Issue No. 1, 2013

IS-MPMI Reporter

International Society for
Molecular Plant-Microbe Interactions

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Twitter.com/ISMPMI
for the latest updates!

New Year, New *Reporter*

Brad Day, IS-MPMI Reporter, *Editor-in-Chief, Michigan State University, bday@msu.edu*

Brady Day,
Editor-in-Chief

As we bring in the New Year, we want to do our best to get your stories into *IS-MPMI Reporter*. Historically, *IS-MPMI Reporter* has been a great mechanism for students, professors, and professionals to deliver snapshots of their research, announce graduations, and share other exciting news with colleagues in IS-MPMI. This is still the case, yet in this era of pervasive media and online networking, a newsletter sent three times a year—while still a convenient way to deliver updates and summaries of scientific advances in our field—needs to transform to maintain itself as a useful means to communicate up-to-date information. To this end, IS-MPMI and *IS-MPMI Reporter* will increase our efforts to deliver information rapidly through various outlets, yet, at the same time, will transform the three-times-a-year issue of *IS-MPMI Reporter* to facilitate the delivery of new types of information.

First, we are on social media, and many of you may be reading this right now on your computer. With a simple click, you can navigate to the IS-MPMI website and access articles, updates, and announcements that are highlighted in *IS-MPMI Reporter*; online, you have access to expanded information and comments. This change will allow those of us behind the scenes to include more feature articles and highlights in *IS-MPMI Reporter* than in previous years, while not sacrificing content and presentation.

Second, *IS-MPMI Reporter* will transform itself to rapidly communicate not only announcements but also ideas and news that affect IS-MPMI and the field of biology. To this end, we will be introducing several recurring articles focused on social issues related to plant biology. These will include—just to name a few—updates on funding initiatives and opportunities in the biological sciences, the debate on GMO application and its transformation of agriculture, as well as bulleted quotes captured from various media outlets that impact plant and agricultural sciences. In total, it is our goal, through *IS-MPMI Reporter*, to provide our society with a quick and easy reference to access the pulse of our world through the eyes of plant and microbial biology.

In closing, we invite all of our members, new and old, recently graduated or moving into the next stage of your career, to send your ideas to *IS-MPMI Reporter*. No matter how brief or verbose, we want to use *IS-MPMI Reporter* as a foundation for conversation, both online and wherever our members may travel. ■

MPMI Focus Issue to Spotlight Translational Research

This special issue of *Molecular Plant-Microbe Interactions* (*MPMI*) will bring extra attention to scientists who are making advancements in this critically important area. "The translation of modern molecular insights to inform new developments in crop protection or yield enhancement is vital to secure the food supply for the growing human population while preserving the health of global

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***IS-MPMI REPORTER* DEADLINE**

The deadline for submitting items for the next issue is April 26, 2013.

Share your news, accomplishments, and upcoming meeting details with your colleagues. Submit articles, announcements, and any ideas you may have for the next issue. You can send an e-mail (ismpmireportereditor@scisoc.org) or submit your item online (www.ismpminet.org/newsletter/submissionform.asp).

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Sophien Kamoun, President

A Letter from the President

Trees and Trends

Sophien Kamoun, John Innes Centre
sophien.kamoun@tsl.ac.uk

The latter part of last year brought home the importance of our science. In October 2012, tests from necrotic ash twigs taken from Ashwellthorpe Wood in Norfolk (just a few kilometers from our campus) confirmed that the explosive disease epidemic of late summer 2012 had been caused by the ascomycete fungus *Chalara fraxinea* (teleomorph *Hymenoscyphus pseudoalbidus*). It turned out that the pathogen had already spread to many parts of the country, threatening Britain's 80 million ash trees. In Denmark, where Chalara dieback has been raging for a few years, about 90% of the ash trees had become infected.

The disease captured the interest of the British public and media. *The Times* (of London) devoted about half of its front page of October 26 to the "Deadly Ash Disease," dedicating more space to this topic than to a "James Bond Special." The British government convened the emergency committee COBRA to discuss the ash dieback threat. By November, the #ashdieback hashtag was trending on Twitter and the media coverage became intense. The broad public interest and media storm were a pleasant surprise, complementing recent positive coverage of plant pathology in the context of food security. The lesson I take from the ash dieback situation is that we need to pay attention to problems that engage the attention of the public. When we can contribute to a problem that concerns the public, we have an obligation to step in. No matter where we are on the scale from basic to applied research, we all have a role to play.

Fungal diseases are not the only threat to ash trees. In the Midwestern United States, the emerald ash borer, a buprestid beetle, has been causing havoc since it was first detected near Detroit, Michigan, in 2002. An article published online in *The Atlantic* on January 22, 2013, discussed the increased mortality noted in counties most affected by the beetle. "When Trees Die, People Die," the title read. The study highlights potentially unexpected relationships between plant diseases and human welfare. This should serve as a reminder of the wider implications of our science.

Our community has long been aware of the importance of pests, such as insects and nematodes, as key interacting organisms of plants—although this is not necessarily reflected in the name of the society. The emerald ash borer is one example among many of the pests that impact natural and managed plant communities. Research on this topic is booming and the potential for novel discoveries is huge. If I were to take a student aside, just like that businessman did with the Dustin Hoffman character in the classic 1967 movie "The Graduate," I might as well tell them "I just want to say one word to you, just one word—aphids!" (in the movie it was "plastics"). There is a great future in aphids, just think about it! Consider these insects' bizarre parthenogenetic mode of asexual reproduction or their complex relationships with the viruses they vector. Note the astonishing diversity of structures that gall-forming aphids induce in plants. These days, we even think that aphids behave like "pathogens with legs" by secreting effectors into their host cells.

Yet much remains to be discovered about the molecular mechanisms underlying the interactions between plants and animal pests. Current knowledge is covered in the January 2013 issue of *Molecular Plant-Microbe Interactions* (*MPMI*), which is entirely focused on molecular plant-nematode and plant-insect interactions. I hope that this issue will contribute to a better appreciation of nematode and insect systems

A Letter from the President *continued on page 9*

MPMI Announces New Editorial Board

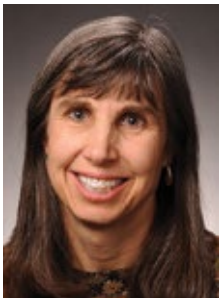
The new Editorial Board of *Molecular Plant-Microbe Interactions* began its three-year term in January 2013. **Jane Glazebrook** replaces **Gary Stacey** as editor-in-chief and has chosen an impressive group of senior editors to work with her.

