

Curriculum Vitae

Scott Charles Peck

University of Missouri-Columbia
271H Bond Life Sciences Building
Columbia, MO 65211
USA

Telephone: 573-882-8102
E-mail: pecks@missouri.edu

Education

Ph.D., Botany and Plant Pathology Department, Laboratory of Dr. Hans Kende, MSU-DOE Plant Research Laboratory, Michigan State University, East Lansing, MI, USA (1995)
B.A. in Biology (*cum laude*), Lawrence University, Appleton, WI, USA (1988)

Professional Experience

Associate Professor, Biochemistry Department, University of Missouri-Columbia, Columbia, MO, USA (Nov. 2005 - present)
Junior Group Leader, Sainsbury Laboratory, Norwich, England (Nov. 2000 – Nov. 2005)
Post-Doctoral Research Associate, Laboratory of Dr. Thomas Boller, Friedrich Miescher Institute, Basel, Switzerland (Jan. 1998 – Oct. 2000)
Post-Doctoral Research Associate, Laboratory of Dr. Hans Kende, MSU-DOE Plant Research Laboratory, Michigan State University, East Lansing, MI, USA (Dec. 1995 - Dec. 1997)

Awards and Fellowships

Outstanding Graduate Faculty Advisor – Biochemistry (2009)
European Molecular Biology Org. (EMBO) Long Term Postdoctoral Fellowship (June 1998 – June 2000)
MSU College of Natural Science Research Fellowship (1993)
E.I. du Pont de Nemours Graduate Fellowship (Sept. 1989 – Sept. 1990)

Grant Panels

2004 - UK Biotechnology and Biological Science Research Council (BBSRC) Plant and Microbial Science Committee – *ad hoc* member for Proteomics Initiative
2007 - NSF Cellular Signaling Panel
2009 – NSF IOS – Symbiosis, Defense, and Self-Recognition

Editorial Functions

2005 – present Co-editor, *The Plant Cell*
2005 – present Co-editor, *Plant Methods*

Reviewer

Journals – *Science*, *EMBO J.*, *Plant Cell*, *Plant J*, *Plant Physiol.*, *Mol. Cell Proteomics*, *Proteomics*, *Functional Plant Biology*, *J. Experimental Botany*, *J. Proteome Res*, *Plant Science*
Grants - BBSRC, MRC (*UK*); NSF, NIH, USDA (*USA*); SNF (*Switzerland*); DFG (*Germany*); NOW (*Netherlands*); KAUST (*Saudi Arabia*)

University Committees

Current

Biochemistry: 3 (Policy; Graduate Student Admissions; Undergraduate Education)
Life Sciences Center: 1 (Advisory Panel to the Director)
Campus: 1 (Plant Transformation Core Facility Advisory Committee)

Past

Campus: Interdisciplinary Plant Group Executive Panel (2006-2008)

Publications (Peer Reviewed)

