Animal Diversity: An Introduction

Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Indonesia

Biology Undergraduate Program Learning Outcome

- The students able to identify and manage the biological resources and environment based on conservation and prospecting.

Course Learning Outcome

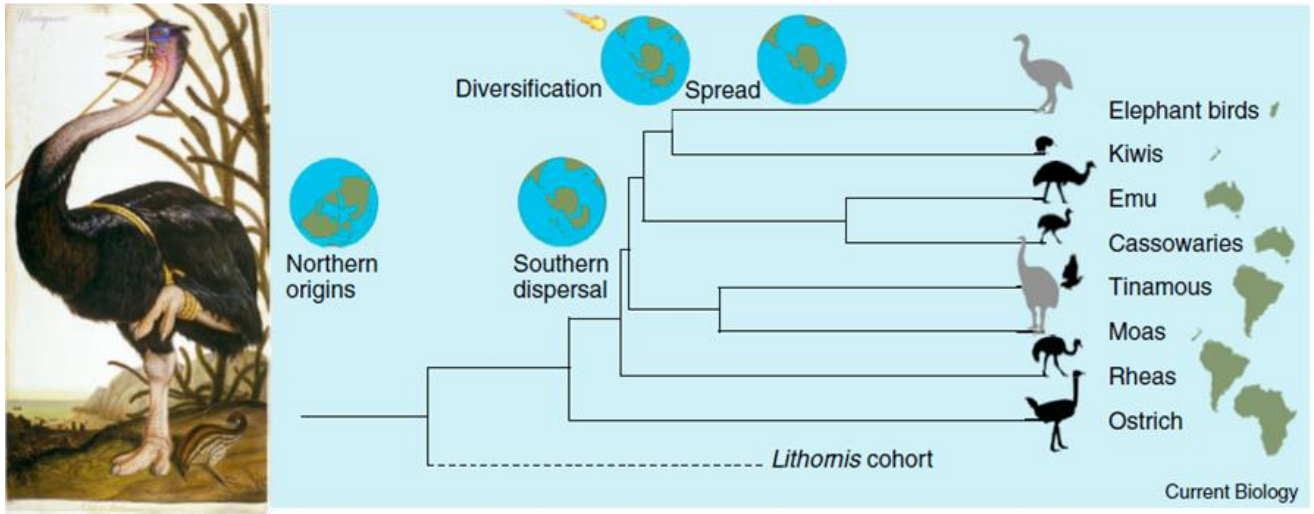
- The students able to link the evolutionary process as a source of variation in animal diversity so that it can be used as a basis for conservation works and animal prospecting.

Course Contents

- Evolutionary and historical biogeography of animal diversity.
- Evolution and Developmental Biology (EvoDevo) as a fundamental for animal classification.
- Invertebrate diversity.
- Minor phyla diversity.
- Vertebrate diversity.
- Measuring spatial animal diversity and its application for biomonitoring.
- Animal conservation and prospecting.

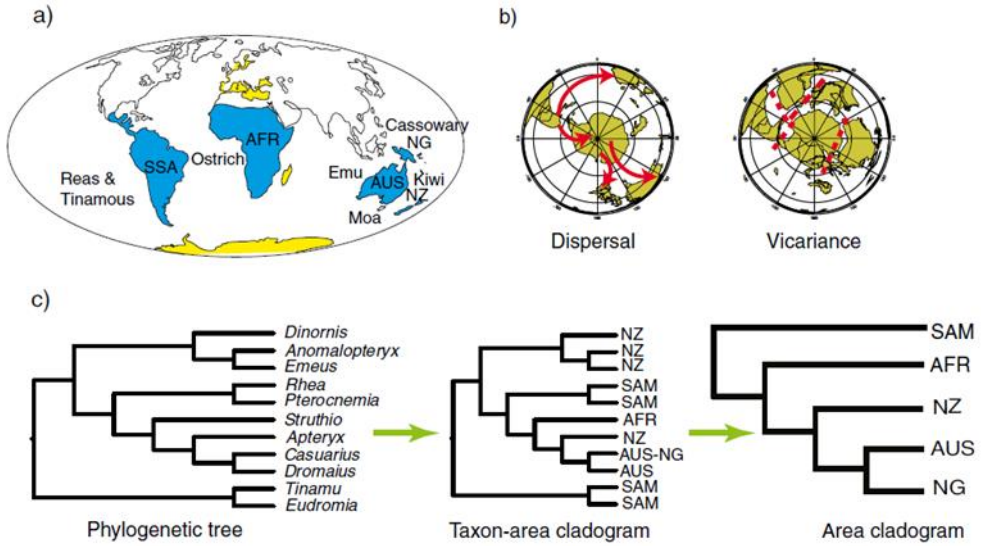
Evolutionary and historical biogeography of animal diversity

