Alan Monte Jones
Departments of Biology (primary appointment) and Pharmacology (courtesy appointment)
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EDUCATION

Ph.D. Plant Biology, 1983, University of Illinois, Urbana
B.S. *summa cum laude*, Botany, 1978, University of Florida, Gainesville

APPOINTMENTS

2018- present Adjunct Professor Universidad San Fransisco de Quito
2013- present Kenan Distinguished Professor (permanent title)
2005-2010 George and Alice Welsh Distinguished Professor (termed title)
2004- present Professor of Pharmacology, University of North Carolina-Chapel Hill
1999- 2005 Professor of Biology, University of North Carolina-Chapel Hill
1992-1999, Associate Professor of Biology, Univ. of North Carolina-Chapel Hill
1986-1992 Assistant Professor of Biology, Univ. of North Carolina-Chapel Hill
1983-1986 Res. Associate with Dr. Peter Quail, Botany, Univ. of Wisconsin
1982-1983 Research Assistant with Dr. Tuan-Hua David Ho, Univ. of Illinois.
1981-1982 Research Assist. with Dr. Fred Meins, Friedrich Miescher Inst. in Basel.
1978-1981 Res Assist. for Dr. Larry Vanderhoef, Plant Biology, Univ. of Illinois.

PROFESSIONAL

2012-2015 President Elect, President, Past President (3-y term) of Am. Soc. Plant Biologists
2010- 2017 Editorial board *Current Opinion in Plant Sciences*
2010, 2001 USDA AFRI, Panel Manager
2007-2010 Executive Committee, Amer. Soc. Plant Biologists (society-elected member)
2005- present, BASF IBC member
2005- 2012, Associate Editor, *Plant Physiology*
2004 NIH Study Section, Immunology Fellowships, permanent
2003-2017 DOE Bioscience Program, panel member
2002-2018 NSF, Cell Biology Signal Transduction, regular member
2002- NIH study section member, SSS-Y (SBIR)
1999 NIH Study Section, Molecular Biology, CDF-1
1991-1998; Editor, *Plant Physiology*
1998- Faculty member in Program in Genetics and Molecular Biology
1997- Faculty member in Program in Cell Biology
1991-1996, Faculty member in the Program for Protein Engineering and Molecular Biology
1992-1996 1998- 2006 Associate Editor, *J. Plant Growth Regulation*
1991-1993 USDA NRICGO, panel member
1995-1996 BARD Program CoChairman, 1995; BARD Chairman 1996
Member: AAAS, IPGSA, ISPMB, ASCB, ASPB, NCAS, ASBMB, Sigma Xi

HONORS AND AWARDS

2013 Kenan Distinguished Professor
2012 AAAS Fellow
2009 Fellow of the American Society of Plant Biologists
2005-2010 George and Alice Welsh Termed Distinguished Professor
1996 Alexander von Humboldt Fellow
1987 John T. Lupton Research Award (UNC)
1987 IBM Junior Faculty Award (UNC)
1982 University of Illinois Competitive Graduate Research Award (Stanford University)
1977 Pensacola Jr. College Full Merit-based Scholarship

PUBLICATIONS

Publication metric is public at: https://scholar.google.com/citations?user=u7MvE5MAAAAJ&hl=en

As of Oct 20, 2021: H index = 73 with a total of 18,011 citations

(Peer-reviewed manuscripts only)

Jones RD, , Ghusinga, KR, Elston TC, Jones AM Maximum Entropy Production in Biological Signaling. (*submitted*)

Watkins JM, Clark NM, Song G, Cabral Oliveira C, Brachova L, Justin W. Walley JW, Jones AM Phosphorylation dynamics of heterotrimeric G-protein dependent signaling of flg22 in *Arabidopsis thaliana* (*submitted)*

2021

208. Biswal AK, Wu T-Y, Urano D, Jones AM,Biswal AK (2021) Novel mutant alleles reveal a role of the extra-large G protein in rice grain filling, panicle architecture, plant growth, and disease resistance. Frontiers in Plant Sciences (*accepted*)

206. Ghusinga KR, AM, Elston TC, Jones AM (2021) Towards resolution of a paradox in plant G-protein signaling. *Plant Physiology* (*accepted*)

205. Maruta N, Trusov Y, Urano D, Chakravorty D, Assmann SM, Jones AM, Botella JR (2021) GTP binding by Arabidopsis extra-large G protein 2 is not essential for its functions. *Plant Physiology* 186(2):1240-1253 doi: 10.1093/plphys/kiab119

204. Ghusinga, K, Jones, RD, Jones, AM, Elston, TC, Molecular switch architecture determines response properties of signaling pathways. (2021) *Proc. Natl Acad. Sci*. **18**:e2013401118 doi.10.1073/pnas.2013401118

203. Ross-Elliott, TJ, Watkins J, Shan X, Lou F, Dreyer B, Tunc-Ozdemire M, Jia H, Yang J, Wu L, Trusov Y, Krysan P, Jones AM (2020) Biased signaling: Distinct ligand-directed plasma membrane signalosomes using a common RGS/ G protein core. (*revision under review*) *BioRxiv* doi.org/10.1101/666578

202. Ghusinga, KR, Predes, F, Jones AM, Colaneri AC (2021) Reported differences in the flg22 response of the null mutation of AtRGS1 correlates with fixed genetic variation in the background of Col-0 isolates. *Plant Signaling and Behavior* Article 1878685 Accepted 13 Jan 2021, Published online: 31 Jan 2021 doi.org/10.1080/15592324.2021.1878685

2020

201. Yan, C, Cannon, AE Keereetaweep, J, Khan, BR, Jones, AM, Blancaflor, EB Azad, RK, Chapman, KD (2020) An intact heterotrimeric G-protein complex is required for the N-acylethanolamine-induced, transcriptionally-mediated chloroplast responses in developing Arabidopsis seedlings. *Plant Physiology* 184:459-477 doi: 10.1104/pp.19.01552.

2019

200. Lou, F, Abramyan, TM, Jia, H, Tropsha, A, and Alan M. Jones (2019) An atypical heterotrimericGα protein has substantially reduced nucleotide binding but retains nucleotide-independent interactions with its cognate RGS protein and Gβγ dimer. *J. Biological and Structural Dynamics Dec 23;1-15* 10.1080/07391102.2019.1704879 also on *BioRxiv* doi.org/10.1101/795088

199. Jia, H, Song, G, Werth, EG, Walley, JW, Hicks, LM and Jones, AM 2019 Receptor-like kinase phosphorylation of Arabidopsis heterotrimeric G-Protein Gα -Subunit AtGPA1 *Proteomics* (*accepted*) DOI: 10.1002/pmic.201900265 (featured on the Journal cover)

198. Urano D, Leong R, Wu TY, Miura K, Jones AM Quantitative morphological phenomics of rice G protein mutants portend autoimmunity disease. *Developmental Biology* (*accepted, on-line Sept 18, 2019*) **457**: 83-90 doi.org/10.1016/j.ydbio.2019.09.007

197. Biswal AK, McConnell EW, Werth EG, Lo S-F, Yu S-M, Hicks LM, Jones AM (2019) The nucleotide-dependent interactome of rice heterotrimeric G-protein subunit. *Proteomics* 1800385 DOI: 10.1002/pmic.201800385

196. Escudero, V. Torres, MA, Delgado, M, Sopeña-Torres, S, Swami, S, Morales, J, Muñoz-Barrios, A, Mélida, H, Jones, AM, Jordá, L, Molina A (2019) Mitogen-activated protein kinase phosphatase 1 (MKP1) negatively regulates the production of reactive oxygen species during Arabidopsis immune responses. *The Plant Journal* **32**(4):464-478. doi: 10.1094/MPMI-08-18-0217-FI

2018

195. Song G, Brachova L, Nikolau BJ, Jones AM, Walley JW (2018) Heterotrimeric G-protein-dependent phosphoproteome in unstimulated Arabidopsis roots. *Proteomics* Nov 8:e1800323 doi.org/10.1002/pmic.201800323

194. Khin M, Jones AM, Cech NB, Caesar LK Phytochemical analysis and antimicrobial antimicrobial efficacy of *Macleaya cordata* against extensively drug-resistant *Staphylococcus aureus Nat Prod Comm* **13**(11):1479-1483

193. Liang Y, Zhao X, Jones AM, GaoY G (2018) proteins sculp root architecture in response to nitrogen in rice and Arabidopsis *Plant Science* **274**: 129-136

192. Li, B, Urano, D, Mowrey, DD, Dokholyan, NV, Torres, MP, Jones, AM (2018) Tyrosine phosphorylation switching of a G protein substrate. *J. Biol Chem*. **293**(13):4752-4766. doi: 10.1074/jbc.RA117.000163

191. Tunc-Ozdemir, M., Liao, K-L, Jones, AM (2018) Long-distance communication in Arabidopsis involving a self-activating G protein. Feb 26 DOI: 10.1002/pld3.37

2017

189. Liao K-L, Melvin, CE, Sozzani R, Jones RD, Elston TC, Jones AM (2017) Dose-Duration Reciprocity for G protein activation: Modulation of kinase to substrate ratio alters cell signaling. *PLoS One 12*, e0190000 doi: 10.1371/journal.pone.0190000 PMCID: PMC5635846

188. Escudero, V Jordá, J, Sopeña-Torres, S, Mélida, H, Muñoz-Barrios, A, Swami, S, Alexander, D, McKee, LS, Sánchez-Vallet, A, Bulone, V, Jones, AM, Molina, A (2017) Alteration of cell wall xylan acetylation triggers defensive responses that counterbalance the immune deficiencies of plants impaired in the β subunit of the heterotrimeric G protein. *Plant Journal* 92(3):386-399. doi: 10.1111/tpj.13660 PMCID: PMC5641240

