# **IS-MPMI Reporter**

#### December 2000

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nt-Associated Microbes Enter the Genomics Age

#### Jonathan D. Walton

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With sequencing of the genomes of E. coli, yeast, Drosophila, human, etc., all now finished (that is to say, the official press conferences have been held), the high-volume sequencers can now focus on the truly important organisms, those that have positive or negative effects on our food supply. This update gives a brief description of current and completed projects on prokaryotes associated with plants; fungi will be covered in the next issue of the Reporter.

A symposium entitled "Genomics of Plant-Associated Bacteria" was held at the American Phytopathological Society Annual Meeting in August 2000. An article in APSnet by Leland Pierson and Carol **Ishimaru**, including the abstracts of the symposium presentations, is available at www.apsnet.org/online/feature/Genomics/. The genomics of plant-associated microbes will also be covered at the Agricultural Microbes Genome II Conference, January 17-19, 2001, San Diego ( <u>www.intl-paq.org/amg/</u>).

#### I. Plant-Associated Prokaryotes

#### A. Pathogens

1. Xylella fastidiosa. A landmark genomics project, the first plant pathogen to be completely sequenced (Nature, 2000, 406:151). X. fastidiosa is a fastidious, xylem-limited bacterium that causes several important worldwide diseases on a variety of woody plants; the isolate sequenced in this project causes citrus variegated chlorosis (CVC). The genome is 2.7 Mb and is predicted to contain 2,838 genes. The sequencing was accomplished in São Paolo state, Brazil, by a unique "virtual genomics insitute" called the Organization for Nucleotide Sequencing and Analysis (ONSA) under the overall coordination of Andrew Simpson. A description of the unique organization of ONSA can be found at

http://www.uk.embnet.org/embnet.news/vol7 1/brazil.html. More than 35 laboratories participated in the sequencing and bioinformatics. The work was funded mainly by the state of São Paulo with additional funds from the Brazilian national government and the São Paulo citrus growers. The entire sequence is publicly available without restrictions. An excellent website located at <a href="http://onsona.lbi.ic.unicamp.br/xf/">http://onsona.lbi.ic.unicamp.br/xf/</a> includes information on the administrative structure of ONSA, photographs and description of CVC, and a searchable database.

- 2. Sequencing of the complete genome of the strain of *X. fastidiosa* responsible for Pierce's disease, which is a serious threat to grapevines in California and elsewhere, has been started at ONSA in Brazil. Eightfold coverage is expected by January, 2001. Confirmed funding for this project comes from the state of São Paulo and the U.S. Department of Agriculture. Coordinators are Mariana C. de Oliveira and Marie-Anne Van Sluys, and further information can be obtained from their website at <a href="http://www.lbi.dcc.unicamp.br/xf-grape/">http://www.lbi.dcc.unicamp.br/xf-grape/</a>. Another source for information on Pierce's disease and other diseases caused by *X. fastidiosa*, particularly in California, is <a href="http://www.cnr.berkeley.edu/xylella/">http://www.cnr.berkeley.edu/xylella/</a>.
- 3. Xanthomonas citri (also known as X. campestris pv. citri or X. axonopodis pv. citri) causes citrus canker. A project to sequence its ~5-Mb genome, with an expected completion date of July, 2001, is underway by an ONSA consortium composed of more than 11 Brazilian laboratories. Coordinators are Fernando C. Reinach, Ana C. R. da Silva, Ronaldo B. Quaggio, Shaker Chuck Farah (University of São Paulo), and Jesus A. Ferro (UNESP). Bioinformatics will be coordinated by João C. Setubal and João Meidanis at the Laboratory for Bioinformatics (LBI) of Unicamp. Information can be obtained at <a href="http://watson.fapesp.br/xantho/menu2.htm">http://watson.fapesp.br/xantho/menu2.htm</a>.
- 4. Leifsonia (Clavibacter) xyli subsp. xyli is another slow-growing fastidious bacterium. It causes ratoon stunting of sugarcane. Twenty-one labs, one in Australia and the rest in São Paulo, Brazil, have begun sequencing a Brazilian isolate to 5-6x coverage. An Australian isolate will also be sequenced for comparative purposes. The planned completion date is mid-2002. Funding comes from the ONSA as well as Brazilian and Australian sugar growers. Coordinators are Luis Camargo and Claudia Monteiro-Vitorello (University of São Paulo) and Stevens Brumbley (Indooroopilly, Queensland, Australia). In addition to full genome sequencing, the project will characterize 750 transposon insertions and make microarrays for expression studies. A website is under construction; preliminary information is available at <a href="http://watson.fapesp.br/AEG/agro.htm">http://watson.fapesp.br/AEG/agro.htm</a>.
- 5. Ralstonia (Pseudomonas) solanacearum. This pathogen attacks over 200 plants including many species in the Solanaceae and banana. With funding from the French government, the 5.7-Mb genome, which is split into two replicons of 2.1 and 3.6 Mb, has been sequenced by a group headed by Christian Boucher (INRA-CNRS, Toulouse, France), Marcel Salanoubat (Genoscope, France), and Christine Gaspin (INRA-CNRS). Currently, 1.8 Mb of the sequence, encoding a predicted 1,581 proteins, is publicly available at <a href="http://sequence.toulouse.inra.fr/R.solanacearum">http://sequence.toulouse.inra.fr/R.solanacearum</a>. The rest of the sequence will be available "when a paper is accepted for

