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

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9 “There are few things more presumptuous than a US scientist holding forth on
10 the future of tropical ecology” (Janzen 1972).

11 **1. INTRODUCTION**

12 1. Motivation: In 19XX I received a decision on a manuscript that included justification
13 I suspect many of us have seen:

14 ”The scope of your paper makes it more appropriate for a specialized
15 journal focusing on tropical systems”

- 16 1. This has always troubled me, because there is an implicit (or explicit) emphasis in
17 training students and professional advancement that broad, general conclusions
18 should be our scientific goal. The implication of this decision is that those of us that
19 call ourselves tropical biologists are making a less general (=less important)
20 contribution.
- 21 2. In recent years we have seen the re-emergence of what is actually an old conversation
22 - the extent to which not tropical biologists, but biologists from tropical countries are
23 excluded from the scientific process.
- 24 3. Here I reconsider the notion that Tropical Biology is a specialized discipline of the
25 biological sciences by considering two distinct but related datasets - the way in which
26 biologists self-organize into specialized groups (i.e., subdisciplines) and (2) the topics
27 of their research and how the way in which they conceptualize their contributions to
28 the scientific literature.
- 29 4. I wish to emphasize that this is by no means intended to be a comprehensive
30 historical overview of the field. Nor am I the first to have wrestled with questions
31 about the breadth, novelty, and status of tropical biology (Robinson 1978, Zuk 2016,
32 Janzen n.d.).

33 Instead, my goal is to stimulate discussion about the fundamental yet generally
34 ignored question that serves as the foundation on which our association is built: Is there
35 really such a thing as “*Tropical*” Biology?

36 **1. Why the answer might be ‘No’**

- 37 1. There are different ways in which
- 38 2. This specialization could be one of (specialization of approach and tools, conceptual
39 domain, or study system). Figure 1.
- 40 3. ‘Tropical’ transcends all of these.
- 41 4. Moreover, the tropics is transcient: tropical species don’t stop at the 23rd parallel,
42 the adjective is rarely used in the tropics themselves, and although “tropics” has a

43 very specific definition, biologists rarely use it... in fact, they don't have a consistent
44 definition.

- 45 5. The fact is that “the tropics” as a distinct and unique entity is a historical artefact
46 whose end result was considering the tropics as (culturally, scientifically, biologically)
47 ‘other’ and ‘unique’.

48 Tropical biology defies all of these specialization guidelines. It is cross-conceptual,
49 cross-tool, and cross-system - it simply doesn’t fit neatly into any of these specialization
50 categories along which scholars typically self-organize.

51 But perhaps the best evidence that there really isn’t such a thing as Tropical Biology
52 is that the term is primarily used *outside* of the tropics. It is rare for colleges in Brazil or
53 India or Peru to offer a course in “Tropical Biology” or “Tropical Ecology” - they simply
54 call it “Ecology”.

55 The tropics also defy biological definition - the distributions of “tropical” species
56 don’t end at the 23rd parallels.

57 Finally, even tropical biologists can’t agree on what the tropics are - Feeley and
58 Stroud surveyed the literature and found that biologists working in the tropics defined the
59 region at least eight different ways (Feeley & Stroud 2018).

60 The reason for this divergence is that the tropics exist as an astronomical artefact -
61 they are the points on earth that are exposed to directly overhead solar radiation for at
62 least one day.

63 Their existence in the colloquial sense - as a distinct region - is actually a historical
64 artifact that traces its origins back to Marco Polo. He was not the first european to visit
65 the tropics in search of spices like cinnamon and nutmeg, but he was the first person whose
66 vivid descriptions about the things he saw mesmerized European audiences. Over the
67 course of the next several centuries, these stories were retold, reinterpreted, and mixed with
68 the stories of others to cement in our imaginations multiple paradigms defining the tropics
69 and the people that lived there.

