EFFECTS OF TAXONOMIC GROUPS AND GEOGRAPHIC SCALE ON PATTERNS OF NESTEDNESS

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WHAT IS NESTEDNESS ?

LOW NESTEDNESS

HIGH NESTEDNESS

WHY ARE SPECIES ASSEMBLAGES NESTED ?

- Species are not randomly distributed
- Geographically adjacent areas host similar biota
- Smaller areas host poorer biota

DEPARTURES FROM NESTEDNESS ARE CAUSED BY:

- increased local speciation
- differential, or even stochastic, immigration and extinction
- habitat heterogeneity
- peculiarities in local palaeogeography

WHY IS NESTEDNESS IMPORTANT ?

THEORETICAL INTEREST:

NESTEDNESS HELPS US UNDERSTAND THE WAYS INSULAR BIOTA ARE ASSEMBLED

PRACTICAL INTEREST:

NESTEDNESS IS RELATED TO THE '*SLOSS*' DEBATE AND, GENERALLY, CONSERVATION POLICIES

HOW DO WE MEASURE NESTEDNESS ?

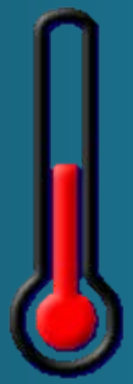
Various metrics have been proposed by several authors

According to our view, the most effective and comprehensive metric for measuring LEVELS of nestedness is the "Temperature" of Atmar & Patterson (1993) that measures the entropy of the species per island presence-absence matrix

ATTENTION: The measurement of nestedness levels does not necessarily have explanatory power in revealing causal factors

REMINDER !

LOW T = HIGH NESTEDNESS



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HIGH T = LOW NESTEDNESS

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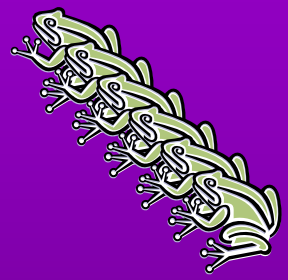
EFFECTS OF MATRIX STRUCTURE ON NESTEDNESS

- MATRIX SIZE (SPECIES x ISLANDS)
- NUMBER OF SPECIES
- SLOPE OF SPECIES / AREA CURVES
- NUMBER OF ISLANDS
- MATRIX FILL (% 1s)

PARAMETRIC AND NON PARAMETRIC CORRELATIONS WITH T

- MATRIX SIZE
- NUMBER OF SPECIES
- SLOPE OF SPECIES / AREA CURVES
- ✓ **NUMBER OF ISLANDS (-)**
- ✓ **MATRIX FILL (+)**

PARTIAL CORRELATIONS



Species

Islands

WHEN No. SPECIES < No. ISLANDS, NESTEDNESS IS HIGHER

T is positively correlated with the ratio No. Species / No. Islands

EFFECTS OF TAXONOMIC GROUPS ON NESTEDNESS

- PLANTS
- INVERTEBRATES
  - land snails
  - terrestrial isopods
  - beetles
  - ants
  - butterflies
  - orthoptera
  - various
- FRESHWATER FISH
- AMPHIBIANS
- ‘REPTILES’
- MAMMALS (except bats)
- BATS
- BIRDS

non-parametric ANOVA (Mann-Whitney U test)

PLANTS:

T > all vertebrate groups (except bats)

T > ants (marginally)

MAMMALS:

T < total invertebrates (marginally)

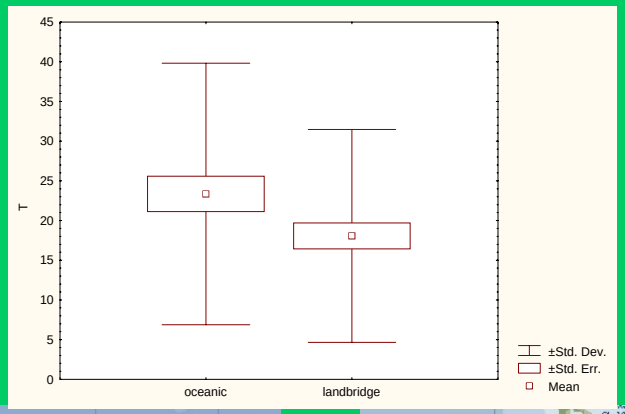
In landbridge islands only:

