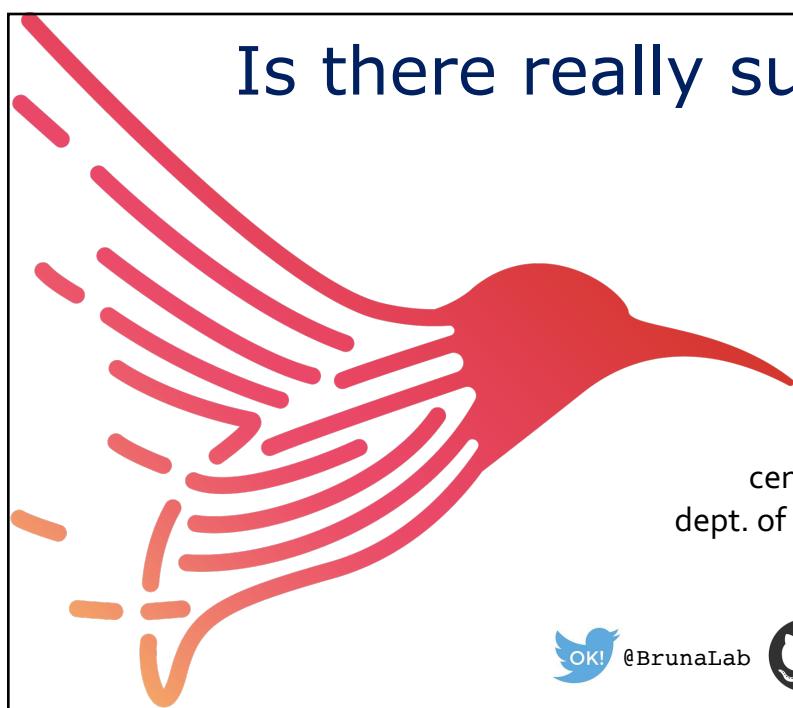


# Is there really such a thing as *Tropical* Biology?



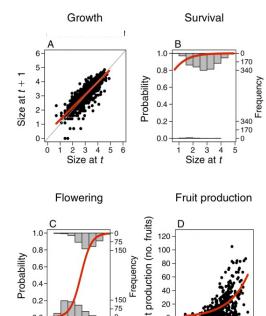
emilio m. bruna  
university of florida  
center for latin american studies &  
dept. of wildlife ecology & conservation



[github.com/BrunaLab](https://github.com/BrunaLab)  
[www.BrunaLab.org](http://www.BrunaLab.org)



1



$$n(y, t+1) = \int_L^U [p(x, y) + f(x, y)] n(x, t) dx.$$

λ

2



3



4

# Caveats

This is not a comprehensive historical review.



Pires Campos & Scabelo da Silva (2016)  
*J Humanities & Social Science*

Christen (2002), *The Americas*

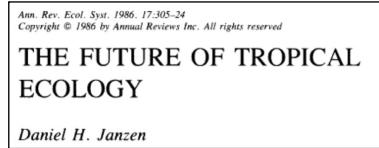
Burlingame (2002), *Rev. Biol. Tropical*

Driver and Yeoh (2002)  
*Singapore J of Tropical Geography*

Raby (2016) *Environmental History*

Hagen (1990) *History and Philosophy of the Life Sciences*

This is a question we have wrestled with for decades (centuries?)



Michael H. Robinson. 1978.  
Is tropical biology real.  
*Tropical Ecology* 19(1): 30-52.

5

Is there really such a thing as  
**Tropical Biology?**

- 1. NO**
- 2. MAYBE**
- 3. YES**

6

"The scope of your paper makes it more appropriate for a specialized journal focusing on tropical systems".

Sincerely,

Dr. <name redacted>  
Editor, <journal name redacted>

7

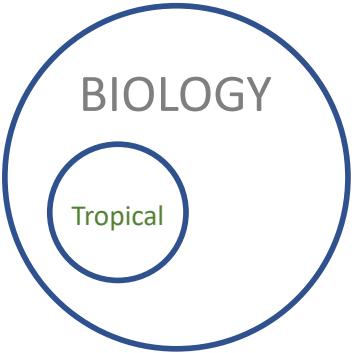


**ASSOCIATION FOR  
TROPICAL BIOLOGY  
AND CONSERVATION**

8

## Approach & Tools

crosses systems & conceptual domains



**Society for Mathematical Biology**



**ascb**  
the american society for cell biology



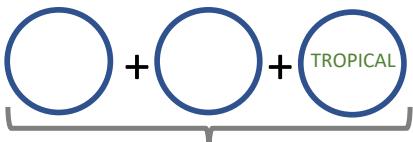
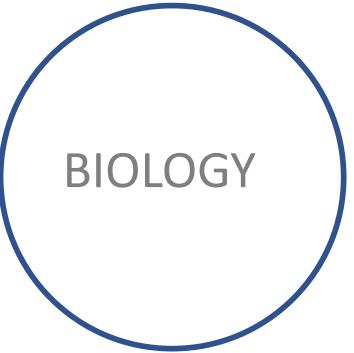
**The Society for Integrative & Comparative Biology**




9

## Conceptual Domain

crosses systems & approaches

**Society for Conservation Biology**



**Society of Systematic Biologists**



**INTERNATIONAL SOCIETY  
of ETHNOBIOLOGY**

**COLEVOL**  
ASOCIACIÓN COLOMBIANA  
DE BIOLOGÍA EVOLUTIVA



10



11



12

# Graduates of the Universidad del Rosario get a degree in “Biology”

13

 Plan de **estudios**  
**BIOLOGÍA**

SEMESTRE I	SEMESTRE II	SEMESTRE III	SEMESTRE IV	SEMESTRE V	SEMESTRE VI	SEMESTRE VII	SEMESTRE VIII
Catedra rosarista (2)	Constitución política (2) e instr. cívica	Electiva HM I (2)	Lectura crítica para Ciencias Naturales (2)	Electiva general II (1)	Argumentación para Ciencias Naturales (2)	Electiva HM II (2)	Electiva HM III (2)
Química I (3)	Electiva general I (2)	Bioquímica funcional (4)	Ética (2)	Ánalisis estadístico de datos (3)	Evolución (3)	Electiva I (2)	Electiva III (2)
Introducción a la programación de computadores (3)	Química II (3)	Física II (3)	Probabilidad y estadística (3)	Genética (4)	Fisiología vegetal (4)	Electiva II (2)	Menor IV* (4)
Precálculo (3)	Física I (3)	Cálculo II (3)	Zoología de vertebrados (3)	Fisiología animal (3)	Sistemas de información geográfica (3)	Menor I* (4)	Menor V* (4)
Evolución de la vida (3)	Cálculo I (3)	Biología molecular (3)	Microbiología (3)	Sistemas socio-ecológicos (3)	Biología del desarrollo (3)	Menor II* (4)	Opción de grado (6)
Sistema Tierra y cambios globales (3)	Biología celular (3)	Zoología de invertebrados (3)	Ecología (3)	Conservación (3)	Redacción de manuscritos y proyectos (2)	Menor III* (4)	
	Botánica (3)		Diseño experimental (2) y técnicas biológicas	Fund. derecho y política ambiental (2)			

\* Las materias menor I - V cambian de acuerdo al menor elegido.

Formación Rosarista Formación Científica Mayor en Biología Área menor

  
**Universidad del  
Rosario**

14



15

<b>RESEARCH LETTER</b>	
<b>Where on Earth are the “tropics”?</b>	
Kenneth J. Feeley <sup>1*</sup> and James T. Stroud <sup>2</sup>	
<b>Table 1.</b> Summary of eight criteria used to define the terrestrial tropics	
Criterion	Brief description of tropics according to criterion
C1	Areas that receive direct overhead solar radiation
C2	Areas with a net positive energy balance
C3	Areas where mean annual temperatures do not vary with latitude
C4	Areas where temperatures do not go below freezing in a typical year
C5	Areas where the mean monthly temperatures are never <18°C
C6	Areas where the mean annual “biotemperature” ≥24°C
C7	Areas where the annual range of temperature is less than the average daily temperature range
C8	Areas where seasonality of precipitation exceeds seasonality of temperature

16

## “The Tropics” (*sensu lato*) as a **distinct & unique** entity is a historical artefact.

17



18

## The Tropics as Paradise

"that if there be any place upon the earth of that nature, beauty, and delight that Paradise had, the same must be found within the tropics..."

Sir Walter Raleigh  
History of the World (1614)



Albert Eckhout, *Mameluca woman under a fruiting cashew tree* (ca. 1641)

19

## The Tropics as Hellscapes



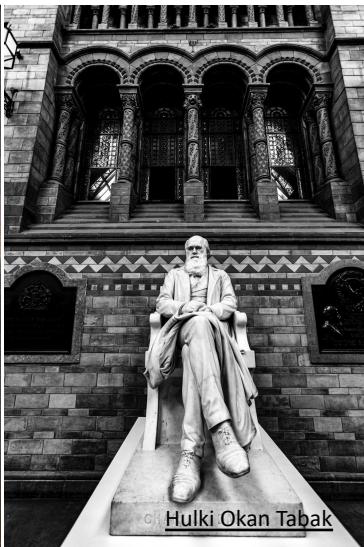
Theodor DeBry's illustration of South Americans 'cannibals', ca. 1590

"I assure you all the men of this island...have heads like dogs, and teeth and eyes likewise...and eat everybody that they can catch."

