

## Stephen A. Smith

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### Education

Ph.D. Evolutionary Biology, Yale University, Major Advisor: Michael Donoghue, 2008

M.S. Evolutionary Biology, Yale University, 2005

B.A. Liberal Arts, Sarah Lawrence College, 2003

### Professional Experience

Assistant Professor 2012–  
University of Michigan Ann Arbor, MI  
Phylogenetic methods and theory, especially large scale. Evolutionary and especially biogeographic methods and analyses.

iPlant Postdoctoral Researcher 2010–2011  
Casey Dunn & Alexandros Stamatakis Brown University  
Developing tools for constructing large phylogenetic datasets, comparative analyses, and examining the utility of new sequencing technologies for phylogenetics.

NESCent Postdoctoral Fellow 2008–2010  
NESCent Duke University  
National Evolutionary Synthesis Center postdoctoral fellow examining the evolution of angiosperms with comparative analyses and large datasets.

CIPRES Graduate Student 2004–2008  
Michael Donoghue Yale University  
CIPRES: Cyberinfrastructure for Phylogenetic Research graduate student collaborating on database and other subprojects.

Programmer 2004–2006  
Tree of Life projects Yale University  
TOLKIN: Tree of Life Knowledge and Information Network.

### Teaching Experience

*Instructor* – Bodega Bay Workshop in Applied Phylogenetics, Spring 2009

*Instructor* – NESCent Computational Phyloinformatics Course: Java Component, Summer 2007

*Lecturer* – MB&B 230 Rainforest Expedition and Laboratory: Phyloinformatics Workshop, Yale University, Yale University, Spring 2007 and Summer 2008

*Teaching Assistant* – Plant Diversity and Evolution, Yale University, 2004-2007

### Publications

## 2012

Grass Phylogeny Working Group II. 2012. New grass phylogeny resolves deep evolutionary relationships and discovers C4 origins. *New Phytologist*. 193: 304-312.

## 2011

Izquierdo-Carrasco F, **S. A. Smith**, A. Stamatakis. 2011. Algorithms, Data Structures, and Numerics for Likelihood-based Phylogenetic Inference of Huge Trees. *BMC Bioinformatics*. 12(1):470.

**Smith, S. A.**, N. G. Wilson, F. E. Goetz, C. Feehery, S. C. S. Andrade, G. W. Rouse, G. Giribet, C. W. Dunn. 2011. Resolving the evolutionary relationships of molluscs with phylogenomic tools. *Nature*. doi:10.1038/nature10526.

Siebert, S., M. Robinson, S. Tintori, F. Goetz, R. Helm, **S. A. Smith**, N. Shaner, S. Haddock, C. Dunn. 2011. Differential Gene Expression in the Siphonophore *Nanomia bijuga* (Cnidaria) Assessed with Multiple Next-Generation Sequencing Workflows. *PLoS ONE*. e22953. doi:10.1371/journal.pone.0022953

Soltis, D. E., **S. A. Smith**, N. Cellinese, et al. 2011. Angiosperm phylogeny: 17 genes, 640 taxa. *American J. of Botany*. 98: 704

**Smith, S. A.**, J. Beaulieu, A. Stamatakis, & M. J. Donoghue. 2011. Understanding angiosperm diversification using large and small phylogenies. *American J. of Botany*. 98: 404-414.

## 2010

Goldberg, E. E., J. R. Kohn, R. Lande, K. A. Robertson, **S. A. Smith** & B. Iqic. 2010. Species Selection Maintains Self-Incompatibility. *Science*. 328: 587-591.

**Smith, S. A.** & M. J. Donoghue. 2010. Informing large-scale biogeography with niche models in *Lonicera* (Caprifoliaceae, Dipsacales) subgenus *Caprifolium*. *Systematic Biology*. 590: 322-341.

Edwards, E., C. P. Osborne, C. A. E. Stromberg, **S. A. Smith** & C4 Grasses Consortium. 2010. The Evolutionary Origins of C4 Grasslands. *Science*. 328: 587-591.

**Smith, S. A.**, J. Beaulieu & M. J. Donoghue. 2010. An uncorrelated relaxed-clock analysis suggests an earlier origin for flowering plants. *PNAS*. 107: 5897-5902.

