CURRICULUM VITAE

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Education:

1995: Ph. D.	Plant Pathology, University of California, Berkeley, CA
1992: M.S.	Plant Pathology, University of California, Berkeley, CA
1990: B.S.	Agricultural Biochemistry, Iowa State University, Ames, IA

Professional Experience:

2012 –	Professor, Department of Plant Pathology & Microbiology, Iowa State University, Ames, IA
2013 –	Director, Center for Plant Responses to Environmental Stresses, Iowa State University, Ames, IA
2007 – 2012	Associate Professor, Department of Plant Pathology, Iowa State University, Ames, IA
2000 – 2007	Assistant Professor, Department of Plant Pathology, Iowa State University, Ames, IA
1999 – 2000	Staff Scientist, Torrey Mesa Research Institute, Inc., San Diego, CA
1996 – 1999	Postdoctoral research, Institute of Biological Chemistry, Washington State University and Department of Biology, Texas A&M University. Advisor: Dr. James C. Carrington
1995 – 1996	Postdoctoral research, USDA & Department of Plant Biology, University of California, Berkeley, CA. Advisor: Dr. Barbara Baker
1990 – 1995	Graduate Student, Department of Plant Pathology, University of California, Berkeley, CA. Advisor: Dr. Barbara Baker

Honors and Awards:
Fellow, American Association for the Advancement of Science (2016)
ISU College of Agriculture and Life Sciences Special Research Award (2015)
ISU Exemplary Faculty Mentor (2015)
ISU College of Agriculture and Life Sciences Mid-career Outstanding Achievement in Research (2009)
NIH NRSA Postdoctoral Fellowship (1996-1999)
USDA Plant Gene Expression Center - outstanding research paper (1994)
William Carrol-Smith Fellowship (1990)

Affiliations:
American Society of Plant Biologists; American Phytopathological Society; International Society for Molecular Plant-Microbe Interactions; American Association for the Advancement of Science

Editorial boards:
Senior Editor, Molecular Plant Microbe Interactions (2015 – present)
Review Editor, Frontiers in Plant Science (2014 – present)
Editorial Board, Virology (2013 – 2016)
Senior Editor, Molecular Plant Pathology (2009 – 2014)
Associate Editor, Molecular Plant Microbe Interactions (2005 – 2007, 2011 – 2015)
Editorial Board Member, Molecular Plant Pathology (2006 – 2008)

Peer-Reviewed Journal Articles (* indicates corresponding author):