An example from the extinct elephant bird and the extant ratite birds



The Malagasy giant elephant bird or vorompatra

Maderspacher, 2017



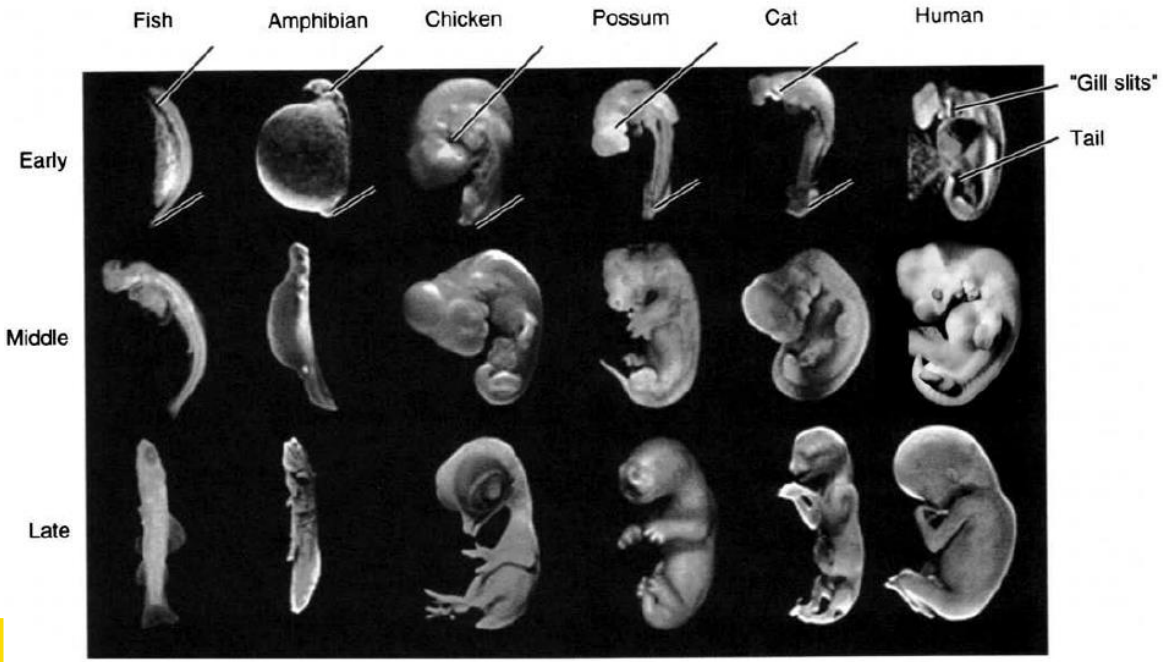
Biogeographic history of the ratite birds

Sanmartín, 2012

Evolution and Developmental Biology (EvoDevo) as a fundamental for animal classification