70 2. Why the answer might be ‘*Maybe*’

- 71 1. Despite its origins as a colonial construct, Tropical Biology could still be a
72 conceptually distinct field if the scientists studying tropical systems address a distinct
73 suite of topics than those working in other regions.
- 74 2. To assess this possibility, I compared the titles and keywords of articles published
75 from 1960-2022 four ‘Tropical Journals’ (*Journal of Tropical Ecology*, *Biotropica*,
76 *Tropical Ecology*, and *Tropical Conservation Science*) with those of research from
77 both tropical and extra-tropical locations that had been published in six ‘General
78 Journals’ (*The American Naturalist*, *Evolution*, *Journal of Evolutionary Biology*,
79 *Journal of Ecology*, *Ecology*, and *Journal of Animal Ecology*)

80 3. (N=62,750 and N = 220,612, respectively)

81 I found that 10 of the top 20 key words for articles published in “Tropical Journals”
82 were either a geographic location (e.g., *Costa Rica, Amazonia*) or the ecosystem in which
83 the study was conducted (e.g., *tropical dry forest, savanna*).

84 In contrast, the the 20 most common key words in the “General Journals” were
85 conceptual (e.g., *competition, species diversity, climate change, sexual selection*). The
86 exception were articles based on research conducted in the tropics, which also emphasized
87 the location or system.

88 The only overlap is in....

89 Article titles show a similar pattern - the most bi-grams for “Tropical Journals” were
90 almost all about the study system, whereas in Global Journals they were conceptual with
91 three notable exceptions: *Drosophila melanogaster, plant/tree species/communities, and*
92 *rain forest.*

93 *Drosophila melanogaster* is one of the most important model systems for
94 experimental work investigating evolutionary processes, and plant communities have been a
95 major focus of research since the pioneering work of Clemments and Gleason. Of this work,
96 only tropical forests get a descriptive adjective.

97 (Anon n.d.a)

98 While preliminary, this suggests

99 Discussion & Caveats

100 **3. Why the answer might be ‘Yes’**

101 What makes ‘Tropical Biology’ distinct is not the science *per se*, but rather then
102 broader context in which that science is conducted. Research anywhere can be difficult,
103 but for most tropical biologists the daily struggle with precarious infrastructure, economic
104 volatility, drastically reduced funding for research and education, and political instability
105 can feel insurmountable - and all this is before having to communicate one’s results in a
106 foreign language to the potentially biased reviewers (Anon n.d.b) and readers of journals
107 that charge open access fees equivalent to several months salary. When added to the
108 physical and emotional toll of disease, crime, working in isolation, field sites being cleared
109 at unprecedented rates, and threats of professional retribution or physical violence, tropical
110 biology and conservation can be uniquely dangerous - even deadly. Lamentably, this is also
111 true for the truly heroic environmental journalists and advocates with whom we
112 collaborate.

113 **4. The Future of (Tropical) Biology**

114 How then to resolve this conundrum? I believe that the solution is neither dropping
115 the adjective that inspires so many of us, nor keeping it and accepting status as
116 complementary subdiscipline. Instead, I call on our members to **reclaim and reshape**
117 **the Tropical narrative** by continuing to emphasize what makes tropical biology distinct
118 - place and context - while also repositioning tropical ecosystems as the biological baseline.
119 Here are six simple ways that anyone can contribute to this movement:

120 1. **Cite with purpose.** Citation is a powerful and political act: it conveys legitimacy
121 on the scholarship in the article being cited as well as its author, helps elevate the
122 profile of the author and study system, and those reading your work will cite these
123 articles when writing their own. For many scientists it also plays an important role in
124 their professional advancement. Be mindful of this power and the opportunity it
125 presents when choosing which articles to cite. Cite scientists whose work or approach
126 you feel is undervalued or overlooked. Cite scientists from countries or institutions
127 that have been ignored by the broader scientific community. Cite scientists whose
128 approach to research you feel others should emulate. Cite studies conducted in the
129 tropics.

130 2. **Teach with Purpose.** All tropical biologists are teachers, whether it be in a
131 classroom or in a meeting with policy makers, and teaching also provides an
132 opportunity to elevate the scholarship of others. Be mindful of whose papers are
133 assigned as readings, the studies and systems used to illustrate concepts, the
134 scientists highlighted in presentations, and who is invited to speak in seminar series
135 or present guest lectures. Use your syllabus as a tool to recast the biological narrative
136 about tropical ecosystems and the composition of the scientific community that
137 studies them. Train students in the skills needed when working in tropical systems -
138 collaboration, facilitation, conflict resolution, and communication to diverse
139 audiences (Kainer *et al.* 2006, Duchelle *et al.* 2009).