The new board met December 5–6, 2012, in St. Paul to set the course and determine their objectives for the next three years with the aim of publishing the highest-quality research in the field and continuing to raise *MPMI*'s impact factor. High on their list is the publication of yearly focus issues. The first such issue, developed by **John Carr** with help from **Matteo Lorito**, will be on translational research. The second, beneficial interactions beyond rhizobia and mycorrhizae, will be spearheaded by **Uta Paszkowski** and **Jeanne Harris** with input from **Seogchan Kang**. They have also set a goal of acquiring 10 to 12 current reviews per year.

To acquaint IS-MPMI members with the new and returning board members, brief biographies are presented.

Jane Glazebrook

Jane Glazebrook is a professor in the Department of Plant Biology at the University of Minnesota. Her current research interests include architecture of the innate immunity signaling network in *Arabidopsis thaliana*, role of the plant cell wall in defense against microbes, and virulence of and resistance to the gram-positive bacterial pathogen *Clavibacter michiganensis*. She served as a senior editor of *MPMI* from 2000 to 2003 and has been a member of the editorial board of *The Plant Journal* since 2004. She earned her Ph.D. degree from the Massachusetts Institute of Technology in 1991 for work on *Sinorhizobium meliloti* genes required for symbiosis, advised by **Graham C. Walker**. She began studying *Arabidopsis* innate immunity during her post-doctoral work with **Frederick M. Ausubel** at Massachusetts General Hospital. She then worked as an assistant professor at the University of Maryland Biotechnology Institute and as a senior staff scientist for Torrey Mesa Research Institute in San Diego before joining the University of Minnesota as an associate professor in 2003.



Gwyn Beattie

Gwyn Beattie is a professor in the Department of Plant Pathology and Microbiology at Iowa State University (ISU). After obtaining a B.A. degree in chemistry at Carleton College in Northfield, Minnesota, she received her Ph.D. degree in cellular and molecular biology from the University of Wisconsin-Madison, where she worked with **Jo Handelsman** on nodulation competitiveness among *Rhizobium etli* strains. Her post-doctoral research with **Steven Lindow** at the University of California-Berkeley focused on the epiphytic fitness of *Pseudomonas syringae*. Beattie's research area is plant bacteriology, with a particular focus on bacterial strategies for growth and survival in the phyllosphere. Recent projects include evaluating the functional genomics of *P. syringae* during its interactions with leaves and the role of osmoadaptation strategies, quaternary ammonium compounds, and photosensory proteins in *P. syringae* biology. Additional work has focused on the role of phyllosphere microbial communities in the degradation of air pollutants. She currently holds the position of the Robert Earle Buchanan Distinguished Professor of Bacteriology for Research and Nomenclature at ISU.

John Carr

John Carr is a senior lecturer in molecular plant pathology in the Department of Plant Sciences at the University of Cambridge. He conducted his Ph.D. research on pathogenesis-related (PR) proteins at Rothamsted Experimental Station (supervisors **John Antoniw** and **Ray White**) and the Biochemistry Department of Liverpool University (supervisor **Mike Wilson**). He carried out post-doctoral work with **Dan Klessig** at the University of Utah Medical School in Salt Lake City and subsequently at the Waksman Institute (Rutgers University) on light-regulated gene expression, PR proteins, and the role of salicylic acid (SA) in the induction of resistance to plant viruses. He then worked as a research associate in **Milt Zaitlin**'s laboratory in the Plant Pathology Department at Cornell, working on transgenic resistance to viruses. He started his own research group in Cambridge in 1993. The group works on the mechanisms underlying SA-induced resistance and on viral evasion of induced resistance. Further details on the work of the group can be found at www.plantsci.cam.ac.uk/research/johncarr.html.

Darrell Desveaux

Darrell Desveaux is an associate professor in the Department of Cell and Systems Biology at the University of Toronto and Canada Research Chair in Plant-Microbe Systems Biology. He carried out his Ph.D. research on plant defense gene regulation in the laboratory of **Normand Brisson** at the University of Montreal, where he biochemically characterized the Whirly family of plant ssDNA-binding proteins and their role in plant immunity. He then joined the laboratory of **Jeff Dangl** at the University of North Carolina-Chapel Hill, where he carried out structure/function studies of *Pseudomonas syringae* type III secreted effector proteins. His current research continues to focus on the study of type III effector proteins, using them as molecular probes to study plant immunity. Since these effector proteins are remarkably efficient suppressors of host defense responses, identifying their mode of action in plant cells promises to reveal fundamental aspects of plant immunity. Additional information about research in the Desveaux group can be found at http://labs.csb.utoronto.ca/desveaux/Home.htm.

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Biao Ding

Biao Ding grew up in Yunnan Province, China. He obtained his B.S. degree in forestry from Beijing Forestry College (now Beijing Forestry University) in Beijing, China. Following his undergraduate studies, he went to Cornell University for graduate studies. There he obtained an M.S. degree in plant anatomy and then a Ph.D. degree in plant cell biology with work on the structure of phloem, plasmodesmata, and the cytoskeleton under the supervision of **Mandayam V. Parthasarathy**. He then went on to pursue post-doctoral research with **William J. Lucas** at the University of California-Davis, working on viral cell-to-cell movement, structure of plasmodesmata, and protein trafficking. In 1994, he started his faculty position as an assistant professor in the Department of Botany at Oklahoma State University-Stillwater. He initiated research programs to study viroid systemic trafficking in addition to plant developmental regulation of protein trafficking. In 1999, he was promoted to associate professor. A year later, he moved to The Ohio State University, Columbus, as an associate professor in the Department of Plant Biology and was promoted to full professor in 2005. In the current Department of Molecular Genetics, his research focuses on viroid-host interactions, addressing fundamental questions in RNA replication and systemic trafficking for the establishment of pathogen infection and for systemic gene regulation in plant growth and development.