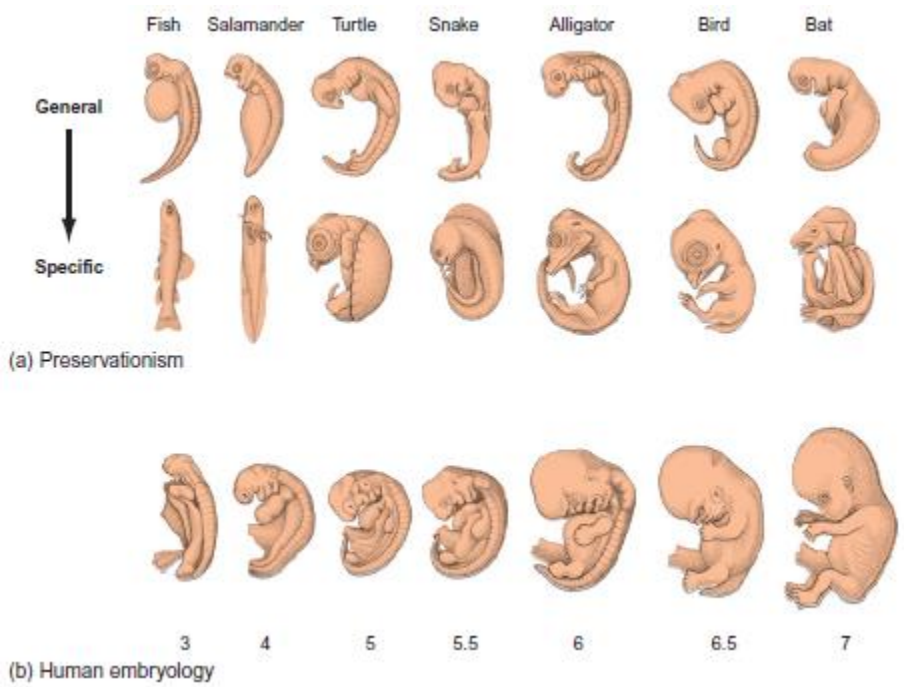
A comparison of Biogenetic and Von Baer's Law

