Department of Biology

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**Nathan Muchhala**

**EDUCATION**

**Ph.D., Biology** (5/07), University of Miami, Coral Gables, FL (with Dr. Theodore Fleming)

**B.A., Biology** (5/98), Earlham College, Richmond, IN (college and departmental honors)

**PROFESSIONAL EXPERIENCE**

Assistant Professor (2013-Present), Department of Biology, University of Missouri – St. Louis, St. Louis, MO

Postdoctoral Research Fellow (2011-2013), School of Biological Sciences, University of Nebraska, Lincoln, NE (with Dr. Stacey Smith)

Postdoctoral Research Fellow (2007-2010), Dept. of Ecology and Evolutionary Biology, University of Toronto, Toronto, ON (with Dr. James Thomson)

**GRANTS & FELLOWSHIPS**

* UMSL ORA Research Award (PI), “Is speciation faster in the tropics? Effects of seasonality and mutualists on plant genetic structure”; **$9,174** (2016)
* St. Louis Zoo Field Research for Conservation Grant (Co-PI), “From bat to bird: Investigating a potential case of sympatric speciation via pollinator shift in the Andes”; **$10,000** (2016)
* UM Research Board Grant (PI), “Speciation in *Burmeistera*”; **$50,000** (2015)
* University of Nebraska Program of Excellence Postdoctoral Fellowship (2012-2013)
* Prometeo Fellowship for Visiting Scholars to Ecuador; **$36,000** (2012; Declined)
* Encyclopedia of Life Rubenstein Fellowship; **$24,000** (2012)
* Fulbright Scholar Grant; **$12,000** (2010)
* National Geographic Society Grant (PI), “Coevolution in an extremely specialized bat-flower mutualism: exploring the geographic mosaic”; **$22,577** (2010)
* University of Toronto Departmental Postdoctoral Fellowship (2007-2009)
* Bat Conservation International Postdoctoral Grant; **$1,000** (2007)
* National Science Foundation Graduate Research Fellowship (2002-2005)
* Curtis Scholarship, University of Miami; **$500** (2004)
* Bat Conservation International Student Grant; **$2,524** (2003)
* Curtis Scholarship, University of Miami; **$500** (2002)
* Organization for Tropical Studies Post-Course Award; **$500** (2002)
* Maytag Fellowship (2005-2007; 2001)
* Fulbright Fellowship (1999-2000)

**PUBLICATIONS**

34. Muchhala, N. and M. Tschapka. 2017. The ecology and evolution of nectar-feeding phyllostomids. Chp. 16 in T. H. Fleming, L. Davalos, and M. Mello (eds.) *Phyllostomid Bats, a Unique Mammalian Radiation* (In review)

33. Maguiña, R., and N. Muchhala. 2017. Do artificial nectar feeders affect bat-plant interactions in an Ecuadorian cloud forest? *Biotropica* (In review)

32. Gamba, D., R. Maguiña, C. Calderón-Acevedo, K. Torres, and N. Muchhala. 2017. Seed dispersal for the unusual inflated berries of *Burmeistera* (Campanulaceae). *Neotropical Biodiversity* **3**(1):10-17.

30. Uribe-Convers, S., M. M. Carlsen, L. P. Lagomarsino, and N. Muchhala. 2017. Phylogenetic relationships of *Burmeistera* (Campanulaceae: Lobelioideae): Combining whole plastome with targeted loci data in a recent radiation. *Molecular Phylogenetics and Evolution* **107**(2017):551-563

29. Lagomarsino, L. P., D. Santamaría Aguilar, and N. Muchhala. 2015. Two new species of *Burmeistera* (Campanulaceae: Lobelioideae) from the Cordillera de Talamanca of Costa Rica and Panama, with a key to the Central American species. *Systematic Botany* **40**(3):914-921.

28. Muchhala, N., and D. Serrano. 2015. The complexity of background clutter affects nectar bat use of flower odor and shape cues. *PlosONE* **10**(10):e0136657.

27. Muchhala, N., and A. Perez. 2015. *Burmeistera zamorensis* (Campanulaceae: Lobelioideae), a new species from southern Ecuador. *Novon* **24**(1), 36-38.

26. Clark J. L., L. Clavijo, and Muchhala, N. 2015. Convergence of anti-bee pollination mechanisms in the Neotropical plant genus *Drymonia* (Gesneriaceae). *Evolutionary Ecology* **29**(3), 355-377.

25. Lagomarsino, L. P., A. Antonelli, N. Muchhala, S. Mathews, and C. C. Davis. 2014. Phylogeny, classification, and fruit evolution of the species-rich Neotropical bellflowers (Campanulaceae: Lobelioideae). *American Journal of Botany* **101**(12): 2097-2112.