Jeanne Harris

Jeanne Harris is an associate professor in the Department of Plant Biology at the University of Vermont in Burlington. After obtaining her B.A. degree in biology from Swarthmore College in Swarthmore, Pennsylvania, she received her Ph.D. degree in cell biology in 1996 from the University of California-San Francisco, where she studied developmental genetics of cell migration in *Caenorhabditis elegans* with **Cynthia Kenyon**. She then switched to molecular plant-microbe interactions, doing post-doctoral research with **Sharon Long** at Stanford University on the symbiotic interaction between legumes and nitrogen-fixing rhizobia, focusing on the developmental genetics of the plant host. She has been at the University of Vermont since 2000, examining the integration of legume nodule formation into preexisting plant developmental signaling networks. Her lab is interested in the evolutionary origins of the legume nodule and the coordination of nodule development with lateral root development. Currently, her lab has begun to study environmental regulation of nodulation and root architecture via hormone signaling.

Seogchan Kang is a professor in the Department of Plant Pathology and Environmental Microbiology at the Pennsylvania State University. He obtained his B.S. and M.S. degrees in chemistry from Seoul National University. For his Ph.D. degree, he studied how the bread mold *Neurospora crassa* controls the expression of a group of genes involved in phosphorus acquisition under the guidance of **Robert L. Metzenberg** in the Department of Physiological Chemistry at the University of Wisconsin-Madison. His post-doctoral studies on *Magnaporthe oryzae* and rice blast disease with **Barbara Valent** (DuPont Co.) and **John Hamer** (Purdue University) introduced him to plant pathology. In 1997, he joined the faculty of Penn State. His laboratory works on the molecular and cellular mechanism underpinning plant-fungi interactions and develops online informatics platforms supporting comparative fungal genomics, pathogen diagnosis, and fungal systematics. Another area of research is how the calcium signaling pathway controls the polarized tip growth of fungi at the molecular and subcellular levels and how this signaling pathway has evolved. More information about the Kang lab can be found at http://plantpath.psu.edu/directory/sxk55.


Seogchan Kang

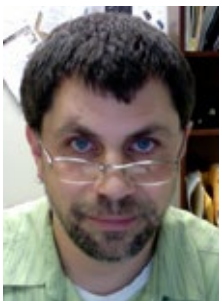

Barbara Kunkel

Barbara Kunkel earned her B.S. degree in genetics from the University of California-Davis in 1985. She carried out her Ph.D. research on gene expression in *Bacillus thuringensis* under the guidance of **Richard Losick** at Harvard University and completed her Ph.D. dissertation in 1990. She joined the laboratory of **Brian Staskawicz** at the University of California-Berkeley for her post-doctoral studies and worked as a member of one of the first teams of researchers studying the interactions between *Pseudomonas syringae* and *Arabidopsis thaliana*. In 1994, she joined the faculty of the Department of Biology at Washington University in St. Louis, Missouri, where she has since been teaching and running her own research group. A primary objective of Kunkel's research is to elucidate the strategies used by plant pathogens to colonize and cause disease on their hosts. Specifically, this involves identifying and characterizing *P. syringae* virulence factors and studying their mode of action in *A. thaliana* and tomato. Her research group is currently focusing on mechanisms used by *P. syringae* to modulate the hormone physiology of its hosts and understanding why *P. syringae* appears to specifically target the plant hormones jasmonate and auxin. She spent the 2009–2010 academic year on sabbatical in France, studying auxin signaling in the laboratory of **Catherine Perrot-Rechenmann** at the Centre National de la Recherche Scientifique (CNRS) in Gif-sur-Yvette. Additional information about research in the Kunkel lab can be found at www.biology.wustl.edu/faculty/kunkel/index.html.

Matteo Lorito is a full professor of plant pathology at the University of Naples, Naples, Italy, and the director of the Department of Arboriculture, Botany and Plant Pathology. He is also affiliated with the National Research Council (CNR), Institute for Plant Protection, Naples. His major interest is the various aspects of biological control, particularly the use of the fungal agents *Trichoderma* spp., on which he has become an internationally recognized expert. His ongoing research aims to understand the relationships

Matteo Lorito

that these antagonists establish with the plant and pathogens and the mechanisms involved in producing beneficial effects to the plant. Important findings include the discovery of molecular factors that regulate these interactions and antimicrobial genes useful for increasing plant disease resistance. His research has contributed to the development of new biopesticide and biofertilizer products based on living microbes and/or their bioactive metabolites, which are presently used in several countries worldwide. Lorito is a fellow of The American Phytopathological Society (APS), the Organization for Economic Cooperation and Development (OECD), and the Fulbright Research Program. He has served as a senior and associate editor of *MPMI*, associate editor of the *IS-MPMI Reporter*, and the chair of the XIII International Congress on Molecular Plant-Microbe Interactions. He has also been a member of the APS *Phytopathology News* Advisory Committee, the APS Biological Control Committee, the International Commission on the Taxonomy of Fungi, and several other committees. He is a member of the board of directors and vice president of the Italian Phytopathological Society, as well as a member of the IS-MPMI Board of Directors (currently serving as past treasurer).



John McDowell

John McDowell is an associate professor in the Department of Plant Pathology, Physiology, and Weed Science at Virginia Tech, Blacksburg. He received his Ph.D. degree in 1995 from the University of Georgia under the guidance of **Rich Meagher**. His dissertation was on the structure, expression, and evolution of actin genes in *Arabidopsis*. He then entered the field of molecular plant-microbe interactions through post-doctoral research in **Jeff Dangl**'s lab at the University of North Carolina at Chapel Hill. There, he studied the structure, evolution, and signaling of disease resistance (*R*) genes in *Arabidopsis*, with emphasis on genes against the oomycete pathogen *Hyaloperonospora arabidopsidis* (cause of downy mildew). In 2000, he started his own group at Virginia Tech to continue investigating plant-oomycete interactions. His group is investigating the role of recombination in *R* gene cluster evolution and the mechanisms through which plant cells succumb to manipulation by oomycete pathogens. His group is part of a collation to sequence and analyze the *H. arabidopsidis* genome. Another area of emphasis is secreted effector proteins and their targets inside plant cells.