187. Tunc-Ozdemir, M, Li, B, Jaiswal, DK, Urano, D, Jones, AM, Torres, MP (2017) Predicted functional implications of phosphorylation of regulator of G protein signaling protein in plants. *Front Plant Sci*.8:1456. doi: 10.3389/fpls.2017.01456

186. Liang, Y, Gao, Y, Jones, AM (2017) Extra Large G-protein interactome reveals multiple stress response function and partner-dependent XLG subcellular localization. *Frontiers in Plant Sci*. doi: 10.3389/fpls.2017.01015

185. Tunc-Ozdemir, M Jones AM (2017) BRL3 and AtRGS1 cooperate to fine tune growth inhibition and ROS activation. *PLoS ONE* **12**(5):e0177400. doi: 10.1371 PMCID: PMC5436702

184. Liang, Y, Urano, D, Gao, Y, Hedrick, TL, Jones, AM (2017) A nondestructive method to estimate the chlorophyll content of *Arabidopsis* seedlings *Plant Methods* **13**:26. doi: 10.1186/s13007-017-0174-6 PMCID: PMC5391588

183. Tunc-Ozdemir, M, Jones, AM (2017) Ligand-induced dynamics of a heterotrimeric G protein-coupled receptor kinase complex *PLoS ONE* **12**: e0171854 https://doi.org/10.1371/journal.pone.0171854 PMCID: PMC5302818

182. Liao, K-L, Jones, RD, McCarter, P, Tunc-Ozdemir, M, Draper, JA,Elston, TC, Kramer, D, Jones, AM (2017) A shadow detector for photosynthesis efficiency. *J. Theoret. Biol*. **414**: 231-244 **doi**: 10.1016/j.jtbi.2016.11.027.

2016

181. Mudgil, Y, Karve, A, Teixeira, PJPL, Colaneri, A, Yang, J, Jiang, K, Tunc-Ozdemir, M, and Jones, AM (2016) Photosynthate regulation of the root system architecture mediated by the heterotrimeric G protein complex. *Frontiers in Plant Science* **7**: article 1255 doi.org/10.3389/fpls.2016.01255 PMCID: PMC4997095

180. Urano, D, Maruta, N, Trusov, Y, Stoian, R, Liang, Y, Jaiswal, DK, Thung, L, Botella, JR, and Jones, AM (2016) Saltational evolution of the heterotrimeric G protein signaling mechanisms in the plant kingdom. *Science Signaling* Vol 9, Issue 446 20 September 2016 featured on the cover **doi**: 10.1126/scisignal.aaf9558

179. Tunc-Ozdemir, M, Urano, D, Jaiswal, DK, Clouse, SD, Jones, AM (2016) Direct activation of a heterotrimeric G protein by a receptor kinase complex. *J. Biol Chem*. **291**: 13918-13925 DOI: 10.1074/jbc.C116.736702 PMCID: PMC4933153

178. Li, B, Makino,S, Beebe, ET, Urano, D, Aceti, DJ, Misenheimer, TM, Peters, J, Fox, BG, Jones, AM (2016) Cell-free translation and purification of *Arabidopsis thaliana* regulator of G protein signaling 1. *Protein Expression and Purification* **126**: 33-41 doi: 10.1016/j.pep.2016.04.016 PMCID: PMC5594927

2015

177. Jaiswal, DK, Werth, EG, McConnel, EW, Hicks, LM, Jones, AM 2015 Time-dependent, glucose-regulated Arabidopsis Regulator of G-protein Signaling 1 network. *Curr. Plant Biol*. (on-line 23Dec2015) doi.org/10.1016/j.cpb.2015.11.002

176. Huang J-P, Tunc-Ozdemir M, Chang Y and Jones AM (2015) Functional overlap between AtRGS1- and AtHXK1-dependent sugar signaling in Arabidopsis. *Frontiers in Plant Science* 13;6:851. doi: 10.3389/fpls.2015.00851 PMCID: PMC4602111

175. Urano, D, Jackson, D and Jones AM (2015) A null G protein alpha mutation confers prolificacy in maize. *J. Expt Botany* doi :10.1093/jxb/erv215 PMCID: PMC4507758

174. Urano, D, Dong, T, Bennetzen, JL, Jones, AM (2015) Adaptive evolution of signaling partners. *Mol Biol. Evol*. advance access Jan 6 doi:10.1093/molbev/msu404 PMCID: PMC4379405

173. Urano, D, Czarnecki, O, Wang, X, *Jones, AM, Chen, J-G (2015) Arabidopsis RACK1 phosphorylation by WNK8 kinase. *Plant Physiol*. **167**: 507–516 *corresponding author DOI: https://doi.org/10.1104/pp.114.247460 PMCID: PMC4326752

172. Wolfenstetter, S Chakravorty, D, Kula, R, Urano, D, Trusov, Y, Sheahan, MB, McCurdy, DW, Assmann, SM, *Jones, AM, Botella, JR (2015) Evidence for an unusual trans-membrane configuration of AGG3, a class C Gγ subunit, of Arabidopsis. *The Plant Journal* **81**(3):388-98 *corresponding author doi: 10.1111/tpj.12732 PMCID: PMC4334566

2014

169. Anderson, J, Ellis, JP, Jones, AM (2014) Early elementary children's conceptual understanding of plant structure and function. *CBE Life Sci Educ* **13**:375-386 PMCID: PMC4152200

168. Urano, D, Colaneri, A, Jones, AM (2014) Gα modulates salt-induced cellular senescence and cell division in rice and maize. *J. Expt Botany* **65**: 6553–6561 doi: 10.1093/jxb/eru372 PMCID: PMC4246186

167. Colaneri, AC, Tunc-Ozdemir, M, Huang, JP, Jones, AM (2014) Growth attenuation under saline stress is mediated by the heterotrimeric G protein complex. *BMC Plant Biology* **14**:129 doi: 10.1186/1471-2229-14-129 PMCID: PMC4061919

166. Montgomery, ER, Temple, BRS, Booker, BK, Martin, JW, Smolski, WC, Rogers, SL, Jones, AM and Meigs, TE (2014) Class-distinctive residues of Gα12 necessary for Hsp90-dependent mitogenic signaling. *Molecular Pharmacology* **85**:586-597 PMCID: PMC3965892

165. Fu, Y, Lim, S, Urano, D, Phan, NG, Elston, TC, Jones, AM (2014) Reciprocal encoding of signal intensity and duration in the glucose-sensing circuit *Cell* **156**: 1084-1095 doi: 10.1016/j.cell.2014.01.013 PMCID: PMC4364031

164. Xu, T., Dai, N., Nagawa, S., Chen, J., Cao,M., Zhou, Z., Li, H., Jones, AM, Patterson, S, Bleecker, AB, and Yang, Z The ABP1-TMK complex perceives auxin that activates ROP GTPase signaling pathways. *Science* **343**: 1025-1029 PMCID: PMC4166562

2013

155. Urano, D, Fu, Y, Jones, AM (2013) Activation of an unusual G-protein in the simple protist *Trichomonas vaginalis*. *Cell Cycle* **12**: 19,1-2

154. Effendi, Y., Jones, AM, and Scherer, GFE (2013) AUXIN-BINDING-PROTEIN1 (ABP1) in phytochrome-B-controlled responses. *J. Expt Bot*. **64**(16):5065-74

153. Lorek, J, Griebel, T, Jones, AM, Panstruga, R (2013) The role of Arabidopsis heterotrimeric G-protein subunits in MLO2 function and MAMP-triggered immunity. *Molecular Plant-Microbe Interactions. **25**:* 991-1003.

152. Mudgil, Y. and Jones, AM (2013) NDL protein regulation of meristem initiation and shoot branching. *PLoS One.* 2013 Nov 4;8(11):e77863. doi: 10.1371/journal.pone.0077863

151. Colaneri, A, Jones AM (2013) Genome-wide quantitative identification of DNA differentially methylated sites in Arabidopsis seedlings grown at different water potential. *PLoS One* **8**(4):e59878. PMCID: PMC3620116

150. Bradford,W., Buckholz, A., Morton, J., Price, C., Jones, AM, Urano D. (2013) Ancestral regulation of eukaryotic G protein signaling. *Science Signaling* **6**: ra37

149. Thung, L., Chakravorty, D., Trusov, Y., Jones, AM, Botella JR (2013) Signaling specificity provided by the *Arabidopsis thaliana* heterotrimeric G-protein gamma subunits AGG1 and AGG2 is partially but not exclusively provided through transcriptional regulation. *PLoS One* 8(3):e58503. doi: 10.1371/journal.pone.0058503.

