IS-MPMI *Reporter*

International Society for Molecular Plant-Microbe Interactions, Summer, 1996

President's Column
Eugene Nester

The past two years have been extremely positive for IS-MPMI. The number of members rose from 416 to 560; the number of registrants at the meeting in Knoxville was at an all-time high; the coffers of the Society are healthy and the official publication of the Society, MPMI, is now being published 9 times per year, up from 6. Further, we now have a Newsletter for publishing this information.

The success enjoyed by the Society is in no small part a result of many hours of work by a number of dedicated scientists who set aside other responsibilities in order to carry out functions required of a young, actively growing Society. I would like to thank each of them personally for all they have done and for the help they have been to me in the past 2 years.

Linda Thomashow, our treasurer, has kept a watchful eye on the budget of the Society and especially on expenditures. Linda, who continues as treasurer for the next 3 years, also was largely responsible for rewriting the by-laws.

Sally Leong, our secretary, and Ulla Bonas were responsible for much of the contents of the Newsletter. They have agreed to continue in that capacity.

Alan Collmer, our new secretary, Jan Leach, Barry Rolfe and Sally as well as Linda, Ulla, and Mike Daniels all provided very useful input through e-mailings, conference calls, and meetings into solving a number of vexing problems such as the time and site of the next and succeeding conferences. I thank them all for their dedicated service.

Also, Stan Gelvin, Editor-in-Chief of MPMI, deserves special kudos from all members of the Society for continuing to upgrade the Journal and bring it to the front rank of Plant Journals.

The efforts of the Board and officers would never have accomplished what it did without the professional

support and gentle chiding and appropriate reminders from Corie Dacus and Steve Nelson of the Headquarters Staff in St. Paul.

It has been a pleasure and honor to have served as President of such a dynamic and vibrant Society. My best wishes to Barry Rolfe as he assumes his new position.

Barry, IS-MPMI's new president, and Margaret Rolfe at the biennial meeting.

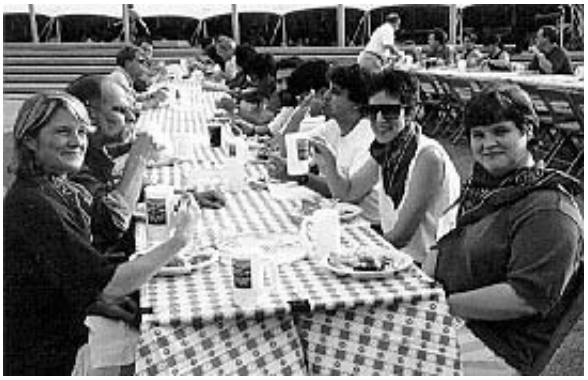
Eighth IS-MPMI Biennial Meeting
July 14-19, 1996 Knoxville, TN

The eighth IS-MPMI biennial meeting kicked off on Sunday, July 14 with over 900 advance registrants converging in Knoxville, TN, home to the 1982 World's fair. Gary Stacey and the organizing committee had their hands full with congress attendance up by over 150 people over the last congress meeting held in Edinburgh Scotland in 1994. All three designated hotels and over 620 university dorm rooms housed the majority of the delegates with others spilling over to nearby accommodations in the area. The meeting was held in the adjacent Knoxville Convention Center and coordinated by the very able conference staff from the University of TN-Knoxville.

The Knoxville site necessitated that all food functions were included with a conference registration and this allowed ample time for all attendees to mix and mingle outside the technical sessions . This was also a great way to keep everyone on schedule and focused throughout the congress. From breakfast to breaks, to lunches and dinner we networked with our colleagues at almost all venues.

The opening gala included a heavy hors d'oeuvres reception with cash bar and dancing to Wendel Warner and his band. Everyone got a chance to catch up with old friends or make some new friends as they reviewed the agenda for the week. The congress also included a southern barbecue on the World's Fair grounds on Tuesday and some free time on Wednesday afternoon to take in the local sights. Not to be missed was the final banquet on Friday evening as we all said our good-byes and our thoughts turn to the next time we meet again.

All conference registrants (except guests) will all receive a printed copy of the proceedings scheduled to be mailed in early December. Additional copies of the proceedings will be available for those that did not attend the conference and anyone interested should contact IS-MPMI headquarters to purchase their copy.



