

Jose Barba-Montoya

Gerstner Scholar in Bioinformatics and Computational Biology
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Education

- **2017: Ph.D. in Molecular Evolution, Department of Genetics, Evolution and Environment, University College London, UK.** *Bayesian molecular clock dating and the divergence times of angiosperms and primates.* Supervised by Professor Ziheng Yang.
- **2012: M.Sc. in Systematics, Institute of Biology, National Autonomous University of Mexico (UNAM), Mexico City, Mexico.** *Diversification of Pachycereeae (Cactaceae) due to pollination syndromes.* Supervised by Professor Susana Magallón.
- **2009: B.Sc. in Biology, Faculty of Sciences, UNAM, Mexico City, Mexico.** *Origin and evolution of tribe Pachycereeae (Cactaceae).* Supervised by Professor Susana Magallón.

Professional and Research Experience

- **Nov 2023 – date: Gerstner Scholar in Bioinformatics and Computational Biology at Richard Gilder Graduate School, American Museum of Natural History, New York, New York, USA.** Research on the arachnid tree of life.
- **Nov 2018 – Nov 2023: Postdoctoral Researcher in the Lab of Professor Sudhir Kumar at the Institute for Genomics and Evolutionary Medicine at Temple University, Philadelphia, PA, USA.** Development of models/methods for estimation of molecular evolutionary rates and species divergence times, and analysis of large-scale phylogenomic data.
- **Jan – Sep 2018: Research and consulting for Agroproductos de Alto Valor, Edomex, México.** Research on plant species cultivated in Mexico with high nutritional value for production of tortilla flours.
- **Oct – Dec 2017: Tree planting supervisor (volunteer) at Trees for Cities, London, UK.** Supervision and support to the community people to plant trees.
- **Jan – Sep 2012: Research Assistant for Professor Susana Magallón at the Institute of Biology, UNAM, Mexico City, Mexico.** Collection of wild specimens, DNA extraction, PCR amplification and sequencing of succulent plants.
- **Feb – July 2012: Researcher at Papalote Children’s Museum, Mexico City, México.** Natural History of *Brossimum alicastrum*.
- **Dec 2010: Visiting Researcher, Institute of Ecology, UNAM, Hermosillo, Sonora, México.** Research on cactus pollination and collection of Cactaceae and Fouquieriaceae wild specimens.
- **Apr – May 2010: Visiting Researcher, Dessert Botanical Garden, Phoenix, Arizona, USA.** Collection of Cactaceae specimens from the botanical garden and preparation of herbarium specimens.
- **Jan – March 2009: Researcher, Verde Vertical, Mexico City, Mexico.** Development of sustainable hydroponics.

Research Mentoring and Teaching Experience

- **2019 – 2020: Mentorship – undergraduate students, Temple University.** Four students were mentored to conduct research projects on molecular evolution: Mary Kate Durnan, Jonathan Falciani, Roshni Vadher, and Sara Vahdatshoar.
- **Jan – May 2019: Seminar on Molecular Phylogenetics – graduate level, Temple University.** Topic selection and coordination of discussion sessions.

Awards, Fellowships, and Grants

- **2023: AMNH Gerstner Scholar in Bioinformatics and Computational Biology Fellowship Award.** Covering stipend and research expenses.
- **2013: Wellcome Trust Grant** to attend The Wellcome Trust Advanced Course: Molecular Evolution. Cambridge, UK.
- **2012 – 2016: National Council of Science and Technology (CONACyT) / UCL PhD degree Scholarship.** Covering stipend and scholar fees.
- **2011: Botanical Society of America Grant** to attend the *Botany 2011 Conference*. St. Louis Missouri, USA. Covering registration fee and lodging.
- **2011: UNAM Travel Grant** to attend the *Botany 2011 Conference, Botanical Society of America*. St. Louis Missouri, USA. Covering flights and travel expenses.
- **2010: UNAM's Postgraduate Studies Office Grant** to visit the Institute of Ecology, UNAM, Hermosillo Sonora, México.
- **2010: UNAM's Postgraduate Studies Office Grant** to visit the Dessert Botanical Garden, Phoenix, AZ, USA. Covering flights and travel expenses.
- **2009 – 2012: CONACyT Master's Degree Scholarship.** Covering stipend and scholar fees.