24. Muchhala, N., S. Johnsen, and S. D. Smith. 2014. Competition for hummingbird pollination shapes flower color variation in Andean Solanaceae. *Evolution* **68**(8): 2275–2286.

23. Muchhala, N., and J. D. Thomson. 2012. Interspecific competition in pollination systems: costs to male fitness via pollen misplacement. *Functional Ecology* **26**(2):476-482.

22. Jorgensen, P.M., N. Muchhala, and J.M. MacDougal. 2012. *Passiflora unipetala*, a new bat-pollinated species of *Passiflora* supersection *Tacsonia*. *Novon* **22**(2):174-179.

21. Moreno, M.P. and N. Muchhala. 2011. Campanulaceae. In: R. Valencia, N. Pitman, S. León-Yánez, and P.M. Jørgensen (eds.). *Libro rojo de las plantas endémicas del Ecuador, segunda edición.* Herbario QCA, Pontificia U. Católica del Ecuador, Quito.

20. Garibaldi, L.A., N. Muchhala, I. Motzke, L. Bravo-Monroy, R. Olschewski, and A.M. Klein. 2011. Services from plant-pollinator interactions in the Neotropics. Pp. 119-139 in B. Rapidel, F. DeClerck, J.F. Le Coq, J. Beer (eds.), *Ecosystem Services from Agriculture and Agroforestry: Measurement and Payment.* Earthscan, London, UK.

19. Muchhala, N., Z. Brown, W.S. Armbruster, and M.D. Potts. 2010. Competition drives specialization in pollination systems through costs to male fitness. *American Naturalist* **176**(6):732-743.

18. Muchhala, N., and J.D. Thomson. 2010. Fur versus feathers: Pollen delivery by bats and hummingbirds, and consequences for pollen production. *American Naturalist* **175**:717-726

\* Featured in Science Podcast and ScienceNOW

17. Muchhala, N., and J.D. Thomson. 2009. Going to great lengths: selection for long corolla tubes in an extremely specialized bat-flower mutualism. *Proceedings of the Royal Society B* **276**:2147-2152

\* Featured in Nature's Research Highlights, *Nature* **458**:388

16. Muchhala, N., A. Caiza, J.C. Vizuete, and J.D. Thomson. 2009. A generalized pollination system in the tropics: Bats, birds, and *Aphelandra acanthus*. *Annals of Botany* **103**(9):1481-1487

15. Armbruster, W.S. and N. Muchhala. 2009. Associations between floral specialization and species diversity: Cause, effect, or correlation? *Evolutionary Ecology* **23**:159-179

14. Knox, E.B., A.M. Muasya, and N. Muchhala. 2008. The predominantly South American clade of Lobeliaceae. *Systematic Botany* **33**(2):462-468.

13. Muchhala, N. 2008. Functional significance of interspecific variation in *Burmeistera* flower morphology: Evidence from nectar bat captures. *Biotropica* **40**(3): 332–337

12. Fleming, T.H. and N. Muchhala. 2008. Nectar-feeding bird and bat niches in two worlds: pantropical comparisons of vertebrate pollination systems. *Journal of Biogeography* **35**(5): 764–780

11. Muchhala, N. and M.D. Potts. 2007. Character displacement among bat-pollinated flowers of the genus *Burmeistera*: analysis of mechanism, process, and pattern. *Proceedings of the Royal Society B* **274**:2731-2737.

\* Featured in Science Daily News

10. Muchhala, N. 2007. Adaptive tradeoff in floral morphology mediates specialization for flowers pollinated by bats and hummingbirds. *American Naturalist* **169**:494-504.

\* Featured in Science Daily News and LiveScience

9. Muchhala, N. 2006. Nectar bat stows huge tongue in its rib cage. *Nature* **444**:701-702.

\* Featured in The New York Times, Quirks & Quarks, New Scientist, Scientific American, and various other news outlets

8. Muchhala, N. 2006. The pollination biology of *Burmeistera* (Campanulaceae): Specialization and syndromes. *American Journal of Botany* **93**(8):1081-1089.

7. Muchhala, N., P. Mena V., and L. Albuja V. 2005. A new species of *Anoura* (Chiroptera: Phyllostomidae) from the Ecuadorian Andes. *Journal of Mammalogy* **86**:457-461.

6. Fleming, T.H., N. Muchhala, and P. Ornelas. 2005. New world nectar-feeding vertebrates: Community patterns and processes. Pp. 161-182 in V. Sanchez-Cordero and R. A. Medellín (eds.) *Contribuciones Mastozoológicos en Homenaje a Bernardo Villa-R. Instituto de Biología e Instituto de Ecología*, UNAM, Mexico City.