publication". For more information on this and other Genoscope projects, see <a href="http://www.genoscope.cns.fr/">http://www.genoscope.cns.fr/</a>.

- 6. Agrobacterium tumefaciens. One of the most famous and useful of bacterial plant pathogens, A. tumefaciens causes crown gall on a wide range of dicotyledenous plants. Ti plasmids (~200 kb), which are required for virulence and contain the T-DNA that is transferred to the host plant during infection, have been sequenced from at least two strains of A. tumefaciens (GenBank accession numbers AB016260 and AF242881). The 218-kb Ri plasmid of A. rhizogenes has also been sequenced (GenBank AP002086). A project to sequence the genome of A. tumefaciens strain C58 has recently been initiated as a collaboration between Eugene Nester and Maynard Olson (University of Washington, Seattle) and the DuPont Corporation (Wilmington, DE). DuPont expects to complete 7x coverage by the end of 2000, and the UW team will finish the sequencing contingent on federal funding. If funding is obtained, DuPont has agreed to release the sequence data in accordance with National Science Foundation guidelines.
- 7. Pseudomonas syringae pv. tomato DC3000. One of the most intensively studied pathogens at the molecular level, this bacterium attacks tomato, Arabidopsis, and other plants. It is the subject of a recent genomics grant from the U.S. National Science Foundation to Alan Collmer (Cornell University) and collaborators at Cornell, the Boyce Thompson Institute, the University of Nebraska, the University of Missouri, Kansas State University, and The Institute for Genomic Research (TIGR) (Rockville, MD). The sequence data will be publicly available "at the 3x genome coverage stage and monthly thereafter". Although a specific project website has not yet been constructed, the sequences will be available through GenBank and at the TIGR website at <a href="https://www.tigr.org/tdb/mdb/mdb.html">www.tigr.org/tdb/mdb/mdb.html</a>.
- 8. Xanthomonas oryzae pv. oryzae. A project to sequence this important pathogen of rice has been initiated at the National Institute of Agrobiological Resources (<a href="http://www.abr.affrc.go.jp/">http://www.abr.affrc.go.jp/</a>) under the coordination of Hisatoshi Kaku (<a href="http://www.abr.affrc.go.jp">http://www.abr.affrc.go.jp/</a>). Further information is not yet available.
- 9. Clavibacter michiganensis pv. sepedonicus causes bacterial ring spot of potato. Its genome is ~2.6 Mb. Although full-scale sequencing has not yet commenced, a physical map has been constructed and anchored with sequence tags. The work is being done at Colorado State University in the laboratories of Carol Ishimaru (cishimar@lamar.colostate.edu), Dennis Knudson, and Susan Brown.