Biogenetic law



Kardong, 2009

Von Baer's law



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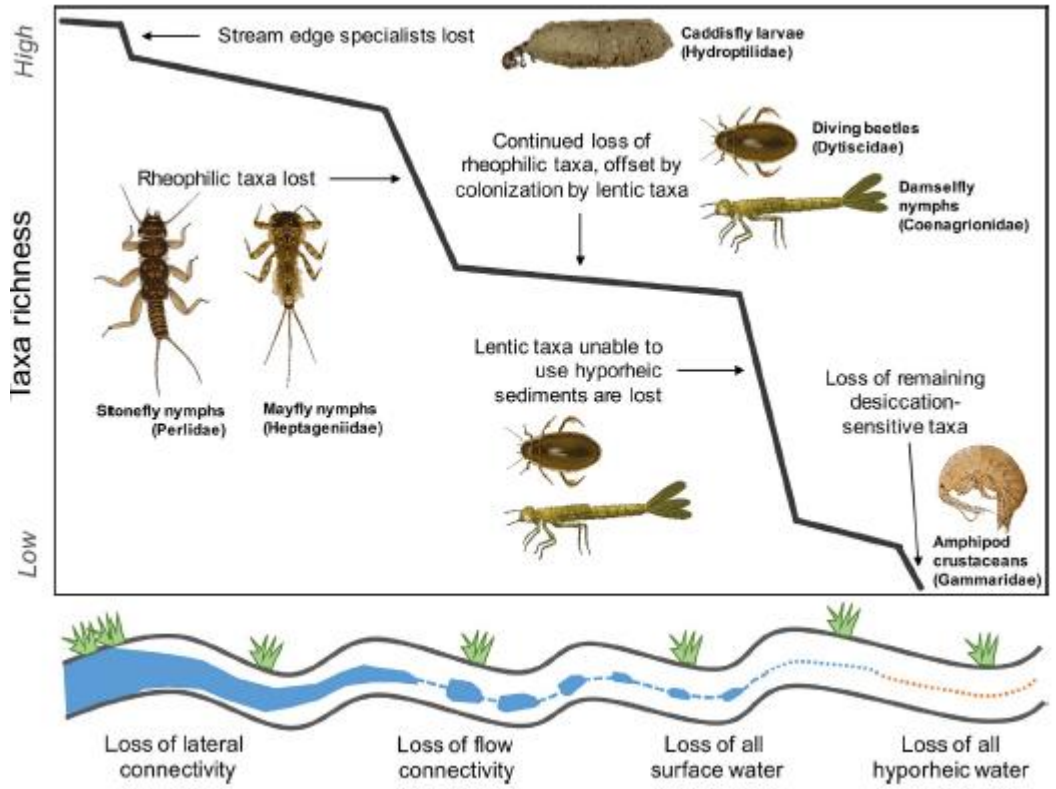
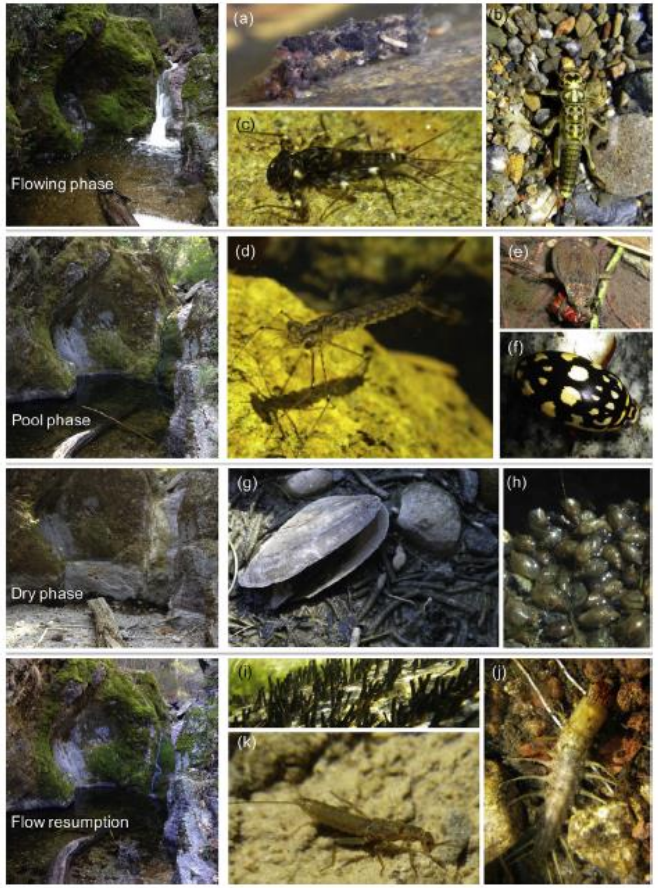
Invertebrate diversity