140 3. **Collaborate with Purpose.** Helicopter science. International collaboration can be
141 challenging, but the results are often published in more prestigious outlets and have
142 higher citation rates (Smith *et al.* 2014). treating coauthorship is collaboration.
143 Purposeful collaboration requires Allow community members to guide the
144 identification of research questions (Kainer *et al.* 2009). Push for organizations to
145 strengthen collaborations within the Global South.

146 4. **Build on public fascination with the tropics.** Public fascination with the
147 tropics and their charismatic species (Albert *et al.* 2018) provides unparalleled
148 opportunities for outreach and education (Moreira & Robles 2017). Global events like
149 the World Cup (Melo *et al.* 2014), teams with tropical species as mascots
150 (Sartore-Baldwin & McCullough 2019), movies set in the tropics (Yong *et al.* 2011),
151 tropical images in fashion (Kutesko 2014), viral videos about tropical fruits (Anon
152 n.d.c) - we can find creative ways to leverage this universal appeal into support for
153 tropical research and conservation.

- 154 5. ***Get in the Game.*** It's trite, but true - change requires action. Organizations like
155 the ATBC provide myriad opportunities for meaningful engagement. Help make the
156 process of publishing more fair by serving as a review or subject editor for *Biotropica*.
157 Contribute to capacity building efforts by reviewing student seed grants proposals or
158 serving as a judge for student presentations at the annual meeting. Is there an issue
159 about which you are passionate? Join an ATBC committee or chapter and organize a
160 webinar, workshop, hackathon, or reading group on the topic. What should the
161 Association be doing differently? Tell the leadership at the Council Meetings or stand
162 for election and push for change as a Councillor.
- 163 6. ***Support and celebrate one another.*** Finally, remember that the work done by
164 tropical biologists addresses the “neglected problems that afflict most of the world’s
165 people” (Annan 2003) and, regardless of topic, helps advance the socioeconomic
166 condition of the country in which it’s conducted. It requires effort and resilience.
167 Seek opportunities to thank and congratulate each other for these contributions -
168 you’re truly making the world a better place.

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170 **Disclosure Statement**

171 The author confirms that there have been no involvements that might raise the
172 question of bias in the work reported or in the conclusions, implications, or opinions stated.

References

- 173
174 ALBERT, C., G. M. LUQUE, and F. COURCHAMP. 2018. The twenty most charismatic
175 species. PLOS ONE 13: e0199149. Available at:
176 <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0199149> [Accessed
177 March 14, 2023].
- 178 ANNAN, K. 2003. A Challenge to the World's Scientists. Science 299: 1485–1485.
179 Available at: <https://www.science.org/doi/10.1126/science.299.5612.1485> [Accessed
180 October 25, 2022].
- 181 Anon. North and South: Naming practices and the hidden dimension of global disparities
182 in knowledge production | PNAS. Available at:
183 <https://www.pnas.org/doi/abs/10.1073/pnas.2119373119> [Accessed March 14, 2023a].
- 184 Anon. Peer review perpetuates barriers for historically excluded groups | Nature Ecology &
185 Evolution. Available at: <https://www.nature.com/articles/s41559-023-01999-w>
186 [Accessed March 14, 2023b].
- 187 Anon. South Florida couple goes viral on TikTok, now selling exotic fruit online – WSVN
188 7News | Miami News, Weather, Sports | Fort Lauderdale. Available at:
189 <https://wsvn.com/entertainment/south-florida-couple-goes-viral-on-tiktok-now-selling-exotic-fruit-online/> [Accessed March 14, 2023c].
- 190 DUCHELLE, A. E., K. BIEDENWEG, C. LUCAS, A. VIRAPONGSE, J. RADACHOWSKY, D.
191 J. WOJCIK, M. LONDRES, W.-L. BARTELS, D. ALVIRA, and K. A. KAINER. 2009.
192 Graduate Students and Knowledge Exchange with Local Stakeholders: Possibilities and
193 Preparation. *Biotropica* 41: 578–585. Available at:
194 <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1744-7429.2009.00563.x> [Accessed
195 January 26, 2023].
- 196 FEELEY, K. J., and J. T. STROUD. 2018. Where on Earth are the “tropics”? *Frontiers of
197 Biogeography* 10. Available at: <https://escholarship.org/uc/item/3vc5s2t3> [Accessed
198 June 14, 2022].
- 199 JANZEN, D. 1972. Whither Tropical Ecology. In J. A. Behnke (Ed.) Challenging
200 Biological Problems: Directions Toward Their Solution. pp. 281–296, Oxford
201 University Press, New York.
- 202 JANZEN, D. H. The future of tropical ecology. 22.
- 203 KAINER, K. A., M. L. DIGIANO, A. E. DUCHELLE, L. H. O. WADT, E. BRUNA, and
204 J. L. DAIN. 2009. Partnering for Greater Success: Local Stakeholders and Research in
205 Tropical Biology and Conservation. *Biotropica* 41: 555–562. Available at:
206 <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1744-7429.2009.00560.x> [Accessed
207 January 26, 2023].
- 208 KAINER, K. A., M. SCHMINK, H. COVERT, J. R. STEPP, E. M. BRUNA, J. L. DAIN, S.
209 ESPINOSA, and S. HUMPHRIES. 2006. A Graduate Education Framework for Tropical
210 Conservation and Development. *Conservation Biology* 20: 3–13. Available at:
211 <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1523-1739.2006.00356.x> [Accessed
212 January 26, 2023].
- 213 KUTESKO, E. 2014. Adidas shows the changing face of Brazil with tropical collection. *The
214 Conversation*. Available at: <http://theconversation.com/adidas-shows-the-changing-face-of-brazil-with-tropical-collection-26546> [Accessed March 14, 2023].
- 215 MELO, F. P., J. A. SIQUEIRA, B. A. SANTOS, O. ÁLVARES-DA-SILVA, G. CEBALLOS,

