

References Cited in Robert Colwell's oral presentation at the British Ecological Society Meeting

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Still Little Evidence of Poleward Range Shifts in the Tropics, but Lowland Biotic Attrition May Be Underway

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Anderson, A. S., A. E. Reside, J. J. VanDerWal, L. P. Shoo, R. G. Pearson, and S. E. Williams. 2012. Immigrants and refugees: the importance of dispersal in mediating biotic attrition under climate change. *Global Change Biology* **18**:2126-2134.

Bebber, D. P., M. A. Ramotowski, and S. J. Gurr. 2013. Crop pests and pathogens move polewards in a warming world. *Nature Climate Change* **3**:985-988.

Bell, G. 2017. Evolutionary Rescue. *Annual Review of Ecology, Evolution, and Systematics* **48**:605-627.

Blackman, R. L. & V. F. Eastop. 1984. *Aphids on the World's Crops: An Identification and Information Guide*. John Wiley & Sons: New York. p. 252.

Blake, J. G., and B. A. Loiselle. 2000. Diversity of birds along an elevational gradient in the Cordillera Central, Costa Rica. *The Auk* **117**:663-686.

Botts, E. A., B. F. Erasmus, and G. J. Alexander. 2015. Observed range dynamics of South African amphibians under conditions of global change. *Austral Ecology* **40**:309-317.

Boyle, W. A., and B. J. Sigel. 2015. Ongoing changes in the avifauna of La Selva Biological Station, Costa Rica: twenty-three years of Christmas bird counts. *Biological Conservation* **188**:11-21.

Brehm, G., R. K. Colwell, and J. Kluge. 2007. The role of environment and mid-domain effect on moth species richness along a tropical elevational gradient. *Global Ecology & Biogeography* **16**:205-219.

Brodie, J. F., M. Strimas-Mackey, J. Mohd-Azlan, A. Granados, H. Bernard, A. J. Giordano, and O. E. Helmy. 2017. Lowland biotic attrition revisited: body size and variation among climate change 'winners' and 'losers'. *Proceedings of the Royal Society B: Biological Sciences* **284**:20162335.

Burrows, M. T., D. S. Schoeman, L. B. Buckley, P. Moore, E. S. Poloczanska, K. M. Brander, C. Brown, J. F. Bruno, C. M. Duarte, and B. S. Halpern. 2011. The pace of shifting climate in marine and terrestrial ecosystems. *Science* **334**:652-655.

Burrows, M. T., D. S. Schoeman, L. B. Buckley, P. Moore, E. S. Poloczanska, K. M. Brander, C. Brown, J. F. Bruno, C. M. Duarte, and B. S. Halpern. 2011. The pace of shifting climate in marine and terrestrial ecosystems. *Science* **334**:652-655.

Cardelús, C. L., R. K. Colwell, and J. E. Watkins. 2006. Vascular epiphyte distribution patterns: explaining the mid-elevation richness peak. *J. Ecology* **94**:144-156.

Chen, I.-C., H.-J. Shiu, S. Benedick, J. D. Holloway, V. K. Chey, H. S. Barlow, J. K. Hill, and C. D. Thomas. 2009. Elevation increases in moth assemblages over 42 years on a tropical mountain. *Proceedings of the National Academy of Sciences* **106**:1479-1483.

Clark, D. A., S. C. Piper, C. D. Keeling, and D. B. Clark. 2003. Tropical rain forest tree growth and atmospheric carbon dynamics linked to interannual temperature variation during 1984–2000. *PNAS* **100**:5852–5857.

Colwell, R. K., G. Brehm, C. Cardelús, A. C. Gilman, and J. T. Longino. 2008. Global warming, elevational range shifts, and lowland biotic attrition in the wet tropics. *Science* **322**:258-261.

Comte, L., G. Grenouillet, R. Bertrand, J. Murienne, L. Bourgeaud, T. Hattab, and J. Lenoir. 2020. BioShifts: A global geodatabase of climate-induced species redistribution over land and sea.

Darwin, C. 1859. *The Origin of Species by Means of Natural Selection*. Murray, London.

Dobzhansky, T. 1950. Evolution in the tropics. *American Scientist* **38**:209-221.

Feeley, K. J., J. Hurtado, S. Saatchi, M. R. Silman, and D. B. Clark. 2013. Compositional shifts in Costa Rican forests due to climate-driven species migrations. *Global Change Biology* **19**:3472-3480.