An Example from Aquatic Invertebrates

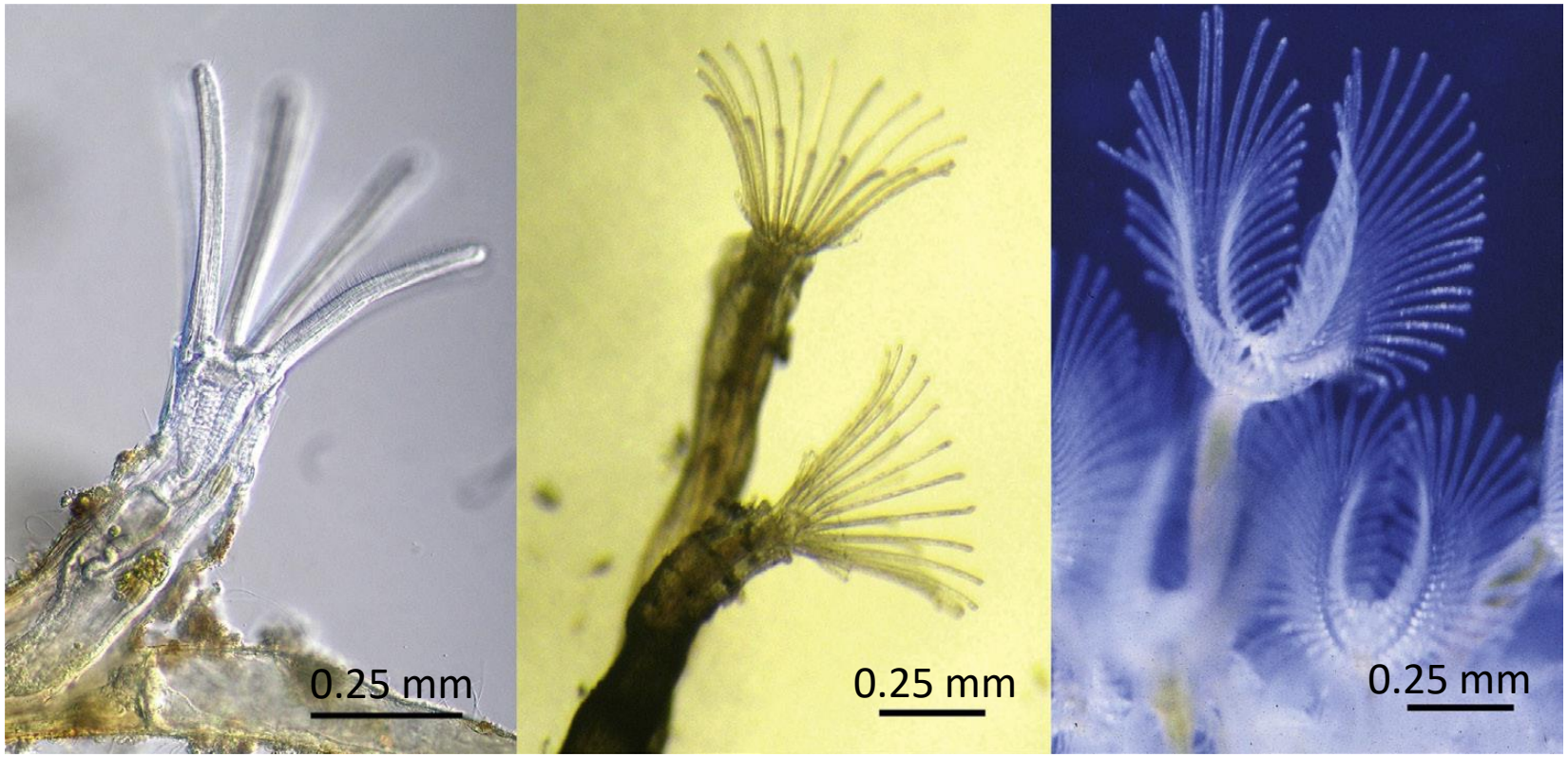




The decline in richness with increasing intermittence

Minor phyla diversity

The Variation of The Food Collecting Organ (Lophophore)