1. Qi, M., Zheng, W., Zhao, X., Hohenstein, J., Kandel, Y., O'Conner, S., Wang, Y., Du, C., Nettleton, D., Macintosh, G., Tylka, G., Wurtele, E., **Whitham, S. A.**, Li, L.* (2018) *QQS* orphan gene and its interactor NF-YC4 reduce susceptibility to pathogens and pests. Plant Biotechnol. J. *In press*. doi: 10.1111/pbi.12961
2. Irizarry, M. D., Elmore, M. G., Batzer, J. C., **Whitham, S. A.**, Mueller, D. S.* 2018. Alternative hosts for *Soybean vein necrosis virus* and feeding preferences of its vector soybean thrips. Plant Health Progress. *In press*. doi: 10.1094/PHP-11-17-0071-RS
3. Hajimorad, M. R.*, Domier, L. L., Tolin, S. A., **Whitham, S. A.**, Saghai Maroof, M. A. (2018) *Soybean mosaic virus*: A successful potyvirus with a wide distribution but restricted natural host range. Mol. Plant Pathol. *In press*. doi: 10.1111/mpp.12644
4. Burkhow, S. J., Stephens, N. M., Mei, Y., Duenas, M. E., Freppon, D. J., Ding, G., Smith, S. C., Lee, Y.-J., Nikolau, B. J., **Whitham, S. A.**, Smith, E. A.* (2018) Characterizing virus-induced gene silencing at the cellular level with *in situ* multimodal imaging. Plant Methods. 14: 37. doi: 10.1186/s13007-018-0306-7
5. Ranjan, A., Jayaraman, D., Grau, C., Hill, J. H., **Whitham, S. A.**, Ané, J.-M., Kabbage, M.* (2018) The pathogenic development of *Sclerotinia sclerotiorum* in soybean requires specific host NADPH oxidases. Mol. Plant Pathol. 19:700-713. doi: 10.1111/mpp.12555
6. Qi, M., Grayczyk, J. P., Seitz, J. M., Lee, Y., Link, T. I., Choi, D., Pedley, K. F., Voegele, R. T., Baum, T. J., **Whitham, S. A.*** (2018) Suppression or activation of immune responses by predicted secreted proteins of the soybean rust pathogen *Phakopsora pachyrhizi*. Mol. Plant Microbe Interact. 31:163-174. doi: 10.1094/MPMI-07-17-0173-FI
7. Mei, Y., **Whitham, S. A.*** (2018) Virus-induced gene silencing in maize with a *Foxtail mosaic virus* vector. Methods Mol. Biol. 1676:129-139. doi: 10.1007/978-1-4939-7315-6_7
8. Liu, J. Z.*, Duan, J., Ni, M., Liu, Z., Qiu, W.-L., **Whitham, Steven A.**, Qian, W.-J. (2017) S-nitrosylation inhibits the kinase activity of tomato phosphoinositide-dependent kinase 1 (PDK1). J. Biol. Chem. 292:19743-19751. doi: 10.1074/jbc.M117.803882
9. Lu, H., Tang, L.*, **Whitham, S. A.**, Mei, Y. (2017) An automated platform for maize seedling morphological traits characterization. Sensors. 17:2082. doi:10.3390/s17092082
10. Rajamaki, M.-L.*, Xi, D., Sikorskaite, S., Valkonen, J. P. T., **Whitham, S. A.** (2017) Differential requirement of the ribosomal protein S6 and ribosomal protein S6 kinase for plant-virus accumulation and interaction of S6 kinase with potyviral VPg. Mol. Plant Microbe Interact. 30:374-384. doi: 10.1094/MPMI-06-16-0122-R
11. Bak, A., Cheung, A., Yang, C., **Whitham, S. A.**, Casteel, C. L.* (2017) A viral protease relocalizes in the presence of the vector to promote vector performance. Nat. Comm. 8:14493. doi: 10.1038/ncomms14493
12. De Carvalho, M. C. C. G, Nascimento, L. C., Darben, L. M., Polizel-Podanosqui, A. M., Lopes-Caitar, V. S., Rocha, C. S., Qi, M., Carazzolle, M. F., Kuwahara, M. K., Pereira, G. A. G., Abdelnoor, R. V., **Whitham, S. A.**, Marcelino-Guimarães, F. C.* (2017) Prediction of *P. pachyrhizi* secretome expressed *in planta* and potential effector families. Mol. Plant Pathol. 18:363-377. doi: 10.1111/mpp.12405
13. Qi, M., Link, T. I., Müller, M., Hirschburger, D., Pudake, R. N., Pedley, K. F., Braun, E., Voegele, R. T., Baum, T. J., **Whitham, S. A.*** (2016) A small cysteine-rich protein from the Asian soybean rust fungus, *Phakopsora pachyrhizi*, suppresses plant immunity. PLoS Pathog. 12:e1005827. doi: 10.1371/journal.ppat.1005827
14. Martin, K. M., Singh, J., Hill, J. H., **Whitham, S. A.**, Cannon, S.* (2016) Dynamic transcriptome profiling of *Bean common mosaic virus* (BCMV) infection in common bean (*Phaseolus vulgaris* L.). BMC Genomics 17:613 doi: 10.1186/s12864-016-2976-8
15. **Whitham, S. A.***, Qi, M., Innes, R. W., Ma, W., Lopes-Caitar, V., Hewezi, T. (2016) Molecular soybean-pathogen interactions. Annu. Rev. Phytopathol. 54:19.1-19.26 doi: 10.1146/annurev-phyto-080615-100156

16. Mei, Y., Zhang, C., Kernodle, B. M., Hill, J. H., **Whitham, S. A.*** (2016) A *Foxtail mosaic virus* vector for virus-induced gene silencing in maize. Plant Physiol. 171:760-772 doi: 10.1104/pp.16.00172

17. Irizarry, M. D.*, Groves, C. L., Elmore, M. G., Bradley, C. A., Dasgupta, R., German, T., Jardine, D. J., Saalau-Rojas, E., Smith, D. L., Tenuta, A. U., **Whitham, S. A.**, Mueller, D. S. (2016) Re-emergence of *Tobacco streak virus* infecting soybean in the United States and Canada. Plant Health Progress 17:92-94 doi: 10.1094/PHP-BR-15-0052

