In late November and early December of 2000, two undergraduate biology majors at Fairmont State College in West Virginia had the opportunity to experience firsthand what it is like to carry out field work in a part of the world a considerable distance from home. Thanks to funding provided by a grant from the National Science Foundation, Dawn Black and Maribeth Overking were able to accompany Dr. Steve Stephenson to New Zealand in order to collect and study the myxomycetes and fungi associated with melting snowbanks in alpine snowbank habitats. The species of myxomycetes and fungi that occupy the rather special and very limited microhabitat represented by melting snowbanks are relatively well known in the Northern Hemisphere, as a result of studies carried out in such places as the Rocky Mountains of western North America and the Alps of Europe. However, very little is known about the distribution and ecology of this group in the Southern Hemisphere. The field work in which the two students were involved represented one component of a joint project (entitled “Myxomycetes and fungi associated with alpine snowbank habitats in New Zealand”) between the United States and New Zealand, with Stephenson as the American PI and Dr. Peter Johnston (a mycologist at Landcare Research in...
Auckland) as the New Zealand PI. For a portion of the field work, Stephenson, Johnston, Overking, and Black were joined by Sarah Marr, a student of Dr. David Orlovich at the University of Otago in Dunedin, New Zealand.

During the period of time they were in New Zealand, the group visited a number of localities in the mountains of the country where snowbank myxomycetes and fungi might be expected to occur. The majority of the localities visited were ski fields located in the Southern Alps, the major range of mountains on South Island. However, they also visited Tongariro National Park, on North Island. Late season snowfall made collecting difficult during late November, but conditions improved greatly during early December. More than 150 specimens of snowbank myxomycetes were collected, and their occurrence was documented at eight different localities. This is the largest series of specimens known from any region of the Southern Hemisphere. Only a few specimens of snowbank fungi were collected, and this ecological group appears to be poorly represented in the New Zealand. It seems to be due, at least in part, to the fact that the treeline is relatively low in New Zealand mountains and does not extend into the alpine habitats where snowbanks occur. Consequently, suitable substrates for the species of fungi (and also myxomycetes) typically associated with coarse woody debris simply do not exist.

**MSA BUSINESS**

*From the President’s Corner ....*

Dear Friends and Colleagues:

The mid-winter meeting of the Executive Council was held in Blacksburg on the Virginia Tech Campus. The weather behaved this year and everyone made the meeting except Lorelei Norvell who was suddenly hospitalized. The good news is that she is doing fine and back with us and carrying on in her usually efficient way. The attendees included Past President Linda Kohn, President Elect Tim Baroni, Vice President John Taylor, Treasurer Jeff Stone and yours truly (see photograph on page the next page). Hope Miller deserves our thanks as the substitute Secretary. The usual range of topics were covered and abstracted minutes in this issue of the *Inoculum* can be consulted for the details. However, we are in negotiations to initiate electronic publication of *Mycologia*. Our Ad Hoc Committee including John Taylor Chair, Rytas Vilgalys, and Jim Ginns Ex-officio have been making active progress to explore the approaches available and the financial obligations which the Society will have to bear to affiliate with an electronic publisher. It is imperative that we join the many other societies now on-line but do so in a financially sound manner.