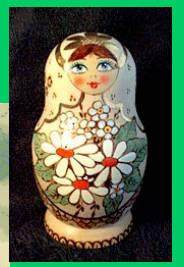
PLANTS:

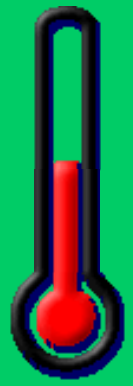
T > all mammals

T > reptiles

NESTEDNESS OF OCEANIC *vs.* LANDBRIDGE ISLANDS



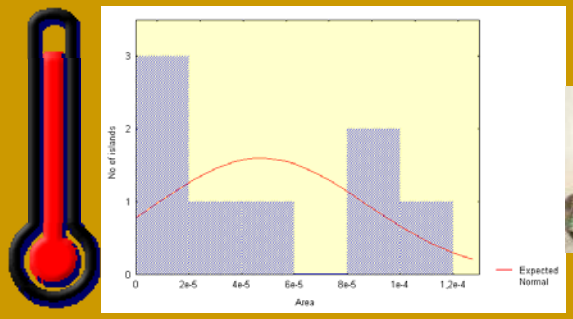


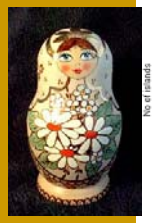


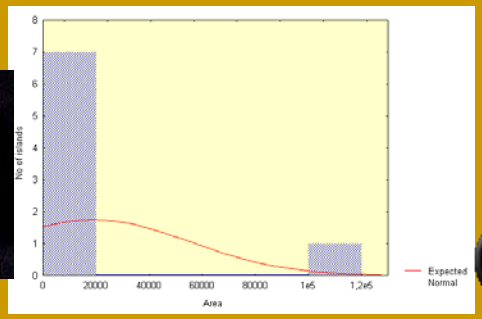
Oceanic islands

Landbridge islands

EFFECTS OF SKEWNESS IN ISLAND AREA DISTRIBUTIONS ON NESTEDNESS







ALL SKEWNESS VALUES WERE POSITIVE IN OUR DATASETS

EFFECT OF ISLAND SIZE RANGE ON NESTEDNESS

NESTEDNESS IS HIGHER:

- **when the largest islands are much larger than the smallest**
- **when mean area is higher (generally larger islands)**

LARGEST / SMALLEST ISLAND : corr (- T)

MEAN ISLAND AREA: corr (- T)

NESTEDNESS OF DIFFERENT TAXA ON THE SAME ISLANDS

NO GENERAL PATTERN !

SOME TENDENCY TO FOLLOW THE REVERSE RICHNESS ORDER

(richer communities = less nested)

BUT NOT CONSISTENTLY

CONCLUSIONS

- Almost all insular communities are nested to some degree, which depends in complex ways on local idiosyncratic factors
- There is not much in comparing nestedness values among taxa or archipelagoes
- What is needed mostly, is biologically meaningful causal explanations of specific nested patterns
- A fruitful approach and methodology in this direction is offered by Lomolino (1996)

- **Conservation efforts should consider nestedness in a case by case manner**
- **The community structure of each taxon on each island group exhibits a unique pattern**
- **The analysis of nestedness reveals the idiosyncratic properties of biotic communities**

INTERESTING NOTE

NESTEDNESS BEHAVES SIMILARLY TO z OF THE SPECIES / AREA CURVE

BOTH ARE SCALE DEPENDED, IDIOSYNCRATIC AND LEAD TO INTERESTING EMPIRICAL STUDIES THAT TEND TO QUESTION THEIR MEANING,

AND BOTH HELP TOWARDS A DEEPER UNDERSTANDING OF THE WAYS INSULAR BIOTA ARE ASSEMBLED