2012

145. Bates GW, Rosenthal DM, Sun J, Chattopadhyay M, Peffer E, Jing Yang, Ort DR, Jones AM (2012) A comparative study of the *Arabidopsis thaliana* guard-cell transcriptome and its modulation by sucrose. *PLoS ONE* 7(11): e49641. doi:10.1371/journal.pone.0049641

144. Phan, N., Urano, D., Jones AM (2012) Endocytosis of plant 7TM-RGS proteins in sugar mediated responses. *Plant Signal Behav.* eLocation ID: e22814

143. Fox, A.R., Soto, GC, Jones, AM, Casal, JJ, Muschietti, JP, Mazzella, MA (2012) Phenotypic convergence of cryptochrome 1 and heterotrimeric G *alpha* subunit mutants in Arabidopsis *Plant Cell Physiol*. **80**: 315-324

142. Urano, D., Phan, N., Jones, JC, Yang, J., Huang, J., Grigston, J., Taylor, JP., Jones, AM (2012) Endocytosis of seven-transmembrane RGS protein activates G-coupled signaling in Arabidopsis. *Nature Cell Biology* **14**: 1079-1088

141. Gupta, A., Singh, M., Jones, AM, Laxmi, A. (2012) Glucose-hormone interaction in controlling hypocotyl directional growth in Arabidopsis: a complex trait. *Plant Physiology* **159**(4):1463-76

140. Booker FL, Burkey KO, Jones AM. (2012) Re-evaluating the role of ascorbic acid and phenolic glycosides in ozone scavenging in the leaf apoplast of *Arabidopsis thaliana* L. *Plant Cell, Environ*. **35:** 1456–1466

139. Jiang, K., Frick-Cheng, A., Trusov, Y., Rosenthal, D., Sun, JD., Botella, JR., Molina, A., Ort D., Jones, AM (2012) Dissecting Arabidopsis Gβ signal transduction on the protein surface. *Plant Physiol*. **159** (3): 975-983

138. Urano, D., Jones, JC, Wang, H., Matthews, M., Bradford, W., Bennetzen, JL, Jones AM (2012) G protein activation without a GEF in the plant kingdom. *PLoS Genetics* 8:e1002756

137. Jones, JC, Jones, AM, Temple, BRS, Dohlman, HG (2012) Differences in intradomain and interdomain motion confer distinct activation properties to structurally similar Gα proteins. *PNAS* **109**:7275-9

136. Booker, F., Burkey, K., Morgan, P., Fiscus, E., and Jones, AM (2012) Sinapoyl malate, kaempferol glycoside and ascorbic acid responses to ozone in the leaf apoplast of *Arabidopsis thaliana* L. *Plant, Cell, Environ.* **35**: 1456-1466

2011

134. Booker, F., Burkey, K., Morgan, P., Fiscus, E., and Jones, AM (2011) Minimal influence of G-protein null mutations on ozone-induced changes in gene expression, foliar injury, gas-exchange and peroxidase activity in *Arabidopsis thaliana* L. *Plant, Cell, Environ.* **35**: 668-681

133. Klopffleisch, et al [37 coauthors with AM Jones senior and corresponding] (2011) Arabidopsis G protein interactome reveals connections to cell wall carbohydrates and morphogenesis. *Molecular Systems Biology* **7**; Article number 532; doi:10.1038/msb.2011.66 Sept 27th, 2011

132. Kushwah, S, Jones, AM, Laxmi A (2011) Cytokinin-induced root growth involves actin filament reorganization. *Plant Signaling Behavior* **6**: 1848-1850

131. Kushwah, S., Jones, AM and Laxmi, A (2011) Cytokinin interplay with ethylene, auxin and glucose signaling controls Arabidopsis seedling root directional growth. *Plant Physiol*. **156**: 1851–1866

130. Friedman, EJ, Wang, HX, Perovic, I, Deshpande, A, Pochapsky, TC,. Temple, BRS, Hicks, SN, Harden, TK, Jones AM (2011) Aci-reductone dioxygenase 1 (ARD1) is an effector of the heterotrimeric G protein beta subunit in *Arabidopsis. J Biol. Chem*. **286**: 30107-18

129. Cao, H., Guo, S., Xu, Y., Jiang, K., Xu,., Jones, AM, Chong, K. (2011) A golgi Localized monosaccharide transporter (OsGMST1) from rice (*Oryza sativa* L.) *J. Expt Botany* **62***:* 4595-4604

128. Jones, JC, Temple, BRS, Jones, AM and Dohlman HG (2011) Functional reconstitution of an atypical G protein heterotrimer and RGS protein from *Arabidopsis thaliana*. *J Biol. Chem*. **286**: 13143-13150

127. Jones, JC, Duffy, JW, Machius, M, Temple, BRS, Dohlman, HG and Jones AM (2011) The crystal structure of a self-activating Gα protein reveals a new mechanism of G protein activation. *Science Signaling* 8 February 2011 Vol. **4**, Issue 159, p. ra8 (cover feature)

2010

124. Xu, T, Wen, M, Fu, Y, Chen, J-G, Wu, M-J, Perrot-Rechenmann, C, Friml, J, Jones, AM, Yang, Z (2010) ABP1 and ROP GTPase-dependent auxin signaling modulates cellular interdigitation in Arabidopsis *Cell* **143**:99-110

123. Robert, S., Kleine-Vehn, J., Paciorek, T., Sauer, M., Barbez, E., Baster, P., Vanneste, S., Zhang, J., Simon, S., Hayashi, K., Dhonukshe, P., Bednarek, S., Jones, AM., Aniento, F., Zažímalová, E., Friml J. (2010) ABP1 mediates a non-nuclear auxin signaling for regulation of clathrin-dependent endocytosis in plants. *Cell* **143**: 111-121

122. Booker, KS, Schwarz, J, Jones AM (2010) Auxin and glucose signaling mediate a novel G protein regulated bimodality in lateral roots. *PLoS One* published 17 Sep 2010 10.1371/journal.pone.0012833

121. Temple, BRS., Jones, CD., Jones, AM. (2010) Evolution of a signaling nexus constrained by protein interfaces and conformational states. *PLoS Comp. Biol*. **6**: e1000962

120. Schenck, D, Christian, M., Jones, AM, Lüthen, AM (2010) Rapid auxin-induced cell expansion and gene expression: A four-decade old question revisited. *Plant Physiol*. 152:1183-1185

2009

115. Mudgil, Y., Jiang, K, Jones, AM (2009) Arabidopsis N-MYC DOWN-REGULATED-LIKE1, a novel downstream effector of AGB1-mediated auxin signaling in roots. *Plant Cell* **21**: 3591-609

114. Galvez-Valdivieso, G., Fryer, MJ, Lawson, T, Slattery, K, Truman, W, Smirnoff, N, Asami, T, Davies, WJ, Jones, AM, Baker, NR Mullineaux, PM (2009) Paracrine signaling between vascular and bundle sheath cells is part of the Arabidopsis high light response. *Plant Cell* **21**: 2143-2162

113. Friedman, EJ, Temple, BRS, Hicks, SN, Sondek, J, Jones, CD, Jones, AM (2009) Prediction of protein-protein interfaces on G-protein β subunits reveals a novel phospholipase2 β domain. *J. Mol. Biol*. **392**: 1044-1054

112. Chen, Z, Noir, S, Kwaaitaal, M, Hartmann, AH, Wu, M-J, Muday, G, Mudgil, Y, Panstruga, R,. Jones, AM (2009) Two seven-transmembrane domain MLO proteins co-function in root thigmotropism *Plant Cell* **21**: 1972-1991 (*featured on the cover)*

111. Weerasinghe, R., Swanson, S., Okada, S., Garrett, M. B., Kim, S-Y., Stacey, G., Boucher, R. C., Gilroy, S., Jones, A. M. (2009) Touch induces ATP release in Arabidopsis roots that is modulated by the heterotrimeric G complex. *FEBS Lett*. **583**: 2521-2526

110. Lu, G, Wang, Z, Jones, AM, Moriyama, EN (2009) *7TMRmine*: A Web Server for Hierarchical Mining of 7TMR Proteins. *BMC Genomics* (doi:10.1186/1471-2164-10-275)

109. Botto, JF., Ibarra, S., Jones, AM. (2009) Heterotrimeric G protein regulates light sensitivity in Arabidopsis seed germination. *Photochem. Photobiol*. **85**(4):949-54

2008

106. Christian, M, Hannah, WB, Lüthen, H, Jones, AM (2008) New auxins from a chemical genomics approach. *J. Expt. Bot* **59**: 2757-2767

105. Fan, L-M., Zhang, W., Chen, J-G., Taylor, JP, Jones, AM, Assmann, SM (2008) Abscisic acid regulation of guard-cell inwardly-rectifying K^+ channels in Gβ and RGS–deficient *Arabidopsis* lines *Proc. Natl Acad Sci USA* **105**: 8476-8481

104. Grigston, JC, Osuna, D., Scheible, W-R., Stitt, M., Jones, AM (2008) Structural requisites for acute vs. chronic D-glucose sensing mediated by *At*RGS1 and *At*GPA1. *FEBS Lett*. **582**: 3577-3584

2007

102. Johnston, C.A., Temple, B.R., Chen, J.G., Gao, Y., Moriyama, E.N., Jones, AM, Siderovski, DP, Willard, FS (2007) Comment on 'A G protein-coupled receptor is a plasma membrane receptor for the plant hormone abscisic acid'. *Science **318**: 914c*

101. Günther F. E. Scherer, Marc Zahn, Judy Callis, Alan M. Jones (2007) A role for phospholipase A in auxin-regulated gene expression. *FEBS Lett* **581**:4205-4211

100. Trusov, Y, Rookes, JE. Tilbrook, K. Chakravorty, D. Mason, MG. Anderson, D. Chen, J-G. Jones, AM. Botella, JR. (2007) Heterotrimeric G protein γ subunits provide functional selectivity in Gβγ dimer signaling in Arabidopsis. *Plant Cell* **19***:*1235-1250

99. Johnston, CA, Taylor, JP, Gao, Y, Kimple, AJ, Chen, JG, Siderovski, DP, Jones, AM, Willard, FS (2007) GTPase acceleration as the rate-limiting step in Arabidopsis G-protein coupled sugar sensing. *Proc. Natl Acad Sci USA* **104**:17317-17322

2006

96. Pandey, S., Chen, J-G., Jones, AM., Assmann, SM. (2006) G protein complex mutants are hypersensitive to ABA-regulation of germination and post-germination development. *Plant Physiol.* **141**: 243-256

95. Wang, HX, Perdue, T,Weerasinghe, R., Taylor, JP, Cakmakci, NG, Marzluff, WF, Jones, AM (2006) A golgi hexose transporter involved in heterotrimeric G protein regulated early development in Arabidopsis. *Mol. Biol. Cell* **17**: 4257-4269.

