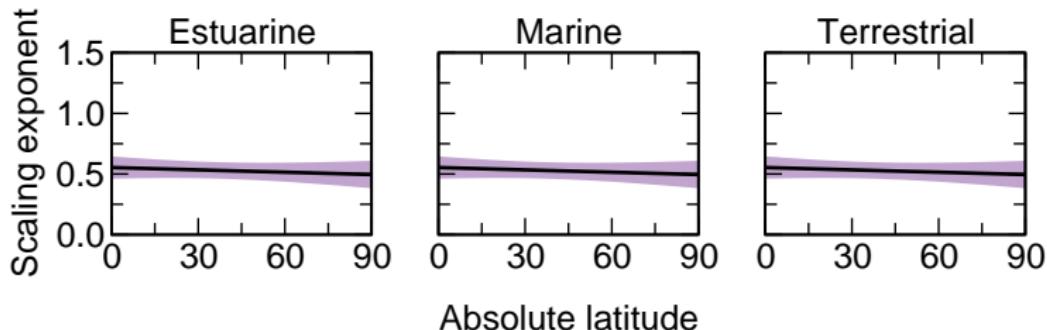
$$b_0 + b_1 \text{Latitude} + b_2 \text{Ecotype} + b_3 \text{Latitude : Ecotype}$$

Does latitude affect scaling?

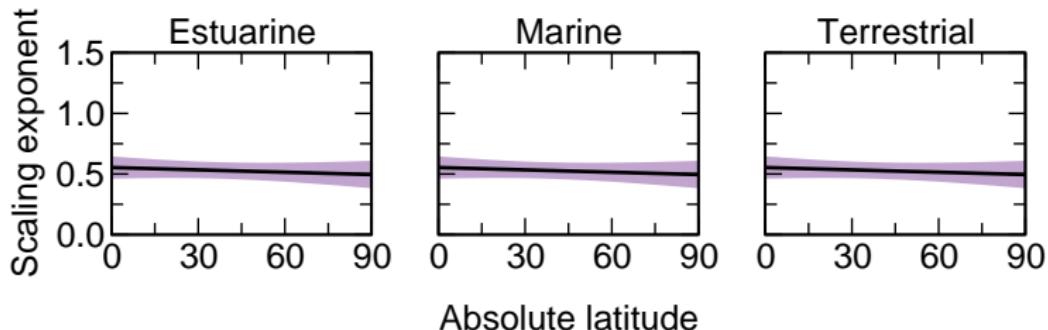


$$b_0 + b_1 \text{Latitude} + b_2 \text{Ecotype} + b_3 \text{Latitude : Ecotype}$$