Publications

- Craig JM, Bamba GL, **Barba-Montoya J**, Hedges SB, Kumar S. 2023. Completing a molecular timetree of apes and monkeys. *Frontiers in Bioinformatics*, 3:1284744.
- **Barba-Montoya J**, Sharma S, Kumar S. 2023. Molecular timetrees using relaxed clocks and uncertain phylogenies. *Frontiers in Bioinformatics*, 3:1225807.
- **Barba-Montoya J**, Tao Q, Kumar S. 2021. Assessing rapid relaxed-clock methods for phylogenomic dating. *Genome Biology and Evolution*, 13(11).
- Tao Q, **Barba-Montoya J**, Kumar S. 2021. Data-driven speciation tree prior for better species divergence times in calibration-poor molecular phylogenies. *Bioinformatics*. 37(S1): i102–i110.
- **Barba-Montoya J**, Tao Q, Kumar S. 2021. Molecular and morphological clocks for estimating evolutionary divergence times. *BMC Ecology and Evolution*, 21(83).
- Mello B. Tao Q, **Barba-Montoya J**, Kumar S. 2020. Molecular dating for phylogenies containing a mix of populations and species by using Bayesian and RelTime approaches. *Molecular Ecology Resources*, 21: 122–136.
- **Barba-Montoya J**, Tao Q, Kumar S. 2020. Using a GTR+ Γ substitution model for dating sequence divergence when stationarity and time-reversibility assumptions are violated. *Bioinformatics*, 36(S2): i884–i894.
- Tao Q, **Barba-Montoya J**, Huuki LA, Durnan MK, Kumar S. Relative efficiencies of simple and complex substitution models in estimating divergence times in phylogenomics. *Molecular Biology and Evolution*, 37(6):1819–1831.
- **Barba-Montoya J**, dos Reis M, Schneider H, Donoghue PCJ, Yang Z. 2018. Constraining uncertainty in the timescale of angiosperm evolution and the veracity of a Cretaceous Terrestrial Revolution. *New Phytologist*, 218:819-834.
- dos Reis M, Gunnell GF, **Barba-Montoya J**, Wilkins A, Yang Z, Yoder AD. 2018. Using phylogenomic data to explore the effects of relaxed clocks and calibration strategies on divergence time estimation: Primates as a test case. *Systematic Biology*, 67(4):594–615.
- **Barba-Montoya J**, dos Reis M, Yang Z. 2017. Comparison of different strategies for using fossil calibrations to generate the time prior in Bayesian molecular clock dating. *Molecular Phylogenetics and Evolution*, 114: 386–400.
- **Barba-Montoya J**, Magallón S. 2012. ¿Por qué tantos cactus columnares? El papel de los murciélagos nectarívoros en su diversificación. *Oikos*, 6(48).

Publications in Preparation

- **Barba-Montoya J**, Craig JM, Kumar S. Assembling the tree of life through integrating chronology and phylogeny. (To be submitted to *Bioinformatics*).

- **Barba-Montoya J**, Prendini L. Interrogating arachnid monophyly and reconstructing the evolution of terrestrialization. (To be submitted to *Nature Ecology and Evolution*).
- **Barba-Montoya J**, Prendini L. Reconstructing major branches and comprehensively dating the arachnid tree of life. (To be submitted to *Systematic Biology*).

