

Brian C. O'Meara

<http://www.brianomeara.info>

865-974-2804

bomeara@utk.edu

Dept. of Ecology and Evolutionary Biology

University of Tennessee, Knoxville

Research

I address questions in evolutionary biology through development, implementation, and application of new phylogenetic methods. These include approaches for examining the process of continuous trait evolution (rate, optimal values, and other factors), species delimitation, phylogeography, diversification analyses, biogeography, and more. I also collaborate extensively with empiricists, including some of my own students.

Education

University of California Davis: PhD (2008) in Population Biology

Harvard University: Bachelor with highest honors in Biology (2001)

Employment

2015-Present: Associate Professor, Dept. of Ecology & Evolutionary Biology, University of Tennessee, Knoxville, TN

2009-2015: Assistant Professor, Dept. of Ecology and Evolutionary Biology, University of Tennessee, Knoxville, TN

2007-2009: Postdoc, National Evolutionary Synthesis Center, Durham, NC

Publications

Papers

Schwery, O. and B. C. **O'Meara** (2016). “MonoPhy : a simple R package to find and visualize monophyly issues”. In: *PeerJ Computer Science* 2, p. e56.

O'Meara, B. C., S. D. Smith, W. S. Armbruster, L. D. Harder, C. R. Hardy, L. C. Hileman, L. Hufford, A. Litt, S. Magallon, S. A. Smith, P. F. Stevens, C. B. Fenster and P. K. Diggle (2016). “Non-equilibrium dynamics and floral trait interactions shape extant angiosperm diversity”. In: *Proceedings of the Royal Society of London B: Biological Sciences* 283.1830.

O'Meara, B. C. and J. M. Beaulieu (2016). “Past, future, and present of state-dependent models of diversification”. In: *American Journal of Botany*. 10.3732/ajb.1600012.

Beaulieu, J. M. and B. C. **O'Meara** (2016). “Detecting hidden diversification shifts in models of trait-dependent speciation and extinction”. In: *Systematic Biology*, p. syw022.

Zanne, A. E., D. C. Tank, W. K. Cornwell, J. M. Eastman, S. A. Smith, R. G. FitzJohn, D. J. McGlinn, B. C. **O'Meara**, A. T. Moles, P. B. Reich, D. L. Royer, D. E. Soltis, P. F. Stevens, M. Westoby, I. J. Wright, L. Aarssen, R. I. Bertin, A. Calaminus, R. Govaerts, F. Hemmings, M. R. Leishman, J. Oleksyn, P. S. Soltis, N. G. Swenson, L. Warman and J. M. Beaulieu (2015a). “Zanne et al. reply”. In: *Nature* 521.7552, pp. E6-E7.

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O'Meara, B. K. Graham, S. Pellis and G. Burghardt (2015). "Evolutionary models for the retention of adult? adult social play in primates: The roles of diet and other factors associated with resource acquisition". In: *Adaptive Behavior* 23.6, pp. 381-391.

Beaulieu, J. M, B. C. **O'Meara**, P. Crane and M. J. Donoghue (2015). "Heterogeneous Rates of Molecular Evolution and Diversification Could Explain the Triassic Age Estimate for Angiosperms". In: *Systematic Biology* 64.5, pp. 869-878.

Beaulieu, J. M. and B. C. **O'Meara** (2015). "Extinction can be estimated from moderately sized molecular phylogenies". In: *Evolution* 69.4, pp. 1036-1043.

Zanne, A. E, D. C. Tank, W. K. Cornwell, J. M. Eastman, S. A. Smith, R. G. FitzJohn, D. J. McGlinn, B. C. **O'Meara**, A. T. Moles, P. B. Reich, D. L. Royer, D. E. Soltis, P. F. Stevens, M. Westoby, I. J. Wright, L. Aarssen, R. I. Bertin, A. Calaminus, R. Govaerts, F. Hemmings, M. R. Leishman, J. Oleksyn, P. S. Soltis, N. G. Swenson, L. Warman and J. M. Beaulieu (2014). "Corrigendum: Three keys to the radiation of angiosperms into freezing environments". In: *Nature* 514.7522, pp. 394-394.

