F Literatur

Aarts, N., Metz, M., Holub, E., Staskawicz, B.J., Daniels, M.J., Parker J.E. (1998) Different requirements for EDS1 and NDR1 by disease resistance genes define at least two R-gene-mediated signaling pathways in Arabidopsis. Proc Natl Acad Sci U S A **17:** 10306-10311

Abramovitch, R.B. and Martin, G.B. (2004) Strategies used by bacterial pathogens to suppress plant defenses. Curr Opin Plant Biol **7:** 356–364

Adam, L. and Somerville S.C. (1996) Genetic characterization of five powdery mildew disease resistance loci in *Arabidopsis thaliana*. Plant J **9:** 341-356

Aderem, A. and Ulevitch, R. (2000) Toll-like receptors in the induction of the innate immune response. Nature **406:** 782-787

Aist, J.R. and Bushnell, W.R. (1991) Invasion of plantsby powdery mildew fungi, and cellular mechanism of the resistance. The Fungal Spore and Disease Initiation in Plants and Animals (Cole, G.T. and Hoch, H.C., eds) New York: Plenum Press 321-345

Alfano, J.R. and Collmer, A. (2004) Type III secretion system effector proteins: double agents in bacterial disease and plant defense. Annu Rev Phytopathol. **42:** 385-414

Alvarez, M.E., Pennell, R.I., Meijer, P.J., Ishikawa, A., Dixon, R.A., Lamb, C. (1998) Reactive oxygen intermediates mediate a systemic signal network in the establishment of plant immunity. Cell **92:** 773-784

Ameisen, J.C. (2002) On the origin, evolution, and nature of programmed cell death: a timeline of four billion years. Cell Death Differ **4:** 367-393

Assaad, F.F., Qiu, J.L., Youngs, H., Ehrhardt, D., Zimmerli, L., Kalde, M., Wanner, G., Peck, S.C., Edwards, H., Ramonell, K., Somerville, C.R., Thordal-Christensen, H. (2004) The PEN1 syntaxin defines a novel cellular compartment upon fungal attack and is required for the timely assembly of papillae. Mol Biol Cell **15:** 5118-5129

Atkinson, M.M., Midland, S.L., Sims, J.J., Keen, N.T. (1996) Syringolide 1 triggers Ca2+ influx, K+ efflux, and extracellular alkalization in soybean cells carrying the disease resistance gene Rpg4. Plant Physiol. **112:** 297-302

Austin, M.J., Muskett, P., Kahn, K., Feys, B.J., Jones, J.D., Parker, J.E. (2002) Regulatory role of SGT1 in early R gene-mediated plantdefenses. Science **295:** 2077-2080

Ausubel, F., Brent, R., Kingston, R.E., Moore, D.D., Seidmann, J.G., Smith, J.A., Stuhl, K. (1997) Short Protocols in Molecular Biology, 3. Ausgabe, John Wiley, New York

Aviv, D. H., Rusterucci, C., Holt, B.F. 3rd, Dietrich, R.A., Parker, J.E., Dangl, J.L. (2002) Runaway cell death, but not basal disease resistance, in lsd1 is SA- and NIM1/NPR1-dependent. Plant J **29:** 381-391

Axtell, M.J., and Staskawicz, B.J. (2003) Initiation of RPS2-specified disease resistance in Arabidopsis is coupled to the AvrRpt2-directed elimination of RIN4. Cell **112:** 369-377

Azevedo, C., Sadanandom, A., Kitagawa, K., Freialdenhoven, A., Shirasu, K., Schulze-Lefert, P. (2002) The RAR1 interactor SGT1, an essential component of R gene-triggered disease resistance. Science **295:** 2073-2076

Bais, H.P., Prithiviraj, B., Jha, A.K., Ausubel, F.M., Vivanco, J.M. (2005) Mediation of pathogen resistance by exudation of antimicrobials from roots. Nature **434:** 217-221

Baldauf, S.L., Roger, A.J., Wenk-Siefert, I., Doolittle, W.F. (2000) A kingdom-level phylogeny of eukaryotes based on combined protein data. Science **290:** 972–977

Bhat, R.A., Miklis, M., Schmelzer, E., Schulze-Lefert, P., Panstruga, R. (2005) Recruitment and interaction dynamics of plant penetration resistance components in a plasma membrane microdomain. Proc Natl Acad Sci U S A **102:** 3135-40

Beers, E.P. and McDowell, J.M. (2001) Regulation and execution of programmed cell death in response to pathogens, stress and developmental cues. Curr Opin Plant Biol **4:** 561-567

Bendahmane, A., Farnham, G., Moffett, P., Baulcombe, D.C. (2002) Constitutive gain-of-function mutants in a nucleotide binding site-leucine rich repeat protein encoded at the Rx locus of potato. Plant J 2002 **32:** 195-204

Bent, A.F., Innes, R.W., Ecker, J.R., Staskawicz, B.J. (1992) Disease development in ethylene-insensitive Arabidopsis thaliana infected with virulent and avirulent Pseudomonas and Xanthomonas pathogens. Mol. Plant Microbe Interact. **5:** 372-378

Bent, A.F. (2001) Plant mitogen-activated protein kinase cascades: Negative regulatory roles turn out positive. Proc Natl Acad Sci U S A **98:** 784-786

Belkhadir, Y., Subramaniam, R., Dangl, J.L. (2004) Plant disease resistance protein signaling: NBS-LRR proteins and their partners. Curr Opin Plant Biol **4:** 391-399

Bell, C.J. and Ecker, J.R. (1994) Assignment of 30 microsatellite loci to the linkage map of Arabidopsis. Genomics **19:** 137-144

Birnboim, H.C. and Doly, J. (1979) A rapid alkaline extraction procedure for screening recombinant plasmid DNA. Nucleic Acids Res **7:** 1513-1523

Blatt, M.R., Grabov, A., Brearley, J., Hammond-Kosack, K., Jones, J.D. (1999) K+ channels of Cf-9 transgenic tobacco guard cells as targets for Cladosporium fulvum Avr9 elicitor-dependent signal transduction. Plant J **19:** 453-462

Blume, B., Nürnberger, T., Nass, N., Scheel, D. (2002) Receptor-mediated increase in cytoplasmic free calcium required for activation of pathogen defense in parsley. Plant Cell **12:** 1425–1440

Boller, T. (1995). Chemoperception of microbial signals in plant cells. Annu. Rev. Plant Physiol Plant Mol Biol **46:** 189-214

Bolwell, G.P., Bindschedler, L.V., Blee, K.A., Butt, V.S., Davies, D.R., Gardner, S.L., Gerrish, C., Minibayeva, F. (2002) The apoplastic oxidative burst in response to biotic stress in plants: a three-component system. J Exp Bot **53:** 1367-1376

Bonas, U. and Lahaye, T. (2002) Plant disease resistance triggered by pathogen-derived molecules: refined models of specific recognition. Curr Opin Microbiol **1:** 44 - 50

Bradley, D.J., Kjellbom, P., Lamb, C.J. (1992). Elicitor- and wound-induced oxidative cross-linking of a proline-rich plant cell wall protein: a novel, rapid defense response. Cell **70:** 21-30

Brown, I., Trethowan, J., Kerry, M., Mansfield, J., Bolwell, G.P. (1998) Localization of components of the oxidative cross-linking of glycoproteins and of callose synthesis in papillae formed during the interaction between non-pathogenic strains of Xanthomonas campestris and French bean mesophyll cells. Plant J **15:** 333-344

Brunner, F., Rosahl, S., Lee, J., Rudd, J.J., Geiler, S., Kauppinen, S., Rasmussen, G., Scheel, D., Nürnberger, T. (2002) Pep-13, a plant defense-inducing pathogen-associated pattern from Phytophthora transglutaminases. EMBO J **21:** 6681-6688

Cao, H., Bowling, S.A., Gordon, A.S., Dong, X. (1994) Characterization of an Arabidopsis Mutant That Is Nonresponsive to Inducers of Systemic Acquired Resistance. Plant Cell 6: 1583-1592

Cao, H., Glazebrook, J., Clarke, J.D., Volko, S., Dong, X. (1997) The Arabidopsis NPR1 gene that controls systemic acquired resistance encodes a novel protein containing ankyrin repeats. Cell **88:** 57-63

Century, K.S., Holub, E.B., Staskawicz, B.J. (1995) NDR1, a locus of Arabidopsis thaliana that is required for disease resistance to both a bacterial and a fungal pathogen. Proc Natl Acad Sci U S A **92:** 6597-6601

Century, K.S., Shapiro, A.D., Repetti, P.P., Dahlbeck, D., Holub, E., Staskawicz, B.J. (2002) NDR1, a pathogen-induced component required for Arabidopsis disease resistance. Science **278:** 1963-1965

