

**the world's biota is distributed non-randomly**

*kinds* (evolutionary lineages) are distributed unevenly in both *time* and *space* (these topics will be addressed later)

this class will look at global patterns in **SPECIES RICHNESS**

**WHERE DO WE FIND MOST DIVERSITY?**

13 *patterns are only partly understood* 1

**DESCRIBING SPECIES RICHNESS**

- 1. Direct count of # species in an area - a **species tally** for **any given area**

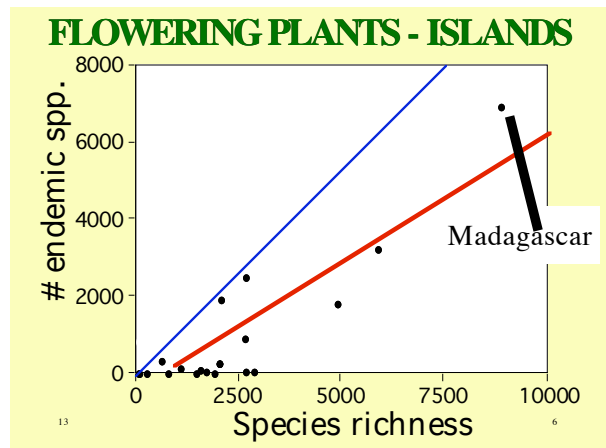
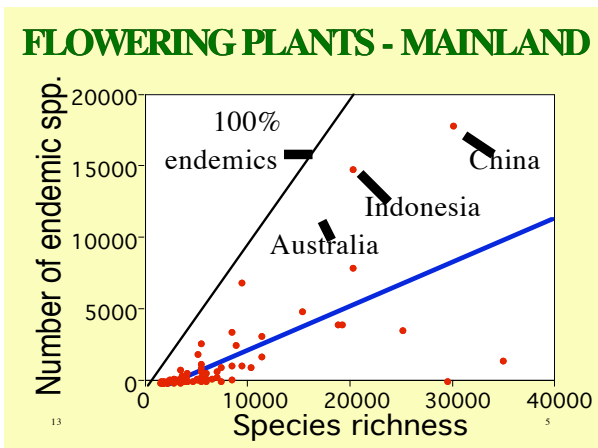
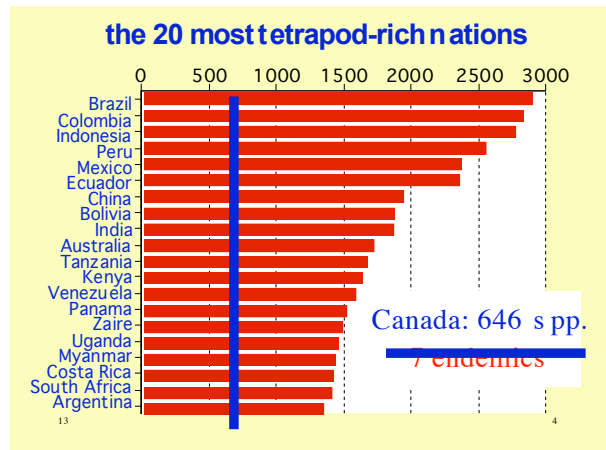
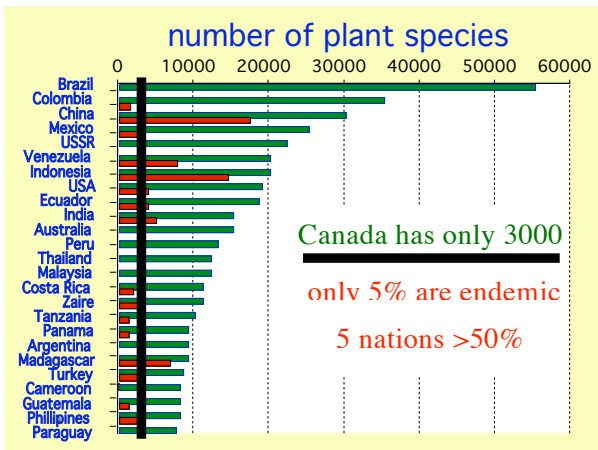
*α - diversity*

- 2. Species # **t turnover** among areas within a larger region

*β - diversity*

**THESE ARE DISTINCT ASPECTS OF DIVERSITY**

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in looking at the bar-diagrams  
you may note that many sp.-rich nations are:

**LARGE**

and / or

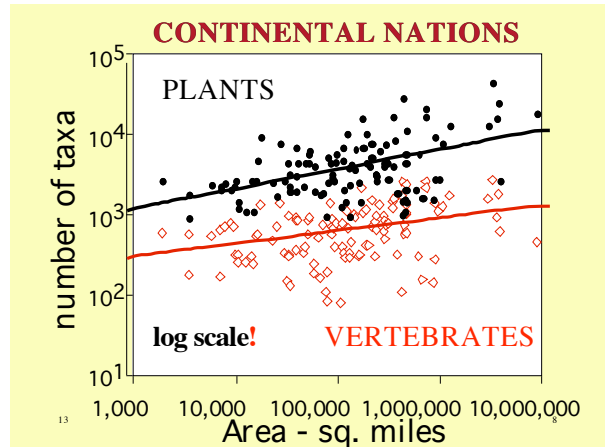
**LOW LATITUDE**

- though a close look will show that  
large size alone does not **g uarantee**  
a large biota (remember Canada?)