18. **Whitham, S. A.***, Lincoln, L. M., Chowda-Reddy, R. V., Dittman, J. D., O'Rourke, J. A., Graham, M. A.* (2016) Virus-induced gene silencing and transient gene expression in soybean using *Bean pod mottle virus* infectious clones. Curr. Protoc. Plant Biol. 1:263-283. doi: 10.1002/cppb.20012

19. Casteel,C. L.*, De Alwis, M., Bak, A., Dong, H., **Whitham, S. A.**, Jander, G. (2015) Disruption of ethylene signaling by *Turnip mosaic virus* mediates suppression of plant defense against the aphid vector, *Myzus persicae*. Plant Physiol. 169:209-218. doi: http://dx.doi.org/10.1104/pp.15.00332

20. Liu, J. Z., Graham, M. A., Pedley, K. F., **Whitham, S. A.*** (2015) Gaining insight into soybean defense responses using functional genomics approaches. Brief. Funct. Genomics. 14:283-290. doi: 10.1093/bfgp/elv009

21. Moran Lauter, A. N., Peiffer, G. A., Yin, T., **Whitham, S. A.**, Cook, C., Shoemaker, R. C., Graham, M. A.* (2014) Identification of candidate genes involved in early iron deficiency chlorosis signaling in soybean (*Glycine max*) roots and leaves. BMC Genomics. 15:702. doi: 10.1186/1471-2164-15-702

22. Liu, J. Z., Braun, E., Qiu, W. L., Shi, Y. F., Marcelino-Guimarães, F. C., Navarre, D., Hill, J. H., **Whitham, S. A.*** (2014) Positive and negative roles for soybean MPK6 in regulating defense responses. Mol. Plant Microbe Interact. 27:824-834. doi: 10.1094/MPMI-11-13-0350-R

23. Casteel, C., Yang, C., Nanduri, A., De Jong, H., **Whitham, S. A.**, Jander, G.* (2014) The NIa-pro protein of *Turnip mosaic virus* improves growth and reproduction of the aphid vector, *Myzus persicae* (green peach aphid). Plant J. 77:653-663. doi: 10.1111/tpj.12417

24. Link, T. I., Lang, P., Scheffler, B. E., Duke, M. V., Graham, M. A., Cooper, B., Tucker, M. L., van de Mortel, M., Voegele, R. T., Mendgen, K., Baum, T. J., and **Whitham, S. A.*** (2014) The haustorial transcriptomes of *Uromyces appendiculatus* and *Phakopsora pachyrhizi* and their candidate effector families. Mol. Plant Pathol. 15:379-393. doi: 10.1111/mpp.12099

25. Atwood, S., O'Rourke, J., Peiffer, G., Yin, T., Majumder, M., Zhang, C., Cianzio, S., Hill, J. H., Cook, D., **Whitham, S. A.**, Shoemaker, R. C., Graham, M. A.* (2014) Replication protein A subunit 3 and the iron efficiency response in soybean. Plant Cell Environ. 37:213-234. doi: 10.1111/pce.12147

26. Kandoth, P. K., Heinz, R., Yeckel, G., Nathan, G. W., Parijat, J. S., Hill, J., **Whitham, S. A.**, Baum, T. J., Mitchum, M. G.* (2013) A virus-induced gene silencing method to study soybean cyst nematode parasitism in *Glycine max*. BMC Res. Notes. 6:255. doi: 10.1186/1756-0500-6-255

27. Morales, A. M. A. P., O'Rourke, J. A., van de Mortel, M., Schneider, K. T., Bancroft, T. J., Borém, A., Nelson, R. T., Nettleton, D., Baum, T. J., Shoemaker, R. C., Fredrick, R. D., Abdelnoor, R. V., Pedley, K. F., **Whitham, S. A.,** and Graham, M. A.* (2013) Transcriptome analyses and virus-induced gene silencing identify genes in the *Rpp4*-mediated Asian soybean rust resistance pathway. Funct. Plant Biol. 40:1029-1047. doi: 10.1071/FP12296

28. Pogorelko, G. V., Lionetti, V., Fursova, O., Sundaram, R. M., Qi, M., **Whitham, S. A.**, Bogdanove, A. J., Bellincampi, D., and Zabotina, O. A.* (2013) Alteration of cell wall polysaccharide acetylation increases plant resistance to fungal pathogens. Plant Physiol. 163:9-23. doi: 10.1104/pp.113.214460