## B. Symbionts

1. The *Rhizobium* NGR234 Sym plasmid (536 kb) has been sequenced under the direction of Christoph Freiberg and André Rosenthal of the Institute of Molecular Biotechnology (Germany) and Xavier Perret and William J. Broughton of the University of Geneva. The Sym plasmid is predicted to encode 416 proteins, many of which are required for nodulation and nitrogen fixation. Information can be found at <a href="http://genome.imb-jena.de/other/cfreiber/pNGR234a2.html">http://genome.imb-jena.de/other/cfreiber/pNGR234a2.html</a>.

2. Sinorhizobium meliloti is a fast-growing symbiont on Medicago, Melilotus and Trigonella spp. The 6.6-Mb genome of strain 1021 is composed of three replicons, a 3.7-Mb chromosome and two Sym plasmids of 1.4 (pSymA) and 1.7 Mb (pSymB). A European consortium (participants from France, Belgium, and Germany) led by Francis Galibert (CNRS, Rennes) is sequencing the chromosome with funding from the European Union. Sharon Long (Stanford University) is coordinating the sequencing of pSymA. Alfred Pühler (University of Bielelfeld, Germany) and Turlough Finan and Brian Golding (MacMaster University, Hamilton, Canada), with funding from the Canadian Science Research Council (NSERC), are sequencing pSymB. The relevant website is

http://sequence.toulouse.inra.fr/meliloti.html. Completion is expected by the end of 2000. The data will be publicly released to Genbank and the website as soon the annotation is completed.

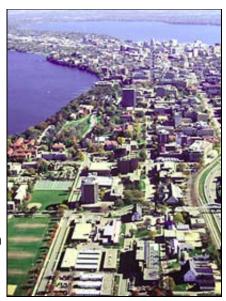
- 3. Mesorhizobium loti. A project to sequence this symbiont of Lotus, Lupinus, and other legumes is being coordinated by Satoshi Tabata, Takakazu Kaneko, and Yasukazu Nakamura of the Kazusa DNA Research Institute, Japan (<a href="www.kazusa.or.jp">www.kazusa.or.jp</a>) with funding from Chiba prefecture. The goal is to complete the entire genome and plasmid sequence with annotation by mid-November, 2000. The data will be released "after publication, possibly the end of the year 2000, through the public DNA databases and the web database".
- 4. The chromosome of *Mesorhizobium loti* strain R7A contains the genes necessary for the symbiotic relationship within a contiguous 501-kb "symbiosis island", which can be transferred between strains of *M. loti* in the field and the lab. The island has been sequenced by a group including Clive Ronson and John Sullivan of the University of Otago, New Zealand, and Frans DeBruijn and Jody Trzebiatowski of Michigan State University. Funding came from the MSU Agriculture Experiment Station, the U.S. Department of Energy, the Marsden Fund of New Zealand, and the University of Otago Research Committee. The sequence plus annotation is predicted to be available at GenBank by the end of 2000.
- 5. Bradyrhizobium japonicum. This nitrogen-fixing symbiont of soybean is the subject of a physical mapping and sequencing effort involving Jeff Tompkins and Todd Wood (Clemson University Genomics Institute), Gary Stacey (University of Tennessee), and Mike Sadowsky (University of Minnesota). Work to date has been restricted to construction of a BAC and marker map and BAC-end sequencing. The plans are for all raw sequence data to be released immediately. For further information see www.genome.clemson.edu/~twood/projects/brady.html.