Planning is underway for the ninth biennial meeting to be held in July, 1999 at the RAI in Amsterdam. This meeting will be chaired by Pierre de Wit and Sally Leong has volunteered to host the 2001 meeting in Madison, WI. Watch the IS-MPMI Reporter for more details!

Meeting Highlights

The following highlights are from the eighth biennial IS-MPMI meeting held July 14-19, in Knoxville, Tennessee.

Plant Disease Resistance and Interactions with Avirulence Genes

Transient expression by particle bombardment of a susceptible Arabadopsis line with bacterial avirulence gene avrRPT2, and its corresponding resistance gene RPS2 with GUS, by **Fred Ausubel and coworkers** revealed that the avr gene product probably interacts with the R-gene product inside the plant cell. If RPS2 is overexpressed, expression of the bacterial avirulence gene is not required to elicit the HR.

The role of hydrogen peroxide in eliciting the HR and SAR was examined in studies reported by **Maria Alvarez from Chris Lamb's laboratory**. Arabadopsis can be "immunized" by inoculation of plants with Pseudomonas syringae pv. tomato (avrRpt2). Challenge of plants with low concentrations of thevirulent bacterium leads to SAR. Interestingly, systemic cell death near veins showing features of apoptosis was observed by DAPI staining. Alvarez postulated that these "micro HRs" likely function as relays of macroscopic HR in the development of SAR.

Jeff Dangl reported on the structure of the RPM1 locus in resistant and susceptible Arabidopsis, and elegant studies to genetically define lsd mutants (lesions simulating disease) and lsd suppressors. These mutations define a common pathway needed to initiate cell death and formation of HR-like lesions. Superoxide rather than hydrogen peroxide is likely to be the signal required to initiate these responses.

Barbara Baker discussed the structure/function of mutant N genes of tobacco. All of the domains were essential for N gene function. Some mutations in the P-loop led to systemic necrosis. Using PCR, N-homologs were isolated from tobacco and tomato. One of the tomato homologs maps to a locus in potato for resistance to late blight (Phytophthora infestans). She also reported on the expression of the tobacco N in tomato and Arabadopsis and the use of these transgenic plants to begin to develop a genetic analysis of the HR response.

Several labs have direct evidence that bacterial Avr proteins act inside the plant cell: **Brian Staskawicz** and coworkers found that the HR was specifically induced in Pto-transgenic tobacco using Agrobacterium carrying the avrPto gene on its T-DNA. PVX-delivered avrPto gene caused systemic necrosis in non-Pto tobacco and healthy Pto-tobacco.

Another example pointing to a direct interaction between the product of an avirulence gene and its 'receptor' was given by **Ulla Bonas**: Expression of the Xanthomonas campestris pv. vesicatoria avrBs3 gene using Agrobacterium for gene delivery induces the HR in the pepper line expressing the corresponding gene for resistance, Bs3.

Alan Collmer et al. reported that using transgenics containing the P. syringae avrB gene in Arabidopsis they got cell death. Co-bombardment of avrB and GUS resulted in lack of GUS activity after shooting RPM1 plants which was used as indication for HR induction.

Greg Martin et al. reported on the interaction of the tomato resistance gene Pto and avrPto in yeast using the two hybrid system. The B domain of Pto was required to interact with avrPto. Interestingly, when the recessive allele of Pto was used, no interaction was seen, while when the recessive allele of Fen was used, interaction was observed.

Biocontrol

Linda Thomashow discussed the cloning and characterization of a gene cluster for biosynthesis of 2.4-diacetylphloroglucinol from Pseudomonas. This antibiotic has been correlated with naturally occurring biocontrol of take-all disease in suppressive soils.

Ben Lugtenberg reported on the cloning and characterization of several operons required for efficient colonization of roots by Pseudomonas.

Jim Lignon described studies of the two component regulatory system encoded by lemA/gacA in the regulation of genes required for effective biocontrol by Pseudomonas. This regulatory system could be bypassed by expressing target genes under control of the Tac promoter or by expressing gacA under this promoter. All of these strains provided biocontrol at lower inoculation densities than wild type strains suggesting that this approach will lead to a cost effective biocontrol agent.

Jo Handelsman spoke about the identification of a Bacillus cereus gene required for resistance of B. cereus to its own antibiotic zwittermicin A. Resistance of E. coli to zwittermicin A was also studied by isolation and genetic mapping of resistant mutants. These mutations indicated that membrane potential is essential for susceptibility of E. coli to the antibiotic.

