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| **Professor responsável:** | Prof. Dr. Alexandre Reis Percequillo |
| **Horário de aula:**  | Segunda a Sexta, das 9:00-12:00 e das 14:00-17:00 |
| **Local:**  | Sala de Aula do Laboratório de Zoologia de Vertebrados |

**Programa**

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| --- | --- | --- | --- | --- | --- | --- |
| **Semana 1** |  | 28.set. | 29.set | 30.set | 1.out | 2.out |
|  | Leitura | Leitura | Leitura | Leitura | Leitura |
| **Semana 2** |  | 5.out | 6.out | 7.out | 8.out | 9.out |
| **Manhã** | Aula 1. Apresentação | Aula 3. Geografia Atual | Aula 5. Variação geográfica | Aula 7. Variação Geográfica: estudos de caso | Aula 9. Variação geográfica e filogeografia |
| **Tarde** | Aula 2. Histórico | Aula 4. Geografia pretérita | Aula 6. Métodos I. | Aula 8. cont. Variação Geográfica: estudos de caso | Aula 10. Métodos II. |
| **Semana 3** |  | 12.out | 13.out | 14.out | 15.out | 16.out |
|  | Leitura | Leitura | Leitura | Leitura | Leitura |
| **Semana 4** |  | 19.out | 20.out | 21.out | 22.out | 23.out |
| **Manhã** | Aula 11. Leitura | Aula 13. Delimitação de espécies | Aula 15. Métodos biogeográficos | Aula 17. Seminários | Aula 19. Seminários |
| **Tarde** | Aula 12. Conceitos de espécie. | Aula 14. Métodos III. | Aula 16. Prática. Métodos de análises de estimativas de tempo de diversificação; Métodos de análises biogeográficas | Aula 18. Seminários | Aula 20. Seminários |

**Aulas 1, 2, 3 e 4. Expositivas, mas os conteúdos de leitura devem ser lidos antes.**

**Demais Aulas. Aulas de discussão dos textos enviados.**

**SEMANA 1. Leitura**

**SEMANA 2**

**05. out - Aula 1**. Apresentação da disciplina. Formato da disciplina. Objetivos.

**05. out - Aula 2.** Histórico

Lomolino, M.V., B.R. Riddle & J.H. Brown. 2006. Biogeography. Sinauer (capítulos 1 e 2).

**06.out - Aula 3**. Geografia da América do Sul.1: os padrões atuais

Clapperton, C. 1993. Quaternary Geology and Geomorphology of South America. Elsevier. (Capítulo 1).

Eva, H.D., et al. 2002. A vegetation map of South America. European Comission.

Prance, G.T. 1989. American Tropical Forests. In: Lieth, H. & M.J.A. Werger (eds.) Tropical Rain Forest Ecosystems, Ecosystems of the world 14B. Elsevier.

Cabrera, A.L. & A. Willink. 1980. Biogeografia de America Latina. Organización de los Estados Americanos.

Rizzini, C.T. 1979. Tratado de Fitogeografia do Brasil: aspectos sociológicos e florísticos. Hucitec e EDUSP.

**06.out - Aula 4**. Geografia da América do Sul.2: os padrões pretéritos

Oliveira, P.E. et al. 2005. Paleovegetação e paleoclimas do Quaternário do Brasil. In: Souza, C.R.G. et al. (eds.) Quaternário do Brasil. Editora Holos, Ribeirão Preto.

**Grupo 1**

Clapperton, C. 1993. Nature of environmental changes in South America at the last glacial maximum. Palaeogeography, Palaeoclimatology and Palaeoecology, 101: 189-208.

Hoorn, C. et al., 2010. Amazonia Through Time: Andean uplift, climate change, and biodiversity. Science, 330: 927-931; mais material suplementar.

**Grupo 2**

Carnaval. A.C. et al., 2009. Stability Predicts Genetic Diversity in the Brazilian Atlantic Forest Hotspot. Science, 323: 785-9.

Leite Y.L.R. et al. 2016. Neotropical forest expansion during the last glacial period challenges refuge hypothesis. Proceedings of the National Academy of Sciences, USA 113:1008–1013.