Chandra-Shekara, A.C., Navarre, D., Kachroo, A., Kang, H.G., Klessig, D., Kachroo, P. (2004) Signaling requirements and role of salicylic acid in HRT- and rrt-mediated resistance to turnip crinkle virus in Arabidopsis. Plant J **40:** 647-659

Cheong, J.-J. and Choi, Y.D. (2003) Methyl jasmonate as a vital substance in plants. Trends Genetics **19:** 409-413

Chomczynski, P., Sacchi, N. (1987) Single-step method of RNA isolation by acid guanidinium thiocyanate-phenol-chloroform extraction. Anal Biochem **162:** 156-159

Clarke, J.D., Volko, S.M., Ledford, H., Ausubel, F.M., Dong, X. (2000) Roles of salicylic acid, jasmonic acid, and ethylene in cpr-induced resistance in Arabidopsis. Plant Cell **12:** 2175-2190

Cohn, J., Sessa, G. and Martin, G.B. (2001) Innate immunity in plants. Curr Opin Immunol **13:** 55-62

Collins, N.C., Thordal-Christensen, H., Lipka, V., Bau, S., Kombrink, E., Qiu, J.L., Huckelhoven, R., Stein, M., Freialdenhoven, A., Somerville, S.C., Schulze-Lefert, P. (2003) SNARE-protein-mediated disease resistance at the plant cell wall. Nature **425:** 973–997

Collmer, A. (1998) Determinants of pathogenicity and avirulence in plant pathogenic bacteria. Curr Opin Plant Biol **4:** 329-335

Cooley, M.B., Pathirana, S., Wu, H.J., Kachroo, P., Klessig, D.F. (2000) Members of the Arabidopsis HRT/RPP8 family of resistance genes confer resistance to both viral and oomycete pathogens. Plant Cell **12:** 663-676

Coppinger, P. Repetti, P.P., Day, B., Dahlbeck, D., Mehlert, A., Staskawicz, B.J. (2004) Overexpression of the plasma membrane-localized NDR1 protein results in enhanced bacterial disease resistance in Arabidopsis thaliana. Plant J **40:** 225-237

Cutt, J.R. and Klessig, D.F. (1992) Pathogenesis-related proteins. In Genes Involved in Plant Defense (Bollert, T. and Meins, F., eds), 209-243, Springer Verlag

Dangl, J.L., Dietrich, R.A, Richberg, M.H. (1996) Death don't have no mercy: cell death programs in plant-microbe interactions. Plant Cell **8:** 1793-1807

Dangl, J.L. and Jones, J.D.G. (2001) Plant pathogens and integrated defence responses to infection. Nature **411**: 826-833

Dat, J.F., Pellinen, R., Beeckman, T., Van De Cotte, B., Langebartels, C., Kangasjarvi, J., Inze, D., Van Breusegem, F. (2003) Changes in hydrogen peroxide homeostasis trigger an active cell death process in tobacco. Plant J 2003 **4:** 621-632

Day, B., Dahlbeck, D., Huang, J., Chisholm, S.T., Li, D., Staskawicz, B.J. (2005) Molecular Basis for the RIN4 Negative Regulation of RPS2 Disease Resistance. Plant Cell **17:** 1292-1305

Delaney, T., Uknes, S., Vernooij, B., Friedrich, L., Weymann, K., Negrotto, D., Gaffney, T., Gut-Rella, M., Kessmann, H., Ward, E. (1994) A Central Role of Salicylic Acid in Plant Disease Resistance. Science **266:** 1247-1250

Delaney, T.P., Friedrich, L., Ryals, J.A. (1995) Arabidopsis signal transduction mutant defective in chemically and biologically induced disease resistance. Proc Natl Acad Sci U SA **92:** 6602-6606

Després, C., Chubak, C., Rochon, A., Clark, R., Bethune, T. Desveaux, D., Fobert, P.R. (2003) The Arabidopsis NPR1 disease resistance protein is a novel cofactor that confers redox regulation of DNA binding activity to the basic domain/leucin zipper transcription factor TGA1. Plant Cell **15:** 2181-2191

Devoto, A., Nieto-Rostro, M., Xiem, D., Ellis, C., Harmston, R., Patrick, E., Davis, J., Sherratt, L., Coleman, M., Turner, J.G. (2002) COI1 links jasmonate signalling and fertility to the SCF ubiquitin-ligase complex in Arabidopsis. Plant J **32:** 457-466

Devoto, A., Ellis, C., Magusin, A., Chang, H.S., Chilcott, C., Zhu, T., Turner, J.G. (2005) Expression profiling reveals COI1 to be a key regulator of genes involved in wound- and methyl jasmonate-induced secondary metabolism, defence, and hormone interactions. Plant Mol Biol. **58:** 497-513

Devoto, A. and Turner, J.G. (2005) Jasmonate-regulated Arabidopsis stress signalling network. Physiol Plant **123:** 161–172

Dietrich, R.A., Delaney, T.P., Uknes, S.J., Ward, E.R., Ryals, J.A., Dangl, J.L. (1994) Arabidopsis mutants simulating disease resistance response. Cell **77:** 565-577

Dittgen, J. (2005) Genetische Analyse der Nichtwirtsresistenz gegenüber biotrophen Mehltaupilzen in *Arabidopsis thaliana*. Dissertation. Universität zu Köln

Doke, N. (1975) Prevention of the hypersensitive reaction of potato cells to infection with an incompatible race of *Phytophthora infestans* by constituents of the zoospores. Physiol Plant Pathol **7:** 1-7

Dong, X. (2001) Genetic dissection of systemic acquired resistance. Curr Opin Plant Biol **4:** 309-314

Dong, X. (2004) NPR1, all things considered. Curr Opin Plant Biol **5:** 547-527

Donofrio, N.M. and Delaney, T.P. (2001) Abnormal callose response phenotype and hypersusceptibility to *Peronospoara parasitica* in defence-compromised *Arabidopsis nim1-1* and salicylate hydroxylase-expressing plants. Mol Plant Microbe Interact **14:** 439-50

Dow, M., Newman, M.A. and von Roepenack, E. (2000) The induction and modulation of plant defense responses by bacterial lipopolysaccharides. Annu Rev Phytopathol **38:** 241-261

Durner, J., Wendehenne, D., Klessig, D.F. (1998). Defense gene induction in tobacco by nitric oxide, cyclic GMP, and cyclic ADP-ribose. Proc Natl Acad Sci U S A **95:** 10328-10333

Ebel, J. and Mithöfer, A. (1998) Early events in the elicitation of plant defence. Planta **206:** 335–348

Ebel, J. and Scheel, D. (1997). Signals in host-parasite interactions. In The Mycota. Plant Relationships, Part A, G.C. Carroll and P. Tudzynski, eds. (Berlin Heidelberg: Springer-Verlag), pp. 85-105

Ehness, R., Ecker, M., Godt, D.E., Roitsch, T. (1997) Glucose and stress independently regulate source and sink metabolism and defence mechanisms via signal transduction pathways involving protein phosphorylation. Plant Cell **9:** 1825–1841

Ellis, C. and Turner, J.G. (2001) The *Arabidopsis* mutant *cev1* has constitutively active jasmonate and ethylene signal pathways and enhanced resistance to pathogens. Plant Cell **13:** 1025-1033

Ellis, C., Karafyllidis, I., Wasternack, C., Turner, J.G. (2002) The Arabidopsis mutant *cev1* links cell wall signaling to jasmonate and ethylene responses. Plant Cell **14:** 1557-1566

Epple, P., Mack, A.A., Morris, V.R., Dangl, J.L. (2003). Antagonistic control of oxidative stress-induced cell death in Arabidopsis by two related, plant-specific zinc finger proteins. Proc Natl Acad Sci U S A **100:** 6831-6836

Eulgem, T. (2005) Regulation of the Arabidopsis defense transcriptome. Trends Plant Sci **10:** 71-78

Falk, A., Feys, B.J., Frost, L.N., Jones, J.D., Daniels, M.J., Parker, J.E. (1999) EDS1, an essential component of R gene-mediated disease resistance in Arabidopsis has homology to eukaryotic lipases. Proc Natl Acad Sci U S A **96:** 3292-3297

Fan, W. and Dong, X. (2002) In vivo interaction between NPR1 and transcription factor TGA2 leads to salicylic acid-mediated gene activation in Arabidopsis. Plant Cell **14:** 1377-1389

Felix, G., Regenass, M., Boller, T. (1993) Specific perception of subnanomolar concentrations of chitin fragments by tomato cells: induction of extracellular alkalinization, changes in protein phosphorylation, and establishment of a fractory state. Plant J **4:** 307–316

Feng, S., Ma, L., Wang, X., Xie, D., Dinesh-Kumar, S.P., Wei, N., Deng, X.W. (2003) The COP9 signalosome interacts physically with SCFCOI1 and modulates jasmonate responses. Plant Cell **15:** 1083-1094