Sandy Pierson spoke of the role of lemA/gacA and a homoserine lactone in the regulation of production of phenazine antibiotic. lemA/gacA were required to express the phzI gene which encodes an enzyme needed to

produce the homoserine lactone autoinducer which in turn is required to express other phz genes involved in antibiotic biosynthesis.

Joyce Loper reviewed the intricacies of control of expression of the antibiotic pyoluteolin and siderophore pseudobactin by Pseudomonas. Reporter gene fusions were used as biosensors to monitor in situ and general expression of the biosynthetic genes. Using a fusion of a pyoluteolin biosynthetic gene to the inaZ gene, she discovered that expression on cotton was early enough to account for biocontrol while expression on cucumber was too late to provide biocontrol. In addition, lemA/gacA, rpoS and rpoD affected production of the antibiotic. She also described the edaphic factors that regulate expression of siderophore genes using the inaZ reporter. Pseudobactin genes were expressed to higher levels at pH8 vs. pH5. Competition for iron has been suggested as a mechanism to account for biocontrol. Using the inaZ reporter fusion in strains able or unable to use siderophores from other Pseudomonads coinoculated with various wild type or siderophore nonproducing mutants of Pseudomonas, she was able to demonstrate that competition for iron via siderophores does occur.

Genetics of Fungal Pathogencity

Barbara Valent reviewed our current understanding of the genome and genes that contribute to pathogencity and virulence in the rice blast fungus Magnaporthe grisea. Efforts of many labs were highlighted. This coordinated effort has made M. grisea the best studied fungal phytopathogen. An integrated genetic map currently on the internet had been developed as part of an effort to develop a Rice Blast Data Base. Over two thousand cDNA clones have been partially sequenced to create ESTs. Eleven genes were found repeatedly and include: hydrophobin, GAPDH, EF-alpha1, ribosomal proteins, superoxide dismutase, and ATP hydrolase. Numerous pathogenicity genes have been identified and include genes required for conidiation, cAMP-mediated signal transduction, production of hydrophobins, production of melanin among others. REMI has been used to identify many of these; however, she cautioned that in their studies, many of the mutants that were generated by REMI did not contain the transforming DNA at the site responsible for the pathogenicity defect. Three genes conferring host/cultivar specificity have been cloned: AVR2-YAMO, PWL2, and AVR1-CO39. AVR-YAMO encodes a neutral protease. The corresponding resistance gene Pi-ta is being cloned using a map-based approach. Cytological studies using strains lacking or containing AVR2-YAMO have shown that within 72 hours after inoculation, few conidia germinate when they contain the AVR gene while the majority lacking the gene are able to penetrate and ramify in host cells carrying the corresponding resistance gene. Thus the host resistance response must occur very early.

Regine Kahmann spoke about efforts of her lab to identify genes required for pathogenicity in Ustilago maydis. Using REMI 34 mutants have been identified, and of these, 23 could be totally or partially suppressed by overexpression of compatible b alleles indicating that they are upstream of b in the regulation of pathogenicity. These encode ribsomal proteins, glyoxal oxidase, protein kinase, and a homolog of yeast SNF7, among others. A fusion protein of bE1 and bW2 was made and found to be functional in vivo and to interact specifically with DNA in vitro. Various deletion mutations were made and showed that active homeodomains were critical to function. Finally she reported on the successful expression and detection of the green fluorescent protein in U. maydis.

Pierre deWit discussed current findings with the AVR9 and AVR4 gene products of Cladosporium fulvum. Analysis of Avr9 has suggested a structure similar to that found in channel formers and inhibitors of proteolytic enzymes such as carboxypeptidase. Interestingly, no difference in binding of Avr9 to membrane preparations from tomato Cf-9 (resistant) and Cf-0 (susceptible) was observed. Moreover, binding to membranes of all

solanaceous plants was observed, correlating with the number of Cf-9 homologs in these plants. Efforts are now underway to express Cf-9 in Arabadopsis to see if Cf-9 is the primary receptor for avr9.

Donald Nuss described experiments to decipher the mechanism of hypovirulence in Cryphonectria parasitica. Transgenic cosuppression of a Galpha gene CPG-1 leads to many of the phenotypes associated with hypovirulence including a reduction of canker size. Differential display of wild type virulent, hypovirulent and wild type containing the cosuppressed CPG-1 gene showed that many of the changes associated with hypovirulence were mimicked in the cosuppressed strain. Finally, addition of caffeine to wild type cells, which leads to an elevation of cAMP, resulted in an increase of transcript levels associated with hypovirulence thus linking G protein-mediated regulation of hypovirulence through the cAMP signal transduction pathway.