**07.out - Aula 5**. **Conceitos**: padrões, processos, variação geográfica

**Grupo 1**

Mayr, E. 1977. Populações, espécies e evolução. EDUSP. (capítulo 11)

Endler, J.A. 1977. Geographic variation, speciation and clines. Princeton University Press (capítulo 1).

**Grupo 2**

Gould, S. J. & Johnston. R. 1972. Geographic variation. Annual Review of Ecology and Systematics. Vol. 3: 457 – 498.

Thorpe, R.S. et al. 1995. Relating geographic pattern to phylogenetic process. Phil. Trans. R. Soc. London B, 349: 61-68.

**07.out – Aula 6.**

**Métodos I.**

Vanzolini, P. E., 1970. Zoologia sistemática, geografia e a origem das espécies. Série Teses e monografias, no 3, Instituto de Geografia, Universidade de São Paulo.

Musser, G. G., 1968. A systematic study of the Mexican and Guatemalan gray squirrel, *Sciurus aureogaster* F. Cuvier (Rodentia: Sciuridae). Miscellaneous Publications Museum of Zoology, University of Michigan, 137: 1-112.

**08.out - Aulas 7 e 8**. **Estudos de caso**: padrões, processos, variação geográfica

Moreira, J. A. & Oliveira, J. A. 2011. Evaluating diversification hypothesis in the South American cricetid *Thaptomys nigrita* (Lichtenstein, 1829) (Rodentia: Sigmodontinae): an appraisal of geographical variation on different character systems. Journal of Mammalian Evolution.

Prado, J.R. & Percequillo, A.R. 2018. Systematic studies of the genus A*egialomys* Weksler, et al., 2006 (Rodentia: Cricetidae: Sigmodontinae): geographic variation, species delimitation, and biogeography. Journal of Mammalian Evolution: doi:10.1007/s10914-016-9360-y.

Chiquito, E.A. et al. 2014. Taxonomic review of genus *Sooretamys* Weksler, Percequillo & Voss (Rodentia: Cricetidae: Sigmodontinae): an integrative approach. Zoological Journal of the Linnean Society, 171: 842 – 877.

Thorpe, R.S. 1987. Geographic Variation: a synthesis of cause, data, pattern and congruence in relation to subspecies, multivariate analysis and phylogenesis. Bolletino Zoologia, 54: 3-11.

Alvarado-Serrano, D.F. et al. 2013. Localized versus generalist phenotypes in a broadly distributed tropical mammal: how is intraspecific variation across disparate environments? BMC Evolutionary Biology, 13: 160. doi:10.1186/1471-2148-13-160.

Fornel, R. et al. 2010. Skull shape and size variation in *Ctenomys minutus* (Rodentia, Ctenomyidae) in geographical, chromosomal, polymorphism and environmental contexts. Biological Journal of Linnean Society, 101: 705-720.

Alvarez-Castañeda, S.T. & J.L. Patton. 2004. Geographic architecture of pocket gopher (*Thomomys bottae*) populations in Baja California, Mexico. Molecular Ecology, 13: 2287-2301.

Libardi, G.S. & Percequillo, A.R. 2016. Variation of craniodental traits in Russet Rats *Euryoryzomys* *russatus* (Wagner, 1848) (Rodentia: Cricetidae: Sigmodontinae) from Eastern Atlantic Forest. Zoologischer Anzeiger, 262: 57-74.

**09.out – Aula 9. Conceitos**: padrões, processos, espécies e especiação

Avise, J.C. (2009) Phylogeography: retrospect and prospect. Journal of Biogeography, 36, 3-15.

Hickerson, M.J., Carstens, B.C., Cavender-Bares, J., Crandall, K.A., Graham, C.H., Johnson, J.B., Rissler, L., Victoriano, P.F. & Yoder, A.D. (2011) Phylogeography’s past, present, and future: 10 years after Avise, 2000. Molecular Phylogenetics and Evolution, 54, 291-301.