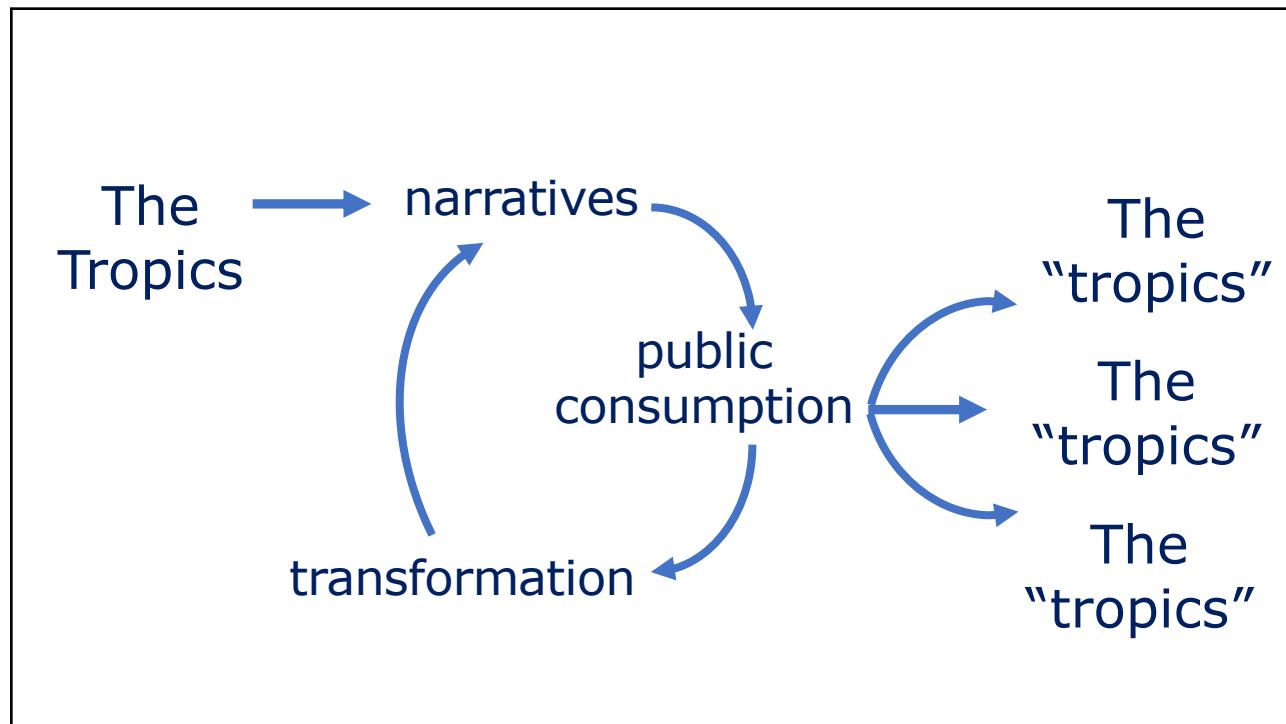
*The Travels of Marco Polo*  
Book 3, Ch. 13

20

## The Tropics as for destinations for (self)discovery & proving oneself



21



22

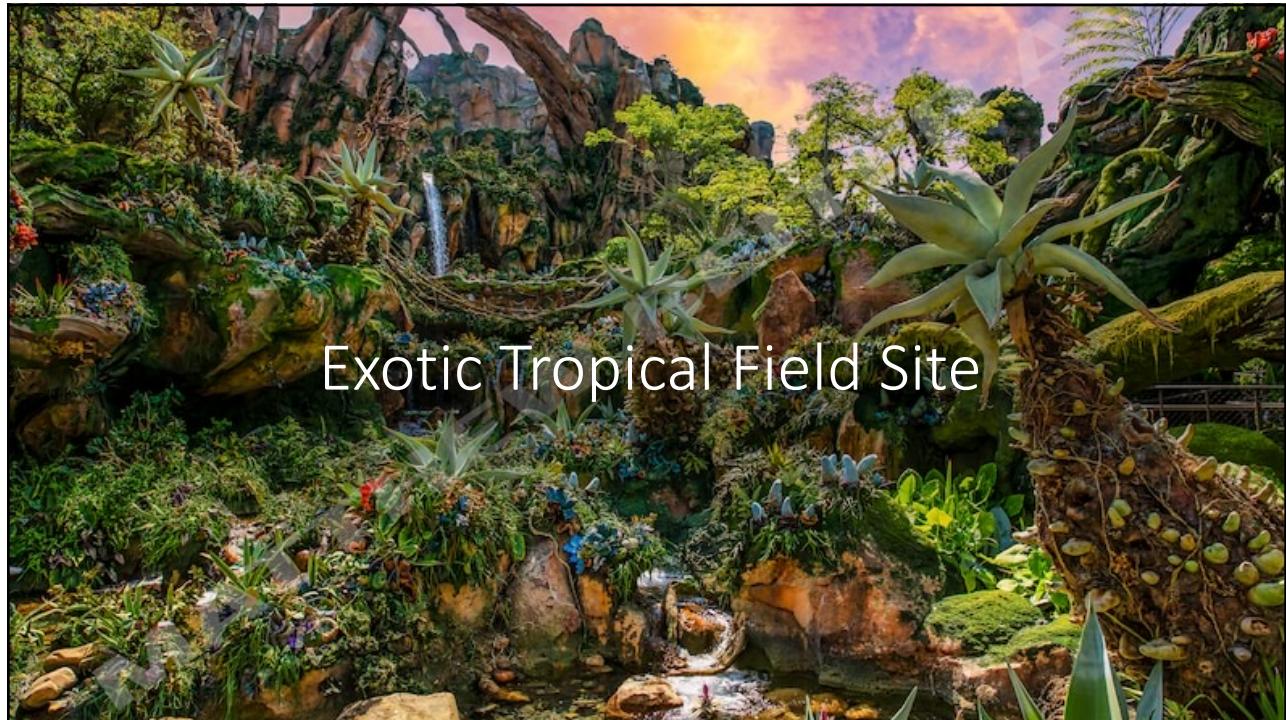


23

“Calling a part of the globe ‘the tropics’ became a Western way of defining something environmentally and culturally distinct from Europe, while also perceiving a high degree of common identity between the constituent regions of the tropical world”.

David Arnold (1996) *The Problem of Nature: Environment, Culture and European Expansion*, Oxford: Blackwell.

24



Exotic Tropical Field Site

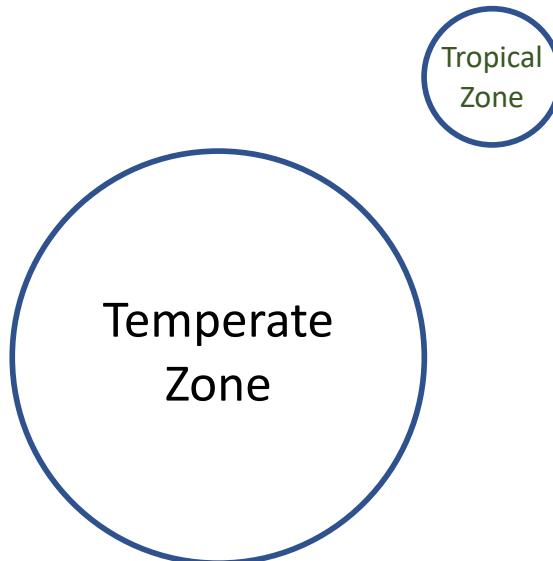
25



“Pandora - The World of Avatar”  
Disney World

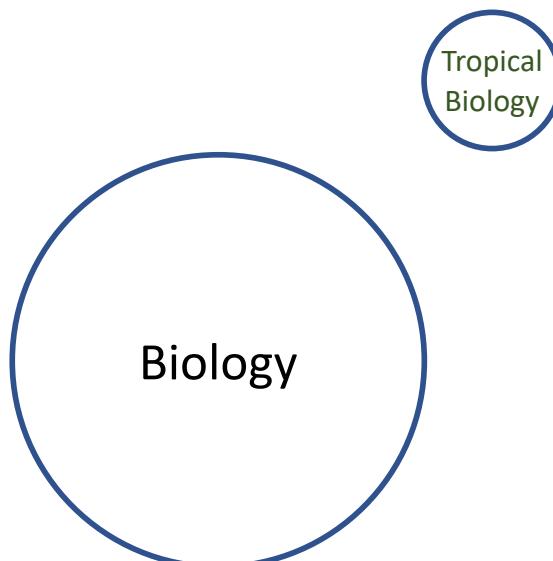
26

The **Tropics** are '**other**' & '**unique**'

