

Biographical Sketch

Barbara Valent

Biosecurity Research Institute Professor of Crop Infectious Diseases
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Education and Training

University of Colorado	Chemistry	B.A., 1972
University of Colorado	Biochemistry	PhD, 1978
Cornell University	Yeast Molecular Genetics	1980-1982

Research and Professional Experience

2020-present Biosecurity Research Institute Professor of Crop Infectious Diseases, KSU
2004-present Chair, Interdepartmental Genetics Program, KSU
2002-present University Distinguished Professor, KSU
2001 – 2002 Kansas State University, Department of Plant Pathology, Professor
1997 - 2001 DuPont Agricultural Products, Research Fellow
1985 - 1997 DuPont Central Research and Development, Research Scientist progressing to Research Manager, Plant Sciences
1982 - 1985 University of Colorado, Senior Research Associate, Department of Chemistry

Honors and Awards

2022 20th Noel T. Keen Distinguished Lecturer Award, University of California, Riverside, Center for Plant Cell Biology Annual Symposium, Riverside, California
2021 Commerce Bank and W.T. Kemper Foundation Award for Distinguished Graduate Faculty, KSU
2020 Dr. Ron and Rae Iman Outstanding Faculty Award for Research, KSU
2020 Elected to the National Academy of Sciences
2019 Lifetime Achievement Award in Rice Blast Disease, 8th International Rice Blast Conference, Chengdu, Sichuan, China
2018 Noel T. Keen Award for Research Excellence in Molecular Plant Pathology, American Phytopathological Society
2017 Major Symposium Organizer, “Plants and Fungi: Friends or Foes” for ‘Plant Biology 2017’, American Society for Plant Biologists, Hawaii
2016 Pathologist of Distinction Talk, “A Conversation with Pathologist of Distinction Barbara Valent, A Passion for a Fungus,” American Phytopathol. Society Ann. Meeting, Florida
2016 Marty Vanier and Bob Krause Biosecurity Research Institute Research Fellow
2015 Recognized as a “Top Author” by the American Society of Plant Biologists
2012 John S. Karling Lecture, Mycological Society of America Annual Meeting, Connecticut
2010 Mentor Award, Department of Plant Pathology Graduate Student Club, KSU
2007 Fellow, American Association for the Advancement of Science
2007 Fellow, American Phytopathological Society
1996 1st Annual John S. Karling Lecture, Mycological Society of America, Joint annual MSA and APS Meetings

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- 1994 Garrett Memorial Lectureship, Annual Meeting of the British Society of Plant Pathology, Lancaster, UK
1990 Chairperson, Gordon Conference on Fungal Metabolism
1989 Opening Plenary Session Lecture, “Rice blast as a model system for plant pathology,” Annual meeting of the American Phytopathological Society, Richmond, VA
1980-1982 NIH National Research Service Award
1978 Phi Beta Kappa

Professional Societies

National Academy of Sciences; American Phytopathological Society; American Society of Plant Biologists; International Society for Molecular-Plant Microbe Interactions; American Association for the Advancement of Science; Mycological Society of America; Genetics Society of America.

Research Interests

The filamentous fungus *Magnaporthe oryzae* is a damaging plant pathogen that causes blast diseases of rice and wheat, a threat to global food security. The Valent lab works to understand how this fungus causes disease, and how its host range is restricted to particular host species and cultivars. How the fungus rapidly defeats host resistance in the field is a key focus. Fungal effectors, small, secreted proteins that are specifically expressed in the plant, function to promote disease. A subset of effectors trigger resistance when they are recognized by intracellular receptors encoded by plant resistance (R) genes. Resistance is defeated when effector genes mutate to avoid recognition. Lab findings include characterization of a fungal effector, encoded by an unstable subtelomeric gene family, that is recognized by direct binding to its R-receptor. Live-cell imaging of the fungus invading rice cells has revealed cellular biology of biotrophic invasion, leading to discovery of novel systems for secretion and translocation of fungal effectors into live plant cells. After reaching host cytoplasm, some effectors move into neighboring cells before fungal invasion. For wheat blast, goals are to identify resistance and understand the role of fungal supernumerary chromosomes in genome plasticity and evading disease resistance.