Williams, J, M. Taylor and B. **O'Meara** (2014). "Repeated evolution of tricellular (and bicellular) pollen". In: *American Journal of Botany* 101.4, pp. 559-571.

Jhwueng, D, S. Huzurbazar, B. C. **O'Meara** and L. Liu (2014). "Investigating the performance of AIC in selecting phylogenetic models". In: *Statistical Applications in Genetics and Molecular Biology* 13.4.

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Banbury, B. L. and B. C. **O'Meara** (2014). "Reol: R interface to the Encyclopedia of Life". In: *Ecol Evol* 4.12, pp. 2577-2583.

Zanne, A. E, D. C. Tank, W. K. Cornwell, J. M. Eastman, S. A. Smith, R. G. FitzJohn, D. J. McGlinn, B. C. **O'Meara**, A. T. Moles, P. B. Reich, D. L. Royer, D. E. Soltis, P. F. Stevens, M. Westoby, I. J. Wright, L. Aarssen, R. I. Bertin, A. Calaminus, R. Govaerts, F. Hemmings, M. R. Leishman, J. Oleksyn, P. S. Soltis, N. G. Swenson, L. Warman and J. M. Beaulieu (2013). "Three keys to the radiation of angiosperms into freezing environments". In: *Nature* 506.7486, pp. 89-92.

Stoltzfus, A, H. Lapp, N. Matasci, H. Deus, B. Sidlauskas, C. M. Zmasek, G. Vaidya, E. Pontelli, K. Cranston, R. Vos, C. O. Webb, L. J. Harmon, M. Pirrung, B. **O'Meara**, M. W. Pennell, S. Mirarab, M. S. Rosenberg, J. P. Balhoff, H. M. Bik, T. A. Heath, P. E. Midford, J. W. Brown, E. J. McTavish, J. Sukumaran, M. Westneat, M. E. Alfaro, A. Steele and G. Jordan (2013). "Phylotastic! Making tree-of-life knowledge accessible, reusable and convenient". In: *BMC Bioinformatics* 14.1, p. 158.

Soltis, D, M. Mort, M. Latvis, E. Mavrodiev, B. **O'Meara**, P. Soltis, J. Burleigh and R. De Casas (2013). "Phylogenetic relationships and character evolution analysis of Saxifragales using a supermatrix approach". In: *American Journal of Botany* 100.5, pp. 916-929.

Darrin Hulsey, C, B. Keck, H. Alamillo and B. **O'Meara** (2013). "Mitochondrial genome primers for Lake Malawi cichlids". In: *Molecular Ecology Resources* 13.3, pp. 347-353.

Beaulieu, J, B. **O'Meara** and M. Donoghue (2013). "Identifying hidden rate changes in the evolution of a binary morphological character: The evolution of plant habit in campanulid angiosperms". In: *Systematic Biology* 62.5, pp. 725-737.

Stoltzfus, A, B. **O'Meara**, J. Whitacre, R. Mounce, E. L. Gillespie, S. Kumar, D. F. Rosauer and R. A. Vos (2012). "Sharing and re-use of phylogenetic trees (and associated data) to facilitate synthesis". In: *BMC Research Notes* 5.1, p. 574.

Smith, S. and B. **O'Meara** (2012). "TreePL: Divergence time estimation using penalized likelihood for large phylogenies". In: *Bioinformatics* 28.20, pp. 2689-2690.

O'Meara, B. (2012). "Evolutionary inferences from phylogenies: A review of methods". In: *Annual Review of Ecology, Evolution, and Systematics* 43, pp. 267-285.

Beaulieu, J, D. Jhwueng, C. Boettiger and B. **O'Meara** (2012). "Modeling stabilizing selection: Expanding the Ornstein-Uhlenbeck model of adaptive evolution". In: *Evolution* 66.8, pp. 2369-2383.

Stack, J. C, L. J. Harmon and B. **O'Meara** (2011). "RBrownie: an R package for testing hypotheses about rates of evolutionary change". In: *Methods in Ecology and Evolution* 2.6, pp. 660-662.