94. Chen, J-G, Gao Y, Jones, AM (2006) Differential roles of heterotrimeric G-protein subunits in root development in Arabidopsis. *Plant Physiology* **141**: 887-897 (*featured on the cover*)

93. Chen, Z, Hartmann, HA, Wu, M-J, Friedman, EJ, Chen, J-G, Pulley, M, Schulze-Lefert, P, Panstruga, R and Jones AM (2006) Expression analysis of the AtMLO gene family encoding plant-specific seven-transmembrane proteins. *Plant Mol. Biol*. **60**:583-597

92. Chen, J-G, Ullah, H., Temple, B. Liang, J., Alonso, J.M., Ecker, J., Jones, A.M. (2006) RACK1 mediates hormone responses and regulates multiple developmental processes in Arabidopsis. *J. Expt. Bot.* **57**: 2697-2708.

91. Huang, J, Taylor, JP, Chen, JG, Wang, M, Uhrig, JF, Nakagawa, T, Korth, KL, Jones, AM (2006) The plastid protein THYLAKOID FORMATION1 and the plasma membrane G-protein GPA1 interact in a novel sugar-signaling mechanism in Arabidopsis. *Plant Cell* **18**:1226-38.

90. Chen, J-G, Wang, S, Lazarus, CM, Napier, RM, Jones, AM (2006) Altered expression of auxin-binding protein 1 affects cell proliferation and auxin pool size in tobacco cells. *J. Plant Growth Regulation* **25**:69-78

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INVENTION DISCLOSURES AND PATENTS (UNC-CH only)

ORS94-78 In vivo expression system for detection of homotypic protein-protein interactions

OTD96-91 A controllable genetic mechanism to increase the growth rate of plants

OTD98-25 A genetic mechanism to increase the growth rate of plants

OTD00-101 Plant cell expansion control by ABP1. (Patent Pending)

OTD02- Hyperpolarization-activated Ca^{++} channels as reporters for membrane hyperpolarization

Docket # 2155P Methods of improving plant agronomic traits by altering the expression of plant G proteins alpha and beta. (Patent Pending)

OTD: 12-0032- Instrument-Free DNA detection.

INVITED PRESENTATIONS (1986-present)

"Biased Signaling: Distinct Ligand-directed Trafficking of Plasma Membrane Signalosomes Using a Common RGS/ G-protein Core.Gordonn Research Conference Waterville NH June 2022

"Rock, Rock Steady Until the Break of Dawn" Optimizing Signaling Outputs in a Dynamic Environment" at ELO (formally Precision BioScience), RTP, NC Nov 10th 2021

"A Shadow Detector for Maximizing Fitness in Dynamic Light Environments" Univ. of Illinois, Urbana Champagn April 2021

"The Evolution of G Signaling" 2020 KRITON HATZIOS SYMPOSIUM, Birmingham AL April 2021

""Heterotrimeric G-protein Signaling: Emergent Properties Embedded in System Architecture in Plants" University of Edinburgh July 3rd 2018

"A sugar-based Shadow Detector for Optimal Photosynthetic Efficincy- A Role for the Plant Heterotrimeric G Protein Complex" University of Cambridge, June 29th 2018

"Heterotrimeric G protein Signaling in Plants: Centinela, despachador, y detector de sombras " Univsidad San Fransisco de Quito, May 2018

"Heterotrimeric G protein Signaling: Emergent Properties Embedded in System Architecture" Dept Biological Engineering, MIT, June 7, 2017

"Paradigm shifts in heterotrimeric G signaling taught to us by plants" Dept Biology, University North Texas April 20th, 2017

"Paradigm shifts in heterotrimeric G signaling taught to us by plants" Dept Plant and Microbial Biology, NCSU April 4th, 2017

"The Physician's Garden" Chapel Hill Garden Club, Chaprl Hill NC Mar 8, 2017

"Mechanism of sugar perception in plants" Dept Plant and Microbial Biology, NCSU Feb 10th, 2015

"What we Learned about G protein Signaling in College is the Exception, not the Rule" Univ Illinois- Chicago Nov 2014

"Heterotrimeric G Signaling in Plants—Signal Strength and Frequency Detection" **Anton Lang Lecture**, Plant Research Lab, Michigan State University, April 14th 2014 East Lansing MI

"Reciprocal encoding of signal intensity and duration in the glucose-sensing circuit in *Arabidopsis thaliana"* Mid Atlantic Section of the American Society of Plant Biologists, College Park MD Mar 7 2014

Two class lectures on "G signaling" Argentina Plant Research Lectures, Buenos Aires Oct 2013

"Regulation of the G protein Activation State" University of Tübingen, Dept of Chemistry, July 2013

"How Activation of Heterotrimeric G Cell Signaling is Important to the Normal and Diseased States: Nature's Secret Twists" School of Chemistry and Molecular Biosciences, University Queensland, Feb. 27th, 2013.

"Sugar sensing through AtRGS1, a Co-Glucose Receptor" 2013 International Conference on Plant Science at POSTECH, Pohang Korea, Jan 24-26th, 2013

"Molecular Plasticity in G Protein Activation for Clinical Relevance" National Univ. of Singapore, Duke-NUS Medical Program, Jan 22nd, 2013

"G-Protein coupled Signaling in Eukaryota: from Ameoba to Zebra Fish" Temasek Life Science Lab, Singapore, Jan 21st, 2013

" Endocytosis of Seven-Transmembrane RGS Protein Activates G-protein Coupled Signaling in Arabidopsis" ASPB 2012, Austin July 21 2012

"Sugar perception and signaling via an unusual RGS protein" Gordon Research Conference, Holderness NH July 15-20, 2012

"Sugar sensing in plants- engineering nutrient-dependent traits." Syngenta, RTP, NC, Nov 15th, 2011

"Activation of G-protein coupled signaling: new twists on the paradigm." Dept Pharmacolgy UNC, Oct 18th, 2011

"A strange way to sense sugar; no April foolin' Cornell University, April 1st 2011

"Structure of a self-activating Gα subunit" DOE Contracters workshop, Baltimore, Oct 17-20 , 2010

"Structure of a self-activating Gα subunit" NCBC PMB retreat, Ashville, NC Oct 1st, 2010

"The unusual (and useful) properties of heterotrimeric G protein signaling in Arabidopsis" University of Heidelberg June 24th, 2010.

"Glucose sensing by regulator of G signaling 1 protein coupled by heterotrimeric G protein complex: illuminating atomic structure and mechanism" University of Freiburg, June 25th, 2010 on the occasion of Eberhard Schaefer's retirement (special symposium)

"A new way to sense sugar", School of Life Science, UN-Las Vegas, Mar 5th, 2010

"Evolution of G protein Signaling" Duke University, Plant Biology, Jan 15, 2010

"How the G protein Complex Mediates Control of Cell Proliferation in Arabidopsis" Colloquium speaker, University of Wisconsin Madison Nov 5th, 2009

"Sui generis yet applicable G-protein cycling in the model organism, Arabidopsis". Medical University of South Carolina, Dept Cell and Molecular Pharmacology, October 22, 2009

"Sugar regulation of cell division through a novel G protein complex" Clemson, March 13, 2009

"A Novel Receptor-GAP in Arabidopsis Glucose Signaling" Max Plank Institute Cologne, Dec 4th, 2008

"Arabidopsis (and other plants) impact on human health" Oxford University, December 2, 2008

"A Novel Receptor-GAP in Arabidopsis G cycling" Donald Danforth Center, St. Louis, Sept 15, 2008

"Glucose sensing through a novel receptor GAP" Banbury Conference entitled " Nutrient Sensing In Plants. What Can Other Model Organisms Tell Us?" Cold Spring Harbor, 21-24 September 2008

"Heterotrimeric G protein coupled D-glucose Signaling in Arabidopsis" Sympossium speaker, ASPB annual Meeting, Merida Mexico, June 28, 2008

"A novel receptor-GAP in Arabidopsis G protein cycling" **Tolbert Distinguished Lectureship**, Michigan State University, April 17, 2008

"Sugar Regulation of Cell Proliferation via the Arabidopsis Heterotrimeric G Protein", Texas A&M, Molecular and Environmental Plant Sciences Symposium, Keynote speaker, College Station, TX, Mar 4th, 2008

"Sugar Sensing via a Hexose-regulated Receptor GTPAse Accelerating Protein" University of Minnesota, Symposium Speaker, February 20, 2007 **Graduate Student Invitation**

"Sugar Sensing via a Hexose-regulated Receptor GTPAse Accelerating Protein" Brody School of Medicine at ECU, Nov. 13th, 2006

"Signaling through the Plant Heterotrimeric G protein Complex" Wageningen Plant Science Summer School lecture, June 20th, 2006

"Heterotrimeric G protein coupled signaling: Do plant cells do it backwards? Univ. MO, Columbia, MO May 8, 2006 **Graduate Student Invitation**