A second and important initiative has been to join NAMA (North American Mycological Association), our amateur counterpart, to urge the U.S. Forest Service not to over regulate mushroom collecting by the public. In the Western United States huge
fruits of morels occur following forest fires. The usual scenario is a massive influx of commercial pickers and buyers who pay daily and in cash for the fresh morels. Pickers can often make $500 to $1000 per day and some very tense interactions occur as commercial pickers make territorial claims to choice locations. Forest Service police are employed to keep the peace and as land managers the Forest Service has a serious problem and they have acted to require permits and fees for both buyers and pickers. On the Umatilla National Forest in Oregon for example an annual permit for commercial collectors is $50.00 and a buyers permit is $500.00. A policy of “free-use” allows one to “harvest, possess, or transport less than one gallon in Oregon or less than three gallons in Washington.” However, “free-use mushrooms can’t be sold, bartered, or given away.” Of course each National Forest has to enforce a set of regulations and this problem, which is basically based in the National Forests of the Western United States, has resulted in discussion and planning by the Forest Service to regulate picking of mushrooms perhaps on a broad scale. The abundance of morels following fire under western conifers is not matched elsewhere in the United States. This, combined with the large acreage of western forests burned each year, has been the impetus for additional federal regulation. In addition, the American Matsutake (Tricholoma magnivelare) is also abundant in many areas on the Pacific Coast and also collected commercially for sale in Asia. Any broad regulation curtailing the collection of fungi on public lands would impact many scientific studies, limit educational experiences for students, and close many habitats in which have never been critically studied. In addition, the ability of amateurs to carry out recreational collecting in an effort to learn more about fungi would also be seriously curtailed. Since none of these activities is done to provide revenue for the professional or amateur mycologist we wish to be heard by the Forest Service and to voice our opposition to any policy which might result in either over regulation, or the prohibition of mushroom picking on U.S. Forest Service lands.

Lastly, I wanted to compliment Dr. Rick Howard, Cover Editor on the new color cover and selected articles in color in Mycologia. It is an impressive change in Mycologia and I was told that it was the subject of the week when the first cover was viewed at Allen Press. Now it is up to all of us to select a favorite image to submit to Rick for a possible future color illustration. As we institute these changes it becomes more costly to publish Mycologia. It is now more important than ever for investigators with grant support to pay page charges. This is an area which provides significant support for the publication of Mycologia.

As we approach the end of the spring semester our thoughts turn to summer and the season for field work, summer school, and vacation. Don’t forget to make your plans to come to Salt Lake City the new color cover and selected articles in color in Mycologia. It is important now it is up to all of us to select a favorite image to submit to Rick for a possible future color illustration. As we institute these changes it becomes more costly to publish Mycologia. It is now more important than ever for investigators with grant support to pay page charges. This is an area which provides significant support for the publication of Mycologia.

As we approach the end of the spring semester our thoughts turn to summer and the season for field work, summer school, and vacation. Don’t forget to make your plans to come to Salt Lake City and be a part of the annual meeting of the Mycological Society. I hope to see you in Salt Lake City!

Orson K. Miller Jr.
President, Mycological Society of America

MSA Foray — 2001

The annual MSA foray will be held on Saturday, August 25 and will be hosted by the Mushroom Society of Utah, a NAMA affiliated club of about 60 members. Ardeen Watts is serving as our local foray representative. We will collect in the Uinta Mountains, one of the few mountain ranges in the US which runs East and West. Two hundred and thirty-seven thousand acres of the tract are designated as the High Uintas Primitive Area, a federal preserve occupying parts of Ashley and Wasatch National Forest. We will enter at Kamas, Utah, at an elevation of 6,500 ft. A paved road runs through the heart of the area reaching an elevation of 10,778 ft at Bald Mountain Pass. Five plant zones are represented: the Arctic on the grassy moss-and-lichen-covered treeless peaks above 11,000 ft; the Hudsonian marked by Engelmann spruce and alpine fir, usually from 9,000 to 11,000 ft; the Canadian with white balsam, blue spruce and aspen as low as 7,000 ft; the Transition between 6,000 and 7,000 ft represented by scrub oak and yellow pine; and the Upper Sonoran with its juniper and sage below 6,000 ft. Indigenous flora includes twenty-five genera of grasses, thirty different shrubs, and more than one hundred types of herbs and weeds. The pine, spruce and fir are varied with quaking aspen, pinon pine, mountain ash, hickory, juniper and scrub oak. A great portion of the region is occupied by grassy parks, open meadows, and heavily forested slopes, above which the barren peaks rise boldly. Registration is required for the foray and is limited to 135 participants. The cost is $35.00 per participant and includes transportation, muffins and juice in the morning, a boxed lunch, additional beverages for both the morning and afternoon collection sessions, and a post-foray lab in the Convention Center. We will leave around 8:30 AM and return by 5:00 PM. If you have any questions, please contact Don Ruch, Foray Coordinator, at 765-285-8829 or <druch@bsu.edu>.
Inoculum