Thorsten Nuernberger is the head of the Department of Plant Biochemistry, Center for Plant Molecular Biology, at the University of Tübingen, Tübingen, Germany. In 1991, he received his Ph.D. degree in biochemistry from the University of Halle-Wittenberg, and from 1991 to 1994, he did post-doctoral research at the Max Planck Institute of Plant Breeding, Cologne, Germany, with **K. Hahlbrock**. In 1995, he continued his research at the Centre National de la Recherche Scientifique, Gif-sur-Yvette, France, with **J. Guern**. From 1996 to 2003, he was a scientific group leader at the Institute of Plant Biochemistry, Halle, Germany. In 2003, he became a full professor at the University of Tübingen, Center for Plant Molecular Biology, Faculty of Chemistry and Pharmacy. Nuernberger's research interests include the identification/characterization of pathogen-associated patterns and their cognate pattern recognition receptors in plants, the functional analysis of bacterial and oomycete virulence factors, and the characterization of immunity-associated plant cell death. He has served as an associate editor of *MPMI*, *Planta*, and *The Plant Journal* and as a senior editor of *Molecular Plant Pathology*.

Thorsten Nuernberger

Uta Paszkowski

Uta Paszkowski is a lecturer at the Department of Plant Sciences at the University of Cambridge. From the beginning of her scientific career, her research interest has revolved around plant interactions. She worked as a master's student with **Jeff Dangl** on the regulation of defense genes and received her Ph.D. degree from the ETH-Zurich, researching the use of viral vectors for gene targeting in plants in the group of **Ingo Potrykus**. During her post-doctoral time, she started researching root interactions, in particular arbuscular mycorrhizal (AM) symbiosis. Using a fellowship from the Swiss National Science Foundation, she employed molecular genetics tools to investigate AM symbiosis in maize in the group of **Thomas Boller** at the University of Basel and later included rice for genomics approaches when employed as a staff scientist with **Steve Briggs** at the Torrey Mesa Research Institute in San Diego, California. At the University of Geneva, she established a research group to study symbiotic root interactions of rice and maize and continued as an assistant professor at the University of Lausanne, Lausanne, Switzerland. In autumn 2012, she joined the Department of Plant Sciences at the University of Cambridge. She runs one of the very few labs that use cereal crops for the study of AM symbiosis. The present focus of her research team is the identification and characterization of plant factors essential for the development and functioning of AM symbiosis.

Silke Robatzek

Silke Robatzek is recognized as a leading scientist in the emergent field of cell biology of plant immunity. She made key discoveries in ligand-induced endocytosis of a major immune receptor, the receptor for bacterial flagellin FLS2, and developed high-throughput imaging in plants to tackle the dynamic changes in plant-microbe interactions. She obtained her Ph.D. degree at the Max Planck Institute for Plant Breeding Research in Cologne, Germany, where she addressed the role of WRKY transcription factors during plant defense and

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senescence. She then moved to the Friedrich Miescher Institute for Biomedical Research in Basel, Switzerland, and did her post-doctoral research on the flagellin receptor FLS2. In 2005, she set up her own research group at the Max Planck Institute in Cologne, focusing on microbe-induced signaling and endocytosis in *Arabidopsis*. In 2009, she took a group leader position at The Sainsbury Laboratory in Norwich, United Kingdom, and is studying the interplay of membrane trafficking and plant immune signaling. In 2010, she obtained her "venia docendi" in plant cell biology at the University of Basel. Her current research at The Sainsbury Laboratory is supported by the Gatsby Charitable Foundation and by the European Research Council. "If we are to understand plant-microbe interactions, we need to investigate the interplay between membrane dynamics and plant immune responses at the molecular level."

Dominique Roby

Dominique Roby is the director of the Plant-Microbe Interaction Laboratory (LIPM, INRA-CNRS) in Toulouse, France. She also coordinates the LabEx TULIP (Toward a Unified Theory of Biotic Interactions: Effect of Environmental Perturbations), which associates the principal research strengths in Toulouse in the fields of plant biology and molecular ecology. She obtained her Ph.D. degree in plant pathology at the Université Paul Sabatier of Toulouse in 1982, working on plant defense responses to fungal pathogens. She moved to the Department of Biological Sciences at Rutgers University, where she investigated the transcriptional regulation of defense genes in bean in response to different pathogens. She then pursued this work as a visiting scientist at the Experimental Station of DuPont de Nemours in the Department of Agricultural Products in Wilmington, Delaware, in the lab of **Rich Broglie**. She is currently heading a team at the LIPM, working on resistance of plants to pathogens, and more specifically on the transcriptional control of the hypersensitive response in *Arabidopsis*, and the genetic basis of quantitative resistance to bacterial pathogens. She has recently been on the editorial boards of *Molecular Plant Pathology* and *The Plant Journal*.

Ken Shirasu graduated from the Department of Agricultural Chemistry of the University of Tokyo in 1988 and was awarded his Ph.D. degree in genetics at the University of California-Davis in 1993. He then served as a Salk-Noble post-doctoral fellow in the laboratory of the late **Chris Lamb** at the Salk Institute, La Jolla, California, where he studied plant immunity. In 1996,

Ken Shirasu

he joined The Sainsbury Laboratory, Norwich, United Kingdom, as a researcher and, in 2000, became group leader of the laboratory. He joined the RIKEN Plant Science Center, Yokohama City, Kanagawa, Japan, as group director in 2005 and since 2008 has also held the position of visiting professor in the Department of Biological Sciences at the University of Tokyo. He is interested in understanding the molecular mechanisms of plant immunity.

Geert Smant

Geert Smant obtained an M.Sc. degree in plant pathology in 1994 and a Ph.D. degree in agricultural sciences in 1998 from Wageningen University in the Netherlands. In 2000, he received a prestigious Vidi grant from the Netherlands Organization for Scientific Research to start his own group at the Laboratory of Nematology at Wageningen University. His group has focused on the molecular aspects of cyst and root-knot nematode interactions on solanaceous host plants with a particular emphasis on the role of nematode secretions in host invasion and feeding site formation. Smant discovered the first endosymbiont-independent production of cell wall-degrading enzymes in animals. Cyst and root-knot nematodes use cell wall-degrading enzymes to invade the host. The unexpectedly high similarity of these cell wall-degrading enzymes with homologous genes in soilborne and plant-pathogenic bacteria could point to a role for horizontal gene transfer in the evolution of parasitism in nematodes, which is now one of the focal points of the group. Following host invasion, cyst and root-knot nematodes transform host cells into an elaborate multinucleate feeding site on which they can feed for several weeks without eliciting a massive immune response in the plant. Smant's group is also studying how nematodes use their effectors to modulate innate immunity in plants, including possible parallels with animal-nematode interactions. Smant is currently one of the coordinators of the European Community's integrated project BIOEXPLOIT on molecular breeding disease resistance in potato and wheat involving 68 research labs from all over Europe. In addition to his research projects, Smant teaches several courses in plant pathology and animal parasitology at Wageningen University. ■