35. Anderson JC, Bartels S, González Besteiro MA, Shahollari B, Ulm R, **Peck SC**. Arabidopsis MAPK Phosphatase 1 negatively regulates PAMP responses and basal resistance to *Pseudomonas syringae* (submitted)
34. Bartels S, Anderson JC, González Besteiro MA, Carreri A, Hirt H, Buchala A, Métraux J-P, **Peck SC**, Ulm R (2009) MAP KINASE PHOSPHATASE1 and PROTEIN TYROSINE PHOSPHATASE1 are repressors of salicylic acid and SNC1-mediated responses in *Arabidopsis*. **Plant Cell** 21: 2884-2987
33. Jones AME, McLean D, Studholme DJ, Serna-Sanz A, Andreasson E, Rathjen J, **Peck SC** (2009) Phosphoproteomic analysis of nuclei-enriched fractions from *Arabidopsis thaliana*. **J Proteomics** 72: 439-451 [Cited: 0]
32. Kaffarnik FAR, Jones AME, Rathjen JP, **Peck SC** (2009) Effector proteins of the bacterial pathogen *Pseudomonas syringae* alter the extracellular proteome of the host plant, *Arabidopsis thaliana*. **Mol Cell Proteomics** 8:145-156 [Cited: 0]
31. Shan L, He P, Li J, Heese A, **Peck SC**, Nürnberger T, Martin G, Sheen J (2008) Bacterial effectors target BAK1 to disrupt MAMP receptor signaling complexes and impede plant innate immunity. **Cell Host & Microbe** 4: 17-27 [Cited: 2]
30. Whiteman S-A, Serazetdinova L, Jones AME, Sanders D, Rathjen J, **Peck SC**, Maathuis FJM (2008) Identification of novel proteins and phosphorylation sites in the vacuolar membrane of *Arabidopsis thaliana*. **Proteomics** 8: 3536-3547 [Cited: 1]
29. Anderson JC, **Peck SC** (2008) A simple and rapid technique for detecting protein phosphorylation using one-dimensional isoelectric focusing gels and immunoblot analysis. **Plant J** 55: 881-885 [Cited: 0]
28. Merkouropoulos G, Erik Andreasson E, Hess D, Boller T, **Peck SC** (2008) An Arabidopsis protein phosphorylated in response to microbial elicitation, AtPHOS32, is a Substrate of MAP Kinases 3 and 6. **J Biol Chem** 283: 10493-10499 [Cited: 0]
27. Thelen J, **Peck SC** (2007) Quantitative Proteomics in Plants: Choices in Abundance. **Plant Cell** 19: 3339–3346 (invited Perspective Article on Large-Scale Biology) [Cited: 2]
26. Nühse TS, Bottrill AR, Jones AME, **Peck SC** (2007) Quantitative phosphoproteomic analysis of plasma membrane proteins reveals regulatory mechanisms of plant innate immune responses **Plant J** 51: 931-940 [Cited: 22]
25. Heese A, Hann DR, Gimenez-Ibenaz S, Jones AME, He K, Li J, Schroeder JI, **Peck SC**, Rathjen JP (2007) The receptor-like kinase SERK3/BAK1 is a central regulator of innate immunity in plants **Proc Natl Acad Sci USA** 104: 12217-12222 [Cited: 29]
24. Kalde M, Nuhse TS, Findley K, **Peck SC** (2007) The syntaxin SYP132 contributes to plant resistance against bacteria and secretion of pathogenesis-related protein 1 (PR1) **Proc Natl Acad Sci USA** 104: 11850-11855 [Cited: 10]
23. Maor R, Jones AME, Nühse TS, Studholme DJ, **Peck SC**, Shirasu K (2007) Multidimensional protein identification technology (MudPIT) analysis of ubiquitinated proteins in plants. **Mol Cell Prot** 6: 601-610. [Cited: 11]