1. After submission of the 2000 Annual Report, I completed my Inoculum editorial duties with issues 51(5-6). 1400 copies of each issue were published by Allen Press and mailed with Mycologia. Content of both issues was sent to MSA webmaster Tom Volk for posting. Final complimentary copies of Inoculum 51 were sent to awards recipients and contributors (this also includes author of book reviews) in January. Complimentary copies were also sent to Joe Miller, Executive Secretary of NAMA (North American Mycological Association); as per 1998 agreement with that society, MSA is asked to continue sending Inoculum to the NAMA Executive Secretary.

2. Arrangements for a smooth transition from Norvell to new Inoculum Editor Don Ruch began in July. Protocols, MSWord© shells, PageMaker© master copies, and some graphics files. were given to Ruch on diskette at the annual meeting in August. There have been subsequent frequent Email exchanges. The Inoculum/MSA Newsletter morgue donated by Roger Goos and augmented by Norvell was mailed to Ruch along with other important historical files in January. As past Editor, I wish to take this opportunity to commend new Editor Don Ruch on an excellent first issue [Inoculum 52(1)] and note that I wish I had thought of using a gray background for block announcements. That is a worthwhile addition to the format, and I am certain there will be other similar improvements in Inoculum, as Don becomes increasingly comfortable with the technical aspects of editing the newsletter.

3. All committee chairs and other Notables STILL would be doing the Membership a large Favor if they would send a really good photo of themselves to Editor Ruch. Better to be immortalized in glory than in ignominy.

4. Finally, I wish to repeat that while I may have grumbled occasionally about time stolen from research activities, I would not exchange my experience as Inoculum Editor for anything. Not only did I master several intriguing software applications, I encountered nothing but good humor and graciousness and made innumerable good and helpful friends during my stint as Editor. MSA has become Family of which I’m delighted to belong. Thanks again are due to officers (particularly Mary Palm, George Carroll, Linda Kohn, and my three-year companion in crime, Secretary Maren Klich) and committee chairs of the past three years, my irrepressible “proofreader” Laurel Carroll, Book Review Editor John Zak, and contributors of all items great and small. The staff and folks at Allen Press are thanked for their on-going helpfulness and understanding. I’ll not miss the deadline flurries, but I will miss the companionship.

Respectfully,
Lorelei Norvell
1998-2000 Inoculum Editor

Minutes of the Midyear Meeting of the MSA Executive Council
February 24, 2001
Conference Room of the Biology Department, Virginia Tech
Blacksburg, VA 24060

The meeting was called to order by President Orson K. Miller at 8:35 AM. Members present were Orson Miller, Jeff Stone, Tim Baroni, John Taylor, and Linda Kohn. As Lorelei Norvell was absent due to illness, Hope Miller volunteered to serve as Acting Secretary. Orson Miller presented the agenda, noting that MSA Portfolio Financial Advisor Phyllis Albritton would be arriving at 10 AM to interact with the committee and discuss investment procedures.

OFFICER REPORTS

President Miller covered the highlights of the year to date. Discussion regarding Electronic Publishing, investments and portfolio health was postponed until later in the meeting.

President Miller also summarized correspondence with a few previous members who had decided not to renew their MSA memberships. The Executive Council noted the problems cited by the dissatisfied members and discussed possible remedies. Use of Allen Press [AP] and Allen Marketing & Management [AMM] (for membership interactions) was discussed. President Miller reported that AMM Association Manager, Linda Hardwick, is very interactive and has served us well. Discussion focused on the need to verify membership information for those requesting Emeritus memberships.

Allen Press lacks “Year Joined” data on members who joined MSA more than a few years ago and thus cannot verify that most applicants qualify for Emeritus status. President-elect Tim Baroni, who obtained much background information as Society Treasurer from numerous old directories and other sources, volunteered to see whether those data have been retained.