I would like to thank all of the people who contributed information on genome projects around the world. I apologize for any mistakes or omissions and will be glad to correct them in a future issue of the *Reporter*. Other relevant information would also be appreciated, in particular anything on (1) genome projects on other plantassociated microorganisms, such as fungi and nematodes, (2) new projects as they commence, and (3) projects in the private sector that have been, or want to be, publicly announced.

#### **Molecular Plant Microbe Interactions**

## IS-MPMI Congress to be held July 2001 in Madison, Wisconsin

We invite you to attend the 10th International Congress of Molecular Plant-Microbe Interactions as well as the associated satellite workshops on Medicago truncatula and teaching molecular plant-microbe interactions. The Congress will be held from July 10-14, 2001 in the Memorial Union of the University of Wisconsin, Madison USA. The Congress is held under the auspices of the International Society for Molecular Plant-Microbe Interactions (IS-MPMI). The satellite meeting on *Medicago* will be held from July 6-9, 2001 immediately before the main Congress. A one day teaching workshop for molecular plant-microbe



interactions will be held on the intervening day, July 10, 2001.

The IS-MPMI Congress is the premier venue for communication of new biology related to the molecular study of plant-microbe interactions. We have invited 64 world class speakers/session chairs and all have agreed to participate. Thirteen additional speakers will be invited based on information presented in the abstracts.

The 10th Congress will cover current, major aspects of the molecular biology of plant-microbe interactions. Major themes of the 10th Congress include: 1) Recognition of pathogens by plants, 2) Defense signal transduction, 3) Local and systemic resistance, 4) Plant-fungus interactions, 5) Plant-virus interactions, 6) Plant-nematode interactions, 7) Secretion of Avr and Vir factors;

8) Ecology and population biology of plant-associated microbes, 9) Cell biology of plant-microbe interactions, 10) Plant-Rhizobium interactions, and 11) Functional genomics and biotechnology.

We anticipate that this will be the largest MPMI meeting to be held to date. Attendance of this Congress has increased steadily since its inception some 20 years ago. More than 1,000 scientists attended the 1999 Congress in Amsterdam. Our facilities at the University of Wisconsin can accommodate 1,300 participants. In particular we hope that many students will be able to attend; to facilitate their attendance, we offer a reduced student registration fee and will have inexpensive housing in university residence halls available.

Further information about the Congress and its program can be accessed at the Congress Web site <a href="http://www.plantpath.wisc.edu/mpmi/">http://www.plantpath.wisc.edu/mpmi/</a> or by contacting Sally Leong at <a href="mailto:sal@plantpath.wisc.edu">sal@plantpath.wisc.edu</a>.

We look forward to seeing you in Madison!

#### **New Centre for Plant Protection Research in Australia**

The Cooperative Research Centre (CRC) for Tropical Plant Protection is a joint venture that commenced in 2000. The Centre aims to undertake world-class research and education in the application of new technologies and innovative strategies for pest and disease control in Australia. Nine institutes are collaborating with regard to this Centre and their input, together with those of the Australian Government, provide a total budget of approximately AUS\$60M over seven years. The Centre will continue and extend the research of the previous CRC for Tropical Plant Pathology that was funded from 1992 to 1999.

The research program of the new Centre is divided into two major sub-programs. Sub-program 1: "Developing technologies for protecting Australia from exotic and endemic pests" includes projects, all incorporating molecular technologies, on etiology/identification; diversity/diagnostics; and pest risk analysis and epidemiology. Sub-program 2: "Increased use and sustainability of plant resistance to pests" has projects on the characterisation of resistant germplasm, primarily using molecular markers; pathogen genetics; plant defence mechanisms; and plant genetic engineering. The host-pathogen systems that are being investigated in the Centre are varied, and obviously prioritise tropical and sub-tropical systems; however generic research focuses on model systems such as Arabidopsis.