Estuarine, Marine, & Terrestrial Food Webs

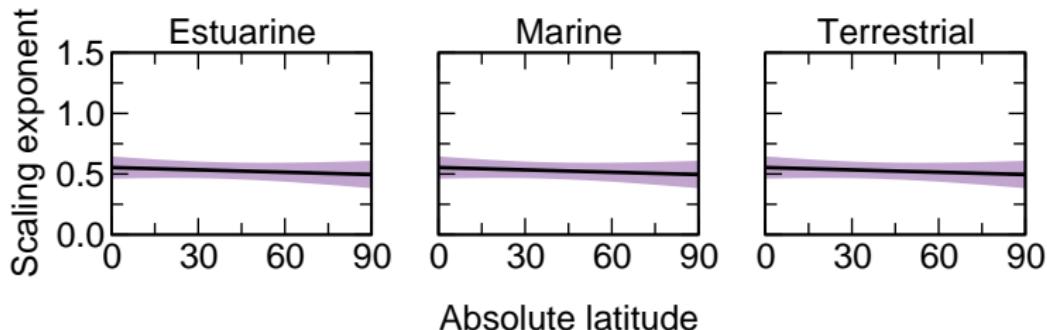


Estuarine, Marine, & Terrestrial Food Webs



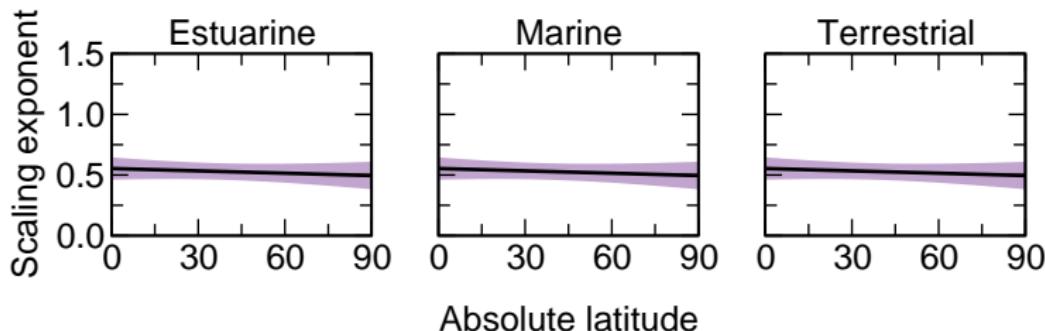
No effect of latitude on scaling

Estuarine, Marine, & Terrestrial Food Webs



No effect of latitude on scaling
Similar niche widths at all latitude

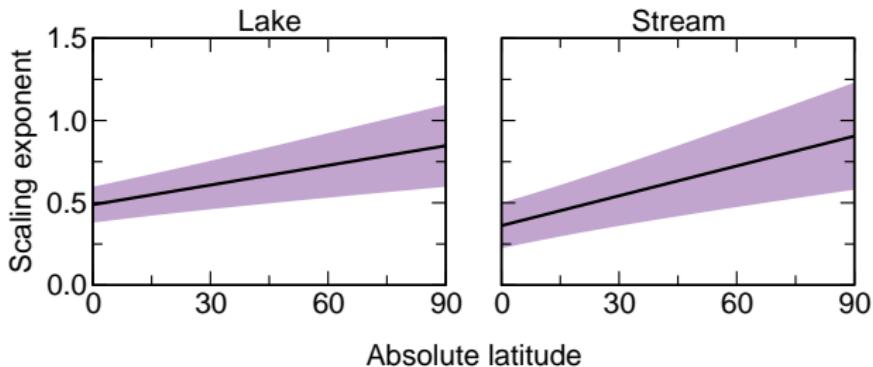
Estuarine, Marine, & Terrestrial Food Webs



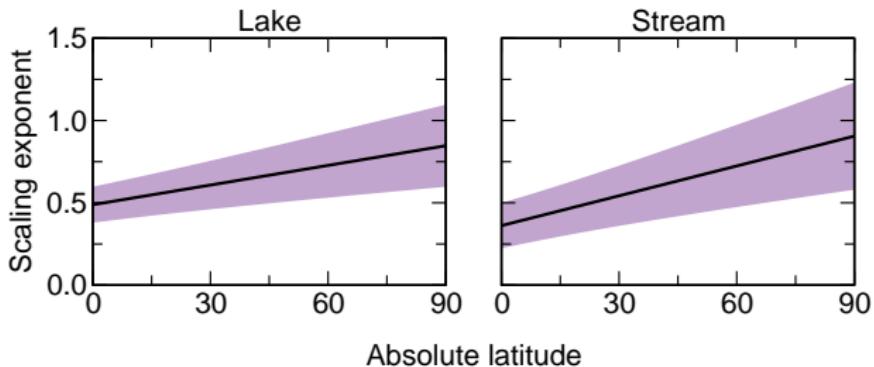
No effect of latitude on scaling
Similar niche widths at all latitude

