Joshua K. Michener

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Education:

California Institute of Technology	Bioengineering	PhD	2012
Massachusetts Institute of Technology	Chemical Engineering	S.B.	2006
Massachusetts Institute of Technology	Biology	S.B.	2006

Research Experience:

2018-Present	Adjunct Professor, Bredesen Center, University of Tennessee
2018-Present	Staff Scientist, Biosciences Division, Oak Ridge National Laboratory
2015-2018	Wigner Staff Fellow, Biosciences Division, Oak Ridge National Laboratory
2014-2015	NRSA Fellow, Biological Engineering, MIT
2012-2014	NRSA Fellow, Organismal and Evolutionary Biology, Harvard University

Publications: (*: Corresponding author)

Close D, Cooper CJ, Wang X, Chirania P, Gupta M, Ossyra JR, Giannone RJ, Engle NL, Tschaplinski TJ, Smith JC, Hedstrom L, Parks JM, and **Michener JK***, Horizontal transfer of a pathway for coumarate catabolism unexpectedly inhibits purine nucleotide biosynthesis. *Mol Microbiol* 2019; 112 (6) 1784-1797. Link.

Millet L, Velez J, and **Michener JK***, Genetic selection for small molecule production in competitive microfluidic droplets. *ACS Synth Biol* 2019. 8, 8, 1737-1743 Link

Trofimov AA, Pawlicki AA, Borodinov N, Mandal S, Mathews TJ, Hildebrand M, Ziatdinov MA, Hausladen KA, Urbanowicz PK, Steed CA, Ievlev AV, Belianinov A, **Michener JK**, Vasudevan R, and Ovchinnikova OS*. Deep data analytics for genetic engineering of diatoms linking genotype to phenotype via machine learning. *npj Comput Mater* 2019 5:67. Link.

Chaves JE, Presley GN, and **Michener JK***, Modular engineering of biomass degradation pathways. *Processes* 2019, 7(4), 230. Link.

Tuskan GA*, Groover AT, Schmutz J, DeFazio SP, Myburg A, Grattapaglia D, Smart LB, Yin T, Aury J-M, Kremer A, Leroy T, Le Provost G, Plomion C, Carlson JE, Randall J, Westbrook J, Grimwood J, Muchero W, Jacobson D, **Michener JK**. Hardwood tree genomics: unlocking woody plant biology. *Front Plant Sci* 2018; 9: 1799. Link.

Cecil JH, Garcia DC, Giannone RJ, **Michener JK***. Rapid, parallel identification of catabolism pathways of lignin-derived aromatic compounds in *Novosphingobium aromaticivorans*. *Appl Environ Microbiol* 2018 84:e01185-18. Link.

Standaert RF, Giannone RJ, and **Michener JK***. Identification of parallel and divergent optimization solutions for homologous metabolic enzymes. *Metab Eng Comm* 2018. 6:56-62. Link.

Clarkson SM, Giannone RJ, Kridelbaugh DM, Elkins JG, Guss AM*, and **Michener JK***, Construction and optimization of a heterologous pathway for protocatechuate catabolism in *Escherichia coli* enables bioconversion of model aromatic compounds. *Appl Env Microbiol* 2017 Aug 31;83(18). Link.

Michener JK*, Vuilleumier S, Bringel F, and Marx CJ. Transfer of a catabolic pathway for chloromethane in *Methylobacterium* strains highlights different limitations for growth with chloromethane or with dichloromethane. *Front Microbiol* 2016. Link

Houser JR, Barnhart C, Boutz DR, Carroll SM, Dasgupta A, **Michener JK**, et al. Controlled measurement and comparative analysis of cellular components in *E. coli* reveals broad regulatory changes in response to glucose starvation. *PLoS Comput Biol* 2015; 11(8): e1004400. Link

Michener JK, Camargo Neves AAC, Vuilleumier S, Bringel F, and Marx CJ. Effective use of a horizontally-transferred pathway for dichloromethane catabolism requires post-transfer refinement. *eLife* 2014;10.7554/eLife.04279 Link.

Michener JK, Vuilleumier S, Bringel F, and Marx CJ. Phylogeny poorly predicts the utility of a challenging horizontally-transferred gene in *Methylobacterium* strains. *J Bacteriol.*, June 2014 196:2101-2107 Link.

Michener JK and Smolke CD. Synthetic RNA switches for yeast metabolic engineering. *Methods in Molecular Biology, Yeast Metabolic Engineering.* 2012; 1152:125-36 Link.

Michener JK, Nielsen J, and Smolke CD. Identification and treatment of heme depletion due to over-expression of a lineage of evolved P450 monooxygenases. *Proc Natl Acad Sci U S A.* 2012 Nov 20;109(47):19504-9. Link.

Michener JK and Smolke CD. High-throughput enzyme evolution in *Saccharomyces cerevisiae* using a synthetic RNA switch. *Metabolic Engineering.* 2012 Jul; 14(4):306-16. Link

Michener JK, Thodey K, Liang JC, and Smolke CD. (2011) Applications of genetically-encoded biosensors for the construction and control of biosynthetic pathways. *Metabolic Engineering.* 2012 May; 14(3):212-22. Link

Invited and contributed presentations:

Michener JK. 2020. Systems Metabolic Engineering of *Novosphingobium aromaticivorans* for Lignin Valorization. Genomic Sciences Program Annual PI Meeting, Washington, DC.