5. Muchhala, N. and T. G. Lammers. 2005. A new species of *Burmeistera* (Campanulaceae) from Ecuador. *Novon* **15**(1):176-179.

4. Muchhala, N. and T.A. Munroe. 2004. A new species of *Soleichthys* (Soleidae: Pleuronectiformes) from tropical seas off northern Australia. *Ichthyological Research* **51**:57-62.

3. Muchhala, N. 2003. Exploring the boundary between pollination syndromes: Bats and hummingbirds as pollinators of *Burmeistera cyclostigmata* and *B. tenuiflora*. *Oecologia* **134**:373-380.

2. Cramer, J. M., M. L. Cloud, N. Muchhala, A. E. Ware, B. H. Smith, and G. B. Williamson. 2003. A test of the bicolored fruit display hypothesis: Berry removal with artificial fruit flags. *Journal of the Torrey Botanical Society* **130**(1):30–33.

1. Muchhala, N. and P.J. Jarrin-V. 2002. Flower visitation by bats in cloud forests of western Ecuador. *Biotropica* **34**:387-395.

**TEACHING EXPERIENCE**

Faculty Resource Person, *Tropical Biology*, Organization for Tropical Studies, Cabo Blanco, Costa Rica (June 16-22, 2015)

Instructor, *Advanced Evolution*, University of Missouri – St. Louis, St. Louis, MO (2015)

Instructor, *Senior Seminar on Plant-Animal Interactions*, University of Missouri – St. Louis, St. Louis, MO (2015)

Instructor, *General Ecology*, University of Missouri – St. Louis, St. Louis, MO (2013-16)

Guest Lecturer, *Introductory Biology* (BIOL1821), University of Missouri – St. Louis (2015)

Guest Lecturer, *Phylogenetic Biology*, University of Nebraska, Lincoln, NE (2013)

Instructor, *Scientific Writing*, University of Nebraska, Lincoln, NE (2012)

Guest Lecturer, *Phylogenetics*, University of Nebraska, Lincoln, NE (2012)

Instructor, *Speciation*, University of Nebraska, Lincoln, NE (2011)

Guest Lecturer, *Ecology and Evolution*, University of Nebraska, Lincoln, NE (2011)

Guest Lecturer, *Tropical Field Research*, Truman State University, Kirksville, MO (2010)

Guest Lecturer, *Animal Behavior*, Pontificia Univ. Catolica del Ecuador, Quito (2010)

Guest Lecturer, *Introductory Biology*, University of Miami, Miami, Fl (2005)

Teaching Assistant, *Biodiversity*, University of Miami, Miami, FL (2000-01)

Teaching Assistant, *Evolution*, Earlham College, Richmond, IN (1997-98)

Teaching Assistant, *Ecological Biology*, Earlham College, Richmond, IN (1996-97)

**MENTORING EXPERIENCE**

**Advisor:**

* Juan Moreira (U. Missouri – St. Louis), PhD (2016-Present)
* Simon Uribe-Convers (U. Missouri – St. Louis), Postdoctoral Researcher (2015-Present)
* Laura Lagomarsino (U. Missouri – St. Louis), Postdoctoral Researcher (2015-Present)
* Mayra Ninazunta (U. Missouri – St. Louis), PhD (2015-Present)
* Diana Gamba (U. Missouri – St. Louis), PhD (2014-Present)
* Serena Achá (U. Missouri – St. Louis), PhD (2014-Present)
* Camilo Andrés Calderón-Acevedo (U. Missouri – St. Louis), PhD (2013-Present)
* Rossana Maguiña (U. Missouri – St. Louis), MS 2016: “Nectar bats and their flowers across cloud forests of Ecuador and the effect of artificial nectar feeders”
* Mónica Carlsen (U. Missouri – St. Louis), Postdoctoral Researcher (2014-2015)
* Juan Carlos Vizuete (U. Central, Ecuador), MS 2011: “Influence of aspects of bat ecology on the richness and abundance of ectoparasites (*Diptera*) in Wisui, Ecuador”
* Guillermo Javier Gilbert (U. de Guayaquil, Ecuador), Licenciatura 2011: “Learning, identification, and discrimination by nectar bats”
* Diana Serrano (Pontificia U. de Ecuador), Licenciatura 2011: “Use of vision and scent in flower foraging by nectar bats”
* Juan Carlos Vizuete (U. Central, Ecuador), Licenciatura 2008: “Seed dispersal by fruits bats of the genus *Sturnira*”
* Angelica Caiza (U. Central, Ecuador), Licenciatura 2007: “Feeding ecology of *Anoura* and their role as pollinators in cloud forests in eastern and western Ecuador”