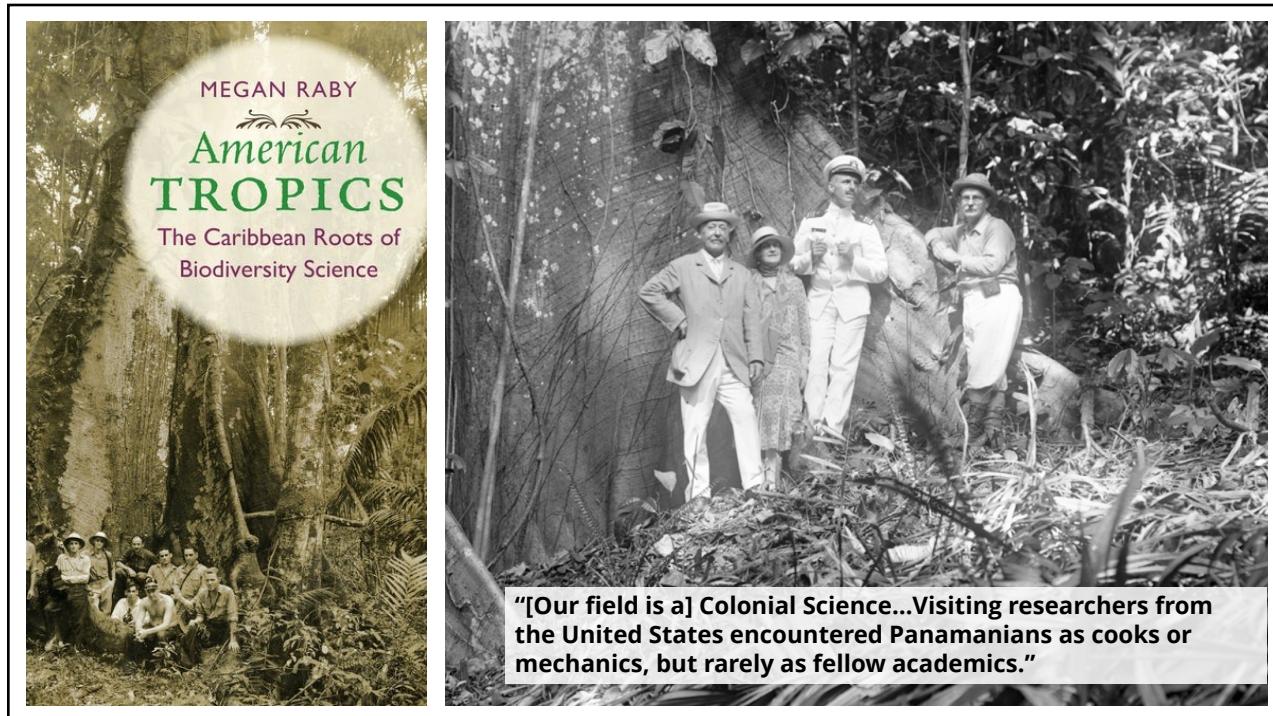


27

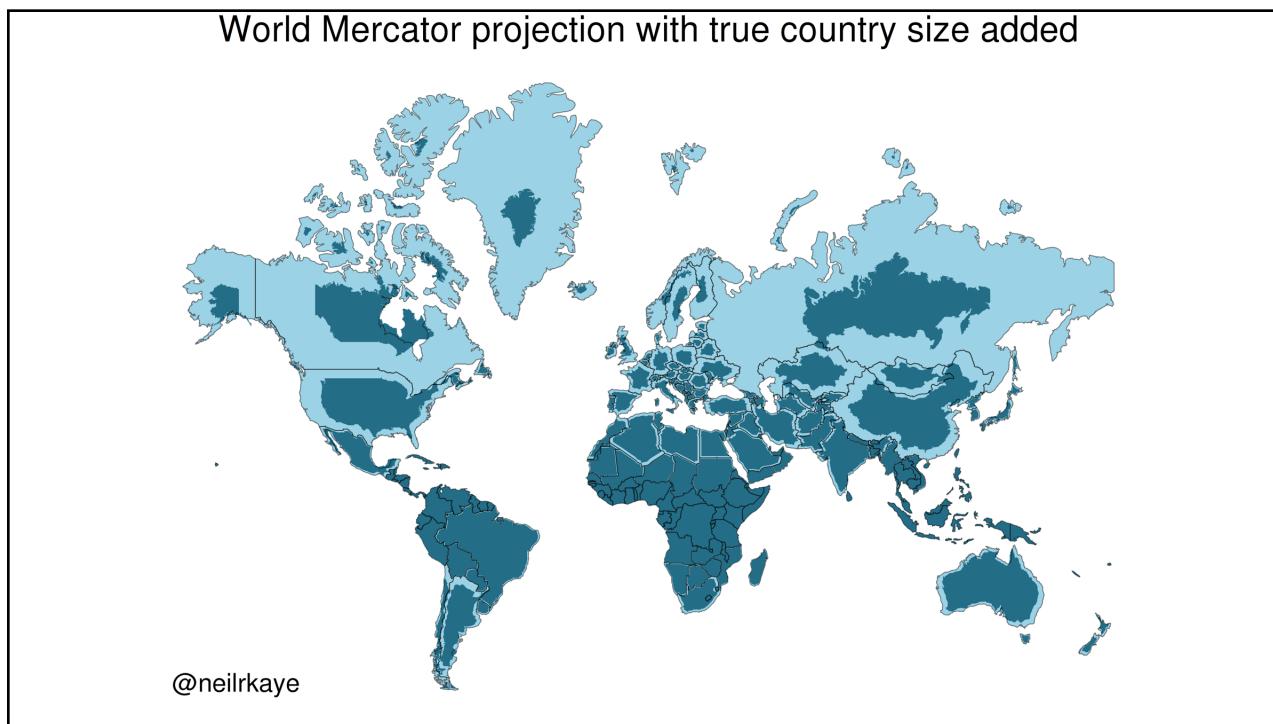
The **Biology of the Tropics** is '**unique**'