Felix, G. and Boller, T. (2003) Molecular sensing of bacteria in plants. The highly conserved RNAbinding motif RNP-1 of bacterial cold shock proteins is recognized as an elicitor signal in tobacco. J Biol Chem **278:** 6201–6208

Ferrari, S., Plotnikova, J.M., De Lorenzo, G., Ausubel, F.M. (2003) Arabidopsis local resistance to Botrytis cinerea involves salicylic acid and camalexin and requires EDS4 and PAD2, but not SID2, EDS5 or PAD4. Plant J **35:** 193-205

Feys, B.J., Benedetti, C.E., Penfold, C.N., Turner, J.G. (1994) Arabidopsis mutants selected for resistance to the phytotoxin coronatine are male sterile, insensitive to methyl jasmonate, and resistant to a bacterial pathogen. Plant Cell **6:** 751-759

Feys, B.J., Moisan, L.J., Newman, M.-A., Parker, J.E. (2001) Direct interaction between the Arabidopsis disease resistance signaling proteins, EDS1 and PAD4. EMBO J **20:** 5400-5411

Feys, B., Wiermer, M., Bhat, R.A., Moisan, L.A., Medina-Escobar, N., Neu, C., da Cruz-Cabral, A., Parker, J.E. (2005) Arabidopsis SAG101 stabilizes and signals within an EDS1 complex in plant innate immunity. Plant Cell; submitted

Flor, H.H. (1971) Current status of the gene-for-gene concept. Annu Rev Phytopathol **9:** 275-296

Freialdenhoven, A., Peterhansel, C., Kurth, J., Kreuzaler, F., Schulze-Lefert, P. (1996) Identification of Genes Required for the Function of Non-Race-Specific mlo Resistance to Powdery Mildew in Barley. Plant Cell **8:** 5-14

Frye, C.A. and Innes, R.W. (1998) An Arabidopsis mutant with enhanced resistance to powdery mildew. Plant Cell **10:** 947-956

Frye, C.A., Tang, D., Innes, R.W. (2001) Negative regulation of defense responses in plants by a conserved MAPKK kinase. Proc Natl Acad Sci U S A **98:** 373-378

Fry, W.E. and Goodwin, S.B. (1997) Re-emergence of potato and tomato late blight in the United States. Plant Dis. **81:** 1349–1357

Gaffney, T., Friedrich, L., Vernooij, B., Negrotto, D., Nye, G., Uknes, S., Ward, E. Kessmann, H., Ryals, J. (1993) Requirement of salicylic acid for the induction of systemic acquired resistance. Science **261:** 754-755

Galan, J.E. and Collmer, A. (1999) Type III secretion machines: bacterial devices for protein delivery into host cells. Science **284:** 1322-1328

Gelli, A., Higgins, V.J., Blumwald, E. (1997) Activation of plant plasma membrane Ca2+-permeable channels by race-specific fungal elicitors. Plant Physiol. **113:** 269-279

Glazebrook, J. and Ausubel, F.M. (1994) Isolation of phytoalexin-deficient mutants of Arabidopsis thaliana and characterization of their interactions with bacterial pathogens. Proc Natl Acad Sci USA **91:** 8955-8959

Glazebrook, J., Rogers, E.E., Ausubel, F.M. (1996) Isolation of Arabidopsis mutants with enhanced disease susceptibility by direct screening. Genetics **143:** 973-982

Glazebrook, J., Zook, M., Mert, F., Kagan, I., Rogers, E.E., Crute, I., Holub, E., Hammerschmidt, R., Ausubel, F.M. (1997a) Phytoalexin-deficient mutants of Arabidopsis reveal that PAD4 encodes a regulatory factor and that four PAD genes contribute to downy mildew resistance. Genetics **146:** 381-392

Glazebrook, J., Rogers, E.E., Ausubel, F.M. (1997b) Use of Arabidopsis for genetic dissection of plant defense responses. Annu Rev Genet **31:** 547-569

Glazebrook, J., Chen, W., Estes, B., Chang, H.S., Nawrath, C., Metraux, J.P., Zhu, T., Katagiri, F. (2003) Topology of the network integrating salicylate and jasmonate signal transduction derived from global expression phenotyping. Plant J **2:** 217-228

Glazebrook, J. (2005) Contrasting Mechanisms of Defense Against Biotrophic and Necrotrophic Pathogens. Annu Rev Phytopathol [Epub ahead of print]

Gornhardt, B., Rouhara, I., Schmelzer, E. (2000) Cyst germination proteins of the potato pathogen Phytophthora infestans share homologywith human mucins. Mol. Plant Microbe Interact **13:** 32–42

Granado, J., Felix, G., Boller, T. (1995) Perception of fungal sterols in plants. Subnanomolar concentrations of ergosterol elicit extracellular alkalinization in tomato cells. Plant Physiol **107:** 485–490

Grant, M. and Mansfield, J. (1999) Early events in host-pathogen interactions. Curr Opin Plant Biol **2:** 312-319

Gray, W.M., Muskett, P.R., Chuang, H.W., Parker, J.E. (2003) Arabidopsis SGT1b is required for SCF(TIR1)-mediated auxin response. Plant Cell **15:** 1310–1319

Greenberg, J.T., Guo, A., Klessig, D.F., Ausubel, F.M. (1994) Programmed cell death in plants: a pathogen-triggered response activated coordinately with multiple defense functions. Cell **77:** 551–563

Guo, H. and Ecker, J.R. (2004) The ethylene signaling pathway: new insights. Curr Opin Plant Biol **7:** 40-49

Halim, V.A., Hunger, A., Macioszek, V., Landgraf, P., Nürnberger T., Scheel, D., Rosahl, S. (2004) The oligopeptide elicitor Pep-13 induces salicylic acid-dependent and –independent defense reactions in potato. Physiological and Molecular Plant Pathology **64:** 311-318

Hammond-Kosack, K.E. and Parker, J.E. (2003) Deciphering plant-pathogen communication: fresh perspectives for molecular resistance breeding. Curr Opin Biotechnol **2:** 177-193

Hanahan, D. (1983) Studies on transformation of Escherichia coli with plasmids. J Mol Biol 166: 557-580

Hayashi, F., Smith, K.D., Ozinsky, A., Hawn, T.R., Yi, E.C., Goodlett, D.R., Eng, J.K., Akira, S., Underhill, D.M., Aderem, A. (2001) The innate immune response to bacterial flagellin is mediated by Toll-like receptor 5. Nature **410:** 1099-1103

Heath, M.C. (1996) Plant resistance to fungi. Can J Plant Pathol **18:** 469-475

Heath, M.C. (2000) Nonhost resistance and nonspecific plant defenses. Curr Opin Plant Biol **3:** 315-319

Heck, S., Grau, T., Buchala, A., Metraux, J.P., Nawrath, C. (2003) Genetic evidence that expression of NahG modifies defence pathways independent of salicylic acid biosynthesis in the Arabidopsis-Pseudomonas syringae pv tomato interaction. Plant J **36:** 342-352

Heo, W.D., Lee, S.H., Kim, M.C., Kim, J.C., Chung, W.S., Chun, H.J., Lee, K.J., Park, C.Y., Park, H.C., Choi, J.Y. Cho, M.J. (1999) Involvement of specific calmodulin isoforms in salicylic acid-independent activation of plant disease resistance responses. Proc Natl Acad Sci USA **96:** 766-771

Hilpert, B., Bohlmann, H., op den Camp, R.O., Przybyla, D., Miersch, O., Buchala, A., Apel, K. (2001) Isolation and characterization of signal transduction mutants of Arabidopsis thaliana that constitutively activate the octadecanoid pathway and form necrotic microlesions. Plant J **26:** 435–446

Holub, E.B. and Cooper, A. (2004) Matrix, reinvention in plants: how genetics is unveiling secrets of non-host disease resistance. Trends Plant Sci **9:** 211-214

Holt, B.F. 3rd, Hubert, D.A., Dangl, J.L. (2003) Resistance gene signaling in plants--complex similarities to animal innate immunity. Curr Opin Immunol **1:** 20-25

Hubert, D.A., Tornero, P., Belkhadir, Y., Krishna, P., Takahashi, A., Shirasu, K. and Dangl, J.L. (2003) Cytosolic HSP90 associates with and modulates the Arabidopsis RPM1 disease resistance protein. EMBO J **22:** 5679–5689

Hückelhoven, R., Fodor, J., Preis, C., Kogel, K. H. (1999) Hypersensitive cell death and papilla formation in barley attacked by the powdery mildew fungus are associated with hydrogen peroxide but not with salicylic acid accumulation. Plant Physiol **119:** 1251–1260

Hülskamp, M., Misera, S., Jürgens, G. (1994) Genetic dissection of trichome cell development in *Arabidopsis.* Cell **76:** 555-566

Huitema, E., Vleeshouwers, V. G. A. A., Francis, D. M., Kamoun, S. (2003) Active defence responses associated with non-host resistance of *Arabidopsis thaliana* to the oomycete pathogen *Phytophthora infestans* Mol Plant Pathol **4:** 487-500

