Jing-Ke Weng

Whitehead Institute for Biomedical Research
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RESEARCH INTERESTS

Metabolic evolution, hormone signaling, chemical ecology, bioluminescence, metabolic engineering, metabolic and neurodegenerative diseases, herbal medicine

POSITIONS

2013-present	Member, Whitehead Institute for Biomedical Research Thomas D. and Virginia W. Cabot Career Development Assistant Professor of Biology, Massachusetts Institute of Technology, Cambridge, MA
2009-2013	Pioneer postdoctoral fellow, Howard Hughes Medical Institute & The Jack H. Skirball Center for Chemical Biology and Proteomics, The Salk Institute for Biological Studies, La Jolla, CA Advisor: Joseph P. Noel

EDUCATION

2003-2009	Ph.D. in Biochemistry, Department of Biochemistry, Purdue University, West Lafayette, IN Advisor: Clint Chapple
1999-2003	B.S. in Biotechnology, *cum laude*, Department of Biotechnology Zhejiang University, Hangzhou, China Advisor: Ji-Zeng Du and Huanxin Weng

HONORS AND AWARDS

2016 Beckman Young Investigator Award
2016 Alfred P. Sloan Research Fellow in Computational & Evolutionary Molecular Biology
2015 Searle Scholar
2014 Thomas D. and Virginia W. Cabot Career Development Chair
2014 Pew Scholar in the Biomedical Sciences
2014 American Society of Plant Biologists Early Career Award
2013 Tansley Medal for Excellence in Plant Science
2011 Pioneer Postdoctoral Fellowship
2011 Plant Metabolic Engineering Gordon Research Conference Best Poster Award
2009 PULSe Outstanding Graduate Student in Research Award
2009 PULSe Publication of the Year Award
2009 Bilsland Dissertation Fellowship
2008 Arnold Kent Balls Award for Outstanding Graduate Student in Research
2008 PULSe Travel Award
2007 Beach Travel Award
2005 Phytochemical Society of North America Annual Meeting Best Poster Award
2005 Phytochemical Society of North America Student Travel Award
2003 Lynn Fellowship
2003 Outstanding Undergraduate Researcher Award

PUBLICATIONS

Research papers

†Co-first authors; *Co-corresponding authors.