Selected Publications: Orchid ID 0000-0002-5088-3345

- Huang, J., D. Rowe, P. Subedi, W. Zhang, T. Suelter, **B. Valent** and D. E. Cook. 2022. CRISPR-Cas12a induced DNA double-strand breaks are repaired by multiple pathways with different mutation profiles in *Magnaporthe oryzae*. **Nature Communications** 13(1): 7168.
- Navia-Urrutia, M., G. Mosquera, R. Ellsworth, M. Farman, H.N. Trick, and **B. Valent**. 2022. Effector genes in *Magnaporthe oryzae* *Triticum* as potential targets for incorporating blast resistance in wheat. **Plant Disease** 106:1700-1712.
- Osés-Ruiz, M., Cruz-Mireles, N., Martin-Urdiroz, M., Soanes, D. M., Eseola, A. B., Tang, B., Derbyshire, P., Nielsen, M., Cheema, J., Were, V., Eisermann, I., Kershaw, M. J., Yan, X., Valdovinos-Ponce, G., Molinari, C., Littlejohn, G. R., **Valent, B.**, Menke, F. L. H., and Talbot, N. J. 2021. Appressorium-mediated plant infection by *Magnaporthe oryzae* is regulated by a Pmk1-dependent hierarchical transcriptional network. **Nature Microbiology** 6:1383-1397.
- Valent, B.**, G. Cruppe, J.P. Stack, C.D. Cruz, M.L. Farman, P.A. Paul, G.L. Peterson and K.F. Pedley, (2021) Recovery plan for wheat blast caused by *Magnaporthe oryzae* pathotype *triticum*. **Plant Health Progress**, 22: 182-212. <https://doi.org/10.1094/PHP-11-20-0101-RP>
- Cruppe, G., C.D. Cruz, G. Peterson, K. Pedley, M. Asif, A. Fritz, L. Calderon, C. Lemes da Silva, T. Todd, P. Kuhnem, P.K. Singh, R.P. Singh, H.J. Braun, N.C.D. Barma, and **B. Valent**. 2020.

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- Novel sources of wheat head blast resistance in modern breeding lines and wheat wild relatives. *Plant Disease*, 104:35-43.
- Peng, Z., E. Oliveira-Garcia, G. Lin, Y. Hu, M. Dalby, P. Migeon, H. Tang, M. Farman, D. Cook, F.F. White, **B. Valent** and S. Liu. 2019. Effector gene reshuffling involves dispensable mini-chromosomes in the wheat blast fungus. *PLoS Genetics* 15:e1008272.
- Kershaw, M. J., Basiewicz, M., Soanes, D. M., Yan, X., Ryder, L. S., Csukai, M., Osés-Ruiz, M., **Valent, B.**, and Talbot, N. J. 2019. Conidial morphogenesis and septin-mediated plant infection require Smo1, a Ras GTPase-activating protein in *Magnaporthe oryzae*. *Genetics* 211:151-167.
- Zhao, H., X. Wang, Y. Jia, B. Minkenberg, M. Wheatley, J. Fan, M.H. Jia, A. Famoso, J.D. Edwards, Y. Wamishe, **B. Valent**, G.-L. Wang, Y. Yang. 2018. The rice blast resistance gene *Ptr* encodes an atypical protein required for broad-spectrum disease resistance. *Nature Communications* 9:2039, doi:2010.1038/s41467-41018-04369-41464.
- Sakulkoo, W., M. Osés-Ruiz, E. Oliviera Garcia, D.M. Soanes, G.R. Littlejohn, C. Hacker, A. Correia, **B. Valent**, N.J. Talbot. 2018. A single fungal MAP kinase controls plant cell-to-cell invasion by the rice blast fungus. *Science* 359:1399-1403.
- Inoue, Yoshihiro, Trinh T. P. Vy, Kentaro Yoshida, Hokuto Asano, Chikako Mitsuoka, Soichiro Asume, Vu L. Anh, Christian Joseph R. Cumagun, Izumi Chuma, Ryohei Terauchi, Kenji Kato, Thomas Mitchell, **B. Valent**, Mark Farman, Yukio Tosa. 2017. Evolution of the wheat blast fungus through functional losses in a host specificity determinant. *Science* 357:80-83.
- Cruz, C. D., G. L. Peterson, W. W. Bockus, P. Kankanala, J. Dubcovsky, K. W. Jordan, E. Akhunov, F.G. Chumley, D. F. Baldelomar and **B. Valent**. 2016. The 2NS translocation from *Aegilops ventricosa* confers resistance to the Triticum pathotype of *Magnaporthe oryzae*. *Crop Science* 56:990-1000, doi: 10.2135/cropsci2015.07.0410.
- Oliveira-Garcia, E. and **B. Valent**, 2015. How eukaryotic filamentous pathogens evade plant recognition. *Current Opinion in Microbiology* 26:92-101, doi: 10.1016/j.mib.2015.06.012.
- Giraldo, M.C., and **B. Valent**. 2013. Filamentous plant pathogen effectors in action. *Nature Reviews Microbiology* 11: 800-814.
- Giraldo, M.C., Y.F. Dagdas, Y.K. Gupta, T.A. Mentlak, M. Yi, A.L. Martinez-Rocha, H. Saitoh, R. Terauchi, N.J. Talbot and **B. Valent**. 2013. Two distinct secretion systems facilitate tissue invasion by the rice blast fungus *Magnaporthe oryzae*. *Nature Communications* 4:1996, doi: 10.1038/ncomms2996.
- Yi, M. and **B. Valent**. 2013. Communication between filamentous pathogens and plants at the biotrophic interface. *Annual Review of Phytopathology* 51: 587-611.
- Park, C.-H., S. Chen, G. Shirsekar, B. Zhou, C.H. Khang, P. Songkumarn, Y. Ning, M. Bellizzi, **B. Valent** and G.-L. Wang. 2012. The *Magnaporthe oryzae* effector AvrPiz-t targets the RING E3 ligase APIP6 for suppression of PAMP-triggered immunity in rice. *The Plant Cell* 24: 4748-4762.
- Chuma, I., C. Isobe, Y. Hotta, K. Ibaragi, N. Futamata, M. Kusaba, K. Yoshida, R. Terauchi, Y. Fujita, H. Nakayashiki, **B. Valent**, and Y. Tosa. 2011. Multiple Translocation of the *AVR-Pita* Effector Gene among Chromosomes of the Rice Blast Fungus *Magnaporthe oryzae* and Related Species. *PLoS Pathogens* 7(7): e1002147. doi: 10.1371/journal.ppat.1002147.