28

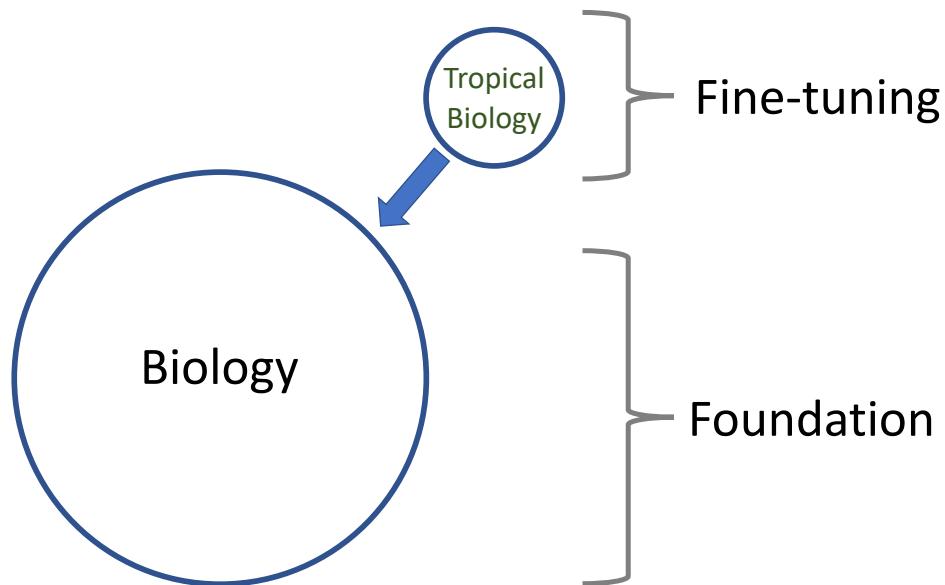


29

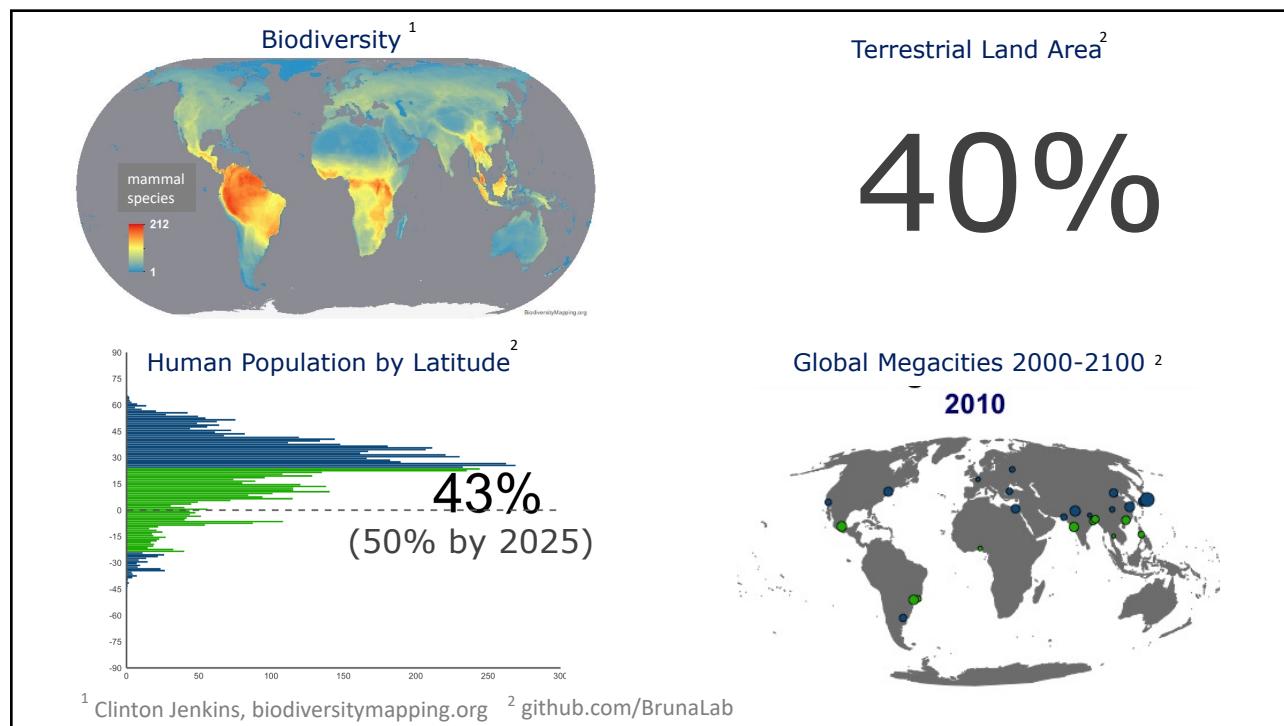


30

## The Biology of the Tropics is “unique”



31



32

**nature**

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[nature](#) > [letters](#) > [article](#)

Published: 25 April 1996

## Insect species diversity, abundance and body size relationships in a North American Grassland

Evan Siemann, David Tilman & John Haarstad

Nature 380, 704–706 (1996) | [Cite this article](#)

---

Vol. 133, No. 2 The American Naturalist February 1989

**THE LATITUDINAL GRADIENT IN GEOGRAPHICAL RANGE:  
WHY ARE THERE SO FEW SPECIES IN THE TEMPERATE ZONE**

GEORGE C. STEVENS

Department of Biology, Gustavus Adolphus College, Saint Peter, Minnesota 56082

Submitted October 17, 1986; Revised March 20 and December 4, 1987; Accepted May 6, 1988

---

**Science**

Current Issue First release papers Archive

HOME > SCIENCE > VOL. 313, NO. 5790 > WHY ARE THERE SO MANY SPECIES OF HERBIVOROUS INSECTS IN TROPICAL RAINFORESTS?

f v in g

## Why Are There So Many Species of Herbivorous Insects in Tropical Rainforests?

VOJTECH NOVOTNY, PAVEL DROZD, SCOTT E. MILLER, MIROSLAV KULFAN, MILAN JANDA, YVES BASSET, AND [...] GEORGE D. WEIBLEN

Authors Info & Affiliations

SCIENCE • 25 Aug 2006 • Vol 313, Issue 5790 • pp. 1115-1118 • DOI:10.1126/science.1129232

---

Vol. 100, No. 910 The American Naturalist January–February, 1966

**SURPRISINGLY STRONG EFFECTS OF PREDATORY STARFISH ON THE MODERATE-DIVERSITY FOOD WEBS OF NORTH AMERICAN TIDE-POOLS.**

ROBERT T. PAINE

Department of Zoology, University of Washington, Seattle, Washington

33

# Perspectives in Tropical Biology

**S. Dillon Ripley**  
**The Smithsonian Institution**

We, in the United States, are inevitably a temperate-zone oriented people. We have always lived and have evolved our culture in the temperate regions; this includes our science as well. Thus, it is not surprising that a disproportionate amount of the scientific information we have gathered concerns the phenomena immediately about us in cooler, strongly seasonal climates. As a result, in the case of biology, a major part of the accumulated biological knowledge is concerned with a rather minor part of the world's fauna and flora, because of the chance development of biology in the temperate zones.

An address given at the Panama Conference on Tropical Biology, Panama City, Nov. 9-12, 1966.

34



35



36

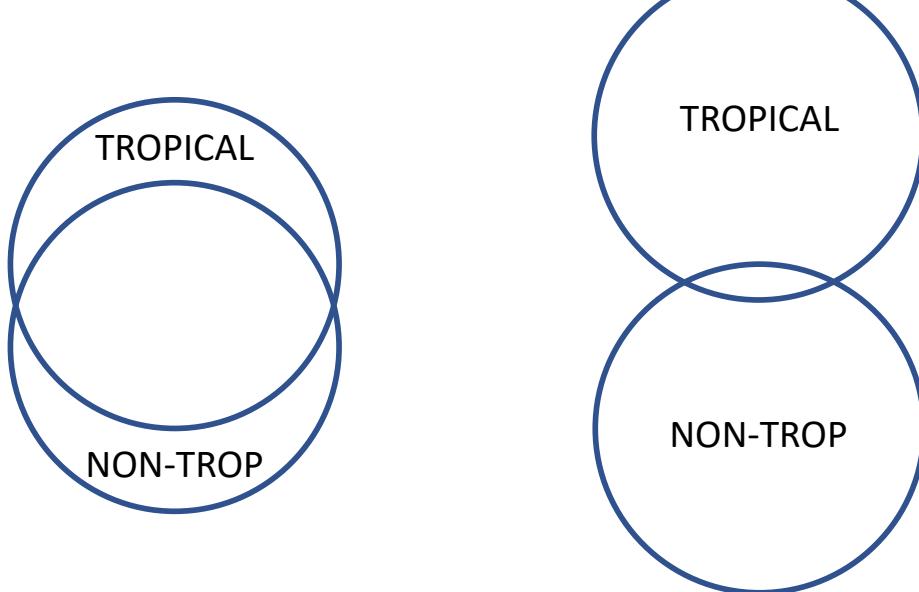
Is there really such a thing as  
**Tropical** Biology?

1. NO
2. MAYBE
3. YES

**That said...**

37

### Research Focus



38

## What are we studying?



39

1960-2022  
N = 62,750 articles

1976-2022  
N = 30,645 with KW  
N = 220,612 keywords

## Cluster Analysis



40

# Key Words

amnat: 20345  
 bitr: 18437  
 ecology: 75727  
 evol: 37478  
 jae: 22569  
 jecol: 28427  
 jte: 13699  
 tcs: 3930

kw <chr>	n <int>
1 (species) diversity/biodiversity	1303
2 competition	1149
3 climate change	986
4 herbivory	861
5 dispersal	729
6 sexual selection	714
7 speciation	660
8 life history	621
9 phenotypic plasticity	614
10 predation	603
11 (tropical) rain forest(s)	588
12 disturbance	583
13 population dynamics	575
14 tropical forest(s)	556
15 adaptation(s)	544
16 seed dispersal	539
17 density dependence	516
18 species richness	511
19 trade-off	510
20 natural selection	421

41

## Global Journals

kw <chr>	n <int>
1 competition	1085
2 (species) diversity/biodiversity	1008
3 climate change	901
4 herbivory	718
5 sexual selection	690
6 dispersal	663
7 speciation	615
8 life history	594
9 phenotypic plasticity	593
10 population dynamics	545
11 predation	543
12 adaptation(s)	522
13 density dependence	495
14 trade-off	495
15 disturbance	412
16 natural selection	403
17 species richness	403
18 coexistence	375
19 food web	367
20 body size	362

## Tropical Journals

kw <chr>	n <int>
1 (tropical) rain forest(s)	415
2 tropical forest(s)	324
3 seed dispersal	294
4 (species) diversity/biodiversity	291
5 brazil	267
6 costa rica	234
7 conservation	198
8 amazon(ia)	196
9 frugivory/fruivore(s)	180
10 mexico	172
11 disturbance	171
12 panama	147
13 herbivory	135
14 seed predation	134
15 neotropics	126
16 tropical dry forest	123
17 phenology	121
18 atlantic forest	115
19 pollination	110
20 savanna	110