**how does richness relate to  
SIZE & LATITUDE?**

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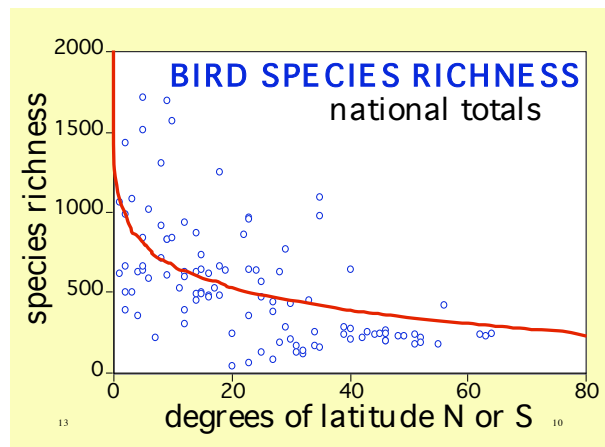
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the positive relationship between  
species richness and area is very general,  
true at all sorts of scales and for  
all sorts of organisms

*(details vary)*

$$\log S = z \cdot \log A + c$$

z and c depend on organisms etc.



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**clearly there is also  
a powerful effect of latitude**

again, as with area, the effect is general,  
being true of many groups  
of very different organisms

**though again, details of the relationship  
vary from group to group**

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discussion up to now is based on  
nation-based measures of richness

**clearly preferable would be  
STANDARD AREAS**

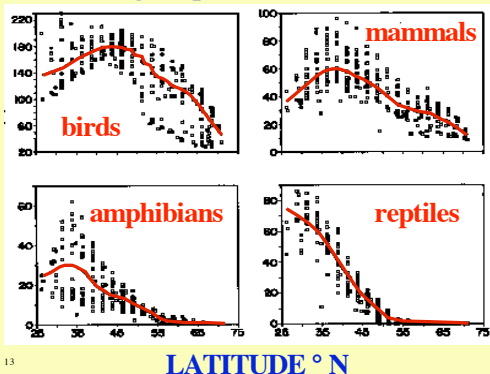
so far, little data of this sort is available

**we do have data for lat.-long. blocks  
for the Americas north of Mexico**

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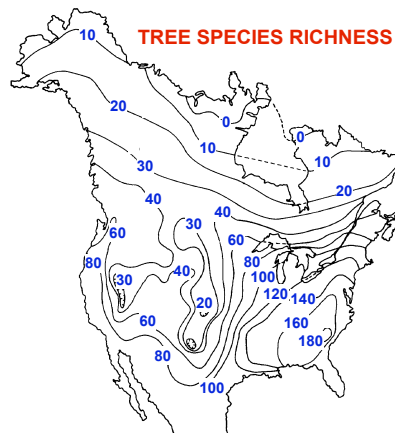
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different groups show different trends



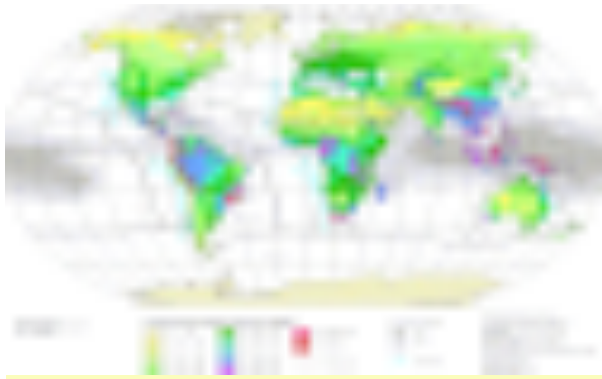
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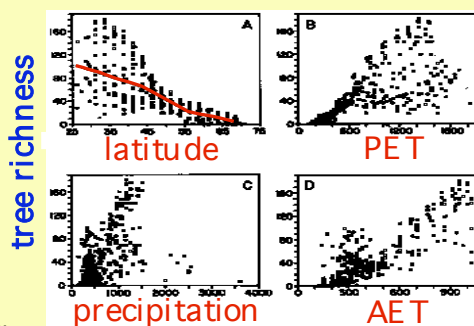


a map of tree species richness clearly suggests that richness relates to both temperature & precipitation a similar pattern is shown by amphibians other v.erts. show other patterns<sup>14</sup>

global vascular plant diversity



tree richness relates best to Actual E v apoT ranspiration



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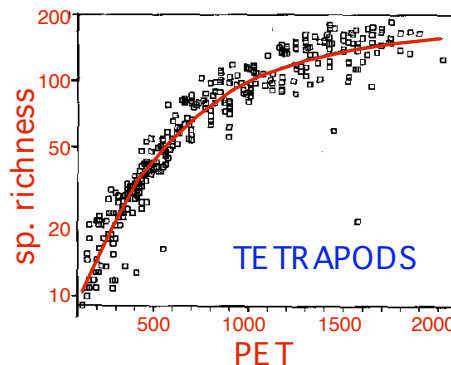
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tree richness obviously relates well to **AET**  
 = **P** rimary **P** roductivity ;  
 photosynthetic rate;  
 biological throughput of water

tetrapods better reflect **PET**  
 = total received **r** adiation;  
 solar energy

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earlier, we noted that places **rich** in one kind of organism were often **rich** in other groups too

and we also showed that **richness** relates positively to **endemism** ( $\alpha$  to  $\beta$ )

now we note that **places high in endemics** in one group often show the same for other groups - they **are generally** **“special”** **biotically**

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so, in general, a given area has a **richer biota** if it is in **humid low latitudes**

## WHY?

we have seen some ecological (*climate; productivity*) reasons for this

but also **HISTORY** is relevant:

**PERSISTENCE** **GLACIATION**

**ISOLATION**

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## NEXT CLASS

### Lineage Patterns in Time

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