1. Al-Wathiqui N[†], Fallon TR[†], South A, **Weng JK***, Lewis SM*. (2016) Molecular characterization of firefly nuptial gifts: a multi-omics approach sheds light on postcopulatory sexual selection. *Sci Rep*. (In press)
2. Edgar S, Li FS, Qiao K, **Weng JK***, Stephanopoulos G*. (2016) Engineering of taxadiene synthase for improved selectivity and yield of a key taxol biosynthetic intermediate. *ACS Synth Biol*. DOI: 10.1021/acssynbio.6b00206 (In press)
3. Levsh O, Chang YC, Tung C, Noel JP, Wang Y*, **Weng JK***. (2016) Dynamic conformational states dictate selectivity toward native substrate in a substrate-permissive acyltransferase. *Biochemistry.* 55:6314-6326.
4. Fallon TR, Li FS, Vicent-Allende M, **Weng JK**. (2016) Sulfoluciferin is biosynthesized by a specialized luciferin sulfotransferase in fireflies. *Biochemistry.* 55:3341–3344.
5. Zhao Q, Zhang Y, Wang G, Hill L, **Weng JK**, Chen XY, Xue H, Martin C. (2016) A specialized flavone biosynthetic pathway has evolved in the medicinal plant, *Scutellaria baicalensis*. *Sci Adv.* 2:e1501780.
6. **Weng JK**, Ye M, Li B, Noel JP. (2016) Coevolution of hormone metabolism and signaling networks expands plant adaptive plasticity. *Cell.* 166:881-893.
7. **Weng JK**, Li Y, Mo H, Chapple C. (2012) Assembly of an evolutionarily new pathway for α-pyrone biosynthesis in Arabidopsis. *Science*. 337:960-964.
8. Bonawitz ND, Soltau WL, Blatchley MR, Powers BL, Hurlock AK, Seals LA, **Weng JK**, Stout J, Chapple C. (2012) The REF4 and RFR1 subunits of the eukaryotic transcriptional coregulatory complex Mediator are required for phenylpropanoid homeostasis in Arabidopsis. *J Bio Chem*. 287:5434-5445.
9. **Weng JK**, Akiyama T, Ralph J, Chapple C. (2011) Independent recruitment of an *O*-methyltransferase for syringyl lignin biosynthesis in *Selaginella moellendorffii*. *Plant Cell*. 23:2708–2724.
10. Banks JA, Nishiyama T, Hasebe M, Bowman JL, Gribskov M, Depamphilis C, Albert VA, Aono N, Aoyama T, Ambrose BA, Ashton NW, Axtell MJ, Barker E, Barker MS, Bennetzen JL, Bonawitz ND, Chapple C, Cheng C, Correa LG, Dacre M, Debarry J, Dreyer I, Elias M, Engstrom EM, Estelle M, Feng L, Finet C, Floyd SK, Frommer WB, Fujita T, Gramzow L, Gutensohn M, Harholt J, Hattori M, Heyl A, Hirai T, Hiwatashi Y, Ishikawa M, Iwata M, Karol KG, Koehler B, Kolukisaoglu U, Kubo M, Kurata T, Lalonde S, Li K, Li Y, Litt A, Lyons E, Manning G, Maruyama T, Michael TP, Mikami K, Miyazaki S, Morinaga SI, Murata T, Mueller-Roeber B, Nelson DR, Obara M, Oguri Y, Olmstead RG, Onodera N, Petersen BL, Pils B, Prigge M, Rensing SA, Riaño-Pachón DM, Roberts AW, Sato Y, Scheller HV, Schulz B, Schulz C, Shakirov EV, Shibagaki N, Shinohara N, Shippen DE, Sørensen I, Sotooka R, Sugimoto N, Sugita M, Sumikawa N, Tanurdzic M, Theißen G, Ulvskov P, Wakazuki S, **Weng JK**, Willats WW, Wipf D, Wolf PG, Yang L, Zimmer AD, Zhu Q, Mitros T, Hellsten U, Loqué D, Otillar R, Salamov A, Schmutz J, Shapiro H, Lindquist E, Lucas S, Rokhsar D, Grigoriev IV. (2010) The Selaginella Genome Identifies Genetic Changes Associated with the Evolution of Vascular Plants. *Science*. 332:960-963.
11. **Weng JK**, Mo H, Chapple C. (2010) Over-expression of F5H in COMT-deficient Arabidopsis leads to enrichment of an unusual lignin and disruption of pollen wall formation. *Plant J*. 64:898-911. (Featured cover article)
12. Li X, Bonawitz ND, **Weng JK**, Chapple C. (2010) The growth reduction associated with repressed lignin biosynthesis in *Arabidopsis thaliana* is independent of flavonoids. *Plant Cell*. 22:1620-1632.
13. **Weng JK**, Akiyama T, Bonawitz ND, Li X, Ralph J, Chapple C. (2010) Convergent evolution of syringyl lignin via distinct biosynthetic pathways in the lycophyte *Selaginella* and flowering plants. *Plant Cell*. 22:1033-1045. [Highlighted in the Editor's Choice of *Science* 328:406-407 (2010)]
14. Schilmiller AL, Stout J, **Weng JK**, Humphreys J, Ruegger MO, Chapple C. (2009) Mutations in the *cinnamate 4-hydroxylase* gene impact metabolism, growth and development in Arabidopsis. *Plant J*. 60:771-782.