18th International Congress on Nitrogen Fixation

The18th International Congress on Nitrogen Fixation (18th ICNF) will be held October 14–18, 2013, at the Phoenix Seagaia Resort, Miyazaki, Japan. This congress, the first of which was held in 1975, has facilitated active exchanges of ideas on nitrogen fixation and a wide range of related areas. Recent research has revealed more potentials of nitrogen fixation in terms of (bio)chemistry, technology, environmental sciences, agronomy, genomics, and biological symbiosis with plants and animals than previously thought. Thus, the novel interdisciplinary fields on nitrogen fixation are encouraged to employ their scientific principles to achieve a sustainable world. This congress offers an opportunity to discuss and exchange the ideas and knowledge of a wide range of topics relevant to nitrogen fixation under relaxed circumstances. Welcome to Miyazaki, Japan. Visit icnf18.brc.miyazaki-u.ac.jp for more information. ■

Research Spotlight:
Interview with Yangnan Gu and Roger Innes on the KEEP ON GOING Protein

In this, and in future issues of *IS-MPMI Reporter*, we will highlight a recent publication by IS-MPMI members, focusing in large part on the application of host-microbe interactions as a tool to dissect basic cellular processes in plants. It is our aim to illustrate how a plant's interaction with both beneficial and pathogenic microbes can be a useful probe for defining the intricate details of plant biology. In this, the inaugural Researh Spotlight, we highlight a publication from the laboratory of **Roger Innes**. In this study, **Yangnan Gu** and Innes provide a nice illustration of how basic plant biological processes can be defined using plant pathology as a probe for function, describing the role of the KEEP ON GOING protein from *Arabidopsis* in regulating vesicle trafficking.
—Brad Day, *IS-MPMI Reporter Editor*

1. The foundation for this work began with a paper by Wawrzynska et al. (Plant Physiol., 2008). Can you tell us the impetus for that work, touching on its relevance within the context of disease resistance signaling?

Years earlier we had performed a forward genetic screen for *Arabidopsis* mutants that displayed enhanced disease resistance without constitutive expression of salicylic acid signaling, which led to the identification of the *EDR1* gene. *EDR1* turned out to encode a protein kinase in the same family as CTR1, but we had very few clues as to the potential substrates of EDR1, or indeed, exactly what pathways were regulated by EDR1. In the 2008 Wawrzynska paper, we sought to identify potential substrates using a classical suppressor screen, in which we screened for second site mutations that suppressed both the ABA hypersensitivity of the original *edr1* mutant and the enhanced disease resistance. This led to the isolation of three independent *edr1* suppressor mutations, all of which turned out to have missense mutations in the *KEEP ON GOING* (*KEG*) gene, which encodes a large protein with a RING Finger E3 ubiquitin ligase domain, a kinase domain, ankyrin repeats, and HERC2-like repeats. It is important to note that a T-DNA knockout allele of *KEG* is seedling lethal; thus, we never would have found *KEG* as part of the *EDR1* pathway by a standard reverse genetics route. Subsequent yeast two-hybrid, co-IP, and confocal microscopy analyses revealed that KEG and EDR1 can form a complex and that this complex localizes to early endosomes, which gave us the first clue that KEG and EDR1 might be involved in endomembrane trafficking. This set the stage for the new work described in the *Plant Cell* paper (Gu and Innes, 2012), which focuses on the role of *KEG* in endomembrane trafficking, and extends well beyond responses to pathogens.

2. In this day and age of "high-throughput, high-volume" analysis of gene networks, the classics—forward genetic screens—still deliver. Can you comment on the utility of these types of directed screens in the age of whole genome analyses?

Most high-throughput analyses of gene networks rely on transcriptomic or interactome-type data to provide candidate genes for subsequent follow-up by analysis of knock-out mutants. When such knock-out mutants are lethal, it is difficult to draw meaningful conclusions. It was only because we had employed a forward genetic screen that we were able to recover missense mutations that linked KEG to EDR1 signaling. It was this linkage that gave us the impetus to dig deeper. Fortunately the *keg* loss-of-function mutant does not die until after the seedling stage, which enabled us to do some careful analyses of endomembrane trafficking in this mutant.

3. The physical interaction of EDR1 and KEG (Gu and Innes, Plant Physiol., 2011) provided a solid hypothesis that this interaction mediates the regulation of stress-induced vesicle trafficking. How does the work (collectively with the two previous publications) provide insight into the primary mechanism(s) of ABA signaling and vesicle trafficking in plants?

Judy Callis and **Sophia Stone** have shown that the *keg* loss-of-function mutant is hypersensitive to ABA and displays elevated levels of the ABA-inducible transcription factor ABI5, which suggested that KEG may play a role in regulating turnover of ABI5. Understanding how KEG regulates ABI5 levels requires more study. Several hypotheses are worth pursuing. One is that KEG is transported to the nucleus in response to ABA, where is could ubiquitinate ABI5, similar to the story of RGLG2-ERF53 (M.-C. Cheng et al., Plant Physiol., 2012); alternatively, KEG may regulate ABI5 levels outside of the nucleus at the endosome level, similar to what has recently been reported for JAZ proteins. The other hypothesis is that important ABA signaling components may exist on endosomes and their activity/degradation/trafficking are regulated by KEG and EDR1.

4. Without giving away all of your secrets, what is the next big question related to KEG function, ABA signaling, vesicle trafficking, and innate immune signaling?

We will focus on two main questions for our future research. The first is to investigate the molecular mechanisms by which fungal pathogens can manipulate host endomembrane trafficking through affecting KEG/EDR1 function and how KEG/EDR1-mediated vesicle trafficking processes confer resistance to incompatible pathogen invasion. The second is to explore the roles of phosphorylation-ubiquitination in fine-tuning stress responses in plant cells at the level of endomembrane trafficking. ■

People

In 2012, sixteen students associated with the Netherlands Graduate School Experimental Plant Sciences (EPS), and participating in research on interactions between plants and biotic agents, defended their Ph.D. theses. The EPS Graduate School is a collaborative research and teaching institution of Wageningen University (WU), Radboud University in Nijmegen (RU), Free University in Amsterdam (VU), Leiden University (LU), University of Amsterdam (UvA), University of Groningen (RUG), and Utrecht University (UU).