Huitema, E., Bos., J.I., Tian, M., Win, J., Waugh, M.E., Kamoun, S. (2004) Linking sequence to phenotype in *Phytophthora*-plant interactions. Trends Microbiol **12:** 193-200

Huitema, E., Vleeshouwers, V.G., Cakir, C., Kamoun, S., Govers, F. (2005) Differences in intensity and specificity of hypersensitive response induction in Nicotiana spp. by INF1, INF2A, and INF2B of Phytophthora infestans. Mol Plant Microbe Interact. **18:** 183-193

Hunt, M.D., Delaney, T.P., Dietrich, R.A., Weymann, K.B., Dangl, J.L., Ryals, J.A. (1997) Salicylate-independent lesion formation in Arabidopsis lsd mutants. Mol. Plant–Microbe Interact. **10:** 531–536

Imler, J.L. and Hoffmann, J.A. (2001) Toll receptors in innate immunity. Trends Cell Biol **11:** 304-311

Jabs, T., Dietrich, R.A., Dangl, J.L. (1996) Initiation of runaway cell death in an Arabidopsis mutant by extracellular superoxide. Science **273:** 1853-1856

Jabs, T., Tschöpe, M., Colling, C., Hahlbrock, K., Scheel, D. (1997) Elicitorstimulated ion fluxes and O2- from the oxidative burst are essential components in triggering defense gene activation and phytoalexin synthesis in parsley. Proc Natl Acad Sci. U S A **94:** 4800-4805

Jacobs, A.K., Lipka, V., Burton, R.A., Panstruga, R., Strizhov, N., Schulze-Lefert, P., Fincher, G.B. (2003) An Arabidopsis Callose Synthase, GSL5, Is Required for Wound and Papillary Callose Formation. Plant Cell **15:** 2503-2513

Jambunathan, N., Siani, J.M., McNellis, T.W. (2001) A humidity-sensitive Arabidopsis copine mutant exhibits precocious cell death and increased disease resistance. Plant Cell **13:** 2225–2240

Jambunathan, N. and McNellis, T.W. (2003) Regulation of Arabidopsis COPINE 1 gene expression in response to pathogens and abiotic stimuli. Plant Physiol **132:** 1370-1381

Jander, G., Norris, S.R., Rounsley, S.D., Bush, D.F., Levin, I.M., Last, R.L. (2002) Arabidopsis map-based cloning in the post-genome era. Plant Physiol **129:** 440-450

Jensen, A.B., Raventos, D., Mundy, J. (2002) Fusion genetic analysis of jasmonate-signaling mutants in Arabidopsis. Plant J **29:** 595-606

Jia, Y., McAdams, S.A., Bryan, G.T., Hershey, H.P., Valent, B. (2000) Direct interaction of resistance gene and avirulence gene products confers rice blast resistance. EMBO J **19:** 4004-4014

Jirage, D., Tootle, T.L., Reuber, T.L., Frost, L.N., Feys, B.J., Parker, J.E., Ausubel, F.M., Glazebrook, J. (1999) *Arabidopsis thaliana* PAD4 encodes a lipase-like gene that is important for salicylic acid signaling. Proc Natl Acad Sci U S A **96:** 13583-13588

Johnson, C., Boden, E., Arias, J. (2003) Salicylic acid and NPR1 induce the recruitment of trans-activating TGA factors to a defense gene promoter in Arabidopsis. Plant Cell **15:** 1846-1858

Jones, D.A. and Takemoto, D. (2004) Plant innate immunity—direct and indirect recognition of general and specific pathogen-associated molecules. Curr Opin Immunol **16:** 48–62

Jonak, C., Okresz, L., Bogre, L., Hirt, H. (2002) Complexity, cross talk and integration of plant MAP kinase signalling. Curr Opin Plant Biol **5:** 415-424

Jones, D.A. and Jones, J.D.G. (1997) The role of leucine-rich repeat proteins in plant defences. Adv Bot Res **24:** 89-167

Jones, J.D. (2001) Putting knowledge of plant disease resistance genes to work. Curr Opin Plant Biol **4:** 281-287

Judelson, H.S., Tyler, B.M., Michelmore, R.W. (1991) Transformation of the oomycete pathogen *Phytophthora infestans*. Mol Plant Microbe Interact **4:** 602-607

Jurkowski, G.I., Smith, R.K. Jr., Yu, I.C., Ham, J.H., Sharma, S.B., Klessig, D.F., Fengler, K.A., Bent, A.F. (2004) Arabidopsis DND2, a second cyclic nucleotide-gated ion channel gene for which mutation causes the "defense, no death" phenotype. Mol Plant Microbe Interact **17:** 511-520

Kachroo, P., Shanklin, J., Shah, J., Whittle, E.J., Klessig, D.F. (2001) A fatty acid desaturase modulates the activation of defense signaling pathways in plants. Proc Natl Acad Sci U S A **98:** 9448-9453

Kachroo, A., He, Z., Patkar, R., Zhu, Q., Zhong, J., Li, D., Ronald, P., Lamb, C., Chattoo, B.B. (2003) Induction of H2O2 in transgenic rice leads to cell death and enhanced resistance to both bacterial and fungal pathogens. Transgenic Res **5:** 577-586

Kagan, I.A. and Hammerschmidt, R. (2002) Arabidopsis ecotype variability in camalexin production and reaction to infection by Alternaria brassicicola. J Chem Ecol **28:** 2121-2140

Kajava, A.V. (1998) Structural diversity of leucine-rich repeat proteins. J Mol Biol **277:** 519-527

Kamoun, S., van West, P., Vleeshouwers, V.G., de Groot, K.E., Govers, F. (1998) Resistance of nicotiana benthamiana to phytophthora infestans is mediated by the recognition of the elicitor protein INF1. Plant Cell. **9:** 1413-1426

Kamoun, S., Huitema, E., Vleeshouwers, V.G. (1999) Resistance to oomycetes: a general role for the hypersensitive response? Trends Plant Sci **4:** 196-200

Kamoun, S. (2001) Nonhost resistance to *Phytophthora*: novel prospects for a classical problem. Curr Opin Plant Biol **4:** 295-300

Kang, L., Li, J., Zhao, T., Xiao, F., Tang, X., Thilmony, R., He, S., Zhou, J.M. (2003) Interplay of the *Arabidopsis* nonhost resistance gene NHO1 with bacterial virulence. Proc Natl Acad Sci U S A **100:** 3519–3524

Kanzaki, H. (2003) Cytosolic HSP90 and HSP70 are essential components of INF1-mediated hypersensitive response and non-host resistance to Pseudomonas cichorii in Nicotiana benthamiana. Mol Plant Pathol **4:** 383–391

Khush, R.S. and Lemaitre, B. (2000). Genes that fight infection - what the Drosophila genome says about animal immunity. Trends Genet **16:** 442-449

Kim, M.C., Panstruga, R., Elliott, C., Muller, J., Devoto, A., Yoon, H.W., Park, H.C., Cho, M.J., Schulze-Lefert, P. (2002) Calmodulin interacts with MLO protein to regulate defence against mildew in barley. Nature **416:** 447-451

Kim, M.G., Cunha, L.D., McFall, A.J., Belkhadir, Y., DebRoy, S., Dangl, J.L., Mackey, D. (2005) Two Pseudomonas syringae type III effectors inhibit RIN4-regulated basal defense in *Arabidopsis*. Cell **121:** 749-759

Kitagawa, K., Skowyra, D., Elledge, S.J., Harper, J.W., Hieter, P. (1999) SGT1 encodes an essential component of the yeast kinetochore assembly pathway and a novel subunit of the SCF ubiquitin ligase complex. Mol Cell **4:** 21-33

Klessig, D.F., Durner, J., Noad, R., Navarre, D.A., Wendehenne, D., Kumar, D., Zhou, J.M., Shah, J., Zhang, S., Kachroo, P., Trifa, Y., Pontier, D., Lam, E. Silva, H. (2000). Nitric oxide and salicylic acid signaling in plant defense. Proc Natl Acad Sci U S A **97:** 8849-8855

Kloek, A.P., Verbsky, M.L., Sharma, S.B., Schoelz, J.E., Vogel, J., Klessig, D.F. Kunkel, B.N. (2001) Resistance to Pseudomonas syringae conferred by an Arabidopsis thaliana coronatine-insensitive (coi1) mutation occurs through two distinct mechanisms. Plant J **26:** 509-522

Klüsener, B. and Weiler, E.W. (1999) Pore-forming properties of elicitors of plant defense reactions and cellulolytic enzymes. FEBS Lett **459:** 263-266

Kobayashi, Y., Kobayashi, I., Funaki, Y., Fujimoto, S., Takemoto, T., Kunoh, H. (1997) Dynamic reorganization of microfilaments and microtubules is necessary for the expression of non-host resistance in barley coleoptile cells. Plant Journal **11:** 525-537