15. **Weng JK**, Li X, Stout J, Chapple C. (2008) Independent origins of syringyl lignin in vascular plants. *Proc Natl Acad Sci U S A*. 105:7887-7892.
16. Weng HX, **Weng JK**, Yan AL, Hong CL, Yong WB, Qin YC. (2008) Increment of iodine content in vegetable plants by applying iodized fertilizer and the residual characteristics of iodine in soil. *Biol Trace Elem Res*. 123:218-228.
17. Weng HX, Sun XW, **Weng JK**, Qing YC, Dong H. (2008) Crucial roles of iron in the growth of *Prorocentrum micans* Ehrenberg (Dinophyceae). *J Coastal Res*. 24:176-183.
18. **Weng JK**, Tanurdzic M, Chapple C. (2005) Functional analysis and comparative genomics of expressed sequence tags from the lycophyte *Selaginella moellendorffii*. *BMC Genomics*. 6:85.
19. Wang W, Tanurdzic M, Luo M, Sisneros N, Kim HR, **Weng JK**, Kudrna D, Mueller C, Arumuganathan K, Carlson J, Chapple C, de Pamphilis C, Mandoli D, Tomkins J, Wing RA, Banks JA. (2005) Construction of a bacterial artificial chromosome library from the spikemoss *Selaginella moellendorffii*: a new resource for plant comparative genomics. *BMC Plant Bio*. 5:10.
20. Weng HX, Qin YC, **Weng JK**. (2005) Inherent correlation between decreased marine sedimentary phosphorus and glacial atmospheric CO_2 decline. *Geophys Res Lett.* 32: L18606.
21. Weng HX, **Weng JK**, Yong WB, Sun XW, Zhong H. (2003) Capacity and degree of iodine absorbed and enriched by vegetable from soil. *J Environ Sci*. 15:107-111.

Reviews, commentaries, and book chapters

1. Torrens-Spence MP[†], Fallon TR[†], **Weng JK**. (2016) A workflow for studying specialized metabolism in non-model organisms. *Methods Enzymol*. 576:69-97.
2. Fallon TR and **Weng JK**. (2014) A molecular gauge for nitrogen economy in plants. *Cell*. 159:977-978.
3. **Weng JK**. (2014) The evolutionary paths towards complexity: a metabolic perspective. *New Phytol*. 201:1141-1149.
4. **Weng JK**. (2013) Elegant Biochemistry, chaotic origin. *New Phytol*. 200:592-594.
5. **Weng JK** and Noel JP. (2013) Chemodiversity in Selaginella: a reference system for parallel and convergent metabolic evolution in terrestrial plants. *Front Plant Sci*. 4:119.
6. **Weng JK** and Noel JP. (2012) The remarkable pliability and promiscuity of specialized metabolism. *Cold Spring Harb Symp Quant Biol*. 77:309-320.
7. **Weng JK**, Philippe RN, Noel JP. (2012) The rise of chemodiversity in plants. *Science*. 336:1667-1670.
8. **Weng JK** and Noel JP. (2012) Structure-function analyses of plant type III polyketide synthases. *Methods Enzymol*. 515:317-335.
9. **Weng JK** and Chapple C. (2010) The origin and evolution of lignin biosynthesis. *New Phytol*. 187:273-285. [Also featured in "a Virtual Special Issue on Sir Arthur Tansley's ecosystem concept". *New Phytol*. 192:561-563 (2011)]
10. **Weng JK**, Banks JA, Chapple C. (2008) Parallels in lignin biosynthesis: a study in *Selaginella moellendorffii* reveals convergence across 400 million years of evolution. *Commun Integr Biol*. 1:20-22.
11. Li X, **Weng JK**, Chapple C. (2008) Improvement of biomass through lignin modification. *Plant J*. 54:569-581.
12. **Weng JK**, Li X, Bonawitz ND, Chapple C. (2008) Emerging strategies of lignin engineering and degradation for cellulosic biofuel production. *Curr Opin Biotechnol*. 19:166-172.