Jon Walton spoke about the unusual and complex structure of the TOX2 locus of Cochliobolus carbonum. Multiple copies of genes required for biosynthesis and efflux were found in a 540 kb region of DNA which segregates as a single locus. Targeted deletions of portions of the region led to strains with reduced virulence indicating the additional genes or multiple copies of the known genes are needed for full virulence.

Jos Wubben described oat mutants with reduced levels of the saponin avenacin in roots and increased susceptibility to Gaeumannomyces graminis.

Bacterial Pathogenicity and Avirulence

Three groups have found evidence for a pilus that is produced by a path protein and probably needed to make contact to the host cell: **Gene Nester** reported on a virB-dependent pilus formed by Agrobacterium tumefaciens.

Mentioned by **Noel Keen** in his overview and presented on a poster (Roine et al.; Labs of M. Romantschuk and S. He) were data on pili formed by P. syringae pv. tomato; the pilus consists of a Hrp protein (HrpA).

Research on bacterial hrp clusters in several species led to the identification of interesting new genes flanking the hrp cluster, (C. Boucher et al. on R. solanacearum; S. Beer et al. on Erwinia). **Alan Collmer** discussed the possible role of hrmA (located next door to the hrp cluster) being an avr gene in the interaction with tobacco. Noel Keen reported on a binding site for syringolide (= AvrD elicitor) which is present in the soluble fraction of S and R soybean.

Jan Leach talked about rice-Xanthomonas interaction. They have identified a 27 kDa bacterial protein that binds the AvrXa10 protein.

Ulla Bonas and **Dean Gabriel** showed data on the importance of NLSs in proteins of the Xanthomonas avrBs3-family for recognition by the resistant plant (avrb6, avrBs3) or pathogenicity (pthA).

Stan Gelvin talked about new developments in Agrobacterium research, using resistant ecotypes of Arabidopsis to identify plant genes involved in T-DNA integration.

Barbara Hohn et al. sprayed Agro (containing GUS gene) on tobacco seedlings and got GUS activity and tumors without wounding. She suggests that Agrobacterium enters plants through stomata.

Peter Christie reviewed the considerable progress he is making in analyzing the interaction and function of each

of the 11 VirB proteins, all of which appear to be involved in pilus formation.

Treasurer's Report

The past year was one of vigorous growth for IS-MPMI, with substantial increases in membership and financial assets. Membership grew from 416 members in March of 1995 to an all-time high of 560 members in July, 1996. Membership dues are a major source of revenue currently available to the Society, and totaled $8,620.67 for the year ending December 31, 1995. Income from dues was $6,859.25 for the first six months of 1996 as compared to $3,856.22 for the same period in 1995. The increased revenue reflects membership growth achieved mainly through membership mailings and conference registration.

Our journal, Molecular Plant-Microbe Interactions, also experienced growth, with publication increasing from six to nine issues annually as of January, 1996. Royalties from the journal totaled $9,766.58 in 1995, up from $8,827.70 in 1994. Revenue from royalties is unlikely to increase substantially in 1996 because of a notable decline in the number of institutional (library) subscriptions and the price reduction from $69 to $40 for individual subscriptions.

Total income to the Society for 1995 was $61,291.28. Operating expenses for member services, administration, and all other were $33,744.09, resulting in a net surplus to the Society of $27,547.19. Operating expenses in 1995 were $22,542.56 greater than in 1994, reflecting costs associated with increased services and activities including promotional mailings, newsletter production and mailing, election/bylaws mailing, and coordination with the Knoxville Symposium. The total net worth of the Society as of June 30, 1996, was $52,481.09.

Continued improvement in membership services remains a top priority for IS-MPMI. Beginning this year the Society will assume responsibility as publisher of the Proceedings for the biennial symposia. This will allow us to make the Proceedings available to members at a reasonable cost while realizing potential revenues from institutional and non-member sales. New services to be made available through the Society's home page on the Internet include a directory of recent graduates and a placement service. Due to increasing postal costs, publication of the newsletter will remain at three issues annually during 1996. Additional growth is also a major goal for IS-MPMI during the coming year. Symposium participants (950 in Knoxville) continue to outnumber Society members, indicating the potential for further membership growth and involvement.