Anderson et al. 2021, Carmel et al. 2013

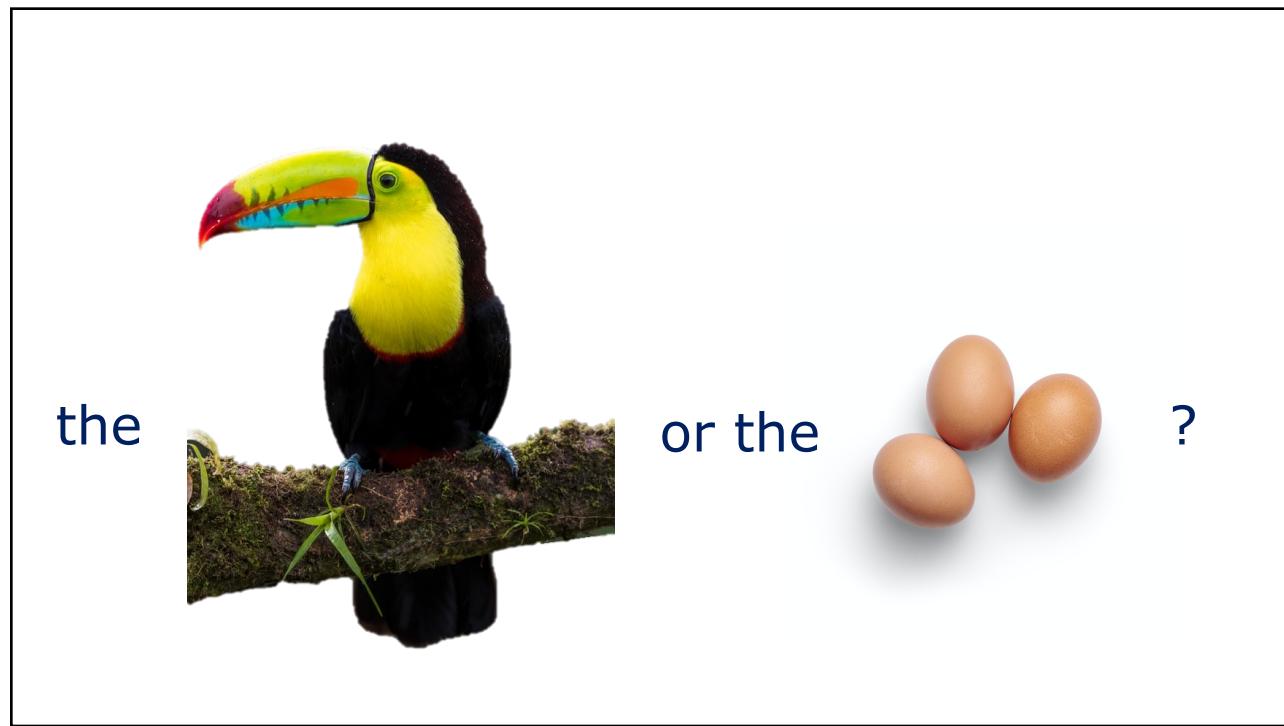
42

# Title Words (bi-grams)

word1	word2	n
<chr>	<chr>	<int>
1 life	history	1148
2 population	dynamics	728
3 sexual	selection	588
4 body	size	538
5 drosophila	melanogaster	520
6 species	richness	443
7 density	dependent	399
8 plant	species	387
9 trade	offs	370
10 sex	ratio	360
11 natural	selection	353
12 rain	forest	346
13 genetic	variation	341
14 reproductive	success	337
15 community	structure	320
16 gene	flow	319
17 density	dependence	293
18 host	plant	277
19 plant	communities	275
20 tree	species	272

word1	word2	n
<chr>	<chr>	<int>
1 costa	rica	1167
2 rain	forest	837
3 tropical	forest	314
4 tree	species	309
5 tropical	rain	280
6 seed	dispersal	251
7 national	park	241
8 de	la	240
9 dry	forest	238
10 tropical	dry	219
11 puerto	rico	192
12 atlantic	forest	191
13 costa	rican	177
14 tropical	forests	134
15 cloud	forest	133
16 rain	forests	125
17 en	el	124
18 french	guiana	106
19 species	richness	105
20 tropical	montane	104

43



44

"The scope of your paper makes it more appropriate for a specialized journal focusing on tropical systems".

Sincerely,  
Dr. <name redacted>  
Editor, <journal name redacted>

45

Is there really such a thing as  
**Tropical Biology?**

1. NO
2. MAYBE
3. YES

46

What makes Tropical Biology  
distinct isn't **Biology**.

47



48



PHOTO: TUCA VIEIRA/FOLHA

49



## Sri Lankan president to resign next week, says Parliament speaker, after protesters storm residence

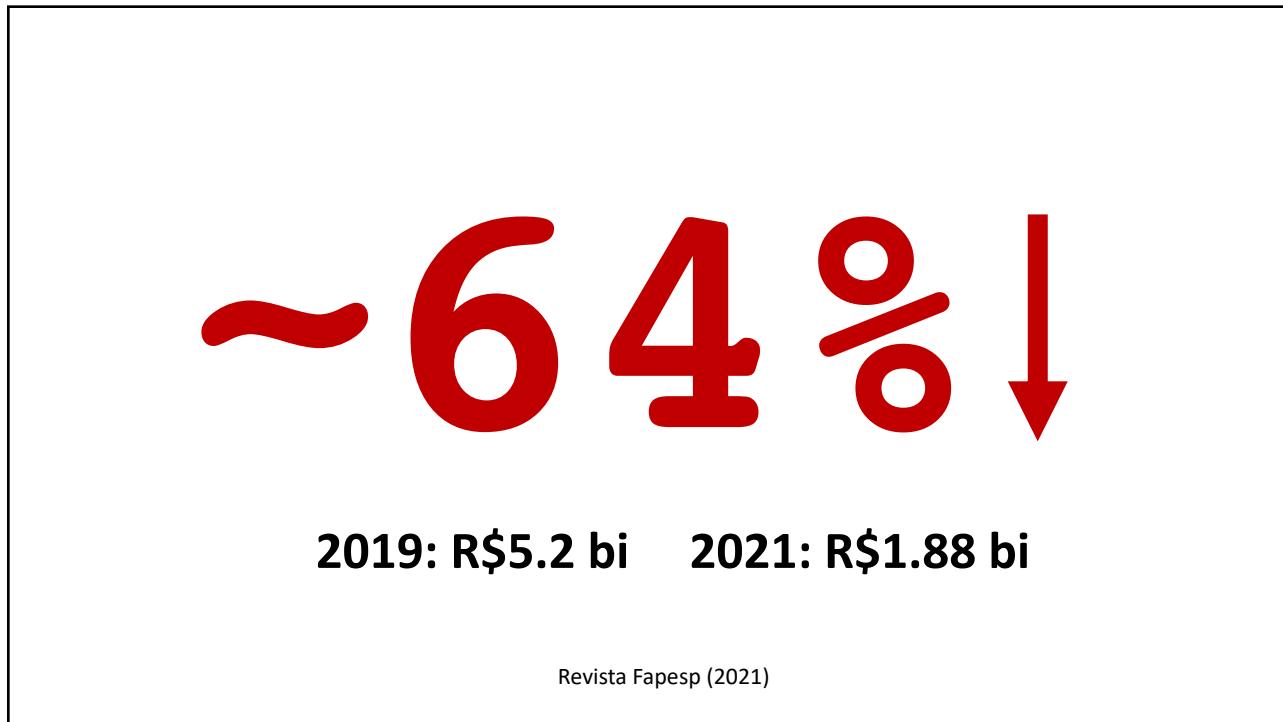


PHOTO: DINUKA LIYANAWATTE/REUTERS

50



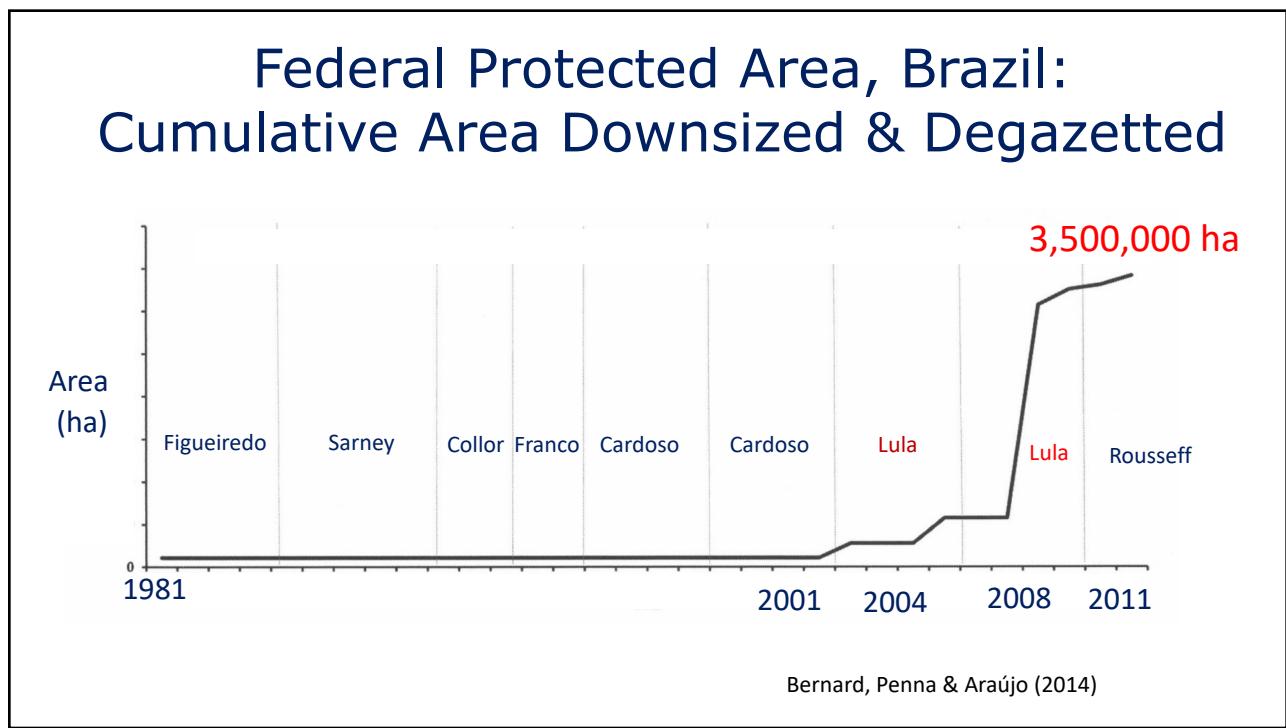
51



52



53



54

## Language



### PLOS ONE

Disadvantages in preparing and publishing scientific papers caused by the dominance of the English language in science: The case of Colombian researchers in biological sciences