Beaulieu, J. M., **S. A. Smith** & I. J. Leitch. 2010. On the tempo of genome size evolution in angiosperms *Journal of Botany*. doi:10.1155/2010/989152.

Bendiksby, M., T. Schumacher, G. Gussarova, J. Nais, K. Mat-Salleh, N. Sofiyanti, D. Madulid, S. A. Smith & T. Barkman. 2010. Elucidating the evolutionary history of the Southeast Asian, holoparasitic, giant-flowered Rafflesiaceae: Pliocene vicariance, morphological convergence and character displacement. *Molecular Phylogenetics and Evolution*. 57: 620-633.

Edwards, E. & **S. A. Smith**. 2010. Phylogenetic analyses reveal the shady history of C4 grasses. *PNAS*. 107: 2532-2538.

## 2009

**Smith, S. A.** & J. Beaulieu. 2009. Life history influences rates of climatic niche evolution in flowering plants. *Proc Roy Soc B*. DOI: 10.1098/rspb.2009.1176. 276: 4345-4352. (*USAToday article*)

**Smith, S. A.** & B. C. O'Meara. 2009. Morphogenera, monophyly, and macroevolution. *PNAS*. 106: E97-E98. (*in response to Jablonski & Finarelli, 2009*)

**Smith, S. A.**, J. Beaulieu & M. J. Donoghue. 2009. Mega-phylogenies for comparative biology: an alternative to supertree and supermatrix approaches. *BMC Evol Bio*. 9: 37. (*NYTimes article*)

**Smith, S. A.** 2009. Taking into account phylogenetic and divergence-time uncertainty in a parametric biogeographic analysis of the Northern Hemisphere plant clade Caprifolieae. *Journal of Biogeography*. DOI: 10.1111/j.1365-2699.2009.02160.x.

Cellinese, N., **S. A. Smith**, E. J. Edwards, S. T. Kim, R. C. Haberle, M. Avramakis & M. J. Donoghue. 2009. Historical biogeography of the endemic Campanulaceae of Crete. *Journal of Biogeography*. 36: 1253-1269.

Evans, M. E., **S. A. Smith**, R. E. Flynn & M. J. Donoghue. 2009. Climate, niche evolution, and diversification of the "bird-cage" evening primroses (*Oenothera*, sections *Anogra* and *Kleinia*). *American Naturalist*. 173: 225-240.

## 2008

**Smith, S. A.** & M. J. Donoghue. 2008. Rates of molecular evolution are linked to life history in flowering plants *Science*. 322: 86-89.

**Smith, S. A.** & C. Dunn. 2008. Phyutility: a phyloinformatics utility for trees, alignments, and molecular data. *Bioinformatics* 24: 715-716.

Ree, R. H. & **S. A. Smith**. 2008. Maximum-likelihood Inference of Geographic Range Evolution by Dispersal, Local Extinction, and Cladogenesis. *Systematic Biology* 57: 400-414.

Dunn, C. W., A. Hejnol, D. Q. Matus, K. Pang, W. E. Browne, **S. A. Smith**, et al. 2008. Broad taxon sampling improves resolution of the Animal Tree of Life in phylogenomic analyses. *Nature* 452: 745-749.

**Smith, S. A.** et al. 2008. Bioactive Endophytes Warrant Intensified Exploration and Conservation. *PLoS ONE* 3(8): e3052. (*product of Phyloinformatics Workshop*)

## 2007-older

Roulston, T. H., **S. A. Smith** & A. L. Brewster. 2007. Comparison of Pan Trap and Intensive Net Sampling Techniques for Documenting a Bee (Hymenoptera: Apiformes) Fauna. *Journal Kansas Entomological Society*. (*product of REU*)

Moore, B. R., **S. A. Smith** & M. J. Donoghue. 2006. Increasing Data Transparency and Estimating Phylogenetic Uncertainty in Supertrees: Approaches Using Nonparametric Bootstrapping.

*Systematic Biology* 55: 662-676.

Donoghue, M. J. & **S. A. Smith**. 2004. Patterns in the assembly of temperate forests around the Northern Hemisphere. *Philosophical Transactions of the Royal Society: Biological Sciences*. 359: 1633-1644.

#### Invited Presentations

**Smith, S. A.\*<sup>1</sup>** 2011. Invited speaker for LIFE SCIENCES COLLOQUIUM (Smith College, Northampton, Massachusetts).

