

JEREMY M. BEAULIEU

Curriculum Vitae

Address: Department of Biological Sciences
University of Arkansas
601 Science Engineering (SCEN)
Fayetteville, AR 72701-1201

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EDUCATION

2007-2012 Ph.D. in Ecology and Evolutionary Biology, Yale University, Dissertation title:
The evolution of campanulid angiosperms
Awarded the John Spangler Nicholas Prize for best dissertation in biology
Advisor: Michael J. Donoghue

2005-2007 M.S. in Biology, California Polytechnic State University, San Luis Obispo, Thesis
title: *Searching for the phenotypic significance of plant genome size variation*
Advisor: Charles A. Knight

2002-2004 B.S., Ecology and Systematic Biology, California Polytechnic State University,
San Luis Obispo

EMPLOYMENT

2017-Present Assistant Professor, University of Arkansas

2015-Present Postdoctoral Fellow, University of Tennessee, Knoxville
Mentors: Brian C. O'Meara and Michael Gilchrist

2012-2015 Postdoctoral Fellow, National Institute for Mathematical and Biological
Synthesis (NIMBioS), University of Tennessee, Knoxville
Mentors: Brian C. O'Meara and James A. Fordyce

2005-2007 Laboratory instructor, various introductory biology courses, California
Polytechnic State University, San Luis Obispo

2004-2006 Resource Ecologist, California State Parks

TEACHING EXPERIENCE

Instructor – Graduate Core Course; U. of Tennessee, Knoxville Fall 2013

Guest Lecturer – Macroevolution; U. of Tennessee, Knoxville 2012-2013

Teaching Assistant – Principles of evolution, ecology, behavior; Yale Spring 2009

Lab instructor – Principles of evolution, ecology, behavior lab course; Yale Spring 2008

Lab instructor – Introduction to Organismal Form and Function; Cal Poly Spring 2006

Lab instructor – Ecology and Evolution; Cal Poly Fall 2006

Lab instructor – Introductory biology for non-majors; Cal Poly; Fall/Winter 2005-2006

AWARDS AND APPOINTMENTS

2013 John Spangler Nicholas Prize for Outstanding Doctoral Student, Yale

2011 AAAS/Science Program for Excellence in Science

2007 Outstanding graduate student, Biological Sciences Department, Cal Poly

2007 Best student presentation, California Botanical Society Meeting

FUNDING

iPlant Collaborative – Assembling the Tree of Life to enable Plant Science, 2009-2011 – \$150,000
NIMBioS postdoctoral fellowship, 2012-2014 – \$140,000, P.I.

OTHER FUNDED ACTIVITIES

NCEAS – *Member Working group on Linking Phylogenetic history, plant traits, and ecological processes at multiple scales*
NESCent – *Member Working group on Tempo and mode of plant trait evolution: synthesizing data from extant and extinct taxa*

POSTDOCTORAL ASSOCIATES

Daniel Caetano (2017-present)

GRADUATE STUDENTS

UNIVERSITY OF ARKANSAS (4 COMMITTEES)
James Boyko (1st year)

PROFESSIONAL SOCIETIES

Society for the Study of Evolution (SSE)

PUBLICATIONS

My 45+ papers have been cited over 2800 times since 2010 and have an H-index of 27

*Equal contribution; †Invited contribution; §Undergraduate

2017

BEAULIEU, J.M., B.C. O'MEARA, R. ZARETZKI, C. LANDERER, J.J. CHAI, AND M. GILCHRIST (2017). Population genetics based phylogenetics under stabilizing selection for an optimal amino acid sequence: a nested modeling approach. *bioRxiv* <https://doi.org/10.1101/120238>.

NAKOV, T., J.D. BOYKO, A.J. ALVERSON, AND J.M. BEAULIEU (2017). Models with unequal transition rates favor marine origins of cyanobacteria and photosynthetic eukaryotes. *Proceedings of the National Academy of Sciences of the USA* In press.

†BEAULIEU, J.M., AND B.C. O'MEARA (2017). Can we build it? Yes we can, but should we use it?: Assessing the quality and value of a very large phylogeny of campanulid angiosperms. *American Journal of Botany*, In press.

SIEPIELSKI, A.M, AND J.M. BEAULIEU (2017). Adaptive evolution to novel predators facilitates the evolution of damselfly species range. *Evolution* 71: 974-984.