Kobe, B. and Deisenhofer, J. (1994) The leucine-rich repeat: A versatile binding motif. Trends Biochem **19:** 415-421

Kombrink, E. and Somssich, I. E. (1995) Pathogenesis-related proteins and plant defense. In Plant Relationships, 6 (Carroll, G. and Tudzynski, P., eds). Berlin: Springer Verlag, 107-128

Koornneef, M., Dellaert, L.W., van der Veen, J.H. (1982) EMS- and radiation-induced mutation frequencies at individual loci in Arabidopsis thaliana (L.) Heynh. Mutat Res. **93:** 109-123

Kroj, T., Rudd, J.J., Nürnberger, T., Gäbler, Y., Lee, J., Scheel, D. (2003) Mitogen-activated protein kinase play an essential role in oxidative burst-independent expression of pathogenesis-related genes in parsley. J. Biol Chem **278:** 2256-2264

Kunkel, B.N. and Brooks, D.M. (2002) Cross talk between signaling pathways in pathogen defense. Curr Opin Plant Biol **5:** 325-331

Lam, E., Kato, N., Lawton, M. (2001) Programmed cell death, mitochondria and the plant hypersensitive response. Nature **411:** 848-853

Lam, E. (2004) Controlled cell death, plant survival and development. Nat Rev Mol Cell Biol. **4:** 305-315

Lamb, C. and Dixon, R. A. (1997) The oxidative burst in plant disease resistance. Annu Rev Plant Physiol Plant Mol Biol **48:** 251-275

Li, J., Brader, G., Palva, E.T. (2004) The WRKY70 transcription factor: a node of convergence for jasmonate-mediated and salicylate-mediated signals in plant defense. Plant Cell **16:** 319-331

Ligterink, W., Kroj, T., zur Nieden, U., Hirt, H. and Scheel, D. (1997) Receptor-mediated activation of a MAP kinase in pathogen defense of plants. Science **276:** 2054-2057

Lim, M.T. and Kunkel, B.N. (2004) The Pseudomonas syringae type III effector AvrRpt2 promotes virulence independently of RIN4, a predicted virulence target in Arabidopsis thaliana. Plant J **40:** 790-798

Lipka, V., Dittgen, J., Bednarek, P., Bhat, R., Wiermer, M., Stein, M., Landtag, J., Brandt, W., Rosahl, S., Scheel, D., Llorente, F., Molina, A., Parker, J., Somerville, S., Schulze-Lefert, P. (2005) Pre- and postinvasion defenses both contribute to nonhost resistance in Arabidopsis. Science **310:** 1180-1183

Liu, Y., Schiff, M., Serino, G., Deng, X.W., Dinesh-Kumar, S.P. (2002) Role of SCF ubiquitin-ligase and the COP9 signalosome in the N genemediated resistance response to Tobacco mosaic virus. Plant Cell **14:** 1483-1496

Liu, J., Jambunathan, N., McNellis, T.W. (2005) Transgenic expression of the von Willebrand A domain of the BONZAI 1/COPINE 1 protein triggers a lesion-mimic phenotype in Arabidopsis. Planta **221:** 85-94

Logemann, E., Wu, S.C., Schroder, J., Schmelzer, E., Somssich, I.E., Hahlbrock, K. (1995) Gene activation by UV light, fungal elicitor or fungal infection in Petroselinum crispum is correlateted with repression of cell cycle-related genes. Plant J **8:** 865–876

Lorenzo, O., Piqueras, R., Sánchez-Serrano, J.J., Solano, R. (2003) ETHYLENE RESPONSE FACTOR1 integrates signals from ethylene and jasmonate pathways in plant defense. Plant Cell **15:** 165-178

Lorenzo, O., Chico, J.M., Sánchez-Serrano, J.J., Solano, R. (2004) JASMONATE-INSENSITIVE1 encodes a MYC transcription factor essential to discriminate between different jasmonate-regulated defense responses in Arabidopsis. Plant Cell **7:**1938-1950

Lorrain, S., Vailleau, F., Balagué, C., Roby, D. (2003) Lesion mimic mutants: keys for deciphering cell death and defense pathways in plants? Trends Plant Sci **8:** 263-271

Lu, M., Tang, X., Zhou, J.M. (2001) Arabidopsis NHO1 is required for general resistance against Pseudomonas bacteria. Plant Cell **13:** 437-447

Lukowitz, W., Gillmor, C.S., Scheible, W.R. (2000) Positional cloning in Arabidopsis. Why it feels good to have a genome initiative working for you. Plant Physiol **123:** 795-805

Mackey, D., Holt, B.F., Wiig, A., Dangl, J.L. (2002) RIN4 interacts with Pseudomonas syringae type III effector molecules and is required for RPM1 -mediated resistance in Arabidopsis. Cell **108:** 743-754

Mackey, D., Belkhadir, Y., Alonso, J.M., Ecker, J.R., Dangl, J.L. (2003) Arabidopsis RIN4 is a target of the type III virulence effector AvrRpt2 and modulates RPS2-mediated resistance. Cell **112:** 379-389

Maldonado, A.M., Doerner, P., Dixon, R.A., Lamb, C.J., Cameron, R.K. (2002) A putative lipid transfer protein involved in systemic resistance signalling in Arabidopsis. Nature **419:** 399-403

Martin, G.B., Brommonschenkel, S.H., Chunwongse, J., Frary, A., Ganal, M.W., Spivey, R., Wu, T.Y., Earle, E.D., Tanksley, S.D. (1993) Map-based cloning of a protein-kinase gene conferring disease resistance in tomato. Science **262:** 1432-1436

Martinoia, E., Klein, M., Geisler, M., Bovet, L., Forestier, C., Kolukisaoglu, U., Muller-Rober, B., Schulz,B. (2002) Multifunctionality of plant ABC transporters - More than just detoxifiers. Planta **214:** 345-355

McDowell, J.M. and Dangl, J.L. (2000) Signal transduction in the plant immune response. Trends Biochem Sci **25:** 79-82

Medzhitov, R. and Janeway, C.A.J. (1997). Innate immunity: the virtues of a nonclonal system of recognition. Cell **91:** 295-298

Medzhitov, R. and Janeway, C.A.J. (2000) Innate immune recognition: mechanisms and pathways Immunol Rev **173:** 89–97

Mellersh, D.G., Foulds, I.V., Higgins, V.J., Heath, M.C. (2002) H2O2 plays different roles in determining penetration failure in three diverse plant-fungal interactions. Plant J **29:** 257-268

Mellersh, D.G. and Heath, M.C. (2003) An investigation into the involvement of defense signaling pathways in components of the nonhost resistance of Arabidopsis thaliana to rust fungi also reveals a model system for studying rust fungal compatibility. Mol Plant Microbe Interact **16:** 398-404

Mendgen, K. and Hahn, M. (2002) Plant infection and the establishment of fungal biotrophy. Trends Plant Sci **7:** 352–356

Moffett, P., Farnham, G., Peart, J., Baulcombe, D.C. (2002) Interaction between domains of a plant NBS-LRR protein in disease resistance-related cell death. EMBO J **17:** 4511-4519

Muskett, P.R., Kahn, K., Austin, M.J., Moisan, L.J., Sadanandom, A., Shirasu, K., Jones, J.D., Parker, J.E. (2002). Arabidopsis RAR1 exerts rate-limiting control of R gene-mediated defenses against multiple pathogens. Plant Cell **14:** 979-992

Nandi, A., Krothapalli, K., Buseman, C.M., Li, M., Welti, R., Enyedi, A., Shah, J. (2003) Arabidopsis sfd mutants affect plastidic lipid composition and suppress dwarfing, cell death, and the enhanced disease resistance phenotypes resulting from the deficiency of a fatty acid desaturase. Plant Cell **15:** 2383-2398

Nandi, A., Welti, R., Shah, J. (2004) The Arabidopsis thaliana dihydroxyacetone phosphate reductase gene SUPPRESSOR OF FATTY ACID DESATURASE DEFICIENCY 1 is required for glycerolipid metabolism and for the activation of systemic acquired resistance. Plant Cell **16:** 465-477

Nawrath, C. and Métraux, J.P. (1999) Salicylic acid induction-deficient mutants of Arabidopsis express PR-2 and PR-5 and accumulate high levels of camalexin after pathogen inoculation. Plant Cell **11:** 1393-1404

Nawrath, C., Heck, S., Parinthawong, N., Métraux, J.P. (2002) EDS5, an essential component of salicylic acid-dependent signaling for disease resistance in Arabidopsis, is a member of the MATE transporter family. Plant Cell **14:** 275-286

Nimchuk, Z., Rohmer, L., Chang, J.H., Dangl, J.L. (2001) Knowing the dancer from the dance: R-gene products and their interactions with other proteins from host and pathogen. Curr Opin Plant Biol **4:** 288-294