Goff, S, M. Vaughn, S. McKay, E. Lyons, A. Stapleton, D. Gessler, N. Matasci, L. Wang, M. Hanlon, A. Lenards, A. Muir, N. Merchant, S. Lowry, S. Mock, M. Helmke, A. Kubach, M. Narro, N. Hopkins, D. Micklos, U. Hilgert, M. Gonzales, C. Jordan, E. Skidmore, R. Dooley, J. Cazes, R. McLay, Z. Lu, S. Pasternak, L. Koesterke, W. Piel, R. Grene, C. Noutsos, K. Gendler, X. Feng, C. Tang, M. Lent, S. Kim, K.

Kvilekval, B. Manjunath, V. Tannen, A. Stamatakis, M. Sanderson, S. Welch, K. Cranston, P. Soltis, D. Soltis, B. **O'Meara**, C. Ane, T. Brutnell, D. Kleibenstein, J. White, J. Leebens-Mack, M. Donoghue, E. Spalding, T. Vision, C. Myers, D. Lowenthal, B. Enquist, B. Boyle, A. Akoglu, G. Andrews, S. Ram, D. Ware, L. Stein and D. Stanzione (2011). "The iPlant collaborative: Cyberinfrastructure for plant biology". In: *Frontiers in Plant Science* 2.JUL.

Abercrombie, J, B. **O'Meara**, A. Moffatt and J. Williams (2011). "Developmental evolution of flowering plant pollen tube cell walls: Callose synthase (CalS) gene expression patterns". In: *EvoDevo* 2.1.

O'Meara, B. (2010). "New heuristic methods for joint species delimitation and species tree inference". In: *Systematic Biology* 59.1, pp. 59-73.

Collar, D, J. Schulte, B. **O'Meara** and J. Losos (2010). "Habitat use affects morphological diversification in dragon lizards". In: *Journal of Evolutionary Biology* 23.5, pp. 1033-1049.

Smith, S. and B. **O'Meara** (2009). "Morphogenera, monophyly, and macroevolution". In: *Proceedings of the National Academy of Sciences of the United States of America* 106.36.

Collar, D, B. **O'Meara**, P. Wainwright and T. Near (2009). "Piscivory limits diversification of feeding morphology in centrarchid fishes". In: *Evolution* 63.6, pp. 1557-1573.

O'Meara, B, A. Cécile, M. Sanderson and P. Wainwright (2006). "Testing for different rates of continuous trait evolution using likelihood". In: *Evolution* 60.5, pp. 922-923.

Driskell, A, C. Ané, J. Burleigh, M. McMahon, B. **O'Meara** and M. Sanderson (2004). "Prospects for building the tree of life from large sequence databases". In: *Science* 306.5699, pp. 1172-1174.

Farrell, B, A. Sequeira, B. **O'Meara**, B. Normark, J. Chung and B. Jordal (2001). "The evolution of agriculture in beetles (Curculionidae: Scolytinae and Platypodinae)". In: *Evolution* 55.10, pp. 2011-2027.

Book Chapters

O'Meara, B. and J. Beaulieu (2014). "Modelling stabilizing selection: The attraction of ornstein-uhlenbeck models". In: *Modern Phylogenetic Comparative Methods and their Application in Evolutionary Biology*, pp. 381-393.

Beaulieu, J. and B. **O'Meara** (2014). "Hidden markov models for studying the evolution of binary morphological characters". In: *Modern Phylogenetic Comparative Methods and their Application in Evolutionary Biology*, pp. 395-408.

Teaching

University courses

I created a course on macroevolution targeted at upper level undergraduate and graduate students: we cover diversification, symbiosis, game theory, and more. I have also taught large introductory courses and small discussion seminars. In Spring 2016, as part of an NSF CAREER grant, I started a mixed online and in person course on phylogenetic methods. It is being revised to be taught again in Spring 2017. Note that the "HOFF joint lab group discussion" was a collaborative lab group meeting of the Hulsey-O'Meara-Fordyce-Fitzpatrick labs.