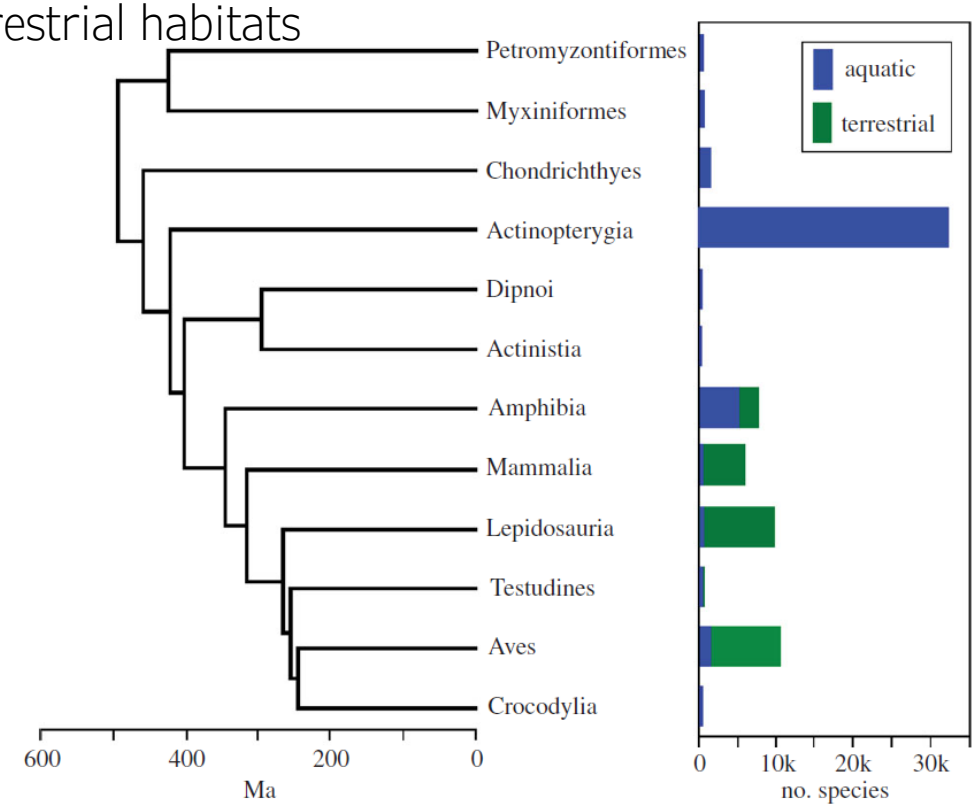


Victorella *Fredericella* *Lophopodella*,

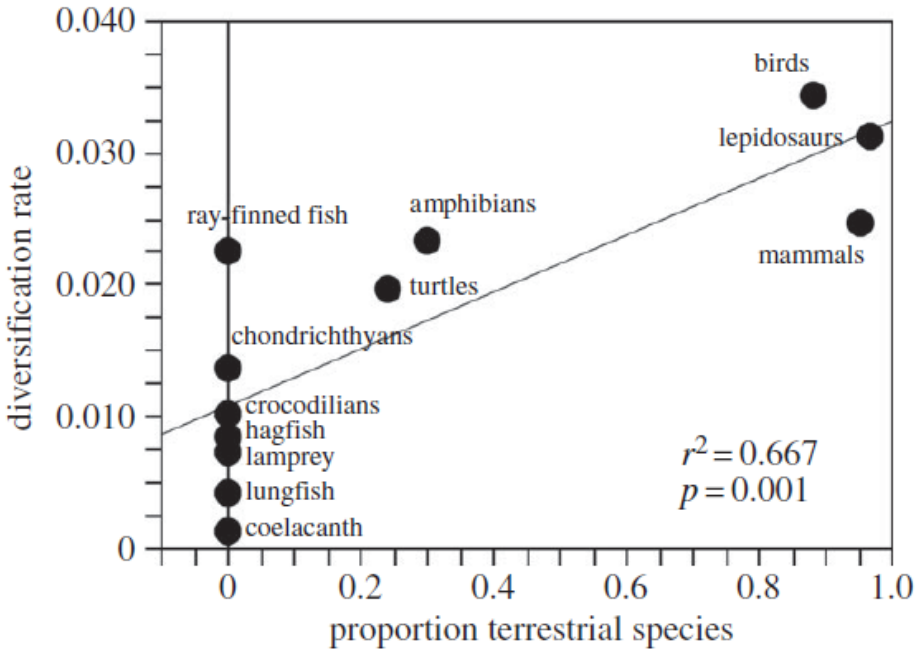
Vertebrate diversity

Large-scale Patterns of Vertebrate Diversity

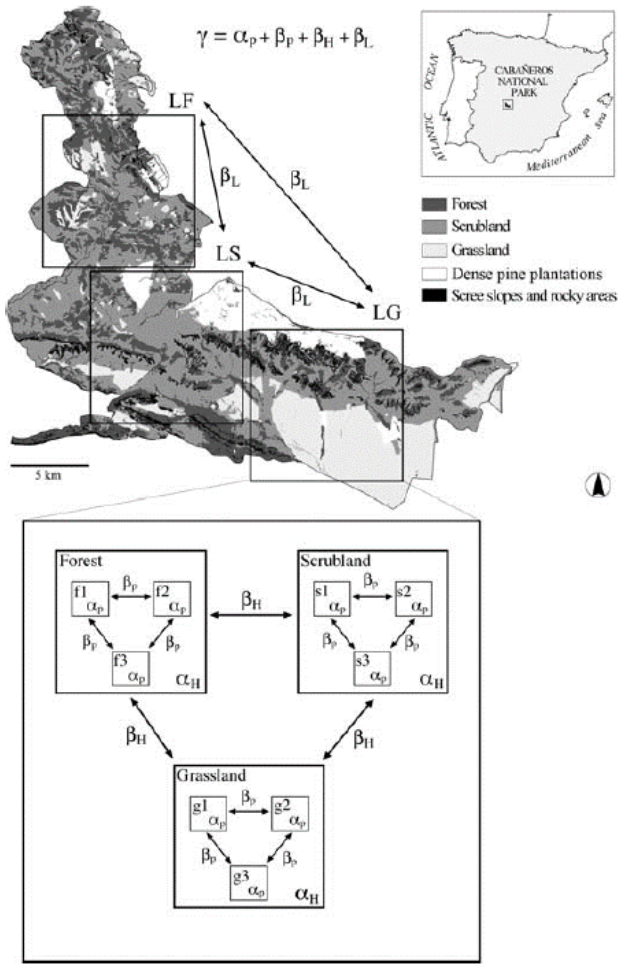