Papadopoulou, A., Knowles, L.L. (2016). Toward a paradigm shift in comparative phylogeography driven by trait-based hypotheses. Proc Natl Acad Sci U S A, 113(29):8018-24

Literatura Complementar:

Avise, J.C. (2000) Phylogeography. The history and formation of species. Harvard Univ. Press, Cambridge, MA

**09.out – Aula 10.**

**Métodos II.**

Santos et al. 2013. Métodos filogeográficos: vantagens e limitações. In Dantas, G. P. M. et al. (Org.), Introdução à Filogeografia aplicada à conservação biológica de vertebrados Neotropicais. Editora CRV, Curitiba, PR

Turchetto-Zolet, A. C; Segatto, A. L. A.; Turchetto, C; Palma-Silva C & Freitas L. B. Guia prático para estudos filogeográficos (PDF disponível). Sociedade Brasileira de Genética. Mais informações: https://www.lume.ufrgs.br/bitstream/handle/10183/100134/000931668.pdf

**SEMANA 3. Leitura**

**SEMANA 4**

**19.out - Aula 11**. **Leitura**

**19.out - Aula 12. Conceitos**: padrões, processos, espécies e especiação

Cracraft, J.A. Introduction. In: Wheeler, Q.D. & R. Meier. 2000. Species concepts and phylogenetic theory. Columbia.

Frost, D.R., A.G. Kluge & D.M. Hillis. 1992. Species in contemporary herpetology: comments on phylogenetic inference and taxonomy. Herpetological Review, 23: 46-54.

De Queiroz, K. 2005. Ernst Mayr and the modern concept of species. PNAS, 102: 6600-6607.

Knowles, L.L. & B.C. Carstens. 2007. Delimiting species without monophyletic gene trees. Systematic Biology, 56: 887-895.

De Queiroz, K. 1998. The General Lineage Concept of Species, Species Criteria, and the Process of Speciation: A conceptual unification and terminological recommendations. In: Howard, D.J. & S.H. Berlocher, eds. *Endless Forms. Species and Speciation.* Oxford, England, UK.: Oxford University Press.

Zachos, F.E., 2018a. Mammals and meaningful taxonomic units: the debate about species concepts and conservation. Mamm. Rev. 48, 153–159. <https://doi.org/10.1111/mam.12121>

**20.out - Aula 13**. **Conceitos**: padrões, processos, espécies e especiação

Agapow, P. M., Bininda‐Emonds, O. R. P., Crandall, K. A., Gittleman, J. L., Mace, G. M., Marshall, J. C., & Purvis, A. (2004). The impact of species concept on biodiversity studies. Quarterly Review of Biology, 79(2), 161–179.

Carstens, B.C., Pelletier, T.A., Reid, N.M. & Satler, J.D. (2013) How to fail at species delimitation. Molecular Ecology, 22, 4369-4383.

Dayrat, B. (2005). Towards integrative taxonomy. Biological Journal of the Linnean Society, 85(3), 407–415.

Edwards, D. L., & Knowles, L. L. (2014). Species detection and individual assignment in species delimitation: Can integrative data increase efficacy? Proceedings of the Royal Society B: Biological Sciences, 281, 20132765.

Camargo, A., Avila, L.J., Morando, M. & Sites Jr., J.W. (2012) Accuracy and precision of species trees: effects of locus, individual, and base pair sampling on inference of species trees in lizards of the *Liolaemus darwinii* group (Squamata, Liolaemidae). Systematic Biology, 61, 272-288.

Pyron, R. A., Hsieh, F. W., Lemmon, A. R., Lemmon, E. M., & Hendry, C. R. (2016). Integrating phylogenomic and morphological data to assess candidate species‐delimitation models in brown and red‐bellied snakes (Storeria). Zoological Journal of the Linnean Society, 177(4), 937–949.

**20.out. – Aula 14.**

**Métodos III**

Luo, A., Ling, C., Ho, S.Y.W. & Zhu, C.-D. 2018. Comparison of Methods for Molecular Species Delimitation Across a Range of Speciation Scenarios. Syst. Bio., 67: 830-846. 10.1093/sysbio/syy011

**21.out. – Aula 15. Biogeografia**

Hortal, J., de Bello, F., Diniz Filho, J.A.F., Lewinsohn, T.M., Lobo, J.M. & Ladle, R.J. 2015. Seven shortfalls that beset large-scale knowledge of biodiversity. Annual Review of Ecology, Evolution, and Systematics, 46, 532-549.

**21.out. – Aula 15. Biogeografia**

**22 e 23.out – Aulas 17 a 20. Seminários**

A definir

**Mais Leituras interessantes**

Bradley, R.D. & R.J. Baker. 2001. A test of the genetic species concept: cytochrome b sequences and mammals. Journal of Mammalogy, 82: 960-973.