**Committee Member:**

* Rani Asmarayani (Stevens Lab, U. Missouri – St. Louis), PhD (2016-Present)
* Samoa Asigua (Parker Lab, U. Missouri – St. Louis), PhD (2015-Present)
* Meghann Humphries (Ricklefs Lab, U. Missouri – St. Louis), PhD (2014-Present)
* Emma Young (Ricklefs Lab, U. Missouri – St. Louis), PhD (2014-Present)
* Justen Zweck (Bernhardt Lab, Saint Louis U.), PhD (2013-Present)
* Ben Abt (Dunlap Lab, U. Missouri – St. Louis), MS 2016: “Forgetting and the value of social information”
* Priya Maharaj (Bourne Lab, U. Missouri – St. Louis), PhD 2016: “Color-mediated foraging by pollinators: A comparative study of two passionflower butterflies at *Lantana camara*”
* Leticia Soares (Ricklefs Lab, U. Missouri – St. Louis), PhD 2016: “Historical biogeography, spatial distribution, and within-host interactions of avian haemosporidian parasites (Apicomplexa, Haemosporida)”
* Haydee Hernandez (Marquis Lab, U. Missouri – St. Louis), MS 2015: “The role of herbivores and soils as limiting factors in *Piper*’s distribution in a tropical rain forest”
* Cassandra Lynn Coleman (Clark Lab, U. of Alabama), MS 2012: “A phylogeny and study of pollinator shifts and floral traits in the Neotropical genus *Gasteranthus* (Gesneriaceae)”

**External Reviewer:**

* Marinus de Jager (U. of Stellenbosch, South Africa), PhD 2013: “The role of pollinators in generating and maintaining floral polymorphism: phylogeographic and behavioral aspects”

**HONORS & AWARDS**

* SSE Student Travel Award, Evolution Meeting (2007)
* Best Graduate Student Paper, University of Miami (2007)
* Best Student Talk (Lubee Prize), North American Symposium on Bat Research (2006)
* SBDN Student Travel Award, North American Symposium on Bat Research (2006)
* Best Student Talk (Gentry Award), Association for Tropical Biology (2004)
* Best Student Talk (Lubee Prize), North American Symposium on Bat Research (2000)
* National Merit Scholar (1994-1998)

**PRESENTATIONS**

**Scientific Meetings**

* North American Symposium on Bat Research, Annual Meetings (2015, 2014, 2013, 2012, 2008, 2006, 2000)
* Society for the Study of Evolution, Annual Meetings (2015, 2012, 2011, 2008, 2006)
* Congreso Latinoamericano de Murcielagos (2014)
* International Bat Research Conference (2016, 2013)
  + Co-organized symposium: "The ecology and evolution of the mutualism between nectar bats and bat-pollinated flowers" N. Muchhala and M. Holderied (2013)
* Association for Tropical Biology & Conservation, Annual Meetings (2013, 2007, 2004, 2002)
  + Co-organized symposium: “Bats and hummingbirds as pollinators: from ecological differences to evolutionary consequences” L. Lopes, N. Muchhala, S. Buzato (2013)
* Congreso Ecuatoriano de Mastozoología, Puyo, Ecuador (2013)
* Ecological Society of America, Annual Meetings (2009, 2008, 2006)
* American Society of Mammalogists Meeting, Amherst, Mass. (2006)
* Jornadas Ecuatorianas de Biología, Annual Meetings, Ecuador (2004, 2003)
* Congreso Ecuatoriano de Botánica, Loja, Ecuador (2003)