Valeria Ramírez-Castañeda<sup>1,2,3\*</sup>

<sup>1</sup> Department of Catalan Philology, University of Barcelona, Barcelona, Spain, <sup>2</sup> Department of Integrative Biology, University of California, Berkeley, California, United States of America, <sup>3</sup> Museum of Vertebrate Zoology, University of California, Berkeley, California, United States of America

## Citation



### Conservation Biology

#### Geographic bias in citation rates of conservation research

Erik Meijaard

PLOS ONE

#### Articles by Latin American Authors in Prestigious Journals Have Fewer Citations

Rogerio Meneghini<sup>1,2,\*</sup>, Abel L. Packer<sup>1,3</sup>, Lillian Nassi-Calò<sup>1</sup>

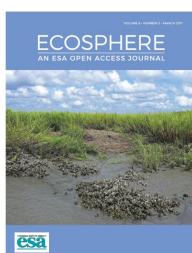
See also Maas et al. 2021, Campos-Arceiz et al., 2018; Espin et al., 2017; Pettorelli et al., 2021; Primack et al., 2019

55

## Open Access

# US\$908

average APC for  
N = 4418 OA journals  
(Morrison & Singh 2019)



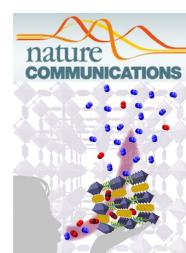
\$1500



\$1760



\$4500



\$5380

	MS	PhD
	\$282	\$413
	\$493	\$711
	\$574	\$588

Audrey C. Smith, L Merz, JB Borden, CK Gulick, AR Kshirsagar, EM. Bruna. 2021. Assessing the effect of article processing charges on the geographic diversity of authors using Elsevier's "Mirror Journal" system. *Quantitative Science Studies* 2021; 2 (4): 1123–1143.

56

"The scope of your paper makes it more appropriate for a specialized journal focusing on tropical systems".

Sincerely,  
Dr. <name redacted>  
Editor, <journal name redacted>

57

The New York Times

Account ▾

## A Battle to Protect Forests Unfolds in Central Africa

Indigenous people, environmentalists and industries vie for control over lands that can offer economic benefits or climate protection — but not always both.

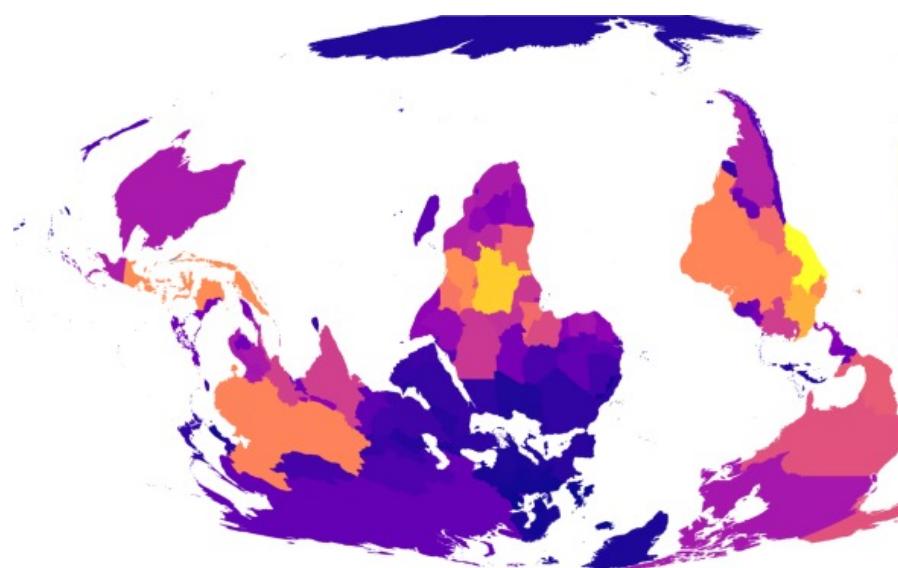


58

# Tropical Biology sounds terrible.

59

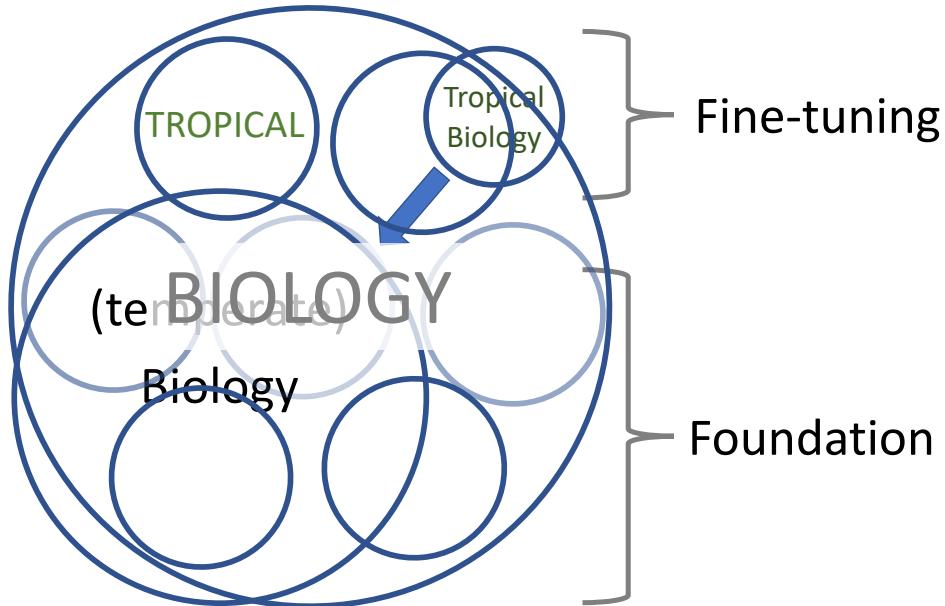
**Take back and reshape the Tropical Narrative**



Trisos et al. 2021 *Nature Ecology & Evolution*

60

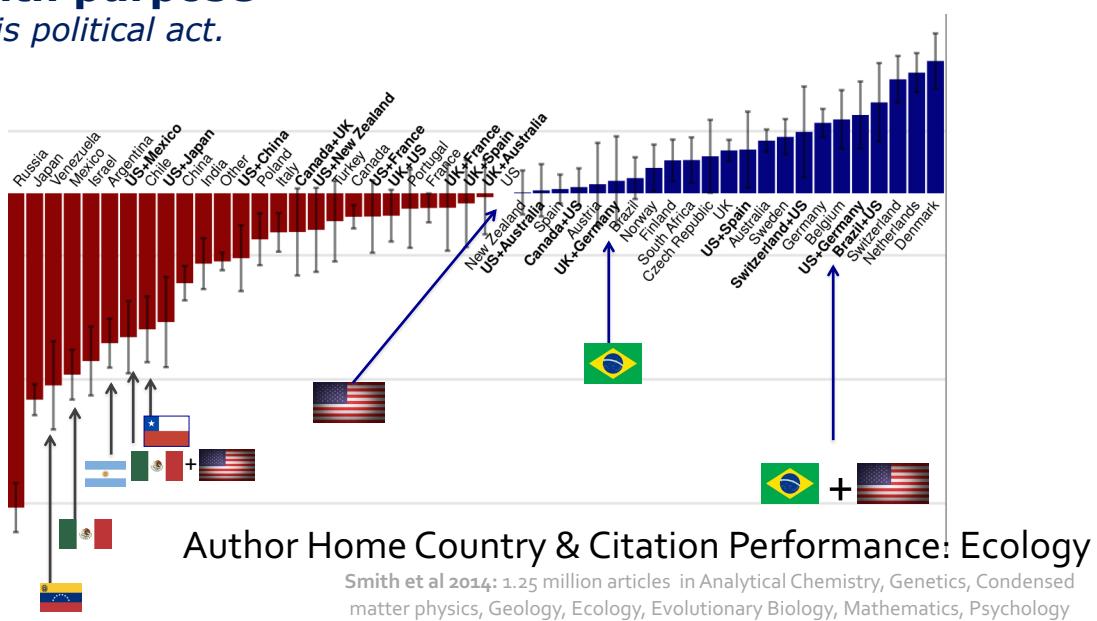
## The Biology of the Tropics is Biology"