LESLIE, A.B., J.M. BEAULIEU, AND S. MATTHEWS. (2017). Variation in seed size is structured by dispersal syndrome and cone morphology in conifers and other nonflowering seed plants. *New Phytologist* 216: 429-437.

NAKOV, T., J.M. BEAULIEU, AND A.J. ALVERSON (2017). Insights into global planktonic diatom diversity: comparisons between phylogenetically meaningful units that account for time. *bioRxiv* <https://doi.org/10.1101/167809>.

2016

O'MEARA, B.C., AND J.M. BEAULIEU. (2016). Past, future, and present of state-dependent models of diversification. *American Journal of Botany* 103: 1-4.

BEAULIEU, J.M., AND B.C. O'MEARA. (2016). Detecting hidden diversification shifts in models of trait-dependent speciation and extinction. *Systematic Biology* 65: 583-601.

2015

BEAULIEU, J.M., AND B.C. O'MEARA. (2015). Detecting hidden diversification shifts in models of trait-dependent speciation and extinction. *Systematic Biology* In press. doi: <http://dx.doi.org/10.1101/016386>

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. *Systematic Biology* 64:869-878.

T.J. NEAR, A. DORNBURG, R.C. HARRINGTON, C. OLIVEIRA, T.W. PIETSCH, C.E. THACKER, T.P. SATOH, E. KATAYAMA, P.C. WAINWRIGHT, J.T. EASTMAN, AND J.M. BEAULIEU. (2015) Identification of the notothenioid sister lineage illuminates the biogeographic history of an Antarctic adaptive radiation. *BMC Evolutionary Biology* 15:109.

LESLIE, A.B., J.M. BEAULIEU, P.R. CRANE, P. KNOPF, AND M.J. DONOGHUE. (2015). Trait integration and macroevolutionary patterns in the pollination biology of conifers. *Evolution* 69:1573-1583.

BEAULIEU, J.M., AND B.C. O'MEARA. (2015). Extinction can be estimated from moderately sized molecular phylogenies. *Evolution* 69:1036-1043.

DORNBURG A., J. MOORE, J.M. BEAULIEU, R.I. EYTAN, AND T.J. NEAR. (2015). The impact of shifts in marine biodiversity hotspots on patterns of range evolution: Evidence from Holocentridae (squirrelfishes and soldierfishes). *Evolution* 69:146-161.

2014

†BEAULIEU, J.M., AND B.C. O'MEARA. (2014). Hidden Markov models for studying the evolution of binary morphological character. In “*Modern Phylogenetic Comparative Methods and their Application in Evolutionary Biology - Concepts and Practice*” edited by L. Z. Garamszegi.

O'MEARA, B.C., AND J.M. BEAULIEU. (2014). Modeling stabilising selection: the attraction of Ornstein-Uhlenbeck models. In “*Modern Phylogenetic Comparative Methods and their Application in Evolutionary Biology - Concepts and Practice*” edited by L. Z. Garamszegi.

LESLIE, A.B.*, J.M. BEAULIEU*, P.R. CRANE, AND M.J. DONOGHUE. (2014). Cone size is related to branching architecture in conifers. *New Phytologist* 203:119-1127

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. AARSSSEN, R.I. BERTIN, A. CALAMINUS, R. GOVAERTS, F. HEMMINGS, M.R. LEISHMAN, J. OLEKSYN, P.S. SOLTIS, N.G. SWENSON, L. WARMON, AND J.M. BEAULIEU. (2014). Into the cold: three keys to the radiation of angiosperms into freezing environments. *Nature* 506: 89-92.

CORNWELL, W.K., M. WESTOBY, D.S. FALSTER, R.G. FITZJOHN, B.C. O'MEARA, D.J. MCGLINN, J.M. EASTMAN, A.T. MOLES, P.B. REICH, D.C. TANK, I.J. WRIGHT, L. AARSSSEN, J.M. BEAULIEU, R.M. KOOYMAN, M.R. LEISHMAN, U. NIINEMETS, J. OLEKSYN, A. ORDONEZ, M.W. PENNELL, D.L. ROYER, S.A. SMITH, P.F. STEVENS, L. WARMAN, P. WILF, E.T. MILLER, AND A.E. ZANNE. (In revision). Functional distinctiveness of major plant lineages. *Journal of Ecology* 102: 345-356.