P. Kabouw. Consequences of intra-specific metabolic diversity in plants for soil organisms. A baseline approach for evaluating ecological effects of genetic modifications. W. H. van der Putten and N. M. van Dam (promoters); A. Biere (copromoter); WU, Wageningen, 1 February 2012.

T. Zeilmaker. Functional and applied aspects of the downy mildew resistant 1 and 6 genes in *Arabidopsis*. C. M. J. Pieterse (promoter); A. F. J. M. van den Ackerveken (copromoter); UU, Utrecht, 6 February 2012.

B. Houshyani Hassanzadeh. Application of omics technologies for environmental risk assessment of genetically modified plants. *Arabidopsis* and modified defence mechanisms as a model study. H. J. Bouwmeester and R. J. Bino (promoters); I. F. Kappers (copromoter); WU, Wageningen, 16 March 2012.

M. Kos. Multitrophic effects of plant resistance: From basic ecology to application in transgenic crops. M. Dicke and L. E. M. Vet (promoters); J. J. A. van Loon (copromoter); WU, Wageningen, 16 March 2012.

Y. Li. Multiplex SSR analysis of *Phytophthora infestans* in different countries and the importance for potato breeding. E. Jacobsen (promoter); T. A. J. van der Lee (copromoter); WU, Wageningen, 12 June 2012.

S. Ahmad. Plant basal resistance: Genetics, biochemistry and impacts on plant-biotic interactions. C. M. J. Pieterse (promoter); J. Ton (copromoter); UU, Utrecht, 18 June 2012.

E. Spyropoulou. Transcription factors regulating terpene synthases in tomato trichomes. M. A. Haring (promoter); R. C. Schuurink (copromoter); UvA, Amsterdam, 3 July 2012.

S. Firdaus. Components of whitefly resistance in tomato. R. G. F. Visser (promoter); A. W. van Heusden (copromoter); WU, Wageningen, 12 September 2012.

V. Mathur. Temporal dynamics of induced responses in *Brassica juncea*. L. E. M. Vet and N. M. van Dam (promoters); A. Sankara Reddy (copromoter); WU, Wageningen, 18 September 2012.

C. Zamioudis. Signaling in *Arabidopsis* roots in response to beneficial rhizobacteria. C. M. J. Pieterse (promoter); UU, Utrecht, 24 September 2012.

A. van der Does. Hormonal crosstalk in plant immunity. C. M. J. Pieterse (promoter); S. C. M. van Wees (copromoter); UU, Utrecht, 10 October 2012.

K. A. Yadeta. Verticillium wilt resistance in *Arabidopsis* and tomato: Identification and functional characterization. P. J. G. M. de Wit (promoter); B. P. H. J. Thomma (copromoter); WU, Wageningen, 15 October 2012.

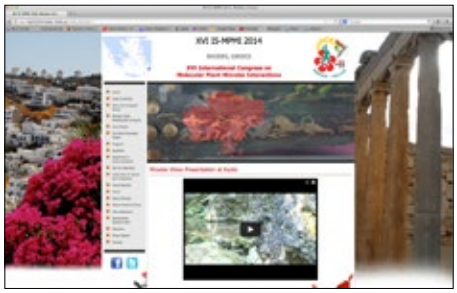
L. Ma. The role of *Fusarium oxysporum* effector protein Avr2 in resistance and pathogenicity. B. J. C. Cornelissen (promoter); F. L. W. Takken (copromoter); UvA, Amsterdam, 23 October 2012.

J. H. M. Stassen. Identification and functional analysis of downy mildew effectors in lettuce and *Arabidopsis*. C. M. J. Pieterse (promoter); A. F. J. M. van den Ackerveken (copromoter); UU, Utrecht, 24 October 2012.

R. de Jonge. The role and evolution of fungal effectors in plant pathogenesis. P. J. G. M. de Wit (promoter); B. P. H. J. Thomma (copromoter); WU, Wageningen, 9 November 2012.

Z. Zheng. Exploration of mlo-based resistance in vegetable crops. R. G. F. Visser (promoter); Y. Bai (copromoter); WU, Wageningen, 4 December 2012. ■

Get Geared Up for Greece!



If you haven't had a chance to visit Greece, go there today. You don't have to book a plane ticket yet. The XVI Congress organizers created a preview video (www.mpmi2014rhodes-hellas.gr/index.php?pid=1) that debuted in Kyoto, Japan, last year. Take a trip to the island of Rhodes, Greece, and discover the beauty and history of Greece without leaving your desk. The video also shows breathtaking views of Athens and some sites to see while you are in Greece. Want to see even more beautiful images of the landscape and culture of Greece? The website photo gallery (www.mpmi2014rhodes-hellas.gr/index.php?pid=18) has several stunning images to get you excited about the upcoming meeting July 6–10, 2014. Keep your eyes on www.mpmi2014rhodes-hellas.gr/index.php for the latest congress updates. ■

COMING EVENTS

March 25–28, 2013
Society for General Microbiology Spring Conference
Manchester, United Kingdom
www.sgm.ac.uk/meetings/MTGPAGES/MA_Programme.cfm

April 21–25, 2013
17th International Reinhardsbrunn Symposium on Modern Fungicides and Antifungal Compounds
Friedrichroda, Germany
www.reinhardsbrunn-symposium.de

August 10–14, 2013
APS-MSA Joint Meeting
Austin, Texas, U.S.A.
www.apsnet.org/meet

August 25–30, 2013
10th International Congress of Plant Pathology (ICPP 2013)
Beijing, China
www.icppbj2013.org

Include your meeting in IS-MPMI's printed and online event calendar. Submit online at **www.ismpminet.org/meetings/calsubmit.asp.**

***MPMI* Focus Issue** *continued from page 1*

ecosystems," according to **Jane Glazebrook**, editor-in-chief of *MPMI.*

Glazebrook announced **John Carr**, **John McDowell**, and **Matteo Lorito** as special focus issue editors who will recruit minireviews on translational research written by key scientists. "We expect this issue to be highly cited, and the single-topic format gives researchers a place to present their work alongside the related work of their peers to show the collective progress being made in translational research. If you are doing work in this area, you will want to take advantage of this opportunity to be part of something special," she said.