Phylogenetic tree of vertebrates in aquatic and terrestrial habitats



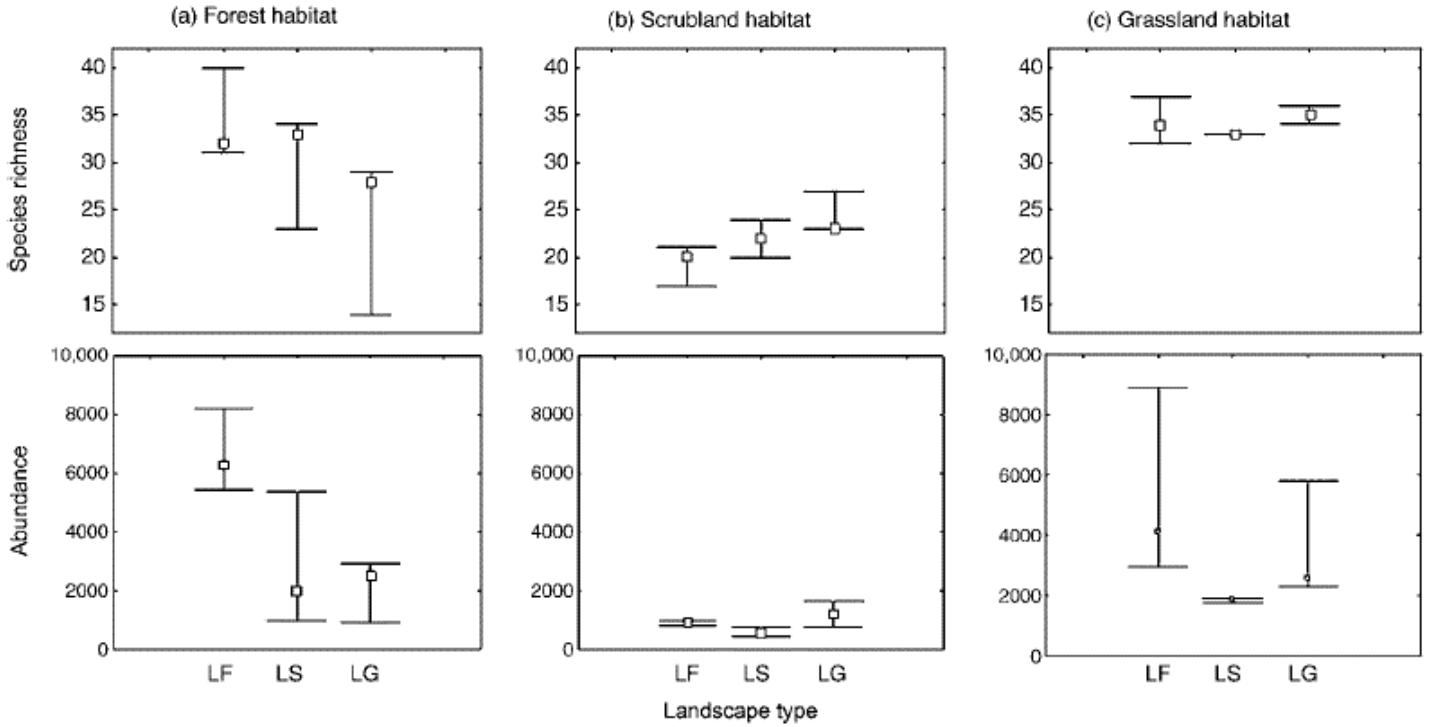
Relationship between habitat (proportion of terrestrial species) and net diversification rates