"Novel Signaling via the Heterotrimeric G protein in Arabidopsis" Univ. Nebraska, Lincoln Mar 1, 2006

"How and why do we sense sugars? A lesson from a weed." William and Mary University, Feb 3, 2005

"High Glucose Signaling in Arabidopsis Involves Plasma Membrane to Organelle Communication" NCBC Plant Molecular Biology Retreat Speaker, Wilmington, Sept 30th, 2005

"Sugar sensing- A Novel Signal Pathway from Plasma Membrane to Organelles" Florida State University, Sept. 29th, 2005

"Sugar Sensing in Plants" Monsanto, St. Louis, August 17, 2005

"Sugar Sensing in Plants from Human, Yeast, and Cyanobacteria Perspectives" Martin-Luther-University of Halle-Wittenberg, March 31, 2005

"Sugar Sensing Via A Novel Regulator of G Signaling (RGS) Protein in Arabidopsis" Univ. California, Davis April 22, 2005 **Graduate Student Invitation**

"Sugar Sensing in Arabidopsis" Keystone Conference, Santa Fe, Feb. 2-5, 2005

"Plastid to Plasma Membrane Signaling in Sugar Sensing Involves the Heterotrimeric G Protein Complex" BASF, RTP, NC Jan 21, 2005

"Heterotrimeric G-Protein-coupled Sugar Sensing in Plants" Iowa State University, Aimes, IA, Novemeber 11, 2004

" Sugar sensing coupled by Heterotrimeric G protein in Arabidopsis" Virginia Polytechnecal Institute, Blacksburg, VA Nov. 5th, 2004

"G Protein-Coupled Sugar Sensing in Arabidopsis" University of Florida, Gainesville, FL Oct. 13th, 2004

"G-protein coupled Sugar Sensing in Arabidopsis Involving a Novel Plastid Protein", Invited Speaker, Biochemical Society Focused Meeting, Royal Agricultural College, Cirencester, UK, September 25-29, 2004

"Role of a Seven-transmembrane RGS Protein in Sugar Sensing in Arabidopsis", Invited Speaker, ASPB Ann Meeting, Orlando, July 24-29th, 2004

"Auxin-binding protein 1" Auxin 2004 Kolympari Crete, May 2004

"G-protein coupled sugar signaling in Arabidopsis" University of Illinois, May 5, 2004

"G-protein coupled signal transduction in Arabidopsis" Dept. Pharmacology, UNC Dec. 2003

"Cell division control in roots: Two separate mechanisms coupled by a heterotrimeric G protein" NC Biotechnology Plant Consortium Retreat, Ashville, Sept. 2003

"G-coupled signaling in Arabidopsis" Dept. Botany, Univ. Tennessee, Mar. 27, 2003.

"University-Industry Relationships and the public good, the bad, and the ugly", Agricultural Biotechnology Worshop held Nov. 19-20, RTP, NC invited panelist

"Role of the beta subunit of Arabidopsis Heterotrimeric G Protein in Controlling Cell Division" Dept. Biology, Penn State Univ. Oct. 15th, 2002

"Role of the Mitochondria in Programmed Cell Death During Tracheary Element Differentiation" Am. Phytopathological Society, **Symposium Speaker**, July 28th, 2002

"Life in the Fastlane- a Perspective from a Principal Investigator" Burroughs Welcome Fund sponsored Conference on Electronic Grantmaking. Research Triangle Park, June 5-6, 2002

"Multiple Signal Coupling by Arabidopsis Heterotrimeric G protein" Univ. Mass. May 2nd, 2002

"Multiple Signal Coupling by Arabidopsis Heterotrimeric G protein" Max Plank Institute, Koln, Mar. 20th, 2002

"Dual and competing auxin signal transductions by independent pathways" , 2nd Internat'l Conference DFG Schwerpunktprogramm Molecular Analysis of Phytohormone Action. Hamburg, Mar 21, 2002 Keynote Speaker

"Dual auxin signal mechanisms involves G protein coupling in *Arabidopsis*", Cell and Molecular Biology, Univ. Texas- Austin, Jan 29, 2002

"Role of a heterotrimeric G-protein in signal crosstalk in seed germination" **Plenary speaker** for San Diego Center for Molecular Agriculture Symp. "How do plant cells transduce hormonal and environmental signals? Oct 19, 2001

"Crop bioengineering benefits to the Earth" Biomedical Debate Panelist, "Genetically Modified Foods: Issues and Answers" 4th Ann. NC Assoc. Biomed Res. A program for general public, HS teachers and students. Oct.10, 2001

"ABP1 is required for coordinated cell elongation and division in arabidopsis embryogenesis", XIV International Congress on Plant Growth Regulators, Brno, Czech Rep., July1-7, 2001 **Plenary speaker**

"Auxin regulation of filling and partitioning space in plant tissues", Western Washington University, May 1st, 2001

"A heterotrimeric G protein in plant cell proliferation", University of British Columbia, April 30, 2001

"Dissection of auxin signal transduction in cell elongation and division", Harvard University, April 18th, 2001

“Auxin control of plant cell growth and division” Dept. Chemisty, UNC-CH, April 4th, 2001

“Signal transduction of plant cell division and expansion”, 4 talks given in Japan between March 11-22, 2001 at RIKEN, HARL, Univ. Tokyo, and Nara Institute

“Final and Fatal Step of Tracheary Element Differentiation” International Symposium on Tree Biotechnology, Tokyo, Mar. 15-17, 2001

“Auxin control of plant cell growth and division” Biotechnology Center, University of Wisconsin, Feb. 15th, 2001

“Signal transduction in Plant Cell growth, division, and differentiation” in Progress in Signaling Research Series, Dept. Pharmacology, UNC, Chapel Hill, Feb 12th, 2001

“Signal transduction pathways in plant cell elongation, division and differentiation”, Cold Spring Harbor Lab, Banbury Conference, Dec. 4-7, 2000

“Regulation of programmed cell death during tracheary element formation by a novel ‘trigger’ protease” Univ. Nebraska, Nov. 8, 2000

“A novel protease controlling programmed cell death during tracheary element differentiation”, NCBC annual PMB retreat, Boone, NC invited speaker, Set. 16, 2000

“Regulation of Programmed Cell Death During Tracheary Element Differentiation”, Invited speaker and session chair, Gordon Conference, July 21, 2000

“"Mediation of auxin action through the auxin receptor”, Plenary, ABP1' Plant Growth Regulator Society of America, Kona Hawaii, July 31, 2000 Plenary speaker

“Auxin signal transduction” Auxin 2000, Ajaccio, Corsica, May 15th, 2000 Plenary speaker

“Programmed Cell Death in Plants” Cell Death Society Symp, El Escorial, Spain, May 9, 2000, Invited speaker

“New targets for auxenic herbicides” DowAgro, Indianapolis, April 24, 2000

“ Induction and termination: two controlling events of tracheary element formation”, Dept. Forestry, Univesity of Sweden, Uppsala, Jan, 13, 2000

“Dual signalling pathways for auxin-regulated cell division and expansion” Dept. of Forestry, University of Sweden, Umea, Jan 10th, 2000

“Regulation of programmed cell death by a secreted protease during terminal differentiation of tracheary elements”
American Soc. Cell Biology, Washington DC, Dec. 14th 1999

“How to become a functional corpse: Lessons from a model cell system” Dept. Biology, The University of North Carolina at Chapel Hill, Nov. 29th, 1999

“Regulation of programmed cell death by a secreted protease during terminal differentiation of tracheary elements.”, Cold Spring Harbor, Banbury Conference, Oct. 17-20, 1999

“Programmed cell death during differential differentiation of tracheary elements” Invited speaker to International Botanical Congress, August 5, 1999

“A two-decade journey towards an auxin receptor” Washington State University, Pullman, July 21, 1999

“"The role of auxin-binding protein 1 in cell expansion and division"” University of Missouri symposium Plant Hormones: Signaling and gene expression. Invited speaker, April 14, 1999

“Auxin-dependent plant cell expansion mediated by overexpressed auxin-binding protein 1” University of Wisconsin, Madison, March 29, 1999

“Reverse genetic approaches to assign function to a novel type of receptor for the plant hormone auxin”, UNC Genetics Program, Nov. 13th, 1998

”Molecular genetic evidence that auxin-binding protein 1 is a receptor mediating auxin-regulated cell expansion” Max Plank Institute für Zuchstuchforschung, Köln, Germany, Sept. 2nd, 1998

“A serine protease regulates programmed cell death during tracheary element differentiation”, Max Plank Institute für Zuchstuchforschung, Köln, Germany, Sept. 4th, 1998

“Developmental programmed cell death during tracheary element formation”, Novartis, RTP, June 21, 1998

“Tracheary element formation: Coordination controls between cell wall formation and its programmed cell death”, Westvaco, Summerville, SC, June 16th, 1998

"A serine protease triggers programmed cell death of developing tracheary elements", DeKalb, Mystic, CT, June 12, 1998

"Controlled overexpression of auxin-binding protein 1 causes auxin-dependent growth", American Society of Plant Physiologists, Madison WI, June 28th, 1998

"A secreted protease coordinates cell wall synthesis with programmed cell death during tracheary element differentiation." American Society of Plant Physiologists, Madison WI, July 1st, 1998

"Controlled overexpression of auxin-binding protein 1 causes auxin-dependent cell expansion". American Society of Plant Physiologists, Roanoke Virginia, Feb. 21-23, 1998

"Signal tranduction by Synecocystis phytochrome." 11th North Carolina Biotechnology Center Plant Molecular Biology Consortium Retreat, Ashville, NC Sept. 1998

