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Distinguished Research Staff

Metabolomics and Bioconversion Group Leader

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RESEARCH INTERESTS

Plant molecular physiologist experienced in biochemistry, specifically the application of mass spectrometry to research problems in genomics, bioenergy crop production, environmental stress physiology, and plant-microbe signaling. Current research includes metabolomics for phenotypic characterization of genetically-modified *Populus*, *Arabidopsis*, *Eucalyptus*, *Castanea*, switchgrass, and numerous bioenergy-relevant microbial species. Research targets include the application of genomic tools for the accelerated domestication of *Populus* to increase drought tolerance and biomass productivity on marginal sites, and to manipulate bioproduct formation. Most recent activities include characterizing the molecular basis of plant-microbe (bacterial and fungal) symbiotic relationships in contrast with pathogenic relationships.

POSITIONS

- 2007-present **Distinguished Research Staff**, Biosciences Division
Oak Ridge National Laboratory, Oak Ridge, TN
- 2004-present **Adjunct Faculty**, UT-ORNL Genome Science & Technology Graduate School
University of Tennessee, Knoxville, TN
- 2003-present **Adjunct Professor**, Department of Plant Sciences
University of Tennessee, Knoxville, TN
- 2002-2006 **Senior Scientist**, Environmental Sciences Division,
Oak Ridge National Laboratory, Oak Ridge, TN
- 1995-1997 **Adjunct Professor**, Institute of Agriculture
University of Tennessee, Knoxville, TN
- 1990-2002 **Research Staff**, Environmental Sciences Division, ORNL, Oak Ridge, TN
- 1989-1990 **ASG Postdoctoral Research Associate**, Environmental Sciences Division
Oak Ridge National Laboratory, Oak Ridge, TN
- 1987-1989 **ORAU Postdoctoral Research Associate**, Environmental Sciences Division
Oak Ridge National Laboratory, Oak Ridge, TN
- 1986 **Lecturer**, Tree Physiology, University of Toronto, Toronto, Canada

EDUCATION

- 1982-87 **Ph.D. Forestry** - University of Toronto, Toronto, Ontario, Canada
- 1980-82 **M.Sc. Forestry** - University of Toronto, Toronto, Ontario, Canada
- 1976-80 **B.Sc. Biology** - Carleton University, Ottawa, Ontario, Canada

PUBLICATIONS - 114 total

Lin, J, Mazarei, M., Zhou, N., Hatcher, C., Wuddineh, W., Rudis, M., Tschaplinski, T., Pantalone, V., Arelli, P., Hewezi, T., Chen, F. Stewart, N. 2016. Transgenic soybean overexpressing GmSAMT1 exhibits resistance to multiple-HG types of soybean cyst nematode *Heterodera glycines*. Plant Biotechnology J. (in press)

Timm, C.M., D.A. Pelletier, S.S. Jawdy, L.E. Gunter, J.A. Henning, N. Engle, J. Aufrecht, E. Gee, I. Nookaew, Z. Yang, T.-Y. Lu, T.J., Tschaplinski, M.J. Doktycz, G.A. Tuskan, and D.J. Weston. 2016. Two poplar-associated bacterial isolates induce additive favorable responses in a constructed plant-microbiome system. Frontiers in Plant Science (in press)

Bible, A.N., S.J. Fletcher, D.A. Pelletier, C.W. Schadt, S.S. Jawdy, D.J. Weston, N.L. Engle, T.J. Tschaplinski, R. Masyuko, S. Poliseti, P.W. Bohn, T.A. Coutinho, M.J. Doktycz, and J.L. Morrell-Falvey. 2016. A carotenoid-deficient mutant in *Pantoea* sp. YR343, a bacteria isolated from the rhizosphere of *Populus deltoides*, is defective in root colonization. Frontiers in Microbiology (in press)

Bryan, A., W. Muchero, S. Jawdy, L. Gunter, E. Gjersing, R. Sykes, N. Engle, T.J. Tschaplinski, X. Yang, G.A. Tuskan, J.-G. Chen. 2016. Knockdown of a laccase in *Populus deltoides* confers altered cell wall chemistry and increased sugar release. Plant Biotechnol. J. (in press)

Dumitrache, A., H. Akinosho, M. Rodriguez Jr., X. Meng, C. Geun Yoo, J. Natzke, N.L. Engle, R.W. Sykes, T.J. Tschaplinski, W. Muchero, A. Ragauskas, B.H. Davison, S.D. Brown. 2016. Consolidated bioprocessing of *Populus* using *Clostridium (Ruminiclostridium) thermocellum*: A case study on the impact of lignin composition and structure. Biotechnol. for Biofuels 9:31 DOI 10.1186/s13068-016-0445-x