22. Ichimura K, Casais C, **Peck SC**, Shinozaki K, Shirasu K (2006) MEKK1 is required for MPK4 activation and regulates tissue specific and temperature dependent cell death in Arabidopsis. **J Biol Chem** 281: 36969-36976 [Cited: 29]
21. Meszaros T, Helfer A, Hatzimasoura E, Magyar Z, Serazetdinova L, Rios G, Bardoczy V, Teige M, Koncz C, **Peck SC**, Bogre L (2006) The Arabidopsis MAP kinase kinase MKK1 participates in defence responses to the bacterial elicitor flagellin. **Plant J** 48: 485-498 [Cited: 24]
20. Elortza F, Mohammed S, Bunkenborg J, Foster LJ, Nühse TS, Brodbeck U, **Peck SC**, Jensen ON (2006) Modification-specific proteomics of plasma membrane proteins: Identification and characterization of glycosylphosphatidylinositol-anchored proteins released upon Phospholipase D treatment. **J Prot Res** 5: 935-943 [Cited: 18]
19. **Peck SC** (2006) Phosphoproteomics in *Arabidopsis*: Moving from Empirical to Predictive Science. **J Exp Botany** 57: 1523-1527 [Cited: 10]
18. **Peck SC** (2006) Analysis of Protein Phosphorylation: Methods and Strategies for Studying Kinases and Substrates. **Plant J** 45: 512-522 [Cited: 9]
17. Assaad FF, Qiu J-L, Youngs H, Ehrhardt D, Zimmerli L, Kalde M, Wanner G, **Peck SC**, Ramonell K, Somerville CR, Thordal-Christensen H. (2004) The PEN1 syntaxin defines a novel compartment upon fungal attack and is required for the timely assembly of papilla. **Mol Biol Cell** 15: 5118-5129 [Cited: 57]
16. Nühse TS, Stansballe A, Jensen ON, **Peck SC** (2004) Phosphoproteomics of the Arabidopsis plasma membrane and a new phosphorylation site database. **Plant Cell** 16: 2394-2405 [Cited: 117]
15. Van der Hoorn RAL, Leeuwenburgh MA, Bogyo M, Joosten MH AJ, **Peck SC** (2004) Activity profiling of papain-like cysteine proteases in plants. **Plant Physiol** 135: 1170-1178 [Cited: 22]
14. Rentel MC, Lecourieux D, Ouaked F, Usher SL, Petersen L, Okamoto H, Knight H, **Peck SC**, Grierson CS, Hirt H, Knight MR (2004) OXI1 kinase is necessary for oxidative burst-mediated signalling in Arabidopsis. **Nature** 427: 858-861 [Cited: 97]
13. Elortza F, Nühse TS, Stansballe A, **Peck SC**, Jensen ON (2003) Proteomic analysis of glycosylphosphatidylinositol-anchored membrane proteins. **Mol Cell Proteomics** 2: 1261-1270 (cover article) [Cited: 54]
12. Nühse TS, Stansballe A, Jensen ON, **Peck SC** (2003) Large-scale analysis of in vivo phosphorylated membrane proteins by immobilized metal ion affinity chromatography and mass spectrometry. **Mol Cell Proteomics** 2: 1234-1243 [Cited: 207]
11. Nühse TS, Boller T, **Peck SC** (2003) A plasma membrane syntaxin is phosphorylated in response to the bacterial elicitor flagellin. **J Biol Chem** 278: 45248-45254 [Cited: 38]
10. Ulm R, Ichimura K, Mizoguchi T, **Peck SC**, Zhu T, Wang X, Shinozaki K, Paszkowski J (2002) Distinct regulation of salinity and genotoxic stress responses by Arabidopsis MAP kinase phosphatase 1. **EMBO J** 21: 6483-6493 [Cited: 49]
9. **Peck SC**, Nühse TS, Iglesias A, Hess D, Meins F, Boller T (2001) Directed proteomics identifies a plant-specific protein rapidly phosphorylated in response to bacterial and fungal elicitors. **Plant Cell** 13: 1467-1475 [Cited: 102]
8. Nühse T, **Peck SC**, Hirt H, Boller T (2000) Microbial elicitors induce activation and dual phosphorylation of the Arabidopsis MAP kinase AtMPK6. **J Biol Chem** 275: 7521-7526 [Cited: 119]

7. **Peck SC**, Pawlowski K, Kende H (1998) Asymmetric responsiveness to ethylene mediates cell elongation in the apical hook of peas. *Plant Cell* 10: 713-719 [Cited: 25]
6. **Peck SC**, Kende H (1998) A single gene encoding an auxin-induced ACC synthase produces two transcripts with alternative 5' ends. *Plant J* 14: 573-581 [Cited: 12]
5. **Peck SC**, Kende H (1998) Differential regulation of two ACC synthase genes in etiolated pea stems by auxin and wounding. *Plant Mol Biol* 38: 977-982 [Cited: 32]
4. Heidstra R, Yang WC, Yalcin Y, **Peck SC**, Emons AM, van Kammen A, Bisseling T (1997) Ethylene provides positional information on cortical cell division but is not involved in NOD factor-induced root hair tip growth in Rhizobium-legume interaction. *Development* 124: 1781-1787 [Cited: 84]
3. **Peck SC**, Kende H (1995) Sequential induction of the enzymes of ethylene biosynthesis by indole-3-acetic acid in etiolated peas. *Plant Mol Biol* 28: 293-301 [Cited: 71]
2. **Peck SC**, Olson DC, Kende H (1993) A cDNA sequence encoding 1-aminocyclopropane-1-carboxylate oxidase from pea. *Plant Physiol* 101: 689-690 [Cited: 18]
1. **Peck SC**, Reinhardt D, Olson DC, Boller T, Kende H (1992) Localization of the ethylene-forming enzyme from tomatoes, 1-aminocyclopropane-1-carboxylate oxidase, in transgenic yeast. *J Plant Physiol* 140: 681-686 [Cited: 18]