Research Presentations

Conference and Symposium Talks

- **Barba-Montoya J**, Sharma S, Kumar S. Molecular timetrees using relaxed clocks and uncertain phylogenies. *Evolution 2023*. Albuquerque, USA.
- **Barba-Montoya J**. Relaxed-clock dating of evolutionary divergences with uncertain phylogeny. *SMBEeverywhere 2022*. (Virtual).
- **Barba-Montoya J**, Sharma S, Kumar S. Relaxed-clock dating analysis with phylogenetic uncertainty. *Evolution 2022*. Cleveland, USA.
- **Barba-Montoya J**, Tao Q, Kumar S. Assessing the performance and accuracy of rapid methods for phylogenomic dating. *SMBE 2021*. (Virtual).
- **Barba-Montoya J**, Tao Q, Kumar S. Using a GTR+ Γ substitution model for dating sequence divergence when stationarity and time-reversibility assumptions are violated. *ECCB 2020*. Barcelona, Spain. (Virtual).
- **Barba-Montoya J**. The discrepancy of molecular and morphological clocks is largely imperceptible in divergence time estimation. *EPIC 2019*. Philadelphia, USA.
- **Barba-Montoya J**, Tao Q, Kumar S. Comparison of species divergence time estimation using morphological and molecular characters. *Evolution 2019*. RI, USA.
- **Barba-Montoya J**, dos Reis M, Schneider H, Donoghue PCJ, Yang Z. Constraining uncertainty in the timescale of angiosperm evolution and the veracity of a Cretaceous Terrestrial Revolution. *Phylogroup X 2016*. London, UK.
- **Barba-Montoya J**. Establishing a timescale for angiosperm evolution. *UCL-GEE Symposium 2015*. London, UK.
- **Barba-Montoya J**, dos Reis M, Yang Z. Angiosperm divergence times: a phylogenetic analysis of genome-scale data sets. *16th Young Systematists' Forum 2014*. Natural History Museum, London, UK.
- **Barba-Montoya J**, dos Reis M, Yang Z. Angiosperm divergence times: a phylogenetic analysis of genome-scale data sets. *LERN 2014*. London, UK.
- **Barba-Montoya J**, Magallón S, Trejo-Salazar R. Understanding arid Neotropical biodiversity: the timing and diversification rate of tribe Pachycereeae (Cactaceae, Caryophyllales). *Botany 2011 Conference, Botanical Society of America*. St. Louis Missouri, USA. (Canceled).

Poster Presentations

- **Barba-Montoya J**, Tao Q, Kumar S. Comparison and evaluation of rapid methods for phylogenomic dating. *Second AsiaEvo Conference 2021*. Tokyo, Japan. (Virtual).
- **Barba-Montoya J**, dos Reis M, Schneider H, Donoghue PCJ, Yang Z. Constraining uncertainty in the timescale of angiosperm evolution and the veracity of a Cretaceous Terrestrial Revolution. *The Royal Society 2015*. London, UK.
- **Barba-Montoya J**, dos Reis M, Yang Z. Angiosperm divergence times: a phylogenetic analysis of genome-scale data sets. *UK Plant Evolution 2014*. Edinburgh, UK.
- **Barba-Montoya J**, dos Reis M, Yang Z. Angiosperm divergence times: a phylogenetic analysis of genome-scale data sets. *LERN 2014*. London, UK — *Best poster award winner*.
- **Barba-Montoya J**, dos Reis M, Yang Z. Angiosperm divergence times: a phylogenetic analysis of genome-scale data sets. *15th Young Systematists' Forum 2013*. Natural History Museum, London, UK.

Workshop and Professional Development

- **March 2018: NERC Short Course — Taxonomic Principles and Tools in Botanical Research**. NHM. London, UK.

- **Nov 2015: Dating Species Divergence Using Rocks and Clocks.** The Royal Society, London, UK.
- **Nov 2014: NERC Short Course — Species Distribution Modelling.** GEE and CBER, UCL. London, UK.
- **Nov 2014: Radiation and Extinction — Investigating Clade Dynamics in Deep Time.** The Linnean Society of London, UK.
- **May 2013: The Wellcome Trust advanced course — Computational Molecular Evolution.** EMBL-EBI, Cambridge, UK.
- **Sept 2011: Climate Change Seminar — The Climate Project Org.** México City, México.
- **Apr 2011: Advanced Course on Cactus propagation.** Botanical Garden, UNAM, Mexico City, Mexico.

Peer Review

Reviewer for: Molecular Biology and Evolution, Systematic Biology, Methods in Ecology and Evolution, Genes, and Journal of Molecular Evolution.

Reference Details

- **Prof. Ziheng Yang, FRS**
R.A. Fisher Professor of Statistical Genetics
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- **Prof. Sudhir Kumar**
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- **Dr. Mario dos Reis**
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