"Auxin-binding Protein 1 defines a new growth hormone signal pathway" Duke University, Developmental Cell and Molecular Biology Seminar Series, April 8th, 1998

"Tracheary Element Differentiation: Coordination of Programmed Cell Death and Secondary Wall Synthesis" University of Ohio, Dept. Botany, Jan. 30th, 1998

"Terminal Differentiation of Tracheary Elements Utilizes a Secreted Protease to Coordinate Programmed Cell Death with Wall Formation" University of California- Berkeley, Department of Plant and Microbial Biology, **Graduate Student Invitation**, Mar. 9th, 1998

"Differentiation of Tracheary Elements involves a Coordinated, Catastrophic, Committed Event in its Cell Death Program" Texas A & M University, Department of Horticulture, Oct. 23rd, 1997

"Xylogenesis: A Model System to Study Plant Programmed Cell Death", University of Warwick, Department of Biology, July 17th, 1997

"Overexpression of ABP1 in Maize causes excessive deposition of Cell Wall" University of Warwick, Department of Biology, July 18th, 1997

"ABP1 and Cell Wall Growth" University of Freiburg, Institut fur Biologie II, June 25th, 1997

"Programmed Cell Death During Tracheary Element Formation Involves a Novel Suicide Event Which May Be Triggered By a Wall Derived Signal" Max Plank Institut fur Molekulare Pflanzenphysiologie Golm, May 27th, 1997

"The possible function of the auxin receptor." Keystone Symposium, Signal Transduction in Plants, Hilton Head, SC, May, 1995.

"Transfer Cells." Keystone Symposium Workshop, Glycochaperones, Tamarron, CO, March, 1996.

"Programmed cell death in plants." Integrative Biology, **Graduate student invitation**, Virginia Tech University, March, 1996.

"Auxin receptors and their mode of action." Friedrich Miescher Institute, Basel, Switzerland. June, 1994.

"Phytochrome-regulated growth." Centre National de la Recherche Scientifique, Gif-sur-Yvette, France. June 1994.

"Auxin receptors and their mode of action" Department of Biology, Cornell University, Ithaca, NY. September, 1994.

"Auxin receptors." Department of Biology, Pennsylvania State University, University Park, PA. April, 1995.

"Subcellular localization of ABP1", Cytonet Retreat, Breckenridge, CO, May, 1993.

"Multiple receptors in auxin action", Congress on Cell and Tissue Cultures, San Diego, CA, June, 1993. Plenary

"Phytochrome-regulated growth: the role of auxin and auxin receptors", Department of Veg. Crops, University of California, Davis, CA, June, 1993.

"Possible role of auxin receptors in plant signal transduction." Steenbock Symposium, University of Wisconsin, Madison, WI. May, 1992. Invited speaker

"Light-regulated growth." Department of Botany and Plant Pathology, Oregon State University, Corvallis, OR. May, 1992.

"Structure and function of key molecules in light-regulated growth." Department of Botany, University of Washington, Seattle, WA. May, 1992.

"Signal transduction in plants." Cold Spring Harbor Laboratory, Cold Spring Harbor, NY. July, 1992.

"Light-regulated growth in plants." Department of Biology, UNC, Greensboro, NC. February, 1993.

"Multiple receptors in auxin action." Juan March Foundation Workshop on Hormone Action in Plants, Madrid, Spain. March, 1993. Invited speaker

"Subcellular localization of ABPI." Cytonet Retreat, Breckenridge, CO. May, 1993. Invited speaker

"Signal transduction in plants." Cold Spring Harbor Laboratory, Cold Spring Harbor, NY. July, 1991.

"Phytochrome polypeptide structure." Internat'l Soc. for Plant Molecular Biology, Tucson, Aug, 1991. Invited

"Auxin-binding proteins and their putative roles in cell elongation." International Society for Plant Molecular Biology, Tucson, AZ. August. 1991. Invited speaker, same conference

"Localization of the dimerization region in phytochrome polypeptide." International Symposium on Photomorphogenesis, Beltsville, MD. October, 1991. Invited speaker

"Mechanism of phytochrome-regulated growth." Department of Biology, Wake Forest University, Raleigh, NC. December, 1991.

"Mechanism of phytochrome-regulated growth." Department of Biology, Yale Univ, New Haven, CT. Feb 1992.

"Auxin receptors." NIEHS, RTP, NC. March, 1992.

"Auxin-regulated growth." Department of Genetics, NCSU. March, 1992.

"Light-regulation of growth: the structure and function of key molecules." Department of Biology, University of Illinois, Chicago. April, 1992.

"Maize auxin receptor." Gordon Conference, June, 1990. Invited speaker.

"Phytochrome-regulated growth." University of Missouri, Columbia, October, 1990.

"Role of auxin and an auxin receptor in light-regulated growth." Duke University, November, 1990.

"Phytochrome-regulated growth in maize-role of auxin and an auxin receptor." Washington University, St. Louis, MO, January, 1991.

"Localization of auxin-transporting cells in maize mesocotyl." Jacque Monod Conference, Roscoff, France, September, 1989. Invited speaker

"Identification and partial purification of a red algal phytochrome." American Society of Plant Physiology, Toronto, Canada, August, 1989, with M. Edgerton. Invited speaker.

"Light-regulation of maize mesocotyl growth: The role of auxin and a putative auxin receptor." Michigan State University, January, 1990.

"Photoaffinity Labeling of Auxin-binding Proteins in Maize." International Congress of Plant Growth Substances, Calgary, Alberta, Canada, July, 1988. Invited speaker.

"Effect of Red Light on NAA-induced Growth Capacity and NAA Binding." International Congress of Plant Growth Substances, Calgary, Alberta, Canada, July, 1988. Invited speaker, same conference.

"Phytochrome-regulated Growth." CIBA GEIGY, Research Triangle Park, North Carolina, June, 1988.

"Structural/Functional Analysis of *Avena* Phytochrome", XIV, International Botanical Congress, Berlin, July 25, 1987. Invited speaker.

"A Structural/Functional Analysis of the Phytochrome Polypeptide", Eidgenossiche Technische Mochschulle (ETM), Zurich, August 10, 1987.

"Phytochrome-regulated Growth in Maize", Department of Botany, NCSU, January 13, 1988.

"Phytochrome-regulated Growth", Department of Botany, Duke University, February 5, 1988.

"Phytochrome-regulated Growth", Department of Horticulture, Virginia Polytechnic Institute, Blacksburg, VA, January 14, 1988.

Okazaki, Japan, Yamada Conference for Phytochrome and Plant Morphogenesis, 1986, "Localization of a 16-kilodalton Domain on the Phytochrome Polypeptide involved in Stable Protein-Chromophone Interactions".

NC Biotechnology Center. Plenary speaker, October 1986, "A Structural/Functional Analysis of Phytochrome".

SERVICE

International

2016- Chair Plantae Steering committee. World's largest digital platform for plant biologists

2005 Conference organizer, Keystone Meeting, "Plant Signal Transduction: In vivo and -omics Approaches"

2000 Session organizer, Plant Senescence Gordon Conference

1999 Co-organizer for the first meeting devoted to programmed cell death in plants, Banbury Conference, Cold Spring Harbor Laboratory
1999 Co-organizer of session on Programmed Cell Death, International Botanical Congress
1999 Instructor for Advance Course in Programmed Cell Death, July 4-9, Porto, Portugal
1999 Chief organizer of the first international meeting on Auxin Year 2000, in Corsica
1998 Scientific delegation from UNC General Adminsitration to Baden-Wurttemburg Germany to establish a Scientist Exchange program between the two states.

National
2012-2015, Board of Trustees, Am. Soc. Plant Biologists
2014-2017 ASPB Science Policy Committee
2012-2015, President (elect through past) Am. Soc. Plant Biologists
2011 HHMI/ASPB-sponsored Plant Summit participant and "white-paper" author.
2010 Panel Manager for USDA NIFA Foundation research program
2010 Organizer of an NSF-funded workshop to solve the evolution of the G protein signaling pathway, NESCent, Durham, NC
2008 Meeting Organizer Banbury Conference Cold Spring Harbor
2007-2010 Executive Committee, Amer. Soc. Plant Biologists
2006 Program Review, Division of Cell Biology, University of Maryland
2005 Organizer of a Keystone Symposium
2003 DOE Biological Science grant panel
2002 Panelist for a workshop on University-Industry Relationships
2002- NIH Small Business Inovative Research Study section, regular member
2002- NSF Signal transduction (Cell Biology) regular panel member
2001 Panel Manager, USDA NRICGO, Plant Growth and Development
1999 Reviewed text book 'Introduction to Plant Physiology' for Am. Soc. Biology.
1999 Panel member, NIH, CDF-1
1999 Instructor for ASPP-sponsored Plant Biochemistry Course
2001-2006 American Society of Plant Biologist program committee
2002-2006 American Society of Plant Physiologist Constitutional By-Laws Committee
1998-2001 American Society of Plant Physiologist Constitutional By-Laws Committee
1993-1996 NSF funded Network of Cell Biologist Advisory Committee
1991-1998 Editor, *Plant Physiology*
1996 BARD Chairman, USDA-Israel Funding Agency
1995 BARD Program CoChairman,
1991-1996 Editor, *J. Plant Growth Regulation*
1991- 1993 Panel Member USDA National Research Initiative Competitive Grants Office
1991, 1992 Instructor, Cold Spring Harbor Course on Signal Transduction in Plants