Nishimura, M.T., Stein, M., Hou, B.H., Vogel, J.P., Edwards, H., Somerville, S.C. (2003) Loss of a callose synthase results in salicylic acid-dependent disease resistance. Science **301:** 969-972

Nomura, K., Melotto, M., He, S.Y. (2005) Suppression of host defense in compatible plant-Pseudomonas syringae interactions. Curr Opin Plant Biol **8:** 361-368

Norman-Setterblad, C., Vidal, S., Palva, E.T. (2000) Interacting signal pathways control defense gene expression in Arabidopsis in response to cell wall-degrading enzymes from Erwinia carotovora. Mol Plant Microbe Interact **13:** 430-438

Nürnberger, T., Nennstiel, D., Jabs, T., Sacks, W.R., Hahlbrock, K., Scheel, D. (1994) High affinity binding of a fungal oligopeptide elicitor to parsley plasma membranes triggers multiple defense responses. Cell **78:** 449–460

Nürnberger, T. (1999) Signal perception in plant pathogen defense. Cell Mol Life Sci **55:** 167-182

Nürnberger, T. and Scheel, D. (2001) Signal transmission in the plant immune response. Trends Plant Sci **8:** 372-379

Nürnberger, T., and Brunner, F. (2002) Innate immunity in plants and animals: emerging parallels between the recognition of general elicitors and pathogen-associated molecular patterns. Curr Opin Plant Biol **5:** 318-324

Nürnberger, T., Brunner, F., Kemmerling, B., Piater, L. (2004) Innate immunity in plants and animals: striking similarities and obvious differences. Immunol Rev **198:** 249-266

Nürnberger, T. and Lipka, V. (2005) Non-host resistance in plants: new insights into an old phenomenon. Mol Plant Pathol **6:** 335-345

Oliver, R. and Ipcho, S.V.S. (2004) Arabidopsis pathology breathes new life into the necrotrophs-vs.-biotrophs classification of fungal pathogens Mol Plant Pathol **5:** 347–352

Osbourn, A.E. (1996) Preformed Antimicrobial Compounds and Plant Defense against Fungal Attack. Plant Cell **10:** 1821-1831

Parker, J.E., Holub, E.B., Frost, L.N., Falk, A., Gunn, N.D., Daniels, M.J. (1996) Characterization of *eds1*, a mutation in Arabidopsis suppressing resistance to Peronospora parasitica specified by several different RPP genes. Plant Cell **8:** 2033-2046

Peart, J.R., Lu, R., Sadanandom, A., Malcuit, I., Moffett, P., Brice, D.C., Schauser, L., Jaggard, D.A., Xiao, S., Coleman, M.J., Dow, M., Jones, J.D., Shirasu, K., Baulcombe, D.C. (2002) Ubiquitin ligaseassociated protein SGT1 is required for host and nonhost disease resistance in plants. Proc Natl Acad Sci U S A **99:** 10865-10869

Penninckx, I.A., Thomma, B.P., Buchala, A., Metraux, J.P., Broekaert, W.F. (1998) Concomitant activation of jasmonate and ethylene response pathways is required for induction of a plant defensin gene in Arabidopsis. Plant Cell **10:** 2103-2113

Perfect, E.S. and Green, J.R. (2001) Infection structures of biotrophic and hemibiotrophic fungal plant pathogens. Mol. Plant Pathol **2:** 101–108

Petersen, M., Brodersen, P., Naested, H., Andreasson, E., Lindhart, U., Johansen, B., Nielsen, H.B., Lacy, M., Austin, M.J., Parker, J.E., Sharma, S.B., Klessig, D.F., Martienssen, R., Mattson, O., Jensen, A.B., Mundy, J. (2000) Arabidopsis MAP kinase 4 negatively regulates systemic acquired resistance. Cell **103:** 1111-1120

Pieterse, C.M.J., van Wees, S.C., van Pelt, J.A., Knoester, M., Laan, R., Gerrits, H., Weisbeek, P.J., van Loon, L.C. (1998) A novel signaling pathway controlling induced systemic resistance in Arabidopsis. Plant Cell **10:** 1571-1580

Pieterse, C.M.J., Van Pelt, J.A., Van Wees, S.C.M., Ton, J., Léon-Kloosterziel, K.M., Keurentjes, J.J.B., Verhagen, B.W.M., Knoester, M., Van der Sluis, I., Bakker, P.A.H.M., Van Loon, L.C. (2001) Rhizobacteria-mediated induced systemic resistance: triggering, signalling and expression. Eur J Plant Pathol **107:** 51-61

Pieterse, C.M., Van Loon, L.C. (2004) NPR1: the spider in the web of induced resistance signaling pathways. Curr Opin Plant Biol **7:** 456-464

Piffanelli, P., Zhou, F., Casais, C., Orme, J., Jarosch, B., Schaffrath, U., Collins, N.C., Panstruga, R., Schulze-Lefert, P. (2002) The barley MLO modulator of defense and cell death is responsive to biotic and abiotic stress stimuli. Plant Physiol **129:** 1076-1085

Pighin, J.A., Zheng, H., Balakshin, L.J., Goodman, I.P., Western, T.L., Jetter, R., Kunst, L., Samuels, A.L. (2004) Plant cuticular lipid export requires an ABC transporter. Science **306:** 702-704

Pratelli, R., Sutter, J.U., Blatt, M.R. (2004) A new catch in the SNARE. Trends Plant Sci **9:** 187-195

Pratt, W.B. and Toft, D.O. (2003) Regulation of signaling protein function and trafficking by the hsp90/hsp70-based chaperone machinery. Exp Biol Med (Maywood) **2:**111-133

Rate, D.N. and Greenberg, J.T. (2001) The Arabidopsis aberrant growth and death2 mutant shows resistance to Pseudomonas syringae and reveals a role for NPR1 in suppressing hypersensitive cell death. Plant J **27:** 203–211

Ren, D., Yang, H., Zhang, S. (2002) Cell death mediated by MAPK is associated with hydrogen peroxide production in Arabidopsis. J Biol Chem **277:** 559-565

Reymond, P. and Farmer, E.E. (1998) Jasmonate and salicylate as global signals for defense gene expression. Curr Opin Plant Biol **1:** 404-411

Reynolds, E.S. (1963) The use of lead citrate at high ph as an electron opaque stain in electron microscopy. J Cell Biol **17:** 208-212

Robinson, L.H. and Cahill, D.M. (2003) Ecotypic variation in the response of Arabidopsis thaliana to Phytophthora cinnamomi. Aust Plant Pathol. **32:** 53–64

Roetschi, A., Si-Ammour, A., Belbahri, L., Mauch, F., Mauch-Mani, B. (2001) Characterization of an Arabidopsis–Phytophthora pathosystem: resistance requires a functional PAD2 gene and is independent of salicylic acid, ethylene and jasmonic acid signalling. Plant J **28:** 293–305

Rogers, S.O. and Bendich, A.J. (1988) Extraction of DNA from plant tissues. Plant Mol Biol Manual **A6:** 1-10

Romeis, T., Ludwig, A.A., Martin, R., Jones, J.D. (2001) Calcium-dependent protein kinases play an essential role in a plant defence response. EMBO J **20:** 5556-5567

Ryals, J.A., Neuenschwander, U.H., Willits, M.G., Molina, A., Steiner, H.Y., Hunt, M.D. (1996) Systemic acquired resistance. Plant Cell **8:** 1809-1819

Salmeron, J.M., Oldroyd, G.E.D., Rommens, C.M.T., Scofield, S.R., Kim, H.S., Lavelle, D.T., Dahlbeck, D., Staskawicz, B.J. (1996) Tomato Prf is a member ofthe leucine-rich repeat class of plant disease resistance genes and lies embedded within the Pto kinase gene-cluster. Cell **86:** 123-133

Sambrook, J., Fritsch, E.F., Maniatis, T. (1989) Molecular Cloning. A laboratory manual, Cold Spring Harbor Laboratory Press. (ed.), Cold Spring Harbor New York

Sanderfoot, A.A., Assaad, F.F., Raikhel, N.V. (2000) The Arabidopsis genome. An abundance of soluble N-ethylmaleimide-sensitive factor adaptor protein receptors. Plant Physiol **124:** 1558-1569

Sangster, T.A. and Queitsch, C. (2005) The HSP90 chaperone complex, an emerging force in plant development and phenotypic plasticity. Curr Opin Plant Biol **1:** 86-92

Scheel, D. (1998) Resistance response physiology and signal transduction. Curr Opin Plant Biol **4:** 305-310

Schulze-Lefert, P. (2004) Knocking on the heaven's wall: pathogenesis of and resistance to biotrophic fungi at the cell wall. Curr Opin Plant Biol **7:** 377-383

Schulze-Lefert, P. (2004) Plant immunity: the origami of receptor activation. Curr Biol **1:** R22-24