INVITED TALKS

2017 The 4th International Conference on Plant Metabolism, Dalian, China (scheduled)
2017 28th International Conference on Arabidopsis Research, St. Louis, MO (scheduled)
2017 School for Integrative Plant Sciences, Cornell University, Ithaca, NY (scheduled)
2016 Berklee College of Music, Boston, MA (scheduled)
2016 Biochemistry & Molecular Biology Colloquium Series, Michigan State University, East

Lansing, MI
2016 造就Talk, Shenzhen, China (TED-style talk chanel in China)
2016 11th International Conference on Genomics, Shenzhen, China
2016 College of Life Sciences, Zhejiang University, Hangzhou, China
2016 Second Institute of Oceanography, State Oceanic Administration, Hangzhou, China
2016 Icahn School of Medicine at Mount Sinai, New York City, NY
2016 Department of Genetics, Yale School of Medicine, New Haven, CT
2016 The Inaugural NTU Plant Sciences Symposium (keynote speaker), School of Biological Sciences, Nanyang Technological University, Singapore
2016 The annual Bob B. Buchanan lecture, Department of Plant and Microbial Biology, UC Berkeley, CA
2016 Molecular Structure Elucidation Gordon Research Conference, West Dover, VT
2016 MIT-Educator Program, Cambridge, MA
2016 The 32nd annual meeting of the International Society of Chemical Ecology, Iguazu Falls, Brazil
2016 MIT ILP Executive Briefing, Cambridge, MA
2016 Flagship Ventures, Cambridge, MA
2016 The Future of Health Technology Summit, Cambridge, MA
2016 Harvard Medical School, Boston, MA
2016 Department of Ecology & Evolutionary Biology, University of Connecticut, Storrs, CT
2015 MIT Annual Research and Development Conference, Cambridge, MA
2015 TEDx Beacon Street, Boston, MA
2015 DSM Nutritional Products Microbia Inc, Lexington, MA
2015 13th Annual Symposium in Plant Biology (keynote speaker), University of Massachusetts, Amherst, MA
2015 MIT Collaborative Initiatives New Models 7, Cambridge, MA
2015 Next Generation Pteridology, Smithsonian National Museum of Natural History & United States Botanic Garden, Washington D.C.
2015 Beijing Biomedicine Summit (keynote speaker), Beijing, China
2015 The Northeast Section American Society of Plant Biologists Annual Meeting (keynote speaker), Boston, MA
2015 Natural Products Affinity Group Ten-Year Anniversary, UCSD, San Diego, CA
2015 The Broad Institute Gene Circuits LabLinks Symposium, Cambridge, MA
2015 The Science behind Biotech Breakthroughs, Whitehead Seminar Series for High School Teachers, Cambridge, MA
2014 The Future of Chemistry in Chemical Ecology Symposium, Max Planck Institute for Chemical Ecology, Jena, Germany
2014 Harvard University Herbaria, Cambridge, MA
2014 Department of Biology, Boston University, Boston, MA
2014 PULSe Ten-Year Anniversary Celebration (keynote speaker), Purdue University, West Lafayette, IN
2014 Center of Excellence for Dynamic Molecular Interactions, University of Copenhagen, Copenhagen, Denmark
2014 Plants in New England (PINE) Symposium, Cambridge, MA
2014 Special presentation with Whitehead Institute, New York City, NY
2014 EITA Conference on New Media and Biomedical Research, Cambridge, MA
2014 New Phytologist Next Generation Scientist, John Innes Centre, Norwich, UK
2014 Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Beijing, China
2014 South China Botanical Garden, Chinese Academy of Sciences, Guangzhou, China
2014 The 3rd International Conference on Plant Metabolism, Xiamen, China
2014 School of Life Sciences, Xiamen University, Xiamen, China
2014 The Future of Health Technology Summit, Cambridge, MA