- 218 and E. BERNARD. 2014. Football and Biodiversity Conservation: FIFA and Brazil Can
219 Still Hit a Green Goal. *Biotropica* 46: 257–259. Available at:
220 <https://onlinelibrary.wiley.com/doi/abs/10.1111/btp.12114> [Accessed March 14, 2023].
- 221 MOREIRA, J. C., and R. A. ROBLES. 2017. Tamar Project: Conservation and Education
222 in Ecotourism Activities Related to Turtles in Fernando de Noronha Archipelago,
223 Brazil. In I. Borges de Lima and R. J. Green (Eds.) *Wildlife Tourism, Environmental
224 Learning and Ethical Encounters: Ecological and Conservation Aspects*. Geoheritage,
225 Geoparks and Geotourism. pp. 169–181, Springer International Publishing, Cham.
226 Available at: https://doi.org/10.1007/978-3-319-55574-4_10 [Accessed March 14, 2023].
- 227 ROBINSON, M. H. 1978. Is tropical biology real. *Tropical Ecology* 19: 30–52.
- 228 SARTORE-BALDWIN, M., and B. MCCULLOUGH. 2019. Examining Sport Fans and the
229 Endangered Species Who Represent Their Affiliated Team Mascots. *Society & Animals*
230 29: 268–286. Available at:
231 https://brill.com/view/journals/soan/29/3/article-p268_3.xml [Accessed March 14,
232 2023].
- 233 SMITH, M. J., C. WEINBERGER, E. M. BRUNA, and S. ALLESINA. 2014. The Scientific
234 Impact of Nations: Journal Placement and Citation Performance. *PLOS ONE* 9.
- 235 YONG, D. L., S. D. FAM, and S. LUM. 2011. Reel conservation: Can big screen
236 animations save tropical biodiversity? *Tropical Conservation Science* 4: 244–253.
237 Available at: <https://bioone.org/journals/tropical-conservation-science/volume-4/issue-3/194008291100400302/Reel-conservation-Can-big-screen-animations-save-tropical-biodiversity/10.1177/194008291100400302.full> [Accessed March 14, 2023].
- 238 ZUK, M. 2016. Temperate Assumptions: How Where We Work Influences How We Think.
239 The American Naturalist 188: S1–S7. Available at:
240 <https://www.journals.uchicago.edu/doi/10.1086/687546> [Accessed June 14, 2022].