Seo, H.S., Song, J.T., Cheong, J.J., Lee, Y.H., Lee, Y.W., Hwang, I., Lee, J.S., Choi, Y.D. (2001) Jasmonic acid carboxyl methyltransferase: a key enzyme for jasmonate-regulated plant responses. Proc Natl Acad Sci U S A **98:** 4788-4793

Shah, J., Tsui, F., Klessig, D.F. (1997) Characterization of a salicylic acid-insensitive mutant (sai1) of Arabidopsis thaliana, identified in a selective screen utilizing the SA inducible expression of the tms2 gene. Mol. Plant Microbe Interact. **10:** 69-78

Shah, J., Kachroo, P., Klessig, D.F. (1999) The Arabidopsis ssi1 mutation restores pathogenesis-related gene expression in npr1 plants and renders defensin gene expression salicylic acid dependent. Plant Cell **11:** 191-206

Shah, J., Kachroo, P., Nandi, A., Klessig, D.F. (2001) A recessive mutation in the Arabidopsis SSI2 gene confers SA- and NPR1-independent expression of PR genes and resistance against bacterial and oomycete pathogens. Plant J **25:** 563-574

Shah, J. (2003) The salicylic acid loop in plant defense. Curr Opin Plant Biol **6:** 365-371

Shao, F., Golstein, C., Ade, J., Stoutemyer, M., Dixon, J.E., Innes, R.W. (2003) Cleavage of Arabidopsis PBS1 by a bacterial type III effector. Science **5637:** 1230-1233

Si-Ammour, A., Mauch-Mani, B., Mauch, F. (2003) Quantification of induced resistance against Phytophthora species expressing GFP as a vital marker: beta-aminobutyric acid but not BTH protects potato and Arabidopsis from infection. Mol Plant Pathol **4:** 237-248

Smart, M.G., Aist, J.R., Israel, H.W. (1986) Structure and function of wall appositions. 1. General histochemistry of papillae in barley (Hordum vulgare) coleoptiles attacked by Erysiphe graminis f. sp. hordei. Can J Bot **64:** 793-801

Spoel, S.H., Koornneef, A., Claessens, S.M., Korzelius, J.P., Van Pelt, J.A., Mueller, M.J., Buchala, A.J., Métraux, J.P., Brown, R., Kazan, K., Van Loon, L.C., Dong, X., Pieterse, C.M. (2003) NPR1 modulates cross-talk between salicylate- and jasmonatedependent defense pathways through a novel function in the cytosol. Plant Cell **15**: 760-770

Spurr, A. R. (1969) A low-viscosity epoxy resin embedding medium for electron microscopy. J Ultrastruct Res **26:** 31-43

Staskawicz, B.J., Ausubel, F.M., Baker, B.J., Ellis, J.G., Jones, J.D. (1995) Molecular genetics of plant disease resistance. Science **268:** 661-667

Staskawicz, B.J., Mudgett, M.B., Dangl, J.L., Galan, J.E. (2001) Common and contrasting themes of plant and animal diseases. Science **292:** 2285-2289

Staswick, P.E., Yuen, G.Y., Lehman, C.C. (1998) Jasmonate signaling mutants of Arabidopsis are susceptible to the soil fungus Pythium irregulare. Plant J **15:** 747-754

Stein, M., Dittgen, J., Sanchez-Rodriguez, C., Hou, B.H., Molina, A., Schulze-Lefert, P., Lipka, V., Somerville, S. (2006) Arabidopsis PEN3/PDR8, an ATP Binding Cassette Transporter, Contributes to Nonhost Resistance to Inappropriate Pathogens That Enter by Direct Penetration. Plant Cell (Epub ahead of print)

Stepanova, A.N. and Alonso, J.M. (2005) Arabidopsis ethylene signaling pathway. Sci STKE **276:** cm4

Sticher, L., Mauch-Mani, B., Métraux, J.P. (1997) Systemic acquired resistance. Annu Rev Plant Pathol **35:** 253-270

Stone, B.A. and Clarke, A.E. (1992) Chemistry and biology of (1→3)-ß-D glucans. (Victoria, Australia: La Trobe University Press)

Takahashi, A., Casais, C., Ichimura, K., Shirasu, K. (2003) HSP90 interacts with RAR1 and SGT1 and is essential for RPS2-mediated disease resistance in Arabidopsis. Proc Natl Acad Sci U S A **100:** 11777-11782

Takemoto, D., Jones, D.A., Hardham, A.R. (2003) GFP-tagging of cell components reveals the dynamics of subcellular re-organization in response to infection of Arabidopsis by oomycete pathogens. Plant J **33:** 775-792

Tameling, W.I., Elzinga, S.D., Darmin, P.S., Vossen, J.H., Takken, F.L., Haring, M.A., Cornelissen, B.J. (2002) The tomato R gene products I-2 and MI-1 are functional ATP binding proteins with ATPase activity. Plant Cell **11:** 2929-2939

Tang, D., and Innes, R.W. (2002) Overexpression of a kinase-deficient form of the EDR1 gene enhances powdery mildew resistance and ethylene-induced senescence in Arabidopsis. Plant J **32:** 975–983

Tao, Y., Xie, Z., Chen, W., Glazebrook, J. Chang, H.S., Han, B., Zhu, T., Zou, G., Katagiri, F. (2003) Quantitative nature of Arabidopsis responses during compatible and incompatible interactions with the bacterial pathogen Pseudomonas syringae. Plant Cell. **15:** 317-330

Thordal-Christensen H., Zhang Z., Wei Y., Collinge D.B. (1997) Subcellular localization of H2O2 in plants. H2O2 accumulation in papillae and hypersensitive response during the barley powdery mildew interaction. Plant J **11:** 1187-94

Thordal-Christensen, H., Gregersen, P.L., Collinge, D.B. (2000) The barley / *Blumeria* (syn. *Erysiphe*) *graminis* interaction. In *Mechanisms of Resistance to Plant Diseases*. Edited by Slusarenko, A., Fraser, R., van Loon, L.C. Dordrecht, The Netherlands: Kluwer Academic Publishers; 77-100

Thomma, B.P.H.J., Eggermont, K., Penninckx, I.A.M.A., Mauch-Mani, B., Vogelsang, R., Cammue, B.P.A., Broekaert, W.F. (1998) Separate jasmonate-dependent and salicylate-dependent defense response pathways in Arabidopsis are essential for resistance to distinct microbial pathogens. Proc Natl Acad Sci USA **95:** 15107-15111

Thomma, B.P., Eggermont, K., Tierens, K.F., Broekaert, W.F. (1999a) Requirement of functional ethylene-insensitive 2 gene for efficient resistance of Arabidopsis to infection by Botrytis cinerea. Plant Physiol **121:** 1093-1102

Thomma, B.P., Nelissen, I., Eggermont, K., Broekaert, W.F. (1999b) Deficiency in phytoalexin production causes enhanced susceptibility of Arabidopsis thaliana to the fungus Alternaria brassicicola. Plant J **19:**163-171

Thomma, B.P., Penninckx, I.A., Broekaert, W.F., Cammue, B.P. (2001) The complexity of disease signaling in Arabidopsis. Curr Opin Immunol. **13:** 63-68

Tierens, K.F., Thomma, B.P., Bari, R.P., Garmier, M., Eggermont, K., Brouwer, M., Penninckx, I.A., Broekaert, W.F., Cammue, B.P. (2003) Esa1, an Arabidopsis mutant with enhanced susceptibility to a range of necrotrophic fungal pathogens, shows a distorted induction of defense responses by reactive oxygen generating compounds. Plant J **29:** 131-140

Ton, J., Van Pelt, J.A., Van Loon, L.C., Pieterse, C.M. (2002) Differential effectiveness of salicylate-dependent and jasmonate/ethylene-dependent induced resistance in Arabidopsis. Mol Plant Microbe Interact **15:** 27-34

Tor, M., Gordon, P., Cuzick, A., Eulgem, T., Sinapidou, E., Mert-Turk, F., Can, C., Dangl, J.L., and Holub, E.B. (2002). Arabidopsis SGT1b is required for defense signaling conferred by several downy mildew resistance genes. Plant Cell **14:** 993-1003

Torres, M.A., Dangl, J.L., Jones, J.D. (2002) Arabidopsis gp91phox homologues AtrbohD and AtrbohF are required for accumulation of reactive oxygen intermediates in the plant defense response. Proc Natl Acad Sci U S A **94:** 517-522

Tornero, P., Merritt, P., Sadanandom, A., Shirasu, K., Innes, R.W., Dangl, J.L. (2002). RAR1 and NDR1 contribute quantitatively to disease resistance in Arabidopsis, and their relative contributions are dependent on the R gene assayed. Plant Cell **14:** 1005-1015

Underhill, D.M. and Ozinsky, A. (2002) Toll-like receptors: key mediators of microbe detection. Curr Opin Immunol **14:** 103-110