All accepted papers that meet the submission deadline and scope will be included in the special issue. Review of all submitted papers will be handled by the *MPMI* Editorial Board and edited by *MPMI*'s professional editorial staff members, who are dedicated to publishing your paper at the highest standard of quality. *MPMI* articles are submitted to CrossRef, allowing citation tracking and connectivity as this research area moves forward in *MPMI* and other scientific journals. Articles will also be indexed by *ISI Web of Science, PubMed,* and other important access portals.

If you are working on research that is translational in nature and would like your paper to be considered for the special **Translational Research Focus Issue**, please submit your manuscript online at **http://mc.manuscriptcentral.com/mpmi** and select the focus issue option. Papers must be submitted by **September 30, 2013**. For questions, or more information about the scope of this issue, please contact *MPMI* Editor-in-Chief Jane Glazebrookatjglazebr@umn.edu. ■

A Letter from the President *continued from page 2*

by the membership of the International Society for Molecular Plant-Microbe Interactions (IS-MPMI). There are remarkable similarities in the mechanisms by which pathogens and pests interact with plants. Common themes include the role of plant immune receptors and signaling pathways and their perturbation by pathogen or pest effectors. I expect that every IS-MPMI member will find useful and interesting tidbits in this issue. Many thanks to outgoing Editor-in-Chief **Gary Stacey** and Guest Editors **Saskia Hogenhout**, **Melissa Mitchum**, and **Geert Smant** for delivering such an excellent volume.

As announced at the Kyoto Congress, **Jane Glazebrook** has now taken charge of *MPMI*. This issue of the *IS-MPMI Reporter* introduces the new Editorial Board that Glazebrook recruited. Following the January 2013 Focus Issue mentioned above, and the equally timely and successful November 2011 "Focus on Symbioses", I expect the *MPMI* Editorial Board to continue to raise awareness of hot topics. I am certain they would welcome your suggestions. Sure, ash, beetles, and aphids are cool but there are plenty more exciting research topics to investigate. ■

Recently published research in *Molecular Plant-Microbe Interactions*

Find complete abstracts online with links to full-text articles at http://apsjournals.apsnet.org/loi/mpmi.

November 2012, Volume 25, Number 11

Oligogalacturonides: Novel Signaling Molecules in Rhizobium-Legume Communications.

Comparative Transcriptional and Anatomical Analyses of Tolerant Rough Lemon and Susceptible Sweet Orange in Response to '*Candidatus* Liberibacter asiaticus' Infection.

Fusarium graminearum Tri12p Influences Virulence to Wheat and Trichothecene Accumulation.

A Polyketide Synthase Gene, *ACRTS2*, Is Responsible for Biosynthesis of Host-Selective ACR-Toxin in the Rough Lemon Pathotype of *Alternaria alternata*.

Pathogen-Induced Accumulation of an Ellagitannin Elicits Plant Defense Response.

ppGpp Controlled by the Gac/Rsm Regulatory Pathway Sustains Biocontrol Activity in *Pseudomonas fluorescens* CHA0.

The Pathogenic White-Rot Fungus *Heterobasidion parviporum* Responds to Spruce Xylem Defense by Enhanced Production of Oxalic Acid.

Arabidopsis Clade I TGA Transcription Factors Regulate Plant Defenses in an NPR1-Independent Fashion.

Nitric Oxide–Mediated Stress Imprint in Potato as an Effect of Exposure to a Priming Agent.

Metabotyping: A New Approach to Investigate Rapeseed (*Brassica napus* L.) Genetic Diversity in the Metabolic Response to Clubroot Infection.

HvWRKY10, HvWRKY19, and HvWRKY28 Regulate *Mla*-Triggered Immunity and Basal Defense to Barley Powdery Mildew.

FxkR Provides the Missing Link in the *fixL-fixK* Signal Transduction Cascade in *Rhizobium etli* CFN42.

December 2012, Volume 25, Number 12

TECHNICAL ADVANCE—A Draft Genome Sequence of *Nicotiana benthamiana* to Enhance Molecular Plant-Microbe Biology Research.

TECHNICAL ADVANCE—Visualizing and Quantifying *Fusarium oxysporum* in the Plant Host.

Horizontal Gene Transfer from Genus *Agrobacterium* to the Plant *Linaria* in Nature.

LAC2 Encoding a Secreted Laccase Is Involved in Appressorial Melanization and Conidial Pigmentation in *Colletotrichum orbiculare*.

Tobacco etch virus Infectivity in *Capsicum* Spp. Is Determined by a Maximum of Three Amino Acids in the Viral Virulence Determinant VPg.

Hibiscus chlorotic ringspot virus Coat Protein Upregulates Sulfur Metabolism Genes for Enhanced Pathogen Defense.

Necrotrophic Pathogens Use the Salicylic Acid Signaling Pathway to Promote Disease Development in Tomato.

A ClpB Chaperone Knockout Mutant of *Mesorhizobium ciceri* Shows a Delay in the Root Nodulation of Chickpea Plants.

Chlorogenic Acid and Maize Ear Rot Resistance: A Dynamic Study Investigating *Fusarium graminearum* Development, Deoxynivalenol Production, and Phenolic Acid Accumulation.

Peroxisome Function Is Required for Virulence and Survival of *Fusarium graminearum*.

Metabolite Profiling of *Arabidopsis* Inoculated with *Alternaria brassicicola* Reveals That Ascorbate Reduces Disease Severity.

The *Nicotiana benthamiana* Mitogen-Activated Protein Kinase Cascade and WRKY Transcription Factor Participate in $Nep1_{Mo}$-Triggered Plant Responses.

January 2013, Volume 26, Number 1

FOCUS ON MOLECULAR PLANT-NEMATODE AND PLANT-INSECT INTERACTIONS

CURRENT REVIEW—Manipulation of Plant Cells by Cyst and Root-Knot Nematode Effectors.

CURRENT REVIEW—Nematode-Induced Endoreduplication in Plant Host Cells: Why and How?