**Smith, S. A.\*** 2011. Invited speaker for Biology 2011 (University of Zurich, Zurich, Switzerland).

**Smith, S. A.\*** 2011. Large scale phylogenetics and the exploration of evolutionary patterns. Invited speaker for the Dept. Plant Biology (MSU, Lansing, MI)

**Smith, S. A.\*** 2010. The challenges of large scale biogeographic analyses: examples in angiosperms. (SSB Symposium: The Future of Historical biogeography: Conceptual and methodological challenges, Evolution 2010, Portland, OR).

**Smith, S. A.\*** 2009. Large-scale angiosperm phylogenies uncover broad evolutionary patterns. (A. Watson Armour Research Seminar Series, Field Museum, Chicago, IL).

**Smith, S. A.\*** 2009. Large-scale angiosperm phylogenies uncover broad evolutionary patterns. (Seminar Series, North Carolina State University, Raleigh, NC).

**Smith, S. A.\***, J. Beaulieu & M. J. Donoghue. 2009. Large-scale phylogenies uncover large-scale evolutionary patterns. (BSA Past-President's Symposium, Snowbird, UT).

**Smith, S. A.\*** 2009. Mega-phylogeny: an alternative to supertree and supermatrix approaches. (Symposium on Advances in Tree Reconstruction from Complex Data Matrices, Evolution 2009, Moscow, ID)

**Smith, S. A.\*** 2007. A novel method for estimating the rate of evolution of niches: an example from desert evening primroses (*Oenothera*, Sections *Anogra* and *Kleinia*). (Museum National d'Histoire Naturelle, Paris).

Ree, R. H.\* & **S. A. Smith**. 2007. Stochastic models of geographic range evolution and likelihood-based inference of ancestral ranges. *Origin and Evolution of Biota in Mediterranean Climate Zones*, (Zurich, Switzerland).

Donoghue, M.J.\*, **S. A. Smith**, S. Carlson, & B. Moore. 2007. Phylogenetic Biogeography: Past, Present, and Future. *Origin and Evolution of Biota in Mediterranean Climate Zones*, (Zurich, Switzerland).

Ree, R. H.\*, M. J. Donoghue, B. R. Moore & **S. A. Smith**. 2005. Likelihood-based inference of historical biogeography. *52nd Annual Systematics Symposium*, (Missouri Botanical Garden).

**Smith, S. A.\***, R. H. Ree, M. J. Donoghue & B. R. Moore. 2005. Computer Demonstration: Likelihood-based inference of historical biogeography. *52nd Annual Systematics Symposium*, (Missouri Botanical Garden).

**Smith, S. A.\*** 2004. New methods for Biogeography. *Sarah Lawrence College Science Seminar*,

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<sup>1</sup>presenter \*

(Sarah Lawrence College, NY).

Donoghue, M.J.\*, **S. A. Smith**, R. C. Winkworth, & R. Ree. 2004. Assembly of temperate deciduous forests of the Northern Hemisphere. *Plant phylogeny and the origin of major biomes*, Royal Society Scientific Discussion Meeting, (London, UK).

### Contributed Presentations

Beaulieu, J.\*, **S. A. Smith** & M. J. Donoghue. 2009. (Moscow, ID) Angiosperm Radiations Aren't Where We Thought They Were, But They're Close.

**Smith, S. A.\***, M. Evans, R. Flynn & M. J. Donoghue. 2007. (Chicago, IL) Rates of climatic niche evolution in *Oenothera* sect. *Anogra* and *Kleinia* (Onagraceae).

Cellinese, N.\*, **S. A. Smith**, E. Edwards, S. Kim, & M. J. Donoghue. 2007. (Chicago, IL) Dating the Campanulaceae: implications for the biogeography of Cretan campanulas.

Ree, R. H.\* & **S. A. Smith**. 2007. (Chicago, IL) Likelihood models for inferring the evolution of geographic ranges on phylogenetic trees.

Ree, R. H.\* & **S. A. Smith**. 2007. (Christchurch, NZ) Maximum-likelihood inference of geographic range evolution.