Cost projections for 1996 and 1997 indicate that at current levels of service the Society may incur a small net loss in 1996, and that this will almost certainly occur in 1997. Accordingly, the Board approved a first-time increase in dues from $25 per year to $40 per year for full membership, effective in January of 1997. Student dues will remain at $10 per year. Pricing of the Journal, which was reduced from $69 to $40 in 1996, will increase to $50 in 1997, reflecting increased costs associated with the expanded publication schedule. Total cost of full membership plus a subscription to Molecular Plant-Microbe Interactions will be $90 (US) per year, as compared to $94 charged for the same services in 1995.
--Linda Thomashow, Treasurer

New Book Examines the Interaction of Plants and Plant Pathogens on the Molecular Level

Molecular Aspects of Pathogenicity and Resistance: Requirement for Signal Transduction brings together articles written by participants in the seventh seminar in the U.S.-Japan Cooperative Science Seminar series on the molecular and physiologic aspects of interactions between plants and their pathogens. The contributors examine the mechanisms that facilitate communication between the cells of plants and pathogens and within individual cells, and the role that these mechanisms play in plant-pathogen interactions. Topics include signal transduction pathways, genic interactions, sensing of plant signals, plant disease resistance genes, and plant signal responses.

EDITORS:

- Dallice Mills is a professor in the department of botany and plant pathology at Oregon State University.
- Hitoshi Kunoh is a professor at Mie University. Noel Keen is a professor in the department of plant pathology at Kobe University.

PUBLICATION DETAILS:

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IS-MPMI's First Book:
Biology of Plant-Microbe Interactions

The proceedings from the 1996 8th International Congress on Molecular Plant-Microbe Interactions meeting information will soon be available as the first book published with IS-MPMI's own publishing imprint.

Meeting registrants will automatically receive a copy of this book as part of their registration. The books will be shipped in mid-December and registrants in the U.S., Canada, and Mexico can expect their books sometime in January. International registrants can expect their books to arrive in mid-April.

A limited supply of books will be available for sale to those unable to attend the Congress and all IS-MPMI members are encouraged to recommend this title to their acquisitions librarian early, before supplies run out. Students may purchase the book at a discounted rate. This 608 page hardbound 6" x 9" book is edited by Gary Stacey, Beth Mullin, and Peter M. Gresshoff. It includes papers from more than 80 invited speakers.

Watch for more information in upcoming issues of the IS-MPMI Reporter and the Society journal. Or check our home page at http://www.scisoc.org/ismpmi/. New information will be posted in October. If you would like to receive a flyer about this book, send your e-mail request to: ismpmi@scisoc.org.

Upcoming Meetings

March 18-23, 1997
The 18th Fungal Genetics Meeting
Asilomar, California, U.S., Contact: Dr. N. Louise Glass, Biotechnology Laboratory, University of British Columbia, Vancouver, BC V6T 1W5 Canada Fax: 604/822-6097 or Dr. Michael J. Hynes, Department of Genetics, University of Melbourne, Parkville, VIC 3052 Australia,
Fax: 613/934-45139 E-mail: hynes_lab@muwayf.unimelb.edu.au http://www.kumc.edu/*fgsc

June 22-27, 1997
The Second International Bacterial Wilt Symposium
Gosier, Guadeloupe (French West Indies) Contact: Dr. Philippe, Prior, INRA, B.P. 515, 97165 Pointe-a-Pitre, Guadeloupe, French West Indies, Fax: (590)94 11 72
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If you have a meeting you would like to list here, please send the information to:

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A Note From The Editors

The Reporter and IS-MPMI home page is the perfect spot to advertise positions available within your company or university. For more information about this valuable service, please contact IS-MPMI Headquarters at:

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Fall/Winter Issue
Articles due: December 1
Mail date: December 30

Spring Issue
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Mail date: March 30

Summer Issue
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IS-MPMI Officers

IS-MPMI Board of Directors, 1996-1999 term. From left to right (standing): E. Nester, Past President; S. Gelvin, Editor-in-Chief, MPMI; A. Collmer, Incoming Secretary; S. Leong, Outgoing Secretary; B. Lugtenberg, Director; J. Leach, President Elect; B. Rolfe, President. From left to right (sitting): L. Thomashow, Treasurer, P. deWit, Director; U. Bonas, Director; M. Daniels, Outgoing Past President. Not pictured: S. Long, Director and N. Koen, Director.

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