CURRENT REVIEW—Toward Understanding the Role of Aphid Effectors in Plant Infestation.

TECHNICAL ADVANCE—Isolation of Whole Esophageal Gland Cells from Plant-Parasitic Nematodes for Transcriptome Analyses and Effector Identification.

The *Arabidopsis* F-box/Kelch-Repeat Protein At2g44130 Is Up-regulated in Giant Cells and Promotes Nematode Susceptibility.

The Amino Acid Permeases AAP3 and AAP6 Are Involved in Root-Knot Nematode Parasitism of *Arabidopsis*.

A Novel Effector Protein, MJ-NULG1a, Targeted to Giant Cell Nuclei Plays a Role in *Meloidogyne javanica* Parasitism.

In Planta Expression or Delivery of Potato Aphid *Macrosiphum euphorbiae* Effectors *Me10* and *Me23* Enhances Aphid Fecundity.

Ethylene Signaling Pathway Modulates Attractiveness of Host Roots to the Root-Knot Nematode *Meloidogyne hapla*.

Synergistic Interaction of CLAVATA1, CLAVATA2, and RECEPTOR-LIKE PROTEIN KINASE 2 in Cyst Nematode Parasitism of *Arabidopsis*.

The Root-Knot Nematode Calreticulin Mi-CRT Is a Key Effector in Plant Defense Suppression.

Brassinosteroids Suppress Rice Defense Against Root-Knot Nematodes Through Antagonism With the Jasmonate Pathway.

Multiple Phytohormone Signals Control the Transcriptional Response to Soybean Aphid Infestation in Susceptible and Resistant Soybean Plants.

Aphid Protein Effectors Promote Aphid Colonization in a Plant Species-Specific Manner.

February 2013, Volume 26, Number 2
CURRENT REVIEW—From Pioneers to Team Players: TGA Transcription Factors Provide a Molecular Link Between Different Stress Pathways.

CURRENT REVIEW—Insights into the Noncoding RNome of Nitrogen-Fixing Endosymbiotic α-Proteobacteria.

The Benyvirus RNA Silencing Suppressor Is Essential for Long-Distance Movement, Requires Both Zinc-Finger and NoLS Basic Residues but Not a Nucleolar Localization for Its Silencing-Suppression Activity.

Optimized Agroinfiltration and Virus-Induced Gene Silencing to Study Ve1-Mediated *Verticillium* Resistance in Tobacco.

Identification and Characterization of In planta–Expressed Secreted Effector Proteins from *Magnaporthe oryzae* That Induce Cell Death in Rice.

The HC-Pro and P3 Cistrons of an Avirulent *Soybean mosaic virus* Are Recognized by Different Resistance Genes at the Complex *Rsv1* Locus.

Development of Tools for the Biochemical Characterization of the Symbiotic Receptor-Like Kinase DMI2.

Gibberellin 20-Oxidase Gene *OsGA20ox3* Regulates Plant Stature and Disease Development in Rice.

A Survey of Resistance to *Tomato bushy stunt virus* in the Genus *Nicotiana* Reveals That the Hypersensitive Response Is Triggered by One of Three Different Viral Proteins.

Verticillium dahliae Sge1 Differentially Regulates Expression of Candidate Effector Genes.

Closely Related Poleroviruses Depend on Distinct Translation Initiation Factors to Infect *Arabidopsis thaliana*. ■

Welcome New Members

We have had 16 people join IS-MPMI between November 1, 2012, and January 31, 2013. Please join us in welcoming them to the society!

Kieren Arthur
New Zealand Institute for Plant & Food Research
Auckland, NB, New Zealand

Xin-Zhong Cai
Zhejiang University
Hangzhou, Zhejiang
Peoples Rep of China

Ann-Maree Catanzariti
The Australian National University
Canberra, ACT, Australia

Nicolas Detry
University of Helsinki
Helsinki, Finland

Yuriy Viktorovich Gogolev
Russian Academy of Sciences
Kazan, Russia

Meenu Gupta
Kochi University Japan
Kochi, Japan

Ying-Ping Huang
National Chung Hsing University
Taichung, Taiwan

Brian Kvitko
Michigan State University
East Lansing, MI, U.S.A.

Xuan Lu
Iowa State University
Ames, IA, U.S.A.

Tomofumi Mochizuki
Osaka Prefecture University
Osaka, Japan

Ei-ichi Murakami
Tokyo University of Agriculture
Wakoshi Saitama, Japan

Sang-Keun Oh
Seoul National University
Seoul, South Korea

Zirmunds Orlovskis
John Innes Centre
Norwich, United Kingdom

Jin-Long Qiu
Institute of Microbiology, Chinese Academy of Science
Beijing, Peoples Rep of China

Sara Schaarschmidt
Humboldt-University Zu Berlin
Berlin, Germany

Guo-Liang Wang
Ohio State University
Columbus, OH, U.S.A.

International Society for Molecular Plant-Microbe Interactions
3340 Pilot Knob Road
St. Paul, MN 55121
United States of America

COUNTDOWN TO GREECE

Photo courtesy of www.mpmi2014rhodes-hellas.gr/index.php?pid=18

XVI International Congress on Molecular Plant-Microbe Interactions

July 6–10, 2014, Rhodes Island, Greece

Currently Proposed Topics

- Bacterial pathogenesis
- Cell Biology Dynamics of Plant-Microbe Interactions
- Ecology and population biology of plant-associated microbes
- Effector proteins
- Functional Genomics and Proteomics
- Fungal pathogenesis
- Gene silencing
- Local/Systemic Resistance
- Molecular diagnostics of plant pathogens
- Mycotoxins
- Novel Plant-Microbe Relationships
- Plant immunity
- Plant Microbiome
- Plant hormones and defense responses
- Plant-Virus Interactions
- Plant-Nematode Interactions
- Programmed Cell Death
- Recognition of Pathogens by Plants - Bacteria and Phytoplasmas
- Recognition of Pathogens by Plants - Fungi and Oomycetes
- Recognition of Pathogens by Plants - Viruses and Viroids
- Secondary metabolites
- Signaling and Molecular dialogues
- Symbiotic Plant-Microbe Interactions
- Symbiotic interactions Biological Control – Bioinoculants
- Quorum sensing

More at **www.mpmi2014rhodes-hellas.gr/index.php**