OLIVER, J.C., J.M. BEAULIEU, L.F. GALL, W.H. PIEL, AND A. MONTEIRO (2014) Nymphalid eyespot serial homologues originate as a few individualized modules. *Proceedings of the Royal Society B.* 281: 20133262

2013

- LESLIE, A.B. *, **J.M. BEAULIEU***, P.R. CRANE, AND M.J. DONOGHUE. (2013). Explaining the distribution of breeding and dispersal syndromes in conifers. *Proceedings of the Royal Society B*. **280**: 20131812.
- BEAULIEU, J.M.**, AND M.J. DONOGHUE. (2013). Fruit evolution and diversification in campanulid angiosperms. *Evolution*. **67**: 3132-3144.
- BEAULIEU, J.M.**, D.C. TANK, AND M.J. DONOGHUE. (2013). A Southern Hemisphere origin for campanulid angiosperms, with traces of the break-up of Gondwana. *BMC Evolutionary Biology* **13**: 80
- BEAULIEU, J.M.**, B.C. O'MEARA, AND M.J. DONOGHUE. (2013). Identifying hidden rate changes in the evolution of a binary morphological character: the evolution of plant habit in campanulid angiosperms. *Systematic Biology* **62**: 725-737.
- BOSSU, C.M., **J.M. BEAULIEU**, P.A. CEAS, AND T.J. NEAR. (2013). Explicit tests of paleodrainage connections of southeastern North America and the historical biogeography of Orangethroat Darters (Percidae: Etheostoma: Ceasia). *Molecular Ecology* **22**:5397-5417.
- LAPIEDRA, O, D. SOL, S. CARRANZA, AND **J.M. BEAULIEU**. (2013). Behavioural changes and the adaptive diversification of pigeons and doves. *Proceedings of the Royal Society B* **280**: 2012-2893

2012

- BEAULIEU, J.M.**, D-J. JHUENG, AND B.C. O'MEARA. (2012). Modeling stabilizing selection: Expanding the Ornstein-Uhlenbeck model of adaptive evolution. *Evolution*. **66**: 2369-2383
- [†]**BEAULIEU, J.M.**, R.H. REE, J. CAVENDER-BARES, G.D. WEIBLEN, AND M.J. DONOGHUE. (2012). Synthesizing phylogenetic knowledge for ecological research. *Ecology* **93**: S4-S13.
- LESLIE, A.B. *, **J.M. BEAULIEU***, H. RAI, P.R. CRANE, M.J. DONOGHUE, AND S. MATTHEWS. (2012). Hemisphere-scale differences in conifer evolutionary dynamics. *Proceedings of the National Academy of Sciences of the USA* **109**: 16217-16221.
- [§]SCHMERLER, S., W.L. CLEMENT, **J.M. BEAULIEU**, D. CHATELET, L. SACK, M.J. DONOGHUE, AND E.J. EDWARDS. (2012). Evolution of leaf form correlates with tropical-temperate transitions in *Viburnum* (Adoxaceae). *Proceedings of the Royal Society B* **279**: 3905–3913.
- AVOLIO, M.L., **J.M. BEAULIEU**, E. LO, AND M.D. SMITH. (2012). Measuring genetic diversity in ecological studies. *Plant Ecology* **213**: 1105-1115.
- AVOLIO, M.L., **J.M. BEAULIEU**, M.D. SMITH. Genetic diversity of a dominant C4 grass is altered with increased precipitation variability. *Oecologia*. **171**: 437-442.
- FRANKS, P.J., R.P. FRECKLETON, **J.M. BEAULIEU**, I.J. LEITCH, AND D.J. BEERLING. (2012). Megacycles of atmospheric CO2 concentration correlate with fossil plant genome size. *Philosophical Transactions of the Royal Society, B*. **367**: 556-564.

2011

- SMITH, S.A., **J.M. BEAULIEU**, A. STAMATAKIS, AND M.J. DONOGHUE. (2011). Understanding angiosperm diversification using small and large phylogenetic trees. *American Journal of Botany* **98**: 404-414.
- DORNBURG, A., **J.M. BEAULIEU**, J.C. OLIVER, AND T.J. NEAR. (2011). Integrating fossil preservation biases in the selection of calibration for molecular divergence time estimation. *Systematic Biology* **60**: 519-527.