| Year | Semester | Course Number | Topic | Enrollment |
|------|----------|---------------|---------------------------------|--------------------------------|
| 2016 | Spring | Biology150 | Introductory biology | 235 |
| 2016 | Spring | EEB603 | PhyloMeth | 9 enrolled, plus dozens online |
| 2015 | Fall | EEB464 | Macroevolution | 27 |
| 2015 | Fall | EEB607 | Phyloseminar discussion | 10 |
| 2015 | Spring | EEB602 | Phyloseminar discussion | 13 |
| 2015 | Spring | EEB607 | HOFF joint lab group discussion | 8 |
| 2014 | Fall | EEB464 | Macroevolution | 28 |
| 2014 | Fall | EEB504 | HOFF joint lab group discussion | 9 |
| 2014 | Fall | EEB511 | Graduate student core | 12 |
| 2014 | Fall | EEB607 | Phyloseminar discussion | 15 |
| 2014 | Spring | Biology130 | Introductory biology | 94 |
| 2014 | Spring | EEB602 | Phyloseminar discussion | 24 |

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|------|--------|------------|---------------------------------|-----|
| 2014 | Spring | EEB607 | HOFF joint lab group discussion | 6 |
| 2013 | Fall | EEB464 | Macroevolution | 30 |
| 2013 | Fall | EEB504 | HOFF joint lab group discussion | 11 |
| 2013 | Fall | EEB511 | Graduate student core | 19 |
| 2013 | Spring | EEB607 | HOFF joint lab group discussion | 8 |
| 2012 | Fall | EEB464 | Macroevolution | 22 |
| 2012 | Fall | EEB504 | HOFF joint lab group discussion | 5 |
| 2012 | Fall | EEB511 | Graduate student core | 14 |
| 2012 | Spring | Biology130 | Introductory biology | 206 |
| 2011 | Fall | EEB464 | Macroevolution | 24 |
| 2011 | Fall | EEB504 | HOFF joint lab group discussion | 7 |
| 2011 | Fall | EEB503 | EEB departmental seminar | 44 |
| 2011 | Fall | EEB511 | Graduate student core | 12 |
| 2011 | Spring | EEB503 | EEB departmental seminar | 35 |
| 2011 | Spring | EEB607 | Speciation discussion | 9 |
| 2010 | Fall | EEB511 | Graduate student core | 8 |
| 2010 | Spring | EEB607 | Speciation discussion | 13 |
| 2010 | Spring | EEB409 | Macroevolution | 13 |

Workshops

I organize and/or participate in numerous workshops or tutorials.

| Year | Location | Topic | Role |
|-------------|-----------------------|--|-------------------------|
| 2016 | Knoxville, TN | Evolutionary Quantitative Genetics workshop at NIMBioS | Instructor |
| 2015 | Ann Arbor, MI | Comparative methods in R, SSB satellite meeting | Organizer/instructor |
| 2015 | Knoxville, TN | Evolutionary Quantitative Genetics workshop at NIMBioS | Instructor |
| 2015 | Guaruja, Brazil | SSB-sponsored phylogeography workshop at Evolution meetings | Instructor |
| 2014 | Knoxville, TN | Evolutionary Quantitative Genetics workshop at NIMBioS | Instructor |
| 2014 | Knoxville, TN | Computing in the Cloud NIMBioS Tutorial | Co-organizer/instructor |
| 2014 | Columbus, OH | PHRAPL workshop | Co-organizer/Instructor |
| 2013 | Lausanne, Switzerland | Markov processes in phylogenetics | Instructor |
| 2013 | Vienna, Austria | eFlower Summer School | Remote instructor |
| 2013 | Knoxville, TN | Evolutionary Quantitative Genetics workshop at NESCent | Instructor |
| 2010 | Knoxville, TN | Fast, Free Phylogenies: HPC for Phylogenetics NIMBioS Tutorial | Organizer/instructor |
| 2010 | Göteborg, Sweden | Species delimitation | Remote instructor |
| 2008 | Durham, NC | Computational phyloinformatics at NESCent | Instructor |
| 2008 | Bodega Bay, CA | Bodega Bay Workshop in Applied Phylogenetics | Instructor |
| 2007 | Bodega Bay, CA | Bodega Bay Workshop in Applied Phylogenetics | Instructor |
| 2007 | Davis, CA | Paleontology and its relevance to neontologists | Instructor |
| 2006 | Bodega Bay, CA | Bodega Bay Workshop in Applied Phylogenetics | Instructor |
| 2006 | Davis, CA | Model selection workshop | Organizer |
| 2005 | Bodega Bay, CA | Bodega Bay Workshop in Applied Phylogenetics | Instructor |

Funding

This is all in addition to other **funding my students have gotten** (NSF EAPSI grant, fellowships from