Publications (Reviews and Book Chapters)

6. Zhang Z, **Peck SC** (2009) Phosphoproteomics of Stress Responses in H Hirt (ed), *Plant Stress Biology: Genomics Goes Systems Biology*, Wiley-VHC (in preparation)
5. **Peck SC** (2008) Proteomics: Setting the Stage for Systems Biology in G Coruzzi, R Gutierrez (eds), *Systems Biology, Annual Plant Reviews*, Blackwell Publishing (in press)
4. Serna-Sanz A, Rairdan G, **Peck SC** (2006) Preparative Denaturing Isoelectric Focussing for Enhancing Sensitivity of Proteomic Studies in P Ronald (ed.) Vol. 354, *Methods in Molecular Biology*, Humana Press, USA, pp 99-104
3. Nühse TS, **Peck SC** (2006) Peptide-based Phosphoproteomics with Immobilized Metal Ion Chromatography (IMAC) in J Salinas, JJ Sanchez-Serrano (eds.) Vol 323, *Arabidopsis Protocols, Methods in Molecular Biology*, Humana Press, USA, pp 431-436
2. **Peck SC** (2005) Update on Proteomics in Arabidopsis: Where Do We Go from Here? *Plant Physiol* 138: 591-599 [Cited: 24]
1. **Peck SC** (2003) Early phosphorylation events in biotic stress. *Curr Opinion Plant Biol* 6:334-338 [Cited: 22]

Other Publications

One of six technical experts contributing to a special issue of **Genome Technology** on phosphoproteomics.

Patents

UK priority patent application number GB 0503342.8 on MAP kinase substrates for commercial use and abiotic stress tolerance.

Presentations at International Meetings

Third PanAmerican Plant Membrane Biology Workshop, Puebla, Mexico (2010)
Biotechnology and Bioinformatics Symposium, Lincoln City, NE (2009)
Phoenix Symposium, Glasgow, Scotland, UK (2009)
XVII Plant Animal Genome Meeting, San Diego, CA, USA (2009)
19th International Conference on Arabidopsis Research (Session Chair), Montreal, Canada (2008)
2nd International Mexican Proteomics Congress, Guanajuato, Mexico (2007)
Symposium on Communication in Plants and their Response to the Environment, Halle, Germany (2007)
Plant Phosphorylation/Plant Proteomics Meeting, Missouri, USA (2007)
Plant Receptor Signaling, Ames, Iowa, USA (2006)
European Congress on Biotechnology, Copenhagen, Denmark (2005)
Society for Experimental Biology, Barcelona, Spain (2005)
Keystone Meeting: In vivo and Omics Approaches, Santa Fe, NM, USA (2005)
5th Annual GARNet (Arabidopsis Functional Genomics Network) Conference, Leicester, UK (2004)
11th International Cereal Rust and Powdery Mildew Conference, Norwich, UK (2004)
3rd International Proteomics Conference/AOHUPO, Taipei, Taiwan (2004)
Protein Phosphorylation Workshop, Clearwater Beach, Florida (2003)
Missouri Plant Biology Symposium on Protein Phosphorylation, Columbia, Missouri (2003)
Plant Science Symposium, Lunteren, Netherlands (2003)
Plant Protein Phosphorylation Meeting, Vienna, Austria (2001)