State and Community

2020- Faculty Advisor to student club Alternative Protein Club
2016- Faculty Advisor to student club Gardenting and Ethnobotany in Academiz
2010 ScieNCe Festival, "Ask a scientist booth" Sept, 2010, sponsored by Sigma Xi
2008 Jones Lab representative, DNA Day - Southern Lee High School
2007 Jones Lab representative, DNA Day - Southern Lee High School
2007 Jones Lab representative, NC State Science Fair Judge - Meredith College - Junior

Biological Sciences Division
2006-2009 NCBC PMB Seminar committee
2005- Internal BioSafety Committee for BASF, RTP, NC
2001 Biomedical Debate Panelist, "Genetically Modified Foods: Issues and Answers" 4th Ann. NC Assoc. Biomed Res. A program for general public, HS teachers and students
1999 Preceptor for NC teacher, UNC Math and Science Education Network
1999- North Carolina Academy of Sciences
1986- Plant Molecular Biology Consortium, NC Biotechnology Center, served on either the Seminar or Steering Committee every year since 1986, except sabbatical year
1986-1989 Weekly mentor to students from the School in Math and Sciences

University

2020- present Faculty Advisor to Student Club Alternative Protein Club
2015- present Faculty Advisor to Student Club Gardening And Ethnobotany in Academia (GAEA)
2010- Alpha Epsilon Delta, Premed Honors club, Faculty Advisor
2009 Boka W. Hadzija Award Selection Committee (UNC award for character and service)
2007- Member, Administrative Board, School of Dentistry
2006- 2012 Genomics Building Greenhouse Planning Committee
2000-2002 Admissions Committee, UNC School of Dentistry
2000- NSF Major Research Instrumentation internal review committee
1999- Science Advisory Committee to the Senior AssociateDean, Interdisciplinary with Schools of Arts and Science and Medicine
1999 Industrial Liaisons in Functional Genomics/Bioinformatics, Advisory Committee to the Provost Office
1998/9 University Teaching Award Selection Committee
1998 Steering committee, Carolina Environmental Program
1998/9 Model Systems Building, planning committee
1999 UNC- Planned Glaxo Training Program in Bioinformatics, Cofounder
1998 UNC- Planned Novartis Training Program in Model Systems, Cofounder
1993-96 Administrative Library Steering Committee
1990-present Summer Undergraduate Research Experience Program
1989-1993 Mason Farm Biological Reserve Advisory Committee

Department
2015- present Chair, Post Tenure Review committee
2005-present Faculty Development Committee
2003-present Greenhouse Committee Chairman
2003-present Microscopy Facility Committee Chairman (implimented policy and rate changes)
2002-present Promotion and Tenure Committees (Research Evaluation)
2003 Fixed-term Faculty Promotion Committee Chairman (implemented first policy outlining requirements for promotion)
2002-2003 MCDB Review committee
1989, '92, '99, '00, '01 Faculty Search Committees (hired 9 faculty)
1998-2003 Chair, Seminar committee, served also 1991 and 1989 as member
1987-1999, 2002- present Graduate Admissions Committee (1999, Chair)
1997-present Electron Microscope Committee

1995- '97 Space and Facilities Committee
1993 Honors Committee
1987- present Greenhouse Committee
1987-1996 Coker Hall Equipment Committee
1986- present Undergraduate Research Advisor (23 students)
1987- present Graduate Advisor (5 PhD and MS)
1987- present Graduate Student comitteees (numerous)
1987- present Undergraduate Advisor

TEACHING EXPERIENCE (1986-present)

The Physician's Garden. Yearly from 2015. This course combines human cell biology and classical botany. Connections between the mode of action of plant metabolites on cellular structures and enzymes become apparent. It includes hands on experiences such as trips to pharmaceuticals and botanical gardens and activities such as chemistries and maintaining the campus medicinal garden. A few centuries ago, each physician kept a garden of plants that produced secondary metabolites to be used as medicines. Plants and medicines were common knowledge in generations past but today, this connection between plants and medicine is lost. The diversity of useful compounds made by plants is astronomical, most have not yet been discovered and are endangered of being lost through extinction of the factory plant. An appreciation of diversity is therefore important to compel upon society. We know the workings of the cell with explicit atomic detail. For example, we can describe how the compound taxol from the evergreen called the Pacific Yew binds to the cytoskeletal protein assembly of the cell. Consequently, we can explain the mode of action of taxol as a chemotherapeutic.

Introduction to Laboratory Practice. Each spring. A small boutique class designed to learn a practical skill set depending on the individual student career goals. For example, in one year, students had interest in developmental biology so they learned how to paraffin section soft tissues of normal and altered organs. Another year the students were interested in becoming geneticists so they learned how to perform chromosome painting. A final example is a year when most of the students were interested in forensic scientists, therefore PCR analyses was learned.

Cellular and Developmental Biology. Yearly from 1987- 1994, 1998-present This is a course with an enrollment between 100- 200 junior and senior undergraduate students. It is an information rich course covering both cell and developmental biology. I also emphasized how knowledge in these fields is obtained. A recitation accompanies this course where the techniques are introduced and problem solving is practiced. The course text is Essentials of Cell Biology by Alberts, et al. Yearly student evaluation ~4.5 (out of 5 max)

Advanced Cell Biology. I taught this first in the Fall, 1997. Because the prerequisite for this is Cellular and Developmental Biology (above), it is possible to go into the interesting details of cell biology. The course focuses both on information and on the analytical thinking. Besides discussing the experiments used to advance our understanding of cell biology, the students read and discuss several published papers.

Laboratory in Cell Biology. Taught every other year since 1989. This is an intense hands on technique course in cell biology. I teach two to three sections of a maximum of 12 students in

each section. The course covers a broad spectrum of techniques used in cell biology. It is divided into 4 parts: 1. organism (plant and animal cell transformations, animal and plant tissue culture, isolation of living explants); 2. cell (brightfield and fluorescent microscopies, microinjection of oocytes); subcellular (organelle isolation, fluorescent in situ hybridization of DNA probes to human chromosomes, chromosome painting); and macromolecular (SDS PAGE, western blotting, chromatographies). I designed the course manual. It has been requested by three other colleges.

Plant Growth and Development. Taught twice since 1986. This is a graduate level course with a small enrollment. It meets a need special of UNC CH. Since Chapel Hill is the medical center (apart from the Agriculture School located in Raleigh), our graduate students and postdocs often come to us with little background in plant biology although they are experienced molecular biologists. They have little time to take full semester courses in each of the basic areas of botany such as anatomy and physiology. One third of the course is in depth plant anatomy, one third is regulation of growth, and one third is plant development. We use several anatomy texts plus Plant Development by Steeves and Sussex in addition to original research papers.

Structure and Function in Plants. Taught three times since 1988. This course is designed for the senior undergraduate. The focus is on how plant structures (cells to organs) are formed and how this is regulated. It incorporates several approaches toward understanding plant development. In 1996, I cotaught with Ralph Quatrano and we included an arabidopsis mutant screen for the students. The students working in teams first had to develop a selection or educated screen for mutagenized arabidopsis. The screens were discussed in length before they began and most groups sucessfully obtained interesting potential mutants within a semester.

Seminars in Plant Cellular and Molecular Biology. Taught about 15 times. This is a weekly journal club for the plant biology graduate students and postdocs. About 35 participate including 7 faculty. I have experimented with different formats.
Programmed cell death in plants. July 1999. I was invited by the Institute in Cell and Molecular Biology of the University of Porto to give five 1.5 hour lectures and a full-day lab. There were 30 students from various graduate schools and agricultural institutes throughout Portugal.

Signal Transduction Workshop, June 2006, Wageningen, Netherlands 3 day course for 30 international students

Plant Research Lectures Buenos Aires 2013. This was the 15th class of ~200 students who came from around Argentina to participate in a course with 4 instructors, Alan Jones, Dominique Bergman, Regine Kahlman, and Hiribert Hirt.

MENTORING

Prebachelaureate UNC Researchers (typically 2-year projects but some are Summer Fellows)

Jiayi Li	2020	Daniel Schmidt	2019

Michael Miltich	2019
#Malik Mitchell	2019
James Kenny	2018
Alexandra (Allie) Barnett	2018
Clara Siefert	2017
Sarah Rebbeor	2017
*Ahn Cao (Nat'l Univ Singapore)	2017
Grace Tan	2017
Nirja Sutaria	2016
Jessica Mcafee	2016
*Ryan Layman	2015
*James Draper	2014
#Yaa Ofori-Marfoh	2014
Minh (Helen) An	2014
Ben Babcock	2014
Ria Das	2014
Ian Rahn	2014
Cai-tong Ng (Nat'l Univ Singapore)	2014
Yaa Ofori	2014
*Richy Stoian	2013
Shreya Shah	2013
*Colin Price	2012
*Sungmin Lim	2012
Ben Theye	2011
*John Morton	2011
*Samantha Deleone	2011
*Melissa Mathews	2011
*Robert Bayne	2010
*Adam Buckholz	2010
*William Bradford	2010
Ben Jepson (East Chapel Hill HS)	2010
*Abigail Liu (East Chapel Hill HS)	2010
*Kaitlin Williamson	2010
Ben Darnell	2010
*Steve Seta	2010
*Arwen Frick-Chen	2009
Denny Scaria	2009
*Mathew Tan(Nat'l Univ Singapore)	2009
Marieke Fenton	2008
Abby Michenfelder	2008
Judy Staub	2008
Thomas Allen	2008
*Shannon Booker	2008
Nathan Hedrick	2008
Mathew Grosso	2008
Andrew Stergio	2007
Jeffery Duffy	2007
#Ameer Hamden	2007
#Mekdam Tesfaee	2006
Christopher Reed	2006
Hyun Kim	2006
#Tavia Clemendor	2006
Kathryn Gouzales	2005
Hala Al-Borno	2005
William Hannah	2005
#Monica Gonzales	2005
Jing-ping (Robbie) Zhou	2004
Casey Kolb	2004
J. Ashley Marsh	2004
*Matthew Pulley	2003
Rodney Grubb	2003
*Nathan Laborde	2002
#Joy Barnes	2001
#LeRon Jackson	2001
*Brian Jones	2000
Jennifer Orning	2000
*Matthew Thomas	1999
Christy Clemmons	1999
Tracey O'Connor	1999
James Hubbard	1999
Cynthia McCarty	1998
*Amy Pattishal	1998
Danielle Dong	1998
Cecilia Marchesini	1997
David Turnquist	1997
Jennifer Wild	1997
*Andrew Heidel	1996
#Cecilia Scott	1995
*Daniel Harnden	1994
Stephanie Councelman	1994
*Justin Brown	1994
Christine Skaer	1994
Mary Lee	1993
Marcin Pazkowski	1993
#*Mike Santos	1992
Jeff Moyer	1991
Kara Hiller	1991
Tammy Allison	1991
Jay Sivasothy	1991
Diane Allen	1990
Carolyn Taylor	1988
Jill Gilbert	1988
Allysa Gelman	1987