Based at The University of Queensland, other Centre partners are the Queensland Department of Primary Industries, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), RhoBio (a private biotechnology company), the Bureau of Sugar Experiment Stations (BSES), Australian National University, the Northern Territory Department of Primary Industry and Fisheries, Northern Territory University, and the Department of Agriculture, Fisheries and Forestry-Australia. Information on the Centre can be obtained by email to <a href="mailto:tppinfo@tpp.uq.edu.au">tppinfo@tpp.uq.edu.au</a>; web site: <a href="http://www.tpp.uq.edu.au">http://www.tpp.uq.edu.au</a>.

# Special MPMI Teaching Workshop to be Held at Next Summer's IS-MPMI Congress in Madison, Wisconsin

Many IS-MPMI members teach graduate or undergraduate courses on Molecular Plant-Microbe Interactions or related topics. While the subject matter is very exciting and interesting (of course!), teaching it well demands considerable breadth of knowledge and a solid command of the current literature. This half-day workshop will be held on Tuesday, July 10, 2001, immediately before the Congress opens. Its goal is to stimulate teaching excellence in our discipline by exposing participants to the latest in teaching technology and theory, and by encouraging exchange of creative ideas, resources, and teaching materials. The workshop will feature a keynote speaker who will address ways to help graduate students think creatively and analytically. Other planned topics include use of distance learning in MPMI courses, keeping current for effective teaching, new approaches to testing and writing assignments in this area, and a working luncheon for the exchange of course syllabi and teaching materials. Please indicate your interest in this workshop on the

Congress registration form. Attendance will be limited to 100 people. For more information, contact **Caitilyn Allen** (cza@plantpath.wisc.edu) or visit www.plantpath.wisc.edu/mpmi/

Report On The First Asian Conference on Plant Pathology (ACPP), and Establishment of the Asian Association of Societies for Plant Pathology (AASPP)

# Wenhua Tang

Professor at the China Agricultural University and Executive Secretary of AASPP email: <u>tangwh@public.east.cn.net</u>

The first ACPP was held in Beijing, China, from August 25 to 28 of this year. Three hundred and eighty seven scientists from 26 countries attended the conference. Proceedings including three hundred and thirty one summaries, which have been published in a book and on CD-ROM. Fifteen invited speakers presented in plenary sessions and another 10 sessions were held for oral presentations. A poster session was also held. The International Society for Plant Pathology (ISPP) Executive Committee attended the conference, and **Dr. P. Scott**, the President of ISPP, organized a Media Workshop entitled "Role of Plant Pathology in Sustainable Agriculture."

A new regional organization of plant pathology, including the Australasian Phytopathological Society, was established and will be called the "Asian Association of Societies for Plant Pathology"(AASPP). The purpose of this new organization will be to promote activities of plant pathologists in this region. Elections for officers resulted in **Prof. Shi-mai Zeng** becoming president of the new organization.

The House of Delegates of the AASPP voted the Indonesian Society of Plant Pathology as the host of the second ACPP. Although the constitution of the AASPP stipulates that the ACPP will convene every three years, the second ACPP will take place in the year 2004 in Bali, Indonesia, in order to avoid overlap with the International Congress on Plant Pathology (ICPP). We believe that the first ACPP and the establishment of AASPP are historical events for plant pathologists in the Asia-Oceania region, and that they will contribute significantly to the future development of plant pathology.

#### **Board of Editors Chosen for the** *IS-MPMI Reporter*

The *IS-MPMI Reporter* is pleased to welcome the following scientists to the newly formed editorial board. The board is responsible for the compilation of news and other material suitable for the *Reporter* from their respective geographical areas.

# Dr. Kazuya Akimitsu

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The CRC for Tropical Plant Protection
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## People

## **Oliver To Start New Laboratory at Murdoch University**

**Richard Oliver** has moved to Murdoch University, Perth Western Australia, to start up a new laboratory to be known as the Australian Centre for Necrotrophic Fungal Pathogens. The laboratory, based in modern facilities in the State Agricutural Biotechnological Centre, is funded by the Grains Research and Development Corporation to undertake research in necrotrophic diseases of grain crops. The initial projects include molecular studies of the pathogenicity of *Septoria nodorum* and resistance in *Medicago truncatula*. **Peter Solomon** and **Stephen Thomas** have joined the project. Other positions are being filled. See the announcement in the employment section for details of current opportunities.