Invited Seminars – Universities

University of Iowa, IA, USA (2009)
University of Maryland, MD, USA (2009)
University of North Texas, TX, USA (2009)
University of California-Riverside, CA, USA (2007)
Texas A&M University, College Station, TX, USA (2007)
University of Delaware, Newark, DE, USA (2007)
Cornell University, Ithaca, NY, USA (2007)
University of Florida, Gainesville, FL, USA (2007)
Lawrence University, Appleton, WI, USA (2006)
USDA Plant Gene Expression Center, Berkley, CA, USA (2006)
Danforth Center, St Louis, MO, USA (2006)
Michigan State University, East Lansing, MI, USA (2005)
Liverpool University, Liverpool, UK (2005)
University of Zurich, Zurich, Switzerland (2005)
Brown University, Rhode Island, USA (2005)
Carnegie Institute, Stanford University, CA, USA (2005)
Rothamsted Research Station, Harpenden, UK (2004)
University of Tübingen, Tübingen, Germany (2003)
University of York, York, UK (2003)

GRANTS AND FUNDING

Current

Grant: RGPP0022/2006-C24

Title: "A Systems Biology Approach to Studying Systemic-Induced Somatic Recombination in Response to Biotic Infection."

Total Costs: \$337,000

Direct Costs: \$303,300

Sponsor: Human Frontiers of Science Program.

Time Periods: Oct. 2006 – Sept 2010 (co-PI; \$337,000 to Peck Lab)

Role in Project: Co-Investigator (PI – Manfred Heinlein, University of Strassbourg)

This grant is part of a 4-member international consortium to study the signaling events leading to induced somatic recombination in response to biotic stress. My lab receives \$337,000 to analyze changes in the phosphoproteome during systemic signaling events. This work includes both screening for new components as well as testing if signaling components involved in local defense responses may also be regulated during systemic responses. Other members are investigating changes in transcript and small RNA profiles. Results are integrated by a bioinformaticist in the consortium.

Grant: Bond LSC Seed Grant

Title: "Phosphoproteomic Analysis of Responses to Zn²⁺"

Total Costs: \$26,300

Direct Costs: \$26,000

Time Periods: June 2008 – June 2009

Role in Project: Principal Investigator (Co-PI, Mick Petris, MU)

This grant represents a new collaboration with Mick Petris to investigate the role of Zn²⁺ in activating signaling pathways in mammalian macrophage cells. Zn²⁺ has been implicated as a novel second messenger in a number of responses, and this exploratory project is to collect preliminary data to seek external funding. This work integrates our expertise in phosphoproteomics and signal transduction with Dr. Petris' expertise in Zn²⁺ uptake and responses in mammalian macrophage cells. All experiments are designed and performed by a graduate student in the Peck lab.

Grant: IOS-0817738

Title: "Phosphoproteomic analysis of the rice XA21-mediated resistance response"

Total Costs: \$650,473

Sponsor: National Science Foundation

Time Periods: October 2008 – October 2011

Role in Project: Principal Investigator (Co-PI, Pam Ronald, UC-Davis)

The goal of this grant is to identify proteins differentially phosphorylated in response to the bacterial elicitor, AvrXa21, in rice plants. We will perform the phosphoproteomic analysis and biochemical characterization of these putative signaling proteins from rice. Our collaborator, Prof. Pam Ronald (UC-Davis) will perform reverse genetic experiments to determine if these putative signaling components are involved in resistance against the bacterial pathogen which produces AvrXa21, *Xanthomonas oryzae* pv *oryzae*.

Completed

Grant: PMS-P15616 - PI

Title: "Characterisation of Arabidopsis Proteins Rapidly Phosphorylated after Treatment with Microbial Elicitors."

Total Costs: £186,932 (~ US \$336,000)

Sponsor: Biotechnology and Biological Science Research Council, Plant Microbial Sciences Committee.

Time Periods: March 2002 – March 2005

Role in Project: PI

Grant: BB-C17990

Title: *"Analysis of Plasma Membrane Phosphoproteomes."*

Total Costs: £177,332 (~ US \$319,000)

Sponsor: Biotechnology and Biological Science Research Council, Biochemistry and Cell Biology Committee.

Time Periods: Feb. 2003 – Feb. 2006

Role in Project: PI

Grant: BB-C510416

Title: *"Arabidopsis Phosphoproteome Sequencing Project"*

Total Costs: £310,259 (~ US \$558,000)

Sponsor: Biotechnology and Biological Science Research Council, Biochemistry and Cell Biology Committee

Time Periods: Sept. 2004 – May 2008

Role in Project: PI