Measuring spatial animal diversity and its application for biomonitoring



The Spatial Distribution of Mediterranean Dung Beetle Diversity



Numa, et.al. 2009

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Animal conservation and prospecting

Bioprospecting Values in Several Ecosystems

Biodiversity "Hot Spots"	Forest Area (1000 ha)	Density, endemic species / 1000 ha	Hit Probability (/ 1000 ha)	Incremental Value ($/hectare)	SSR Scarcity Rent ($/hectare)
Western Ecuador	250	8.75	1.05E-04	$9,177	$20.63
Southwestern Sri Lanka	70	7.14	8.57E-05	$7,463	$16.84
New Calendonia	150	5.27	6.32E-05	$5,473	$12.43
Madagascar	1000	2.91	3.49E-05	$2,961	$6.86
Western Ghats of India	800	2.03	2.44E-05	$2,026	$4.77
Philipines	800	1.98	2.38E-05	$1,973	$4.66
Atlantic Coast Brazil	2000	1.88	2.26E-05	$1,867	$4.42
Uplands of Western Amazonia	3500	1.10	1.32E-05	$1,043	$2.59
Tanzania	600	0.88	1.06E-05	$811	$2.07
Cape Floristic Province of South Africa	8900	0.71	8.52E-06	$632	$1.66
Peninsular Malaysia	2600	0.62	7.44E-06	$539	$1.47
Southwestern Australia	5470	0.52	6.24E-06	$435	$1.22
Ivory Coast	400	0.48	5.76E-06	$394	$1.14
Northern Borneo	6400	0.42	5.04E-06	$332	$0.99
Eastern Himalayas	5300	0.42	5.04E-06	$332	$0.98
Colombian Choco	7200	0.32	3.84E-06	$231	$0.75
Central Chile	4600	0.32	3.84E-06	$231	$0.74
California Floristic Province	24600	0.09	1.08E-06	$0	$0.20

Assumes 10 successes/year, revenues $450,000,000/success, cost $485/test, hit rates based on 1.2 E-05 per species, discount rate 10%.
Source: Myers (1988, 1990); Simpson, Sedjo and Reid (1996); and authors' calculations.