29. Smith, D. L.*, Fritz, C., Watson, Q., Willis, D. K., German, T. L., , A., Mueller, D., Dittman, J. D., Saalau-Rojas, E., and **Whitham, S. A.** (2013) First report of soybean vein necrosis disease caused by *Soybean*

vein necrosis-associated virus in Wisconsin and Iowa. Plant Disease. 97:693. doi: 10.1094/PDIS-11-12-1096-PDN

30. Liu, J. Z. and **Whitham, S. A.*** (2013) Overexpression of a soybean nuclear localized type III DnaJ domain-containing HSP40 reveals its roles in cell death and disease resistance. Plant J. 74:110-121. doi: 10.1111/tpj.12108
31. Zhang, C.*, **Whitham, S. A.**, Hill, J. H. (2013) Virus-induced gene silencing in soybean and common bean. Methods Mol. Biol. 975:149-156. doi: 10.1007/978-1-62703-278-0_11
32. Liu, S., Kandoth, P. K., Warren, S. D., Yeckel, G., Heinz, R., Alden, J., Yang, C., Jamai, A., El-Mellouki, T., Juvale, P. S., Hill, J. H., Baum, T. J., Cianzio, S., **Whitham, S. A.**, Korkin, D., Mitchum, M. G.*, Meksem, K.* (2012) A soybean cyst nematode resistance gene points to a new mechanism of plant resistance to pathogens. Nature. 492:256-260. doi: 10.1038/nature11651
33. Zhang, C.*, Grosic, S., **Whitham, S. A.**, Hill, J. H. (2012) The requirement of multiple defense genes in soybean *Rsv1* mediated extreme resistance to *Soybean mosaic virus*. Mol. Plant Microbe Interact. 25:1307-1313. doi: 10.1094/MPMI-02-12-0046-R
34. Wu, Q., Lin, J., Liu, J.-Z., Wang, X., Lim, W, Oh, M., Park, J., Rajashekar, C. B., **Whitham, S. A.**, Cheng, N.-H.*, Hirschi, K. D., Park, S.* (2012) Ectopic expression of Arabidopsis glutaredoxin *AtGRXS17* enhances thermotolerance in tomato. Plant Biotechnol. J. 10:945-955. doi: 10.1111/j.1467-7652.2012.00723.x
35. Juvale, P. S., Hewezi, T., Zhang, C., Kandoth, P. K., Mitchum, M. G., Hill, J. H., **Whitham, S. A.**, Baum, T. J.* (2012) Temporal and spatial *Bean pod mottle virus*-induced gene silencing in soybean. Mol. Plant Pathol. 13:1140-1148. doi: 10.1111/J.1364-3703.2012.00808.X
36. Moeller, J. R., Moscou, M. J., Bancroft, T., Skadsen, R. W., Wise, R. P., **Whitham, S. A.*** (2012) Differential accumulation of host mRNAs on polyribosomes during obligate pathogen-plant interactions. Mol. BioSyst. 8:2153-2165. doi:10.1039/C2MB25014D
37. Liu, J. Z., Horstman, H. D., Braun, E., Graham, M. A., Zhang, C., Navarre, D., Qiu, W. L., Lee, Y., Nettleton, D., Hill, J. H., **Whitham, S. A.*** (2011). Soybean homologs of MPK4 negatively regulate defense responses and positively regulate growth and development. Plant Physiol. 157:1363-1378. doi: 10.1104/pp.111.185686
38. Schneider, K. T., van de Mortel, M., Bancroft, T. J., Braun, E., Nettleton, D., Nelson, R. T., Frederick, R. D., Baum, T. J., Graham, M. A.*, **Whitham, S. A.*** (2011). Biphasic gene expression changes elicited by *Phakopsora pachyrhizi* in soybean correlates with fungal penetration and haustoria formation. *Plant Physiol.* 157: 355-371. doi:10.1104/pp.111.181149
39. Cheng, N.*, Liu, J.Z., Liu, X., Wu, Q., Thompson, S. M., Lin, J., Chang, J., **Whitham, S. A.**, Park, S., Cohen, J. D., Hirschi, K. D., (2011). Arabidopsis monothiol glutaredoxin, AtGRXS17, is critical for temperature-dependent postembryonic growth and development via modulating auxin response. *J. Biol. Chem.* 286:20398-20406. doi: 10.1074/jbc.M110.201707
40. Ye, C., Dickman, M. B., **Whitham, S. A.**, Payton, M. E., Verchot, J.* (2011). The unfolded protein response is triggered by a plant viral movement protein. *Plant Physiol.* 156:741-755. doi: 10.1104/pp.111.174110
41. Pandey, A. K., Yang, C., Zhang, C., Graham, M. A., Horstman, H. D., Lee, Y., Zabotina, O. A., Hill, J. H., Pedley, K. F.*, **Whitham, S. A.*** (2011). Functional analysis of the Asian soybean rust resistance pathway mediated by *Rpp2*. *Mol. Plant Microbe Interact*. 24: 194–206. doi: 10.1094/MPMI-08-10-0187
(Highlighted as the Editor's Pick for the February 2011 issue of Mol. Plant Microbe Interactions)