**Invited Lectures**

* Purdue University, Purdue, IN (11/16)
* Murray State University, Murray, KY (11/16)
* PGAV Design Firm, St. Louis, MO (5/16)
* Smithsonian Botanical Symposium, “Bat, Birds, Bees, and Bouquets: New Research in Pollination Biology”, Washington, DC (5/16)
* Universidad Mayor de San Andres, La Paz, Bolivia (3/16)
* University of Pittsburgh, Pittsburgh, PA (11/15)
* Missouri University of Science & Technology, Rolla, MO (9/15)
* Sigma Xi Seminar, UMSL Chapter, St. Louis, MO (4/15)
* Simposio de Biodiversidad Neotropical, Quito, Ecuador (2/15)
* Washington University of St. Louis, MO (11/14)
* Saint Louis University, St. Louis, MO (2/14)
* University of Missouri, Columbia, MO (10/13)
* St. Louis Ecology, Evolution, and Conservation (SLEEC) Retreat, St. Louis, MO (9/13)
* Ohio State University, Columbus, OH (1/13)
* University of Missouri – St. Louis, St. Louis, MO (10/12)
* University of California -Davis, Davis, CA (5/12)
* Chicago Plant Science Symposium, Field Museum, Chicago, IL (4/12)
* Universidad de Antioquia, Medellin, Colombia (4/12)
* University of Denver, Denver, CO (2/12)
* Harvard University, Cambridge, MA (10/11)
* Humboldt State University, Arcata, CA (2/11)
* Pontificia Universidad Catolica de Ecuador, Quito, Ecuador (4/10)
* Universidad de San Francisco, Quito, Ecuador (3/10)
* University of Wisconsin-Milwaukee, Milwaukee, WI, USA (1/10)
* University of Guelph, Guelph, ON, Canada (3/09)
* Texas Tech University, TX, USA (1/09)
* Queens University, Kingston, ON, Canada (12/08)
* Trent University, Peterborough, ON, Canada (11/08)
* University of Calgary, Calgary, AB, Canada (11/08)
* Sea & Learn, Saba, Netherlands Antilles (10/08)
* University of Toronto, Toronto, ON, Canada (4/08)
* Fulbright Commission, Quito, Ecuador (8/05)

**MEDIA COVERAGE**

**Press Interviews:** The New York Times, ABC, CNN, Reuters, FOX, BBC Wildlife Magazine, The Telegraph, New Scientist, Scientific American, Science News, and various other print and on-line media

**Radio Interviews:** Crash Davis (KFAB Radio, Omaha, NE), Quirks and Quarks (Canadian Broadcasting Corporation), Good Dirt Radio (Grassroots Educational News), Nature Podcast (Nature), pollinators.info

**Interviews for Books:** Bats: Biggest! Littlest! (S. Markle, In Press); Plant and Animal Systems (R. Johnson, 2011); Why the Lion Grew its Mane (L. Smith, 2009); Dry Storeroom No. 1 (R. Fortey, 2008)

**SERVICE & OTHER EXPERIENCE**

* Associate Editor for *Neotropical Biodiversity*, a new international open-access journal (launched in 2015 in Quito, Ecuador)
* Reviewer for:

*American Naturalist American J. of Botany*

*Annals of Botany*

*Biol. J. Linnean Soc.*

*Biotropica*

*Brittonia*

*Caldasia*

*Check List*

*Ecology*

*Ecography*

*Ecology and Evolution*

*Evolution*

*Evolutionary Ecology*

*Functional Ecology*

*J. of Evolutionary Biology*

*J. of Ornithology*

*J. of Plant Ecology*

*J. of Pollination Ecology*

*Mammalian Species*

*Naturwissenschaften*

*Neotropical Biodiversity Oecologia*

*Oikos*

*Plant Biology*

*Plant Syst. and Evolution*

*PLoS One*

*PNAS*

*Proc. of the Royal Society B*

*Science*

* Reviewer for three NSF proposals, two National Geographic Society grant proposals, a South African National Research Foundation researcher evaluation, a University of Missouri Research Board proposal, and a US-Israel Binational Science Foundation grant proposal
* Judge for UMSL Graduate Research Fair (2016)
* Volunteer for bat survey at Queeny Park, MO; part of a restoration project with the Missouri Department of Conservation (2014)
* Representative for the Organization for Tropical Studies (UMSL, 2014-Present)
* Advisor for undergraduate research project with Missouri Botanical Garden’s summer REU program (2014)
* Scientific advisor for National Geographic Magazine article “Call of the Bloom” (2014)
* Graduate Committee Member (UMSL, 2015-Present)
* Student Awards Committee Member (UMSL, 2014, 2015, & 2016)
* Harris Scholarship Committee Member (UMSL, 2013 - Present)
* Volunteer presenter for ‘Sunday with a Scientist’, Nebraska State Museum (2011)
* Judge for elementary school science fair (Sheridan Elementary, 2011),
* Judge for Biology Graduate Student Association poster session (U. Nebraska, 2011 and 2013)
* Judge for SSE Hamilton Award, Evolution Meeting (2008)
* Student Representative, Graduate Admission Committee (2006-07 and 2001-02)
* Student Representative, Faculty Search Committee (2005-06 and 2000-01)
* Biology Representative, Graduate Student Association, (2000-01)

**REFERENCES**

**Dr. Theodore H. Fleming Dr. W. Scott Armbruster**

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**Dr. Stacey D. Smith Dr. James D. Thomson**

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