Mares, M.A. & Braun, J.K. 2000. Three new species of *Brucepattersonius* (Rodentia: Sigmodontinae) from Misiones Province, Argentina. Occasional Papers Sam Noble Oklahoma Museum of Natural History, 9: 1-13.

Leite, Y. 2003. Evolution and systematics of the Atlantic tree rats, genus *Phyllomys* (Rodentia, Echimyidae), with description of two new species. University of California Publications in Zoology, 132: 1-118.

Percequillo, A.R. et al. 2008. Systematic review of genus *Cerradomys* Weksler, Percequillo and Voss, 2006 (Rodentia: Cricetidae: Sigmodontinae: Oryzomyini), with description of two new species from eastern Brazil. American Museum Novitates, 3622: 1-46.

Voss, R.S. 2003. A new species of *Thomasomys* (Rodentia, Muridae) from eastern Ecuador, with remarks on mammalian diversity and biogeography in the Cordillera Oriental. American Museum Novitates, 3421: 1-47.

Lara, M. et al. 2002. *Trinomys mirapitanga*, a new species of spiny rat (Rodentia: Echimyidae) from the Brazilian Atlantic Forest. Mammalian Biology, 67: 233-242.

Brennand, P.G.G. et al. 2013. The genus *Hylaeamys* (Weksler, Percequillo and Voss 2006) in Atlantic Forest of Brazil: Geographic variation and species definition. Journal of Mammalogy, 94: 1346-1363.

Haffer, J. 1969. Speciation in Amazonian Forest birds. Science, 165: 131-137.

Smith, B.T. et al., 2014. The drivers in tropical speciation. Nature, 515: doi:10.1038/nature13687

Leite, R.N. & D.S. Rogers. 2013. Revisiting Amazonia phylogeography: insights into diversification hypotheses and novel perspectives. Organisms Diversity & Evolution, DOI 10.1007/s13127-013-0140-8

Moritz, C., J.L. Patton, C.J. Schneider & T.B. Smith. 2000. Diversification of rainforest faunas: an integrated molecular approach. Annual Review of Ecology and Systematics, 31: 533-563.

Bush, M.B. 1994. Amazonian Speciation: a necessarily complex model. J. Biogeog., 21: 5-17.

Bonvicino, C.R. & M. Weksler. 2012. Speciation in Amazonia: patterns and predictions of a network oh hypotheses. In: Patterson, B.D & L.P. Costa. Bones, Clones & Biomes. The University of Chicago Press, Chicago & London.

Smith, M.F., D. A. Kelt & J. L. Patton. 2001. Testing models of diversification in mice in the *Abrothrix olivaceus/xanthorhinus* complex in Chile and Argentina. Molecular Ecology 10; 397-405.

Boubli, J.P. et al. 2015. Spatial and temporal patterns of diversification on the Amazon: A test of rivereine hypothesis for all diurnal primates of Rio Negro and Rio Branco in Brazil. Molecular Phylogenetics and Evolution, 82: 200-412. http://dx.doi.org/10.1016/j.y.mpev.2014.09.005

Thomé, M.T.C. et al., 2010. Phylogeography of endemic toads and post-Pleistocene persistence of the Brazilian Atlantic Forest. Molecular Phylogenetics and Evolution, 55: 1018-1031.

Tavares, W.C. et al. 2015. Systematics and acceleration of cranial evolution in *Cerradomys* (Rodentia, Cricetidae, Sigmodontinae) of Quaternary Sandy plains in Southeastern Brazil. Journal of Mammalian Evolution, DOI 10.1007/s10914-015-9316-7.

Upham, N. et al. 2013. Transitions between Andean and Amazonian centers of endemism in the radiation of some arboreal rodents. BMC Evolutionary Biology, 13: 191. http://www.biomedcentral.com/1471-2148/13/191

Ribas, C. et al. 2012. A palaeobiogeographic model for biotic diversification within Amazonia over the past three million years. Proceedings of the Royal Society B, 279: 681-689.

Rocha, R.G. et al. 2015. The Araguaia River as an important biogeographical divide for Didelphid marsupials in Central Brazil. Journal of Heredity, doi:10.1093/jhered/esv058