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- Khang, C.H., R. Berruyer, M.C. Giraldo, P. Kankanala, S.-Y. Park, K. Czymmek, S. Kang and **B. Valent**, 2010. Translocation of *Magnaporthe oryzae* effectors into rice cells and their subsequent cell-to-cell movement. **The Plant Cell** 22:1388-1403.
- Valent, B.** and C.H. Khang. 2010. Recent advances in rice blast effector research. **Current Opinion in Plant Biology** 13: 434-441. (Featured on the journal cover)
- Mosquera, G., M.C. Giraldo, C.H. Khang, S. Coughlan, and **B. Valent**. 2009. Interaction transcriptome analysis identifies *Magnaporthe oryzae* BAS1-4 as biotrophy-associated secreted proteins in rice blast disease. **The Plant Cell** 21:1273-1290.
- Yi, M., M.-H. Chi, C.H. Khang, S.-Y. Park, S., Kang, **B. Valent** and Y.-H. Lee. 2009. The ER chaperone LHS1 is involved in asexual development and rice infection by the blast fungus *Magnaporthe oryzae*. **The Plant Cell** 21:681-695.
- Kankanala, P, K. Czymmek and **B. Valent**, 2007. Roles for rice membrane dynamics and plasmodesmata during biotrophic invasion by the blast fungus. **The Plant Cell** 19:706-724.
- Orbach, M. J., L. Farrall, J. A. Sweigard, F. G. Chumley and **B. Valent**. 2000. A telomeric avirulence gene determines efficacy of the rice blast resistance gene *Pi-ta*. **The Plant Cell** 12:2019-2032.
- Bryan, G. T., K.-S. Wu, L. Farrall, Y. Jia, H. P. Hershey, S. A. McAdams, K. N. Faulk, G. K. Donaldson, R. Tarchini, and **B. Valent**. 2000. A single amino acid difference distinguishes resistant and susceptible alleles of the rice blast resistance gene *Pi-ta*. **The Plant Cell** 12:2033-2046.
- Jia, Y., S. A. McAdams, G. T. Bryan, H. P. Hershey and **B. Valent**. 2000. Direct Interaction of resistance gene and avirulence gene products confers rice blast resistance. **The EMBO Journal** 19:4004-4014.
- Sweigard, J.A., A.M. Carroll, S. Kang, L. Farrall, F.G. Chumley and **B. Valent**. 1995. Cloning and characterization of *PWL2*, a gene from the rice blast fungus controlling host-species specificity. **The Plant Cell** 7:1221-1233.
- Valent, B.**, and F. G. Chumley. 1991. Molecular Genetic Analysis of the Rice Blast Fungus, *Magnaporthe grisea*. **Annual Review of Phytopathology** 29:443-467.
- Valent, B.**, L. Farrall and F. G. Chumley. 1991. *Magnaporthe grisea* genes for pathogenicity and virulence identified through a series of backcrosses. **Genetics** 127: 87-101.
- Valent, B.** 1990. APS Plenary Session Lecture (1989): Rice blast as a model system for plant pathology. **Phytopathology** 80:33-36.
- Hamer, J. E., L. Farrall, M. J. Orbach, **B. Valent** and F. G. Chumley. 1989. Host species-specific conservation of a family of repeated DNA sequences in the genome of a fungal plant pathogen. **Proc. Natl. Acad. Sci. USA** 86:9981-9985.
- Hamer, J. E., R. J. Howard, F. G. Chumley and **B. Valent**. 1988. A mechanism for surface attachment in spores of a fungal plant pathogen. **Science** 239:288-290.
- Parsons, K. A., F. G. Chumley and **B. Valent**. 1987. Genetic transformation of the fungal pathogen responsible for rice blast disease. **Proc. Natl. Acad. Sci. USA** 84:4161-4165.