Feeley, K. J., and M. R. Silman. 2010. Biotic attrition from tropical forests correcting for truncated temperature niches. *Global Change Biology* **16**:1830-1836.

Fick, S. E., and R. J. Hijmans. 2017. WorldClim 2: New 1-km spatial resolution climate surfaces for global land areas. *International Journal of Climatology* **37**:4302-4315.

Freeman, B. G., Y. Song, K. J. Feeley, and K. Zhu. 2021. Montane species track rising temperatures better in the tropics than in the temperate zone. *Ecology Letters* **24**:1697-1708.

Gaston, K., and S. Chown. 1999. Why Rapoport's rule does not generalise. *Oikos* **84**:309.

Gilman, A. 2007. Tropical plant diversity and species altitudinal range across an elevational gradient in Costa Rica. Ph. D. UCLA, Los Angeles.

Lenoir, J., and J. C. Svenning. 2014. Climate-related range shifts—a global multidimensional synthesis and new research directions. *Ecography* **38**:15-28.

Longino, J. T., and R. K. Colwell. 2011. Density compensation, species composition, and richness of ants on a neotropical elevational gradient. *Ecosphere* **2(3):art29**, doi:10.1890/ES10-00200.1.

Maclean, I. M. D., and R. Early. 2023. Macroclimate data overestimate range shifts of plants in response to climate change. *Nature Climate Change* **13**:484-490.

Maclean, I. M. D., and R. Early. 2023. Macroclimate data overestimate range shifts of plants in response to climate change. *Nature Climate Change* **13**:484-490.

Marca-Zevallos, M. J., G. M. Moulatlet, T. R. Sousa, J. Schietti, L. d. S. Coelho, J. F. Ramos, D. d. A. Lima Filho, I. L. Amaral, F. D. de Almeida Matos, L. M. Rincón, and e. al. 2022. Local hydrological conditions influence tree diversity and composition across the Amazon basin. *Ecography* **2022**:e06125.

Osland, M. J., P. W. Stevens, M. M. Lamont, R. C. Brusca, K. M. Hart, J. H. Waddle, C. A. Langtimm, C. M. Williams, B. D. Keim, and A. J. Terando. 2021. Tropicalization of temperate ecosystems in North America: The northward range expansion of tropical organisms in response to warming winter temperatures. *Global Change Biology* **27**:3009-3034

Perissinotto, R., E. Pringle, and J. Giliomee. 2011. Southward expansion in beetle and butterfly ranges in South Africa. *African Entomology* **19**:61-69.

Rangel, T. F., N. R. Edwards, P. B. Holden, J. A. F. Diniz-Filho, W. D. Gosling, M. T. P. Coelho, F. A. S. Cassemiro, C. Rahbek, and R. K. Colwell. 2018. Modeling the ecology and evolution of biodiversity: Biogeographical cradles, museums, and graves. *Science* **361**:eaar5452.

Raxworthy, C. J., R. G. Pearson, N. Rabibisoa, A. M. Rakotondrazafy, J.-B. Ramanamanjato, A. P. Raselimanana, S. Wu, R. S. Nussbaum, and D. A. Stone. 2008. Extinction vulnerability of tropical montane endemism from warming and upslope displacement: a preliminary appraisal for the highest massif in Madagascar. *Global Change Biology* **14**:1703-1720.

Roberts, B. J., C. P. Catterall, P. Eby, and J. Kanowski. 2012. Latitudinal range shifts in Australian flying-foxes: A re-evaluation. *Austral Ecology* **37**:12-22.

Sunday, J. M., A. E. Bates, and N. K. Dulvy. 2012. Thermal tolerance and the global redistribution of animals. *Nature Climate Change* **2**:686-690.

Taheri, S., B. Naimi, C. Rahbek, and M. B. Araújo. 2021. Improvements in reports of species redistribution under climate change are required. *Science advances* **7**:eabe1110.

Terborgh, J. 1973. On the notion of favorableness in plant ecology. *American Naturalist* **107**:481-501.

Whitfield, S. M., K. E. Bell, T. Philippi, M. Sasa, F. Bolaños, G. Chaves, J. M. Savage, and M. A. Donnelly. 2007. Amphibian and reptile declines over 35 years at La Selva, Costa Rica. *Proceedings of the National Academy of Sciences* **104**:8352-8356.

Zarzychny, K. M., M. Rius, S. T. Williams, and P. B. Fenberg. 2023. The ecological and evolutionary consequences of tropicalisation. *Trends in Ecology & Evolution*. In press