2010

- *SMITH, S.A., ***J.M. BEAULIEU**, AND M.J. DONOGHUE. (2010). An uncorrelated relaxed-clock analysis suggests an earlier origin for flowering plants. *Proceedings of the National Academy of Sciences of the USA* **107**: 5897-5902.
- †**BEAULIEU, J.M.** (2010). The right stuff: evidence for an ‘optimal’ genome size in a wild grass population. *New Phytologist* **187**: 883-885.
- LEITCH I.J., **J.M. BEAULIEU**, M.W. CHASE, A.R. LEITCH, AND M.F. FAY. (2010). Genome size dynamics and evolution in monocots. *Journal of Botany* doi:10.1155/2010/862516.
- †**BEAULIEU, J.M.**, S.A. SMITH, AND I.J. LEITCH. (2010). On the tempo of genome size evolution in angiosperms. *Journal of Botany* doi:10.1155/2010/989152.
- KNIGHT, C.A., R.B. CLANCY, L. GOTZENBERGER, L. DANN, AND **J.M. BEAULIEU**. (2010). On the relationship between pollen size and genome size. *Journal of Botany* doi:10.1155/2010/612017.

2009

- *SMITH, S.A. AND ***J.M. BEAULIEU**. (2009). Life history influences rates of climatic niche evolution in flowering plants. *Proceedings of the Royal Society B*. **276**: 4345-4352.
- SMITH, S.A., **J.M. BEAULIEU**, AND M.J. DONOGHUE. (2009). Mega-phylogeny approach for comparative biology: an alternative to supertree and supermatrix approaches. *BMC Evolutionary Biology* **9**: 37.
- LYSAK, M.A., M.A. KOCH, **J.M. BEAULIEU**, A. MEISTER, AND I.J. LEITCH. (2009). The dynamic ups and downs of genome size evolution in Brassicaceae. *Molecular Biology and Evolution* **26**: 85-98.

2008

- BEAULIEU, J.M.**, I.J. LEITCH, §S. PATEL, §A. PENDHARKAR, AND C.A. KNIGHT. (2008). Genome size is a strong predictor of cell size and stomatal density in angiosperms. *New Phytologist* **179**: 975-986.
- KNIGHT, C.A. AND **J.M. BEAULIEU**. (2008). Genome size scaling through phenotype space. *Annals of Botany* **6**: 759-766.
- CONNOLLY, J.A., M.J. OLIVER, **J.M. BEAULIEU**, C.A. KNIGHT, L. TOMANEK, AND M.A. MOLINE. (2008). The correlated evolution of genome size and cell volume in diatoms (Bacillariophyceae). *Journal of Phycology* **44**: 124-131.

2007

- BEAULIEU, J.M.**, A.T. MOLES, I.J. LEITCH, M.D. BENNETT, J.B. DICKIE, AND C.A. KNIGHT. (2007). Correlated evolution of genome size and seed mass. *New Phytologist*. **173**: 422-437.
- BEAULIEU, J.M.**, I.J. LEITCH, AND C.A. KNIGHT. (2007). Genome size evolution in relation to leaf strategy and metabolic rates revisited. *Annals of Botany* **99**: 495-505.
- LEITCH, I.J., **J.M. BEAULIEU**, L. HANSEN, K. CHEUNG, M. LYSAK, AND M.F. FAY. (2007). Punctuated genome size evolution in Liliaceae. *Journal of Evolutionary Biology* **20**: 2296-2308.

CONTRIBUTED DATA

- TANK, D.C., J.M. EASTMAN, **J.M. BEAULIEU**, W.K. CORNWELL, P.F. STEVENS, A.E. ZANNE. (2013). Taxonomic lookup table containing clade-level mappings for 15,363 genera of Spermatophyta. Data from: Three keys to the radiation of angiosperms into freezing environments. *Nature* doi:10.5061/dryad.63q27/1.

TANK, D. C., J.M. EASTMAN, **J. M. BEAULIEU**, AND S.A. SMITH. (2013). Phylogenetic resources. Data from: Three keys to the radiation of angiosperms into freezing environments. *Nature* doi:10.5061/dryad.63q27/3.

SCIENTIFIC SOFTWARE

selac – Sets up models of selection on amino acids and/or codons by merging principles of population genetics with phylogenetic.

hisse – Sets up and executes a HiSSE model (Hidden State Speciation and Extinction) on a phylogeny and character sets to test for hidden shifts in trait dependent rates of diversification.