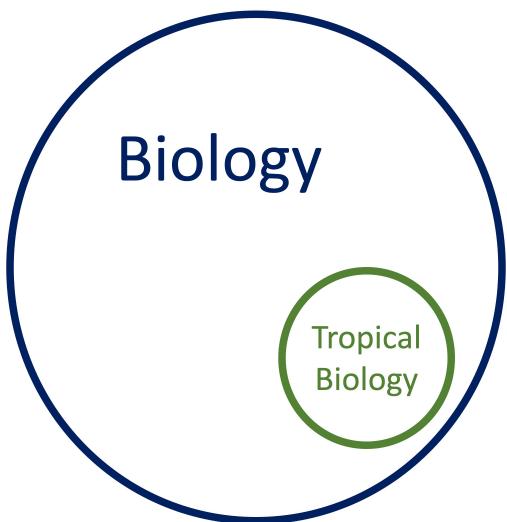
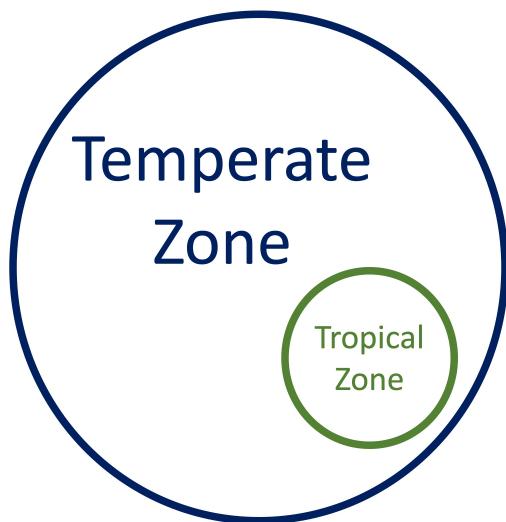
a**b**

Figure 1. (A) Tropical biology conceptualized as biological specialization. (B) Tropical ecosystems conceptualized as "unique" or "special".

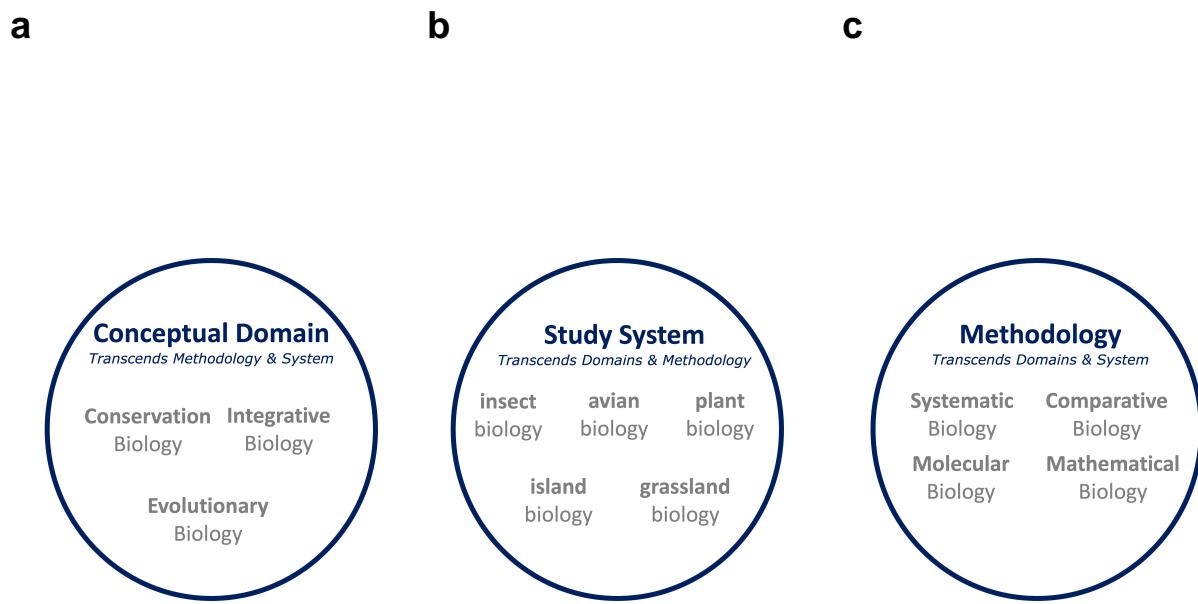


Figure 2. Alternative ways in Biologists self-organize into specialized subdisciplines: (A) the Conceptual Domain from which they approach their work, (B) their focal Study System, and (C) the Methodological Approaches they use to conduct their research.