## Welcome New Members

## **July-November 2000**

## Juan M. Anda Rocabado

Campos, Rio De Janeiro, Plant Protection Department BRAZIL

#### Jane J. Choi

Washington State University Plant Pathology Department Pullman, WA

#### **Dominique Expert**

#### Hans-Albert M. Kolb

University of Hannover Inst. of Biophysics-Biology Dept. Hannover, GERMANY

#### **Hinanit Koltai**

North Carolina State Univ. Plant Pathology Dept. Raleigh, NC

#### Krishnamurthy G. Konduru

CNRS Lab de Pathologie Vegetale Paris, FRANCE

#### Shannon M. Hinsa

Dartmouth Medical College Microbiology Department Hanover, NH

#### Peter T. Hraber

Santa Fe Institute Santa Fe, NM

#### Steven J. Klosterman

Washington State University Plant Pathology Department Pullman, WA Oklahoma State Univ Entomology/Plant Path. Dept. Stillwater, OK

## **Balakrishnan Prithiviraj**

McGill University Plant Science Department Ste-Anne-de-Bellevue, CANADA

## **Karam Singh**

CSIRO Plant Industry Wembley, WA, AUSTRALIA

## **IS-MPMI Reporter Deadline**

# Deadline for submitting items for the next issue is January 10, 2001.

Submission of materials as electronic files, either on disk or as e-mail attachments, will speed processing. Please submit black-and-white or color photos generated from negatives. If your image was created digitally, please submit a laser print of the image and a disk containing the electronic graphics file (.tif and .eps formats are preferred).

For more information on submitting electonic images contact Kayleen Larson at <u>klarson@uslink.net</u>.

#### Send items to:

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## **Employment**

#### Postdoctoral, Graduate, and PhD Student Positions

A new laboratory to study necrotrophic, foliar pathogens of crop plants has been established in new facilities at Murdoch University in Perth, Western Australia with funding from Grains Research and Development Corporation. The laboratory will initially focus on the molecular dissection of pathogenicity of *Septoria nodorum* blotch on wheat and disease resistance in *Medicago*. The unit is funded to appoint four post-docs, a graduate research assistant and three PhD students. Candidates with experience and/or interests in plant and

fungal molecular genetics and biochemistry and plant pathology are invited to contact the Director, Professor **Richard Oliver** (<u>roliver@central.murdoch.edu.au</u>; tel +618 9360 7404; fax +618 9360 6303) for further information.

## **Bacteriologist-Assistant/Associate Professor.**

The Department of Biology at the University of Louisville (http://www.louisville.edu/a-s/biology) invites applications for a tenure-track position in the area of bacteriology to begin in Fall 2001. Ph.D. or equivalent required. The successful candidate is expected to contribute to both undergraduate and graduate training programs in the department and have an excellent record of extramurally-funded research productivity as well as other professional activities. Candidates using physiological, molecular genetic or molecular evolutionary approaches in any area of bacteriology will be considered. The current research addresses the molecular evolution of genes involved in nitrification, resistance to antibiotics and oxidative stress, bio-remediation, and the molecular characterization of plant-microbe interactions. Applicants should submit a curriculum vitae, statements of research and teaching interests, up to three recent reprints and contact information for four references to **Dr. Martin Klotz**, Department of Biology, University of Louisville, Louisville, KY 40292. Review of complete applications will begin immediately and continue until the position is filled. Women and minorities are encouraged to apply. The University of Louisville is an Affirmative Action, Equal Opportunity employer.