**Smith, S. A.\*** 2005. (Austin, TX) Likelihood methods for inference of geographic ranges.

**Smith, S. A.\***, M. J. Donoghue, R. Beaman. 2004. (Snowbird, UT) Comparison of predictive distribution modeling in a *Viburnum* species complex from Mexico and Central America. (poster)

### Current Scientific Software

*lagrange* – Biogeographic likelihood reconstruction and stochastic mapping (in collaboration with Richard Ree) - [code.google.com/p/lagrange](http://code.google.com/p/lagrange)

*pebls* – pebls evolutionary biology libraries - [code.google.com/p/pebls](http://code.google.com/p/pebls)

*PHLAWD* – (pronounced flawd) allows for the creation of large (mega) phylogenies using NCBI databases - [code.google.com/p/phlawd](http://code.google.com/p/phlawd)

*phyutility* – Phylogenetic utilities and analyses - [code.google.com/p/phyutility](http://code.google.com/p/phyutility) (over 1600 users)

*tolkin* – Tree of Life Knowledge and Information Network (in collaboration with Reed Beaman and Nico Cellinese) - [tolkin.org](http://tolkin.org)

### Service

*Mentor* – Google Summer of Code, student Nick Matzke, 2009

*Reviewer* – Science, PLoS Biology, BMC Evolutionary Biology, National Science Foundation (NSF), Systematic Biology, Molecular Phylogenetics and Evolution, Molecular Biology and Evolution, Systematic Botany, Functional Ecology, New Phytologist, and Bioinformatics.

*Panelist* – National Science Foundation (NSF)

*Advisory* – National Science Foundation (NSF)

*Organizer* – Bayesian Invasion, Bayesian Phylogenetics Conference (with B. Moore), 2006

## Honors and Awards

Scientist to Watch, "The Botanist Hacker" in the magazine The Scientist March, 2010 *link to article*  
John Spangler Nicholas prize for outstanding doctoral candidate at Yale University, 2009  
NSF Postdoctoral Research Fellowship in Biology, 2008 (declined; accepted NESCent fellowship)  
The Edward Cogan Prize for Mathematics and Science, Sarah Lawrence College, 2003  
Young Botanist of the Year, Certificate of Special Achievement, Botanical Society of America, 2003  
NSF REU Fellowship, Univ. of VA, 2002

## Funding

iPlant Collaborative – *Member* Assembling the Tree of Life to Enable the Plant Sciences  
NESCent – *Co PI* for Working group on Phylogenetics and biogeographic evolution of C4 grasses  
(with Erika Edwards)

## Other Funded Activities

CIPRES – *Graduate Student* Cyberinfrastructure for Phylogenetic Research  
NESCent – *Member* Evolution of C4 grasses catalysis meeting  
NESCent – *Collaborator* Floral Evolution Working Group  
NESCent – *Member* Northern Hemisphere Phytogeography Working Group  
NESCent – *Member* Developing an Integrative Algorithmic Method for Historical Biogeography  
Tree of Life – *Member* Angiosperms

## Collaborations

Reed Beaman (University of Florida)  
Jeremy Beaulieu (Yale University)  
Nico Cellinese (University of Florida)  
Michael Donoghue (Yale University)  
Casey Dunn (Brown University)  
Erika Edwards (Brown University)  
Margaret Evans (Yale University)  
Amaury Lambert (Ecole Normale Superieure)  
Brian Moore (University of California, Davis)  
Thomas Near (Yale University)  
Brian O'Meara (University of Tennessee)  
Richard Ree (Chicago Field Museum)  
Douglas Soltis (University of Florida)  
Pamela Soltis (University of Florida)  
Alexandros Stamatakis (Technische Universitat Munchen)

## Professional Societies

Society for the Study of Evolution  
Society of Systematic Biologists  
American Society of Plant Taxonomists

## References

Dr. Michael Donoghue (PhD advisor)  
G. Evelyn Hutchinson Professor  
Department of Ecology and Evolutionary Biology  
Yale University  
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Dr. Casey Dunn (current Postdoc advisor)  
Assistant Professor  
Department Ecology and Evolutionary Biology  
Brown University  
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Dr. Alexandros Stamatakis (current Postdoc advisor)  
Assistant Professor  
Department of Computer Science  
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Dr. Todd Vision (previous Postdoc advisor)  
Assistant Professor  
Department of Biology  
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Dr. Richard Ree (collaborator)  
Curator of Botany Field Museum of Natural History  
1400 S Lake Shore Drive  
Chicago, IL 60605  
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