2013 Natural Products Affinity Group seminar series, San Diego, CA
2013 The Donald Danforth Plant Science Center, St. Louis, MO
2013 Department of Molecular, Cellular and Developmental Biology, Yale University, New Haven, CT
2013 Green Center for Systems Biology, UT Southwestern, Dallas, TX
2013 College of Biological Sciences, UC Davis, Davis, CA
2013 Division of Biological Sciences, UC San Diego, San Diego, CA
2013 Whitehead Institute for Biomedical Research, Cambridge, MA
2013 Department of Biochemistry, Purdue University, West Lafayette, IN
2013 Department of Biochemistry, UCLA, Los Angeles, CA
2012 77th Cold Spring Harbor Symposium on Quantitative Biology: The Biology of Plants, Cold Spring Harbor, NY
2011 Natural Products Affinity Group seminar series, San Diego, CA
2010 Banff Conference on Plant Metabolism, Banff, Canada
2010 Plant and Animal Genome XVIII Conference, San Diego, CA
2009 Plant Cell Walls Gordon Research Conference (keynote speaker), Smithfield, RI
2007 American Society of Plant Biologists Annual Meeting, Chicago, IL
2007 Plant and Animal Genome XV Conference, San Diego, CA

OTHER OUTREACH ACTIVITIES

2016 Guest Scientist at "Science by the Pint" to discuss general topics related to GMO with the general public, Aeronaut Brewery, Somerville, MA.
2016 Host of "Exploring the Amazing Plant World" during the Whitehead Institute summer science program (CampBio) for middle school students from the greater Boston area (Three repeated sessions).
2016 Panelist, "The Nuts and Bolts of the Academic Job Search" panel discussion, MIT Graduate Student Council (GSC), Cambridge, MA.
2016 Seminar and career discussion with 2nd – 4th graders at Birches School, Lincoln, MA.
2016 Host and speaker at the outreach dinner event "Our Dinner Table: The Intersection of Food & Health", Cambridge, MA (Event co-hosted by Community Servings and the Whitehead Institute).
2016 Seminar and career discussion with high school students at the Cambridge Rindge and Latin School, Cambridge, MA.
2015 Speaker, MassBioEd's Career Exploration Day for local high school students.
2015 Host of "Biology in Ecology" during the Whitehead Institute summer science program (CampBio) for middle school students from the greater Boston area (Three repeated sessions).
2015 Moderator for panel discussion on "The Safety of Genetically Modified Foods" during the Whitehead Institute spring lecture series for high school students.
2014 Host of "Plant Biology Day: Seed for Tomorrow" during the Whitehead Institute summer science program (CampBio) for middle school students from the greater Boston area (Three repeated sessions).
2014 Panelist, "Search for faculty positions" panel discussion, Independent Activities Period (IAP), MIT, Cambridge, MA.
2014 Host of one-day field trip to MIT and Whitehead Institute for high school students from Tabor Academy, MA.

TEACHING

2016-present	MIT	7.41	Principles of Chemical Biology
2015-present	MIT	7.15	Experimental Molecular Genetics
2016	MIT	7.50	Method and Logic in Molecular Biology (guest lecturer)
2014	MIT	7.89	Topics in Comp & Sys Biology (guest lecturer)
2006	Purdue University	BCHM307	Biochemistry (as teaching assistant)

MENTORING

2014-present Whitehead Institute and MIT

Postdocs: Bastien Christ (2015-present, SNF postdoctoral fellow), Roland Kersten (2015-present, LSRF postdoctoral fellow), Fu-Shuang Li (2014-present), Tomáš Pluskal (2015-present, HHWF postdoctoral fellow), Michael Torrens-Spence (2014-present)

Graduate students: Tim Fallon (2014-present), Joseph Jacobowitz (2015-present), Olesya Levsh (2014-present), Geoffrey Liou (2014-present)

Undergraduate students: Andrea De Abreu (UROP, MIT Biology, 2016-present), Maria Vicent Allende* (Williams College, 2015 Williams-Whitehead Summer Internship Program), Anastassia Bobokalonova (UROP, MIT Biology, 2014-2016), Fanqi (QeeQee) Gao (UROP, MIT Biology, 2015), Edoardo Gianni (University College London, 2016 Summer internship), Mathew Hill (Purdue University, 2016 Summer Internship), Brian Levine (Williams College, 2014 Williams-Whitehead Summer Internship Program), Paul Schwein (UROP, MIT Biology, 2015-2016), Sheena Vasquez* (Georgia Perimeter College, 2014 HHMI-MIT Summer Research Program), Amy Zhang (UROP, MIT Biology, 2014)

Visiting scientists: Edoardo Gianni (University College London, England, 2016), Lea Gram Hansen (University of Copenhagen, Denmark, 2016-present), Cecilia Ruibal (Universidad de la República, Uruguay, 2014)

2009-2013 Salk Institute

Graduate students: Jonathan Hetzel, Helena Sun, Christopher Vickery

2005-2009 Purdue University

Undergraduate students: Kevin Donohue, Yongxiang Hu, and Claire Goldsbrough.

