

## **OEB 141: Biogeography (catalog number 85974)**

### **Spring 2021**

Location: ZoomUniversity  
Tue, Thu, 9–10:15 AM  
Lab/Section, TBD

Instructor: Gonzalo Giribet (ggiribet@g.harvard.edu).  
TF: RJ Knecht (rknecht@fas.harvard.edu).

#### **Lecture 1, Tuesday, Jan 26**

Introduction to Biogeography. Goals of the course. In this lecture we will set up the goals for the integrative science of biogeography.

#### **Lecture 2, Thursday, Jan 28**

A brief history of the early days in the science of biogeography.

*Supporting reading:* Lomolino MV, Riddle, BR, Whittaker, RJ, Brown, JH. 2010 Biogeography, Fourth Edition. Sunderland, Massachusetts: Sinauer Associates. **Chapter 2.**

#### **Lecture 3, Tuesday, Feb 2**

Fundamentals of ecology: species, communities, ecosystems, biomes.

*Paper for discussion:* Moritz, C., Patton, J. L., Conroy, C. J., Parra, J. L., White, G. C., Beissinger, S. R. 2008. Impact of a century of climate change on small-mammal communities in Yosemite National Park, USA. *Science* 322, 261–264.

#### **Lecture 4, Thursday, Feb 4**

Earth history and fundamental geographical processes.

#### **Lecture 5, Tuesday, Feb 9**

Fundamentals of earth sciences: Geological time scale, continents, continental drift, paleomagnetism, tectonics.

*Paper for discussion:* Michael PJ, Cheadle, MJ. 2009 Making a Crust. *Science* 323, 1017–1018.

#### **Lecture 6, Thursday, Feb 11**

Tectonic history: continents, supercontinents, oceans, paleo-oceans. Climatic and biogeographic consequences of plate tectonics.

*Paper for discussion:* Ali JR, Aitchison JC. 2009. Kerguelen Plateau and the Late Cretaceous southern-continent bioconnection hypothesis: tales from a topographical ocean. *Journal of Biogeography* 36, 1778–1784.

**Lecture 7, Tuesday, Feb 16**

Geography of organisms: spatial and temporal dynamics, endemism, cosmopolitanism, provincialism, biogeographic regions.

**Lecture 8, Thursday, Feb 18**

Geography of organisms: disjunction, migratory patterns and routes, dispersal, great geographic interchanges.

*Paper for discussion:* Merckx, V. S., Hendriks, K. P., Beentjes, K. K., Mennes, C. B., Becking, L. E., Peijnenburg, K. T., Afendy, A., Arumugam, N., de Boer, H., Biun, A., et al. 2015. Evolution of endemism on a young tropical mountain. *Nature* 524, 347–350.

**Lecture 9, Tuesday, Feb 23**

Reconstructing the history of lineages: systematics, phylogeography, population genetics.

**Lecture 10, Thursday, Feb 25**

Reconstructing the history of lineages: Time, the fossil record.

*Paper for discussion:* Donoghue, P. C. and M. J. Benton. 2007. Rocks and clocks: calibrating the Tree of Life using fossils and molecules. *Trends in Ecology and Evolution* 22, 424–431.

**Lecture 11, Tuesday, Mar 2**

Reconstructing the history of biotas: Analytical methods for the study of biogeography I: tracks and areas of endemism.

**Lecture 12, Thursday, Mar 4**

Reconstructing the history of biotas: Analytical methods for the study of biogeography II: cladistic biogeography.

**Lecture 13, Tuesday, Mar 9**

Reconstructing the history of biotas: Analytical methods for the study of biogeography III. Probabilistic methods.

*Supporting paper:* Sanmartín, I., van der Mark, P., Ronquist, F. 2008. Inferring dispersal: a Bayesian approach to phylogeny-based island biogeography, with special reference to the Canary Islands. *Journal of Biogeography* 35, 428–449.

**Thursday, Mar 11**

[Class presentations](#)

Tuesday, Mar 16 [Wellness day]

**Lecture 14, Thursday, Mar 18**

Ecological biogeography: The theory of island biogeography and patterns of species richness.

**Lecture 15, Tuesday, Mar 23**

Evolution on islands: Mechanisms and assembly of biotas.

*Paper for discussion:* Borges PAV, Hortal, J. 2009. Time, area and isolation: factors driving the diversification of Azorean arthropods. *Journal of Biogeography* 36, 178–191.

**Lecture 16, Thursday, Mar 25**

Evolution on islands: Oceanic islands, models and examples.

**Lecture 17, Tuesday, Mar 30**

Evolution on islands: Continental islands, examples and models.

**Lecture 18, Thursday, Apr 1**

Understanding biogeographic patterns; discussions and controversies in the Pacific. Examples from New Zealand and New Caledonia.

*Paper for discussion:* Nattier R, Pellens R, Robillard T, Jourdan H, Legendre F, Caesar M, Nel A, Grandcolas P. 2017. Updating the phylogenetic dating of New Caledonian biodiversity with a meta-analysis of the available evidence. *Scientific Reports* 7, 3705.

**Lecture 19, Tuesday, Apr 6**

Caribbean biogeography.

**Lecture 20, Thursday, Apr 8**

Biodiversity gradients.

*Paper for discussion:* Jablonski D, Roy K, Valentine JW. 2006. Out of the tropics: Evolutionary dynamics of the latitudinal diversity gradient. *Science* 314, 102–106.

**Lecture 21, Tuesday, Apr 13**

Conservation biogeography: Biodiversity crisis, hotspots, extinctions, invasions, habitat loss, global climate change.

*Paper for discussion:* Myers N, Mittermeier, RA, Mittermeier, CG, da Fonseca, GA, Kent, J. 2000 Biodiversity hotspots for conservation priorities. *Nature* 403, 853–858.

Thursday, Apr 15 [Wellness day]

**Lecture 22, Tuesday, Apr 20**

Conservation biogeography: Designing reserves and corridors; biological surveys and biogeographic monitoring.

### **Lecture 23, Thursday, Apr 22**

Biogeography of humans.

*Paper for discussion:* Aplin KP, Suzuki, H, Chinen, AA, Chesser, RT, Ten Have, J, Donnellan, SC, Austin, J, Frost, A, Gonzalez, JP, Herbreteau, V et al. 2011 Multiple geographic origins of commensalism and complex dispersal history of Black Rats. PLoS One 6, e26357.

### **Tuesday, Apr 27**

[Final class presentations.](#)

### **LABS:**

Week 1	No lab
Week 2	Geologic processes, paleogeography, and the case of <i>Paradoxides</i>
Week 3	Open Lab
Week 4	GABI, the Great American Biotic Interchange
Week 5	Dating fossils and taphonomic bias/Presentation topics
Week 6	Presentation Check-in
Week 7	No lab/Presentations
Week 8	Open Lab
Week 9	Foster's Rule and the oddities of islands
Week 10	Island biogeography theory applied to insular mainland habitats
Week 11	Historical exploration and it's role in extinction and the dispersal of species
Week 12	Open Lab/Presentation Check-in
Week 13	No Lab/Presentations

### **RECOMMENDED TEXTS:**

Lomolino MV, Riddle, BR, Whittaker, RJ. 2016 Biogeography, Fifth Edition. Sunderland, Massachusetts: Sinauer Associates.

Crisci JV, Katinas, L, Posadas, P. 2003 Historical Biogeography. An Introduction. Cambridge, MA: Harvard University Press.

Morrone JJ. 2009 Evolutionary biogeography: An integrative approach with case studies. New York:

Columbia University Press.

**GRADING:**

Grading will be based on the team presentations (two) and participation in class and sections.