Michener JK. 2019. High-throughput screens and selections for enzyme function in non-model bacteria. American Institute of Chemical Engineering Annual Meeting, Orlando, FL.

Presley GN, Cannon ON, Elkins JG, Giannone RJ, Garcia DC, and **Michener JK**. Expanding the molecular toolkit for lignin valorization by rapid pathway identification and new microbe isolation. SIMB Annual Meeting, Washington, DC.

Burdick LH, Streich JC, Ellis JC, Close D, Jacobson DA, and **Michener JK**. 2019. Measuring Homologous Recombination Rates During Protoplast Fusion. ASM Microbe, San Francisco, CA.

Michener JK. 2019. Optimizing Microbial Pathways for Lignin Valorization. SIMB Symposium on Biotechnology for Fuels and Chemicals, Seattle, WA.

Michener JK. 2019. Optimizing Microbial Pathways for Lignin Valorization. Department of Chemical Engineering, University of Tennessee, Knoxville, TN.

Michener JK. 2018. Enzymatic Conversion of Lignin-derived Aromatic Compounds. Frontiers in Biorefining, St. Simons Island, GA.

Cecil JH and **Michener JK**. 2017. Identification and Reconstruction of Pathways for Catabolism of Lignin-Derived Aromatic Compounds. American Institute of Chemical Engineers Annual Meeting, Minneapolis, MN.

Velez J and **Michener JK**. 2017. Selecting for Small Molecule Production in Competitive Microfluidic Droplets. American Institute of Chemical Engineers Annual Meeting, Minneapolis, MN.

Michener JK. 2015. Evolutionary Optimization of Heterologous Pathways in Microbes. Department of Chemical Engineering, University of Washington, Seattle, WA.

Michener JK. 2015. Evolutionary Optimization of Heterologous Pathways in Microbes. Department of Bacteriology, University of Wisconsin, Madison, WI.
Michener JK. 2015. Evolutionary Optimization of Heterologous Pathways in Microbes. Biosciences Division, Oak Ridge National Laboratory, Oak Ridge, TN.
Michener JK. 2014. Evolutionary Optimization of Heterologous Pathways in Microbes. Center for Environmental Health Sciences, MIT, Cambridge, MA.
Michener JK. 2014. Evolutionary Optimization of Heterologous Pathways in Microbes. Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, IN.
Michener JK. 2014. Evolutionary Optimization of Heterologous Pathways in Microbes. School of Biology, Georgia Tech University, Atlanta, GA.
Michener JK. 2014. Evolutionary Refinement of a Horizontally-Transferred Pathway in Methylobacteria. American Institute of Chemical Engineers Annual Meeting, Atlanta, GA.
Michener JK. 2014. Experimental Evolution Recapitulates Adaptation after Horizontal Gene Transfer. American Society of Microbiology 114th General Meeting, Boston, MA.
Michener JK. 2014. Experimental Evolution of Heterologous Pathways in Microbes. Department of Biochemistry and Molecular Biology, Michigan State University, East Lansing, MI.
Michener JK. 2013. Recapitulating Adaptation after Horizontal Gene Transfer. Microbial Evolution Meetings. Harvard University, Cambridge, MA.
Michener JK. 2013. Optimizing the Host-Pathway Interface. Biochemistry, Molecular Biology and Biophysics Department, University of Minnesota, Minneapolis, MN.

Advisees:

Graduate Students:
Alex Ruzicka (2019 – present) – Bredesen Center, University of Tennessee

Postdocs:
Gerald Presley (2018 – 2019)
PhD, University of Minnesota. Currently Assistant Professor, Oregon State University.
Julie Chaves (2018 – present)
PhD, University of California, Berkeley
Stephan Christel (2019 – present)
PhD, Linnaeus University, Sweden
Delyana Vasileva (2019 – present)
PhD, University of Tokyo, Japan
Christopher Azubuike (2020 – present)
PhD, Newcastle University, United Kingdom

Visitors:
Zach Schmitz (2018) – Undergraduate, MIT
Jacob Cecil (2017) – Undergraduate, University of Tennessee
Jessica Velez (2017) – PhD student, University of Tennessee
Danika Nimlos (2016) – Undergraduate, University of California, Berkeley
Aline Carmago-Neves (2014) – PhD student, University of São Paulo

Professional Affiliations:

American Institute of Chemical Engineers (AIChE)
American Society for Microbiology (ASM)

International Metabolic Engineering Society (IMES)
Society for Industrial Microbiology and Biotechnology (SIMB)

Awards:

DOE Early Career Award (2019-2024)
Oak Ridge Postdoctoral Association Mentor of the Year (2019)
DOE Distinguished Staff Fellowship (2015-2018)
NIH NRSA Postdoctoral Fellowship (2012-2015)
Nordic Research Fellowship (2011)
NSF Graduate Research Fellowship (2018-2011)
Roger de Friez Hunneman Prize (2006)
Phi Beta Kappa (2006)

Professional Service:

Participant, SLAC/JIMB workshop on "Next Generation Measurement of Biological Function" (March 2020)
Editorial Board, *Applied and Environmental Microbiology* (2020-2022)
Session chair, AIChE Annual Meeting (2015, 2018, 2019)
Session chair, SIMB Annual Meeting (2019)
iGEM Championship Judge (2012-2014, 2018)
Invited panelist, NSF workshop on "Creating a Research Agenda for the Ecological Implications of Synthetic Biology" (January 2014)
Invited panelist, Sloan Foundation workshop on "Governance Approaches for Synthetic Biology" (June 2014)