Graduate students: Tara Anderson*, Nicolas Anderson, Elizabeth Buescher, Yi Li

* denotes students who are underrepresented minorities.

THESIS COMMITTEE

Jessie Berta-Thompson (Ph.D. 2015, MIT Microbiology), Yoon Andrew Cho-Park, (Ph.D. candidate, MIT Biology, 2016-present), Andres Cubillos-Ruiz (Ph.D. 2015, MIT Microbiology), Christopher Dawson (Ph.D. candidate, MIT Biology, 2015-present), Steven Edgar (MIT Chemical Engineering, 2015-present), Sonya Entova (Ph.D. candidate, MIT Biology, 2015-present), Emerson Glassey (MIT Biological Engineering, 2016-present), Tedrick Thomas Salim Lew (Ph.D. candidate, MIT Chemical Engineering, 2016-present), Alba Luengo (Ph.D. candidate, MIT Biology, 2014-present), Conor McClune (Ph.D. candidate, MIT Biology, 2015-present), Nadia Mirza (Ph.D. 2014, University of Copenhagen Biology, Molecular Plant Biology), Mark Sullivan (Ph.D. candidate, MIT Biology, 2015-present), Levi Teitz (Ph.D. candidate, MIT Biology, 2015-present), Xiaoqian (Annie) Yu (Ph.D. candidate, MIT Biological Engineering, 2014-present), Shijie Zhao (Ph.D. candidate, MIT Biology, 2016-present)

OTHER PROFESSIONAL ACTIVITIES

2007-present *Ad hoc* reviewer for peer-reviewed journals
Bioinformatics and Biology Insights, *Cell Research, Current Topics in Medicinal Chemistry, eLife, International Journal of Biological Macromolecules, ISRN Botany, Molecular Plant, Nature Communications, New Phytologist, Plant Biology, Plant Cell, Plant Journal, Plant Physiology, Plant Science, Plos Genetics, Plos One, PNAS, Science, Recent Advances in Phytochemistry*, *Tetrahedron*.

2014-present *Ad hoc* reviewer for grant and project proposals
Taylor & Francis Group (2014), Charles A. King Trust Postdoctoral Fellowship (2014), and United States-Israel Binational Science Foundation (2014)

2014-present Advisory Board, Harvard Medical School - Chinese Scholars and Scientists Association (HMS-CSSA)

2016-present Member of the Scientific Advisory Board, VL40

2014-present Member of the Scientific Advisory Board, Phylos Bioscience
2013 Co-Chair of the 2013 Gordon Research Seminar on Plant Metabolic Engineering
2011-2013 Editorial Board, ISRN Botany
2008-2011 Curator for the Selaginella genome project

GRANT SUPPORT

Beckman Foundation, "Exploring and exploiting firefly and coelenterate luciferin biosynthesis", 09/01/16-8/31/20, $750,000

MIT Alumni Class Funds, "Implementing a modern multi-omics approach in experimental molecular genetics project lab (7.15)" (for undergraduate teaching), 07/01/16-06/30/17, $34,825

Jeptha and Emily V. Wade Award, "Tapping plant chemodiversity to find cures for protein folding diseases", 07/01/15-06/30/16, $75,000

Searle Scholars Program, "Mechanistic basis for thiol-based redox switches in metabolic enzymes", 07/01/15-06/30/18, $300,000

Pew Scholars Program, "Elucidating the key action mechanisms of guanidine-based, anti-diabetic drugs", 07/01/14-06/30/18, $240,000