NIMBioS and PEER (an NIH-funded program at UTK), Google Summer of Code funding), **funding for workshops or working groups** (from NIMBioS and the Society for Systematic Biologists), and **funding I got before my faculty position** (NESCent postdoctoral fellowship, NSF DDIG, NSF GRF, and various internal grants at UC Davis).

| Year | Title | Funder | Amount |
|------|---|----------------------|--------|
| 2014 | R interface to Encyclopedia of Life (Rubenstein Fellowship) | Encyclopedia of Life | 50000 |
| 2020 | CAREER: Reducing barriers for comparative methods (PI) | NSF | 738000 |
| 2011 | iPlant: Trait evolution group, year 1 | iPlant | 132345 |
| 2012 | iPlant: Trait evolution group, year 2 | iPlant | 138590 |
| 2013 | rPlant | iPlant | 98252 |
| 2017 | Population genetics-based codon models | NSF | 470000 |
| 2016 | Historical naming traditions and cryptic speciation bias biodiversity estimates in transatlantic agaric fungi | NSF | 393074 |
| 2016 | Collaborative Research: Phylogeographic Inference Using Approximated Likelihoods | NSF | 340000 |
| 2018 | Collaborative Research: ABI Development: An open infrastructure to disseminate phylogenetic knowledge | NSF | 148101 |

Presentations

Bold indicates presentation was delivered by me; otherwise, I was a coauthor. Also see various workshops under teaching.

September 2015: Talk on heterogeneity at Texas A&M

June 2014: Talk on floral evolution at Evolution 2014 meeting; co-lead author was Stacey Smith, coauthors were W SArmbruster, L Harder, C Hardy, L Hileman, L Hufford, A Litt, S Magallon, S Smith, P Stevens, C Fenster, P Diggle.

June 2014: Talk on phylogeography at Evolution 2014 meeting; lead author and speaker was Nathan Jackson, other authors were A. Garcia, B. Carstens, and B. O'Meara.

June 2014: Talk on biogeography at Evolution 2014; lead author and speaker was Katie Massana (grad student), coauthors were J. Beaulieu, B. O'Meara, and N. Matzke.

June 2014: Talk on Hawaiian island plant immigration at Evolution 2014; lead author and speaker was Jeremy Beaulieu, coauthor was Brian O'Meara.

May 2014: Smithsonian Phylopizza

June, 2013: Symposium talk on species delimitation, Evolution meetings

Aug. 2012: Invited talk on comparative methods, Institute of Bioinformatics, U. of Georgia

June, 2012: Symposium talk on ABC and comparative methods, Evolution meetings

March, 2011: Phyloseminar talk on ABC and comparative methods. Apple Keynote and PDF.

May, 2010: Talk on phylogenetics and iPToL at iPlant meeting in Las Vegas

April, 2010: Invited talk on species delimitation at Louisiana State University

Nov., 2009: Talk at NIMBios about species delimitation and species tree inference

Mar., 2009: Talk to UT Knoxville EEB

June, 2008: Talk at Evolution 2008 in Minnesota

June, 2008: Poster at Evolution 2008 in Minnesota

June, 2008: Invited Joel Keizer Prize in Theoretical Biology lecture at University of California, Davis

May, 2008: Invited symposium talk at Interface 2008 [statistics conference] in NC

April, 2008: Invited talk to the Organismic and Evolutionary Biology department at Harvard U.

Jan., 2008: Invited symposium talk at Society for Integrative and Comparative Biology meeting in TX

Oct., 2007: Invited talk at Duke Systematics Discussion Group

Oct., 2007: Talk at NESCent brown bag lunch series

June, 2007: Exit seminar

June, 2006: Talk at Evolution 2006 in NY

Feb., 2006: Poster at CIPRES all hands meeting in TX

July, 2005: Talk at CIPRES-funded graduate student meeting in NM

June, 2005: Talk on Brownie at Evolution meetings in Alaska.

Dec, 2004: Presentation at the Bay Area Biosystematists meeting

Dec., 2001: Talk at Entomology Society of America national meeting in CA

June, 2001: Poster at Evolution 2001 in TN

Dec., 2000: Poster at the Entomology Society of America national meeting in Canada