Supports Davies *et. al.*, 2007:
Broader niche space in the tropics

Lake & Stream Food Webs

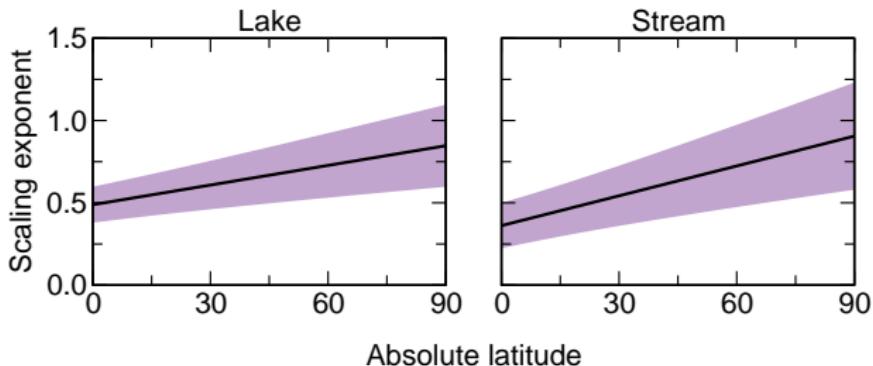


Lake & Stream Food Webs



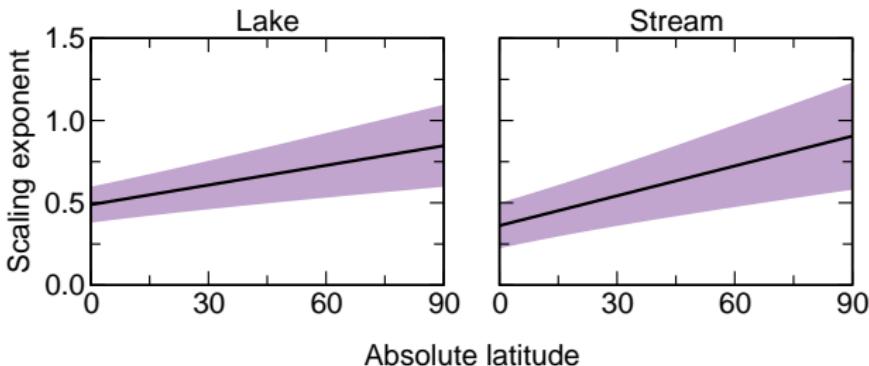
Scaling increases with latitude

Lake & Stream Food Webs



Scaling increases with latitude
Narrower niches in the tropics

Lake & Stream Food Webs

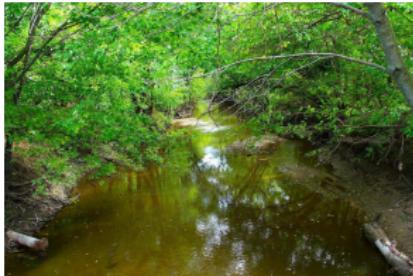
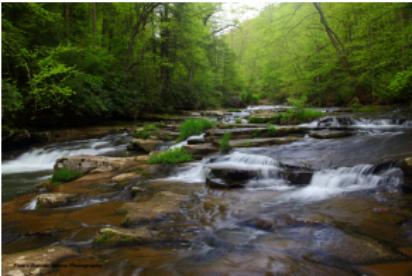


Scaling increases with latitude
Narrower niches in the tropics

Supports Vazquez & Stevens 2004

What's different in freshwaters?

They're highly seasonal



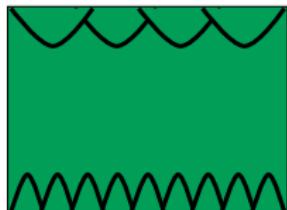
What's different in freshwaters?

They're dominated by fish



Specialisation vs. Gape-limitation

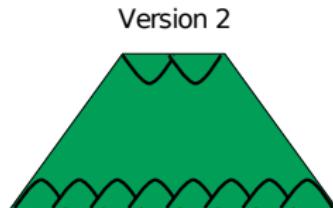
Version 1



So why are there more species in the tropics?

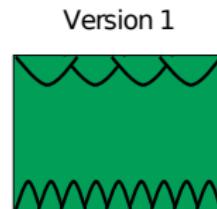
Estuarine, marine, & terrestrial

- Broader niche space in the tropics
- Similar specialisation everywhere



Lakes & Streams

- Narrower niches in the tropics
- Specialisation due to stability

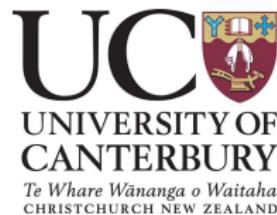


Acknowledgements

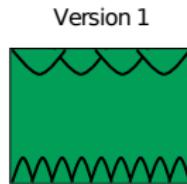
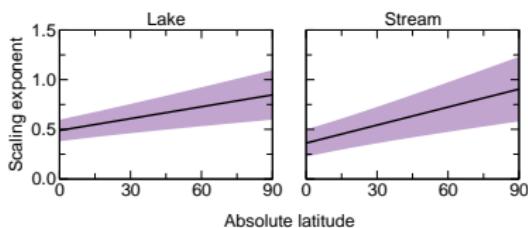
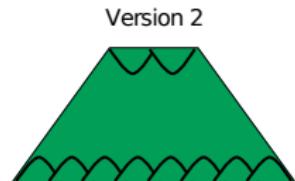
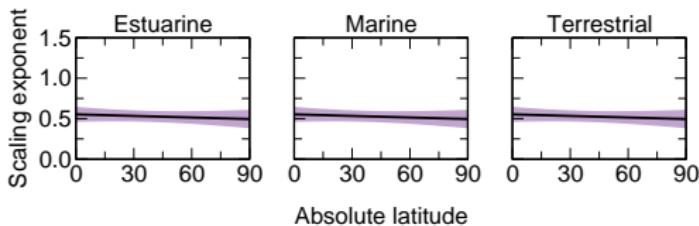
Daniel B. Stouffer
& his lab

Tamara N. Romanuk
& her lab

Angus McIntosh
Matthias Schleuning



Latitude affects scaling in freshwaters



$$G \approx aS^{b_0 + b_1 \text{Latitude} + b_2 \text{Ecotype} + b_3 \text{Latitude:Ecotype}}$$