ORNL Patent # 2525.2 - Key gene regulating cell wall biosynthesis and recalcitrance in *Populus*, Gene Y – US9206436 B2, Published December 8, 2015

Weston D.J., A. Rogers, T.J. Tschaplinski, L.E. Gunter, S.A. Jawdy, N.L. Engle, G.A. Tuskan, and S.D. Wullschleger. 2015. Scaling nitrogen and carbon interactions: what are the consequences of biological buffering? Ecology and Evolution 5(14):2839–2850 doi: 10.1002/ece3.1565

Currie, D.H., B. Raman, C.M. Gowen, T.J. Tschaplinski, M.L. Land, S.D. Brown, S.F. Covalla, D.M. Klingeman, Z.K. Yang, N.L. Engle, C.M. Johnson, M. Rodriguez, A.J. Shaw, W.R. Kenealy, L.R. Lynd, S.S. Fong, J.R. Mielenz, B.H. Davison, D.A. Hogsett, and C.D. Herring. 2015. Genome-scale resources for *Thermoanaerobacterium saccharolyticum*. BMC Sys Bio 9:30 doi:10.1186/s12918-015-0159-x

Rempe, C.S., K.P. Burris, H.L. Woo, B. Goodrich, D. Koessler Gosnell, T.J. Tschaplinski, and C.N. Stewart, Jr 2015. Computational ranking of yerba mate small molecules based on their predicted contribution to antibacterial activity against methicillin-resistant *Staphylococcus aureus*. Plos One 10(5):e0123925. DOI: 10.1371/journal.pone.0123925

Cecchini, N.M, H.W. Jung, N.L. Engle, T.J. Tschaplinski, and J.T. Greenberg. 2015. ALD1 regulates basal immune components and early inducible defense responses in Arabidopsis. Molecular Plant-Microbe Interactions 28(4):455-66. doi: 10.1094/MPMI-06-14-0187-R

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Trajano, H.L., S. Pattathil, B.A. Tomkins, T.J. Tschaplinski, M.G. Hahn, G.J. Van Berkel, C.E. Wyman. 2015. Xylan hydrolysis in *Populus trichocarpa* x *P. deltoides* and model substrates during hydrothermal pretreatment. *Bioresource Tech.* 179: 202-210 doi: <http://dx.doi.org/10.1016/j.biortech.2014.11.090>

Payyavula R.S., T.J. Tschaplinski, S. S. Jawdy, R.W. Sykes, G.A. Tuskan, and U.C. Kalluri. 2014. Metabolic profiling reveals altered sugar and secondary metabolism in response to UGPase overexpression in *Populus*. *BMC Plant Biology* 14:265 doi:10.1186/s12870-014-0265-8

Clarkson, S.M., S.D. Hamilton-Brehm, R.J. Giannone, N.L. Engle, T.J. Tschaplinski, R.L. Hettich, and J.G. Elkins. 2014. A comparative multidimensional LC-MS proteomic analysis reveals mechanisms for furan aldehyde detoxification in *Thermoanaerobacter pseudethanolicus* 39E. *Biotech. for Biofuels* 7:165 doi: 10.1186/s13068-014-0165-z

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Zhao N., Yao J.Z., Chairasongsuk M., Li G.L., Guan J., Tschaplinski T.J., Guo H., Chen F. 2013. Molecular and biochemical characterization of the jasmonic acid methyltransferase gene from black cottonwood (*Populus trichocarpa*). *Phytochemistry* 94: 74-81.
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Trajano, H.L., N.L. Engle, M. Foston, A.J. Ragauskas, T.J. Tschaplinski, and C.E. Wyman. 2013. The fate of lignin during hydrothermal pretreatment. *Biotechnol. for Biofuels* 6:110
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pathways. *J Ind Microbiol Biotechnol* 40:725–734 44196 DOI 10.1007/s10295-013-1275-5

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Ye, C.-Y., T. Li, H. Yin, D.J. Weston, G.A. Tuskan, T.J. Tschaplinski, and X. Yang. 2013. Evolutionary analyses of non-family genes in plants. *Plant J.* 73(5):788-97. doi: 10.1111/tpj.12073