#### **Postdoctoral Positions**

One position requires a Ph.D. in Bioorganic Chemistry/Biochemistry, a strong background in plant protein and enzyme isolation/characterization, extensive experience with HPLC analyses (diode array and radio detectors), and radioisotope use. The other position requires experience with fungal and bacterial culturing and extensive experience with HPLC analysis (diode array detection). Both positions require experience in developing biological assays to determine bioactivity (antifungal, antibacterial, cytotoxic, phytotoxic). The successful applicants must have expertise in spectroscopic techniques, particularly high field NMR spectroscopy, and a strong publication record in the field. Positions are available immediately, however applications

will be considered until positions are filled. Send letter of application and resume, and provide names, e-mail addresses, and telephone numbers of three referees to: M. S. C. Pedras, Professor of Chemistry, Department of Chemistry, University of Saskatchewan, 110 Science Place, SASKATOON, SK S7N 5C9 CANADA. Email: soledade.pedras@usask.ca,

http://www.usask.ca/chemistry/pedras.html

## **Meetings/Events**

## 2001

The Agricultural Microbes Genome II Conference.

January 17-19, 2001, Town & Country Convention Center, San Diego, California. For information visit the program website at: <a href="http://www.intl-pag.org/agm/">http://www.intl-pag.org/agm/</a>.

## **Induced Resistance in Plants against Insects and Disease**

April 26-28, 2001, 1st IOBC/WPRS Conference on Induced Resistence in Plants against Insects and Diseases, Wageningen, The Netherlands. Contact the convenor: Annegret Schmitt, BBA, Institut für biologischen Pflanzenschutz, Heinrichstr. 243, D-64287 Darmstadt, Germany, Phone: 0049 6151 407241, Fax: 0049 6151 407290 E-mail: <a href="mailto:anne.schmitt.biocontrol.bba@t-online.de">anne.schmitt.biocontrol.bba@t-online.de</a> website: <a href="mailto:http://iobc.ethz.ch/events/index.html">http://iobc.ethz.ch/events/index.html</a>

## Fungal Metabolites: The Good, Bad, and Deadly

April 22-27, 2001, University of Wales, Swansea, United Kingdom. Contact: Dr. Tariq M. Butt, University of Wales Swansea, School of Biological Sciences, Singleton Park, Swansea, SA2 8PP UK. Phone: +44.792 295374 Fax: +44.1792 295447 E-mail: t.butt@swansea.ac.uk

## The 13th International Congress on Nitrogen Fixation.

July 2-7, 2001, Hamilton, Ontario, Canada. Contact: Turlough Finan, Professor and Chair, Dept. of Biology 24400, McMaster University, 1280 Main St West Hamilton, Ontario L8S 4K1, Canada. Telephone: 905-525 9140 ext 24400 Fax: 905-522 6066 E-mail: n2fix@mcmaster.ca website: http://www.science.mcmaster.ca/n2fix/

#### Third International Conference on Mycorrhizas (ICOM3)

July 8-13, 2001, Adelaide Convention Centre, Adelaide, Australia. Contact: Professor Sally Smith, Department of Soil and Water, Waite Campus, University of Adelaide, PMB 1, Glen Osmond, South Australia 5064 Phone: +61.08 8303 7351 Fax: +61.08 8383 6511

E-mail: <a href="mailto:sally.smith@adelaide.edu.au">sally.smith@adelaide.edu.au</a> Website: <a href="mailto:www.waite.adelaide.edu.au/soil">www.waite.adelaide.edu.au/soil</a> water/3icom.html

#### **IS-MPMI** Meeting

July 10-15, 2001, Madison, Wisconsin USA. Contact: The Congress and its program can be accessed at the Congress Website <a href="http://www.plantpath.wisc.edu/mpmi/">http://www.plantpath.wisc.edu/mpmi/</a> or by contacting Sally Leong at <a href="mailto:sal@plantpath.wisc.edu">sal@plantpath.wisc.edu</a>. The 2003 meeting will be in St. Petersburg, Russia.

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