*co-authored one or more peer-reviewed papers/abstracts, # under-represented student

Graduate Students

Celio Cabra, PhD 2022 Decoding the phosphobarcode for AtRGS1 trafficking
Jianyong Li, PhD 2018, Role of phosphorylation in the composition and structure of the heterotrimeric G protein complex in Arabidopsis
Libby Ying, Ph.D 2016, The interactome of Arabidopsis Extra Lage G proteins (XLGs)
Jenny Huang, PhD 2015 Cross talk between two sugar sensing pathways in Arabidopsis
Erin Friedman, Ph.D 2011, Arabidopsis G beta function, Asst Prof Lynchburg College
Hemayet Ullah, Ph.D. 2002 "Auxin signal transduction via Heterotrimeric G proteins", currently Prof at Howard University
Andrew Groover, Ph.D. 1993-1997 "Programmed Cell Death of Tracheary Element Differentiation", currently Prof. Univ. California, Davis, and Division Chief, Forest Genetics Lab, United States Department of the Interior
Mike Edgerton, Ph.D. 1987-1992 "Subunit Interactions in the Carboxy-terminal domain of Phytochrome", Director of Genetics, Monsanto, St. Louis, retired
Greg DeWitt, M.S. 1996-1997 currently Practicing Law
Patrick Lamerson, M.S.1987-1989

Postdoctoral Fellows, time, current position:

1. **Anupam Dey** 2021-present
2. **Christelle Ekosso** 2021-present
3. **Wenbin (Bean) Zhou** 2021-present
4. **Dr. Zhi Li** 2021-present
5. **Dr. Khem Gusinghe** 2018-current
6. **Dr. Fei Lou** 2018-present
7. **Dr. Justin Watkins** 2017-current
8. **Dr. Tim Ross-Elliot** 2017-2019 Harvard University
9. **Dr. Haiyan Jia**, 2017-present
10. **Dr. Akshaya Biswal,** 2016-2019 CIMMYT, Mexico City
11. **Dr. Kang-ling Liao,** 2015-2017 Asst Prof Tamking Univ
12. **Dr. Bo Li,** 2015-2017 Scientist CSHL
13. **Dr. Meral Tunc-Ozdemer,** 2012- 2017, Scientist Syngenta
14. **Dr. Dinesh Jaiswal,** 2013- 2015
15. **Dr. Jonathan Peters,** 2013-2014
16. **Dr. Yan Fu,** 2012- 2013 Data scientist, Kforce, Inc
17. **Dr. Susanne Wolfenstetter,** 2012- 2014, Biozym Vertrieb GmbH
18. **Dr. Alejandro Colaneri**, 2011- 2014 UNC Dept Genetics
19. **Dr. Yang Xu,** 2011 Professor in China
20. **Dr. Daisuke Urano,** 2010- 2015, Assistant Professor Temasek Natl Univ Singapore
21. **Dr. Nyugen Phan,** 2008- 2013 Venture capital for life science companies
22. **Dr. Kun Jiang,** 2009-2011 Associate Professor, Zhejiang University
23. **Dr. May Christian,** 2007-2009 Univ Bonn
24. **Dr. Tyrell Carr,** 2007- 2010, Faculty Chowan University
25. **Dr. Chenggang Liu,** 2007- 2009, Noble Foundation
26. **Dr. Jeff Grigston,** 2006-2007 AEI Head science editor
27. **Dr. Ravisha Weerasinghe,** 2006- 2008
28. **Dr. Jan Jones** 2005- 2011, Scientist, AgBiome

29. Dr. Yashmanti Mudgil 2005- 2010, Asst Professor Univ Delhi
30. **Dr. Phil Taylor** 2004-2006, Monsanto St. Louis
31. **Dr. Pat Morgan** 2004-2006 Head of Research and Development, LiCor Instruments
32. Dr. Zhongyin Chen 2004-2007 scientist, Syngenta
33. **Dr. Helen Wang** 2003-2006 Head, International Green Solutions Corp
34. **Dr. KwangChul Oh** 2003- 2004, Professor, Korean Academics
35. **Dr. Satomi Kawasaki,** 2003 Science Writer
36. **Dr. Christopher Breen** 2002-2003 Senior Scientist, Novartis
37. **Dr. Jirong Huang** 2002-2004 Professor, Shanghai Inst. Plant Physiology
38. **Dr. Jin-Gui Chen**, 1998-2004, Senior scientist, Oakridge National Laboratory
39. **Dr. Ani Chatterjee** 2001-2002, Group leader, Glaxo Smith Kline
40. **Dr. Hemayet Ullah** 2002-2003, Professor, Howard University
41. **Dr. Kim Sampson** 2001-2002, Lab manager, NIEHS
42. **Dr. Xiaohong Yu** 1999-2001, Division Manager, Stonybrook Research Labs
43. **Dr. Kyung Im** 1996-1999, Professor, InCheon University, Korea
44. **Dr. Parachuri Prasad**, 1991-1994, Professor, Uniformed Services University
45. **Dr. Ming-Jing Wu** 1991-1993, Vice President of Inst. Marine and Ag Research Inc.

GRANT SUPPORT (only awards over $10,000 shown, boxed are active grants, Jones AM, P.I.)

Phytochrome-regulated growth, USDA NRICGO, 1986-1993, **$460,000**

Antibodies to auxin-binding protein, NC Biotechnology Center, 1986-1987, **$40,000**

Structure and function of auxin-binding protein 1, NSF, 1989-1996, **$650,000**

Expression of auxin-binding protein 1 in tomato fruit, CIBA- Geigy, 1991-1992, **$90,000**

PCD during TE differentiation, Inst. Marine & Agric. Research, 1996-1997, **$20,000**

Structure and function of auxin-binding protein 1, USDA NRICGO, 1996-1999, **$135,000**

Mechanism of action of auxin-binding protein 1, NSF Integrative Biology, 1998-2001, **$321,362**

Tracheary element differentiation, NSF Developmental Mechanisms, 1998-2000, **$198,912**

Inducible Gene Silencing, NCBC, 1999-2000, **$40,000**

Tissue-specific Gene Silencing, Kenan Foundation, 1999-2001, **$110,000**

Auxin 2000, Research Conference, USDA/NSF/DOE/Industry, 2000, approx **$30,000**

Function of Auxin-binding Protein 1, USDA NRICGO, 2000-2002, **$130,000**

Heterotrimeric G Protein in Arabidopsis, NIH, 2002-2008, **$1,050,000** (direct costs only)

In Vivo Genomics: Visualizing G protein Interactions in Arabidopsis, NSF **$909,232** direct

Sugar Sensing via Arabidopsis RGS1, DOE, 2005-2008, **$360,000.00** total

From Plasma Membrane to Organelle: Novel Sugar Signaling through the Arabidopsis Heterotrimeric G Protein Complex, NSF, 2007-2011, **$670,000** total

Rapid imaging- Confocal microscope. NSF Major equipment grant, 2008, **$750,000** (including cost share dollars)

CCD platform for genetic screens based on luciferase and GFP. NCBC Institutional Development Grant, 2011, **$145,000**

The Heterotrimeric G protein Interactome, NSF 2007-2012, **$1,400,000** total

G Protein Activation through Uncoupling Regulator of G Signaling Protein, AtRGS1. NSF 2012-2017 **$1,250,000** total

Novel Regulation of the Activation State of Gα, NIH 2008-2018, **$2,500,000** (direct costs only)

Control of Rice Growth and Stress Tolerance by Activation of the Heterotrimeric G Protein Complex. AFRI, $500,000

G-protein-coupled sugar sensing in Arabidopsis. DOE 2009-2022, **$1,415,000** total 10% effort

Mechanism of Dose-Duration Reciprocity NSF since 1988, current project 2017-2022 **$700,000** total 10% effort

Decoding the phosphorylation bar code in Arabidopsis G Biased Signaling. NIGMS modular **$1,250,000** direct costs. 2021-2025 10% effort

Collaborative research: RoL- Rules for Dynamic Light Environment Sculpting of Genomes **$1,212,609** total 10% effort

Collaborative Research: RoL-Rules for Dynamic-Light Environmental Sculpting of Genomes