Muchero, W., M.M. Sewell, R. Priya, L.E. Gunter, T.J. Tschaplinski, T.-M. Yin, and G.A. Tuskan. 2013. Genome anchored QTLs for biomass productivity in hybrid *Populus* grown under contrasting environments. *PLoS One* 8(1): e54468. doi:10.1371/journal.pone.0054468

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Páez, A., P.M. Páez, M.E. González, J.A. Urdaneta, D. Ringelberg, and T.J. Tschaplinski. 2013. The effect of light on fatty acid concentrations of purslane (*Portulaca oleracea* L.): A promising plant for decreasing serum cholesterol levels | Efecto de la luz en la concentración de ácidos grasos de la verdolaga (*Portulaca oleracea* L.) Planta prometedora para disminuir el colesterol sérico. *Rev. Fac. Agron. (LUZ)* 30:441-453.

Yee, K.L., M. Rodriguez Jr., T.J. Tschaplinski, N.L. Engle, M.Z. Martin, C. Fu, Z.-Y. Wang, S.D. Hamilton-Brehm, and J.R. Mielenz. 2012. Evaluation of the bioconversion of genetically modified switchgrass using simultaneous saccharification and fermentation and a consolidated bioprocessing approach. *Biotechnol. Biofuels* 5:81. doi: 10.1186/1754-6834-5-81

Tschaplinski, T.J., R.F. Standaert, N.L. Engle, M.Z. Martin, A.K. Sangha, J.M. Parks, J.C. Smith, R. Samuel, N. Jiang, Y. Pu, A.J. Ragauskas, C.Y. Hamilton, C. Fu, Z.-Y. Wang, B.H. Davison, R.A. Dixon, and J.R. Mielenz. 2012. Down-regulation of the caffeic acid O-methyltransferase gene in switchgrass reveals a novel monolignol analog. *Biotechnol. Biofuels* 5:71. doi: 10.1186/1754-6834-5-71

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Yang, S., R.J. Giannone, L. Dice, Z.K. Yang, N.L. Engle, T.J. Tschaplinski, R.L. Hettich, and S.D. Brown. 2012. *Clostridium thermocellum* ATCC27405 transcriptomic, metabolomic and proteomic profiles after ethanol stress. *BMC Genomics* 13:336.

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THESES

Ph.D. Physiological correlates of vigorous growth in hybrid poplar.

M.Sc.F. The effects of root restriction on growth, water relations and senescence of European alder (*Alnus glutinosa* Gaertn.) seedlings.

B.Sc. The age composition of a collection of a rabid and non-rabid Big Brown Bats (*Eptesicus fuscus*) as determined by dental annuli.

PROFESSIONAL SOCIETIES/ACTIVITIES

DOE-ARPA-E- Transportation Energy Resources from Renewable Agriculture (TERRA)- Workshop participant and Review Panel Member (2014)

Current Metabolomics - Editorial Board (2012)

ORNL Invention Disclosure Review Committee – (2008-2011)
DOE Genomic Science and Technology for Energy and the Environment Review – Microbial and Plant Processes for Bioenergy Reviewer (2010)
DOE-EREE High-Yield Scenario Workshop – Woody Energy Crops Participant (2009)
DOE 30x30 Workshop on Biomass Energy – Woody Crop Development panel member (2006)
Southeast Regional Biomass Consortium – Lead of Woody Crop Development (2006)
International Poplar Genome Consortium – Coordinator of the Metabolic Characterization and Metabolomics section of the Science Plan for post-genome sequencing research (2002)
Environmental and Experimental Botany – Editorial Board (2002 – present)
Tree Physiology – Editorial Review Board (1994 – present)
Bioactive Natural Products Consortium – University of Tennessee – member (2002 – 2004)
National Science Foundation – Major Research Instruments Panel (1998)
US DOE rep. to the International Energy Agency Ecophysiology Working Group (1989-1993)
American Society of Plant Physiologists – member/participant
Canadian Society of Plant Physiologists – member/participant

SCHOLARSHIPS

1985	Canadian Forestry Service Scholar Scholarship
1984	Natural Sciences & Engineering Research Council Postgraduate Scholarship – Forestry Special
1983	Natural Sciences and Engineering Research Council Postgraduate Scholarship
1982	Natural Sciences and Engineering Research Council Postgraduate Scholarship
1982	Edward Elsworth Johnson Postgraduate Forestry Fellowship
1981	University of Toronto Open Master's Fellowship
1980	Canadian National Sportsmen's Fellowship
1980	Natural Sciences and Engineering Research Council - Summer Research Award