Van der Hoorn, R.A., De Wit, P.J., Joosten, M.H. (2002) Balancing selection favors guarding resistance proteins. Trends Plant Sci **2:** 67-71

Van der Biezen, E.A. and Jones, J.D.G. (1998) Plant disease-resistance proteins and the gene-for-gene concept. Trends Biochem Sci **12:** 454–456

Van Wees, S.C. and Glazebrook, J. (2003) Loss of non-host resistance of Arabidopsis NahG to Pseudomonas syringae pv phaseolicola is due to degradation products of salicylic acid. Plant J **33:** 733-742

Van Wees, S.C., Chang, H.S., Zhu, T., Glazebrook, J. (2003) Characterization of the early response of Arabidopsis to Alternaria brassicicola infection using expression profiling. Plant Physiol **132:** 606-617

Veronese, P., Chen, X., Bluhm, B., Salmeron, J., Dietrich, R., Mengiste, T. (2004) The BOS loci of Arabidopsis are required for resistance to Botrytis cinerea infection. Plant J **40:** 558-574

Vleeshouwers, V.G., van Dooijeweert, W., Govers, F., Kamoun, S., Colon, L.T. (2000) The hypersensitive response is associated with host and nonhost resistance to Phytophthora infestans. Planta **210:** 853-864

Vogel, J. and Somerville, S. (2000) Isolation and characterization of powdery mildew-resistant Arabidopsis mutants. Proc Natl Acad Sci **97:** 1897-1902

Ward, E.R., Uknes, S.J., Williams, S.C., Dincher, S.S., Wiederhold, D.L., Alexander, D.C., Ahl-Goy, P., Metraux, J.P., Ryals, J.A. (1991) Coordinate gene activity in response to agents that induce systemic acquired resistance. Plant Cell **3:** 1085-1094

Warren RF, Henk A, Mowery P, Holub E, Innes RW. (1998) A mutation within the leucine-rich repeat domain of the Arabidopsis disease resistance gene RPS5 partially suppresses multiple bacterial and downy mildew resistance genes. Plant Cell **9:** 1439-1452

Wendehenne, D., Durner, J., Klessig, D.F. (2004) Nitric oxide: a new player in plant signalling and defence responses. Curr Opin Plant Biol **4:** 449-55

Wiermer, M., Feys, B.J., Parker, J.E. (2005) Plant immunity: the EDS1 regulatory node. Curr Opin Plant Biol **8:** 383-389

Wilson, U. E. and Coffey, M. D. (1980) Cytological evaluation of general resistance to Phytophthora infestans in potato foliage. Ann Bot **45:** 81-90

Wright, D.P., Baldwin, B.C., Shephard, M.C., Scholes, J.D. (1995a) Source–sink relationships in wheat leaves infected with powdery mildew. I. Alterations in carbohydrate metabolism. Physiol Mol Plant Pathol **47:** 237–253

Wright, D.P., Baldwin, B.C., Shephard, M.C., Scholes, J.D. (1995b) Source–sink relationships in wheat leaves infected with powdery mildew. II. Changes in the regulation of the Calvin cycle. Physiol Mol Plant Pathol **47:** 255–267

Xiao, S., Ellwood, S., Calis, O., Patrick, E., Li, T., Coleman, M., Turner, J.G. (2001) Broad-spectrum mildew resistance in Arabidopsis thaliana mediated by RPW8. Science **5501:** 118-120

Xiao, S.Y., Brown, S., Patrick, E., Brearley, C., Turner, J.G. (2003) Enhanced transcription of the Arabidopsis disease resistance genes RPW8.1 and RPW8.2 via a salicylic acid-dependent amplification circuit is required for hypersensitive cell death. Plant Cell **15:** 33-45

Xiao, S., Calis, O., Patrick, E., Zhang, G., Charoenwattana, P., Muskett, P., Parker, J.E., Turner, J.G. (2005) The atypical resistance gene, RPW8, recruits components of basal defence for powdery mildew resistance in Arabidopsis. Plant J **42:** 95-110

Xie, D.X., Feys, B.F., James, S., Nieto-Rostro, M., Turner, J.G. (1998) COI1: an Arabidopsis gene required for jasmonate-regulated defense and fertility. Science **280:** 1091-1094

Xu, L., Liu, F., Wang, Z., Peng, W., Huang, R., Huang, D., Xie., D. (2001) An Arabidopsis mutant *cex1* exhibits constant accumulation of jasmonate-regulated AtVSP, Thi2.1 and PDF1.2. FEBS Lett **494:** 161–164

Xu, L., Liu, F., Lechner, E., Genschik, P., Crosby, W.L., Ma, H., Peng, W., Huang, D., Xie, D. (2002) The SCF(COI1) ubiquitin-ligase complexes are required for jasmonate response in Arabidopsis. Plant Cell **14:** 1919-1935

Xue, M., and Zhang, B. (2002) Do SNARE proteins confer specificity for vesicle fusion? Proc Natl Acad Sci U S A **99:** 13359-13361

Yang, Y., Shah, J., Klessig, D.F. (1997). Signal perception and transduction in plant defense responses. Genes Dev. **11:** 1621-1639

Yang, K.-Y., Liu, Y., Zhang, S. (2001) Activation of a mitogen-activated protein kinase pathway is involved in disease resistance in tobacco. Proc Natl Acad Sci USA **98:** 741-746

Yoda, H., Yamaguchi, Y., Sano, H. (2003) Induction of hypersensitive cell death by hydrogen peroxide produced through polyamine degradation in tobacco plants. Plant Physiol **4:** 1973-1981

Yoshida, S., Ito, M., Nishida, I., Watanabe, A. (2002) Identification of a novel gene HYS1/CPR5 that has a repressive role in the induction of leaf senescence and pathogen-defence responses in Arabidopsis thaliana. Plant J **29:** 427-437

You, I.S., Ghosal, D., Gunsalus, I.C. (1991) Nucleotide sequence analysis of the Pseudomonas putida PpG7 salicylate hydroxylase gene (nahG) and its 3'-flanking region. Biochemistry **30:** 1635-1641

Yu, I.C., Parker, J., Bent, A.F. (1998) Gene-for-gene disease resistance without the hypersensitive response in Arabidopsis dnd1 mutant. Proc Natl Acad Sci U S A **95:** 7819-7824

Yun, B.W., Atkinson, H.A., Gaborit, C., Greenland, A., Read, N.D., Pallas, J.A., Loake, G.J. (2003) Loss of actin cytoskeletal function and EDS1 activity, in combination, severely compromises non-host resistance in Arabidopsis against wheat powdery mildew. Plant J **34:** 768-777

Zeyen, R.J., Carver, T.L.W., Lyngkjaer, M.F. (2002) Epidermal cell papillae. In *The Powdery Mildews: A Comprehensive Treatise*. Edited by Belanger, R.R., Bushnell, W.R. St. Paul, Minnesota: APS Press; 107-125

Zhang, Y. L., Fan, W.H., Kinkema, M., Li, X., Dong, X. (1999) Interaction of NPR1 with basic leucine zipper protein transcription factors that bind sequences required for salicylic acid induction of the PR-1 gene. Proc Natl Acad Sci USA **96:** 6523-6528

Zhang, S. and Klessig, D.F. (2001) MAPK cascades in plant defense signaling. Trends Plant Sci **6:** 520-527

Zhao, Y., Thilmony, R., Bender, C.L., Schaller, A., He, S.Y., Howe, G.A. (2003) Virulence systems of Pseudomonas syringae pv tomato promote bacterial speck disease in tomato by targeting the jasmonate signaling pathway. Plant J **36:** 485-499

Zhou, N., Tootle, T.L., Tsui, F., Klessig, D.F., Glazebrook, J. (1998) PAD4 functions upstream from salicylic acid to control defense responses in Arabidopsis. Plant Cell **10:** 1021-1030

Zhou, J.M., Trifa, Y., Silva, H., Pontier, D., Lam, E., Shah, J., Klessig, D.F. (2000) NPR1 differentially interacts with members of the TGA/OBF family of transcription factors that bind an element of the PR-1 gene required for induction by salicylic acid. Mol. Plant Microbe Interact. **13:** 191-202

Zimmerli, L., Stein, M., Lipka, V., Schulze-Lefert, P., Somerville, S. (2004) Host and non-host pathogens elicit different jasmonate/ethylene responses in Arabidopsis. Plant J **40:** 633-646

Zimmermann, S., Nürnberger, T., Frachisse, J.M., Wirtz, W., Guern, J., Hedrich, R. Scheel, D. (1997) Receptor-mediated activation of a plant Ca2+-permeable ion channel involved in pathogen defense. Proc Natl Acad Sci U S A **94:** 2751-2755

Zipfel, C. and Felix, G. (2005) Plants and animals: a different taste for microbes? Curr Opin Plant Biol **8:** 353-360