42. Cosson, P., Sofer, L., Le, H., Leger, V., Schurdi-Levraud, V., **Whitham, S. A.**, Gopalan, S., Le Gall, O., Candresse, T., Carrington, J. C., Revers, F.* (2010). RTM3 which controls long distance movement of potyviruses is a member of a new plant gene family encoding a meprin and TRAF homology (MATH) domain-containing protein. *Plant Physiol.* 154:222-232. doi: 10.1104/pp.110.155754

43. Zhang, C.*, Bradshaw, J. D., **Whitham, S. A.**, Hill, J. H. (2010). The development of an efficient multi-purpose BPMV viral vector set for foreign gene expression and RNA silencing. *Plant Physiol.* 153:52-65. doi: 10.1104/pp.109.151639

44. Zhang, C.*, Hajimorad, M. R., Eggenberger, A. L., Tsang, S., **Whitham, S. A.**, Hill, J. H. (2009). Cytoplasmic inclusion cistron of *Soybean mosaic virus* serves as a virulence determinant on *Rsv3*-genotype soybean and a symptom determinant. *Virology*. 391:240-248. doi:10.1016/j.virol.2009.06.020

45. Yang, C., Zhang, C., Dittman, J. D., **Whitham, S. A.*** (2009). Differential requirement of RIBOSOMAL PROTEIN S6 by plant RNA viruses with different translation initiation strategies. *Virology*. 390:163-173. doi: 10.1016/j.virol.2009.05.018

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47. Zhang, C.*, **Whitham, S. A.** Hill, J. H. (2009). Development and use of an efficient DNA-based viral gene silencing vector for soybean. *Mol. Plant Microbe Interact*. 22:123-131. doi: 10.1094/MPMI -22-2-0123. (Ranked in the Top 9 papers of 2009 in Mol. Plant Microbe Interact., http://www.apsnet.org/journals/apsupdate/apsresearchupdate25.htm)

48. Tasma, I. M., Brendel, V., **Whitham, S. A.,** Bhattacharyya, M. K.* (2008). Expression and evolution of the phosphoinositide-specific phospholipase C gene family in *Arabidopsis thaliana. Plant Physiol. Biochem*. 46:627-37. doi: 10.1016/j.plaphy.2008.04.015

49. Shiboleth, Y. M., Haronsky, E., Leibman, D., Arazi, T., Wassenegger, M., **Whitham, S. A.**, Gaba, V., Gal-On., A.* (2007). The conserved FRNK box in plant viral suppressor of gene silencing HC-Pro is required for small RNA binding and mediates symptom development. *J. Virol*. 81:13135-13148. doi: 10.1128/JVI.01031-07

50. van de Mortel, M., Recknor, J. C., Graham, M. A., Nettleton, D., Dittman, J. D., Nelson, R. T., Godoy, C. V., Abdelnoor, R. V., Almeida, A. M. R., Baum, T. J.*, **Whitham, S. A.*** (2007). Distinct biphasic mRNA changes in response to Asian soybean rust infection. *Mol. Plant Microbe Interact*. 20:887-899. doi: 10.1094/MPMI-20-8-0887

51. Wise, R. P.*, Moscou, M. J., Bogdanove, A. J., **Whitham, S. A.** (2007). Transcript profiling in host–pathogen interactions. *Annu. Rev. Phytopathol*. 45:329-369. doi: 10.1146/annurev.phyto.45.011107.143944

52. Yang, C., Guo, R., Jie, F., Nettleton, D., Peng, J., Carr, T., Yeakley, J. M., Fan, J.-B., **Whitham, S. A.*** (2007). Spatial and temporal analysis of *Arabidopsis thaliana* gene expression in response to *Turnip mosaic virus* infection. *Mol. Plant Microbe Interact*. 20:358-370. doi: 10.1094/MPMI-20-4-0358

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