61

## Cite with purpose

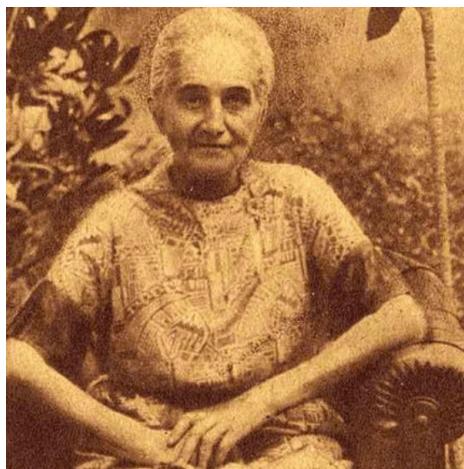
*Citation is political act.*



62

## Teach with purpose.

*Elevate the research and biographies of scientists from the tropics on syllabi, speaker series, etc.*



Emilie Snethlage (1868-1929)

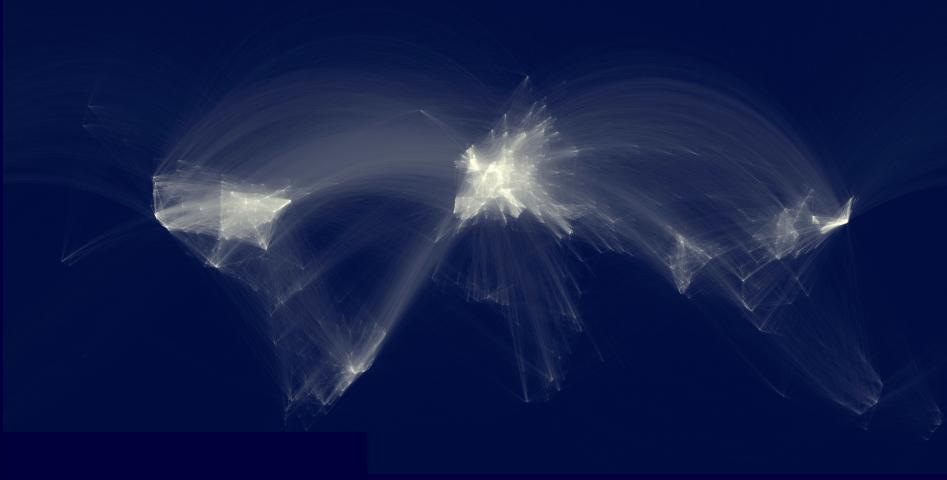


Pará'

63

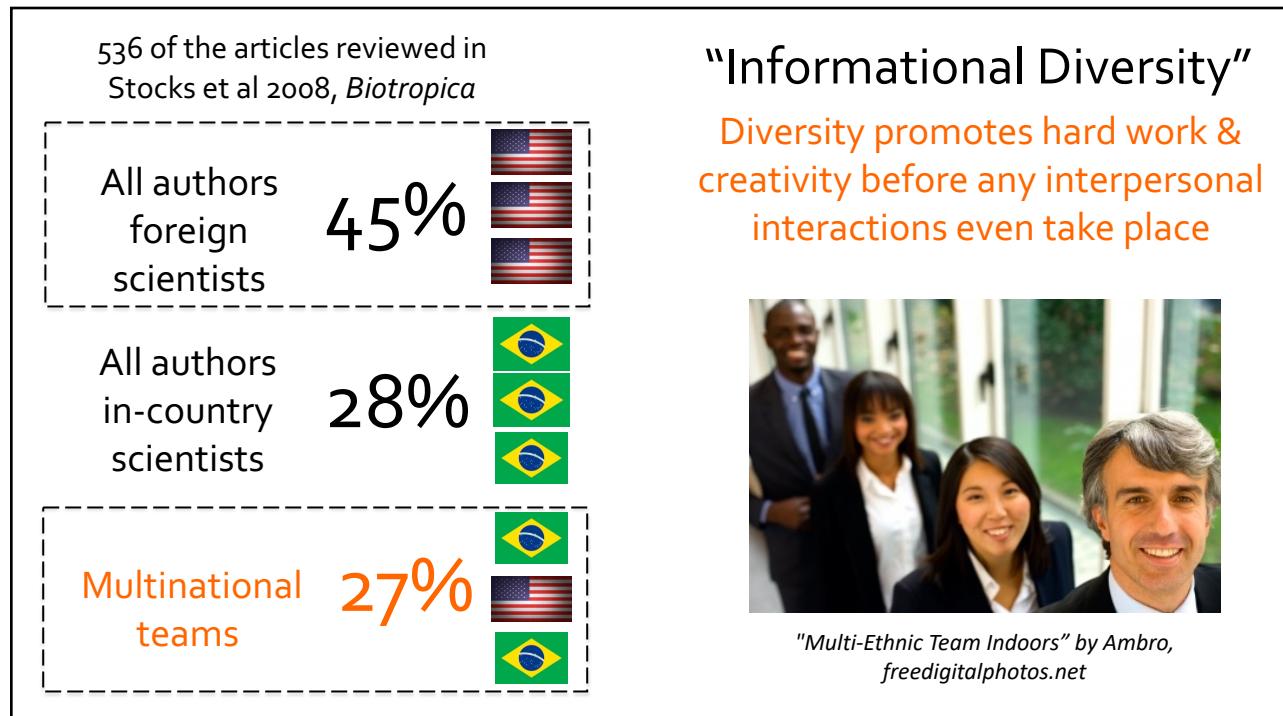
## Collaborate with purpose

*Multinational Coauthorship pays off. But Coauthorship != Collaboration*

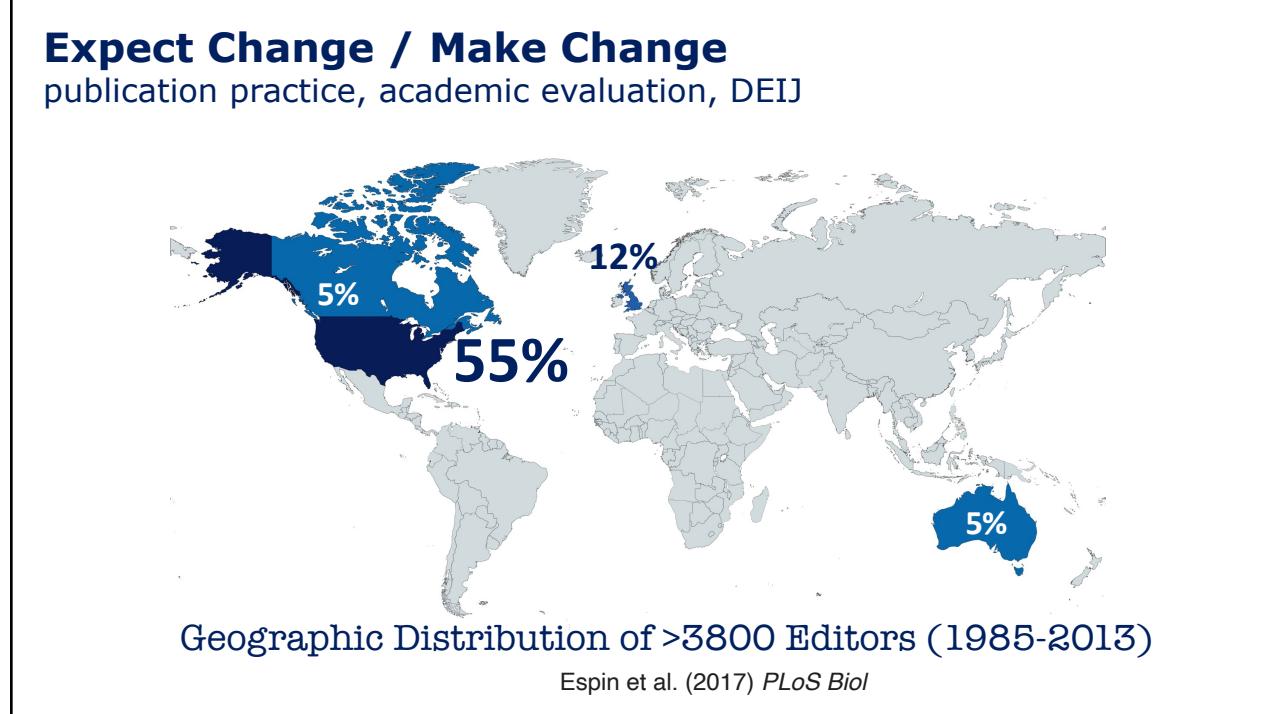


Map of scientific collaborations from 2005 to 2009  
Computed by Olivier H. Beauchesne @ Science-Metrix, Inc.  
Data from Scopus, Google Scholar, trade journals and peer-reviewed journals