OUwie – Calculates and compares rate differences of continuous character evolution under a new and expanded set of Ornstein-Uhlenbeck-based models that allow the strength of selection and drift to vary across selective regimes.

CORHMM – Fits a generalized form of the covarion model that paints distinct transition rate classes on different portions of a phylogeny by treating rate classes as “hidden” states in a Markov process.

rPlant – An R interface to the computational resources made available by the iPlant Discovery Environment (DE)

PRESENTATIONS

Selected contributed abstracts

†Invited contribution

- 2017 †*Detecting hidden rate shifts, Type I errors, and revising our concept of angiosperm innovations using trait-dependent models of diversification*, International Botanical Congress, Shenzhen, China
- 2014 †*Exploring heterogeneity in binary character evolution* Botany meeting, Boise, ID
- 2014 *Estimating how contemporary taxa will evolve in the future, to understand how island communities were assembled in the past* Evolution meeting, Raleigh, NC
- 2013 †*Exploring the evolution of a very old and widespread angiosperm clade 60th* Systematics Symposium at the Missouri Botanical Gardens, St. Louis, MO
- 2013 *Identifying hidden rate changes in the evolution of a binary morphological character* Evolution meeting, Snowbird, UT
- 2011 †*Understanding biases in molecular dating analyses: lessons from campanulid angiosperms* International Botanical Congress (IBC), Melbourne, Australia
- 2010 *A Southern Hemisphere origin for campanulid angiosperms, and traces of the break-up of Gondwana* Evolution meeting, Portland, OR
- 2009 *Angiosperm radiations aren't where we thought they were, but they're close!* Evolution meeting, Moscow, ID
- 2007 *Genome size effects decrease with increasing phenotypic scale across flowering plants* California Botanical Society Meeting, San Luis Obispo, CA

Selected Invited Departmental Seminars

- | | | |
|----------|------|-----------------------------------------------------------|
| March | 2017 | Department of EEB, University of Toronto |
| November | 2016 | Department of Biological Sciences, University of Idaho |
| March | 2016 | Department of Biological Sciences, Rutgers, Newark |
| March | 2016 | Department of Biological Sciences, University of Arkansas |
| March | 2016 | Department of Biological Sciences, UMASS Boston |
| March | 2016 | Department of Biological Sciences, Cal Poly, SLO |
| February | 2016 | Department of Plant Sciences, University of Georgia |
| January | 2016 | Department of EEB, University of Tennessee, Knoxville |

November 2015 Department of Biological Sciences, Eastern Kentucky University
January 2015 Department of EEB, U.C. Los Angeles
May 2014 Department of OEB, Harvard University
March 2014 Department of OEB, Harvard University
November 2013 Department of EEOB, Iowa State University
October 2012 Department of Botany, Field Museum of Natural History
Chicago, IL
August 2012 Department of Ecology and Evolutionary Biology, Yale University

SERVICE

2013 Volunteer for Darwin Day Tennessee, U. of Tennessee, Knoxville.
2006-2007 Graduate Coordinating Committee (GCC), Cal Poly, San Luis Obispo
Reviewer for National Science Foundation (NSF)
Reviewer for *American Journal of Botany*, *American Naturalist*, *Annals of Botany*, *Ecology*,
Evolution, *International Journal of Plant Sciences*, *Journal of Ecology*, *Methods in Ecology and*
Evolution, *Molecular Biology and Evolution*, *Nature*, *New Phytologist*, *Oecologia*, *PLoS*,
Science, *Systematic Biology*, and others.

REFERENCE

Dr. Michael J. Donoghue (Ph.D Advisor)
G. Evelyn Hutchinson Professor
Department of Ecology and Evolutionary
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New Haven, CT 06520-8118
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Professor Sir Peter Crane (collaborator)
Carl W. Knobloch Jr., Dean
School of Forestry and Environmental
Studies
Yale University
195 Prospect Street
New Haven, CT 06511
peter.crane@yale.edu

Dr. Brian C. O'Meara (Postdoctoral mentor)
Associate Professor
Department of Ecology and Evolutionary
Biology
University of Tennessee
569 Dabney Hall
Knoxville, TN 37996-1610
bomeara@utk.edu

Dr. David Tank (collaborator)
Associate Professor
Department of Biological Sciences
University of Idaho
875 Perimeter MS 3051
Moscow, ID 83844-3051
dtank@uidaho.edu