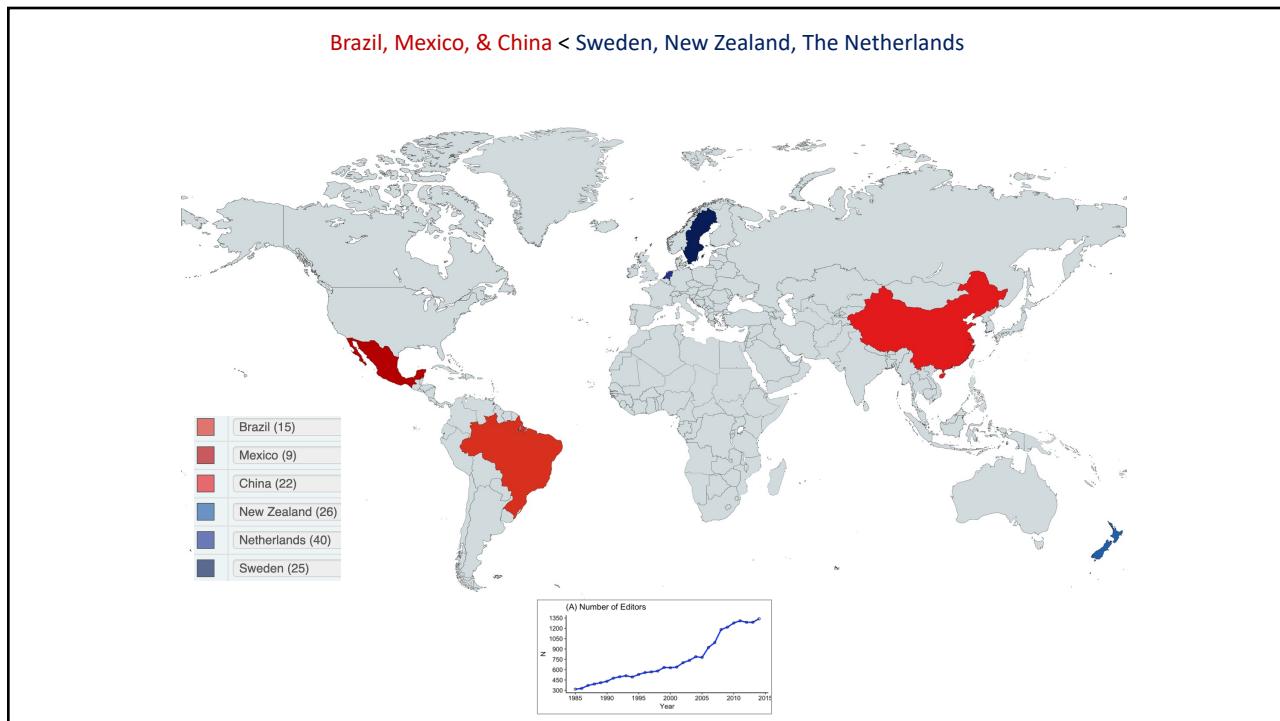
64



65



66



67

## Get in the Game

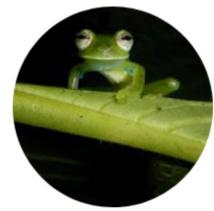
Support societies and their journals, join committees, run for office, Organize reading groups, Wikipedia hackathons, start a local student chapter, organize a local ATBC activity or speaker (we'll help with \$)



Africa Chapter



Asia-Pacific Chapter



Neotropical Chapter

68

## Find new ways to leverage public passion.

People engage with the tropics every day, even if they don't realize it.



69



70



71



72

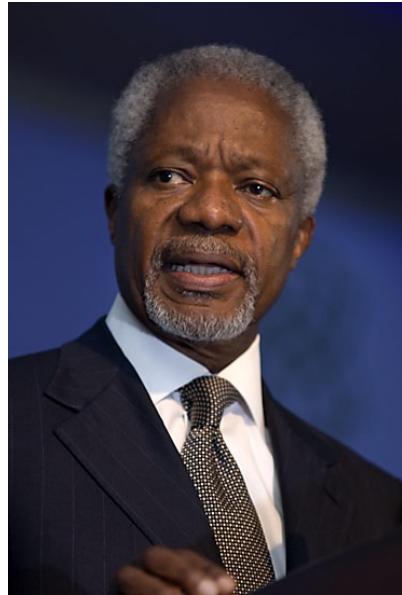


73

## Congratulate each other.

It takes Hard Work & Resilience to do this, but it really matters.

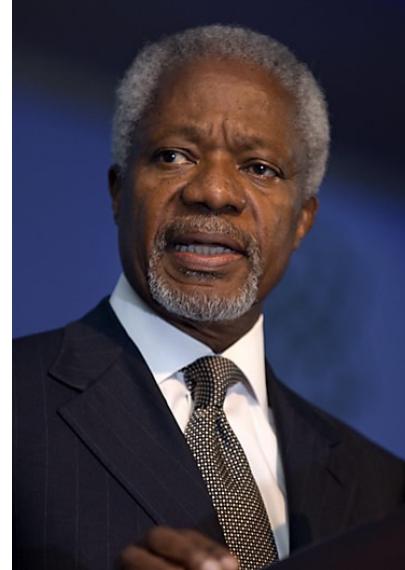
74



**“95% of the new science in the world is created in the countries comprising only 1/5 of the world’s population.** And much of that science -- in the realm of health, for example -- neglects the problems that afflict most of the world’s people.

Kofi Annan (2003) *Science* 299: 1485

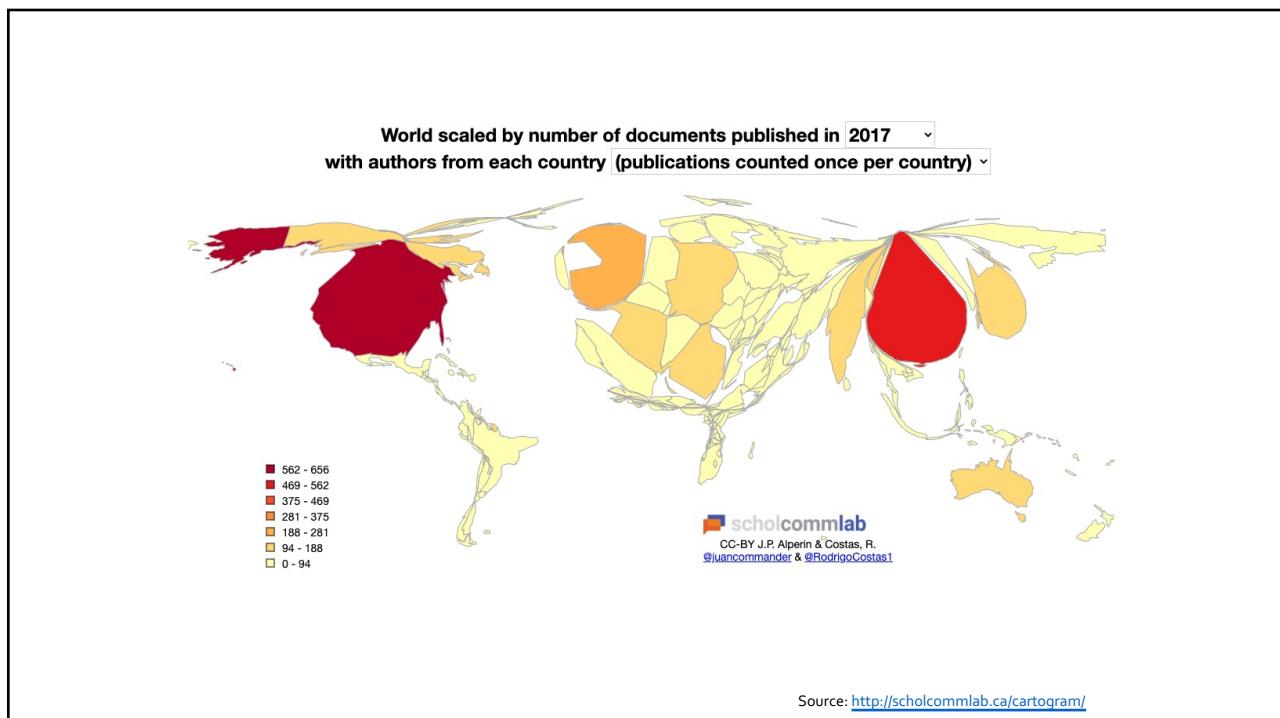
75



“This unbalanced distribution of scientific activity generates serious problems not only for the scientific community in the developing countries, but for development itself. **It accelerates the disparity between advanced and developing countries, creating social and economic difficulties at both national and international levels.”**

Kofi Annan (2003) *Science* 299: 1485

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83



84