Vice President John Taylor, who announced that the “Request for Nominations” form will be mailed with the next Inoculum (52-2), noted that the late August schedule for 2001 Annual Meeting in Salt Lake ensures timely return and processing of the final ballots. Dr. Taylor tabled his discussion
of Electronic Publishing until later in the meeting.

As Secretary Lorelei Norvell was unable to complete her report before her emergency surgery, the mid-year Secretary report will be sent published in Inoculum later. Her final report as Inoculum Editor [see Inoculum, this issue, page 4] was discussed at this time.

Secretary Norvell requested funds to be applied to the purchase of a laptop computer, and President Miller agreed to discuss the particulars regarding the purchase with her. Disposition of the previous Compaq society computer was discussed. President-elect Baroni, who will check on its condition and report to the Executive Council, suggested that it be sold this year at the annual MSA auction. President Miller also noted Dr Norvell’s request to establish a small Secretarial Account to cover costs for postage and supplies.

Treasurer Jeff Stone presented his report, shown below in its entirety:

At approximately the midpoint of the fiscal year, the MSA has received $214,271 in total income and has had a total of $194,900 in expenditures. I am projecting an additional $76,000 in income and $144,400 in expenditures by the end of our fiscal year July 31, 2001, which will result in a net budget surplus of approximately $41,000. We are in good financial shape in large part because of a $25,000 refund from the 2000 annual meeting. Congratulations and thanks are due Linda Kohn for a financially and scientifically successful meeting. Note however that the 2000 meeting surplus, plus a projected $13,000 in endowment contributions (i.e. restricted, not available for operating income) accounts for $38,000 of the projected $41,000 surplus. Therefore if not for the meeting refund, we would be only about $3000 net above operating expenses, not a very comfortable buffer given the magnitude of our budget. Regardless, assuming the remainder of the year goes as predicted, I expect to leave the Treasurer’s office with a positive balance for the year, and this is a big relief.

Two aspects of the 2000-2001 budget should be cause for concern however. Although total income is projected to be $6,500 more in 2001 than for 2000, this is due entirely to the 2000 meeting surplus. If not for the meeting surplus, total income for 2001 would be about $18,400 less than for 2000. Income from memberships and subscribers in 2001 is projected to be $4,100 and $7,700 less than for 2000, respectively. On the expense side, projected publication costs for 2001 are expected to be about $11,600 higher than 2000. This reflects higher costs for publication of Mycologia and increased indexing costs. Fortunately, from the standpoint of the 2001 annual budget, the 2001 annual meeting will be held in August 2001, and therefore all meeting expenses for that meeting will be included in the following fiscal year. All meeting expenses for the current fiscal year, therefore, have been accounted for in this year’s projections. However, this will mean that for 2002 the expense of two meetings will be included in the annual budget (meetings held in August 2001 and June 2002). This might result in a temporary deficit in 2002, although this may be compensated by reduced expenditures in 2003, depending on when that meeting is scheduled.

Projecting the budget for 2002, I estimate a total income of about $290,000, assuming current member and subscriber levels, and expenses of approximately $287,500. If these projections are accurate, it would leave a razor thin net surplus of $2,500. Aspects of both the income and expense sides of the 2002 budget projection need explanation. First, the estimated income includes $20,000 projected for endowment fundraising (two meetings, two auctions, assume current levels of donations to named funds), which should not be considered part of the operating budget. When this is subtracted, a net deficit in operating revenues results. The income estimate also includes increased income from a proposed increase in subscriber rates, assuming the same number of subscribers as in 2001. On the expense side, as pointed out above, two meetings will fall in fiscal 2002, and their associated expenses of awards, symposia, etc. are included in the estimate. Considering this, a small deficit in 2002 should not be alarming and may be balanced by a surplus the following year.

I have been in communication with MSA webmaster Tom Volk and several others to explore adding an online new membership and renewal form to the MSA website. This would incorporate a shopping cart and secure server connections to allow members to renew or join MSA online and pay by credit card. An endowment donation option will also be included. I hope that after this is developed we may also be able to conduct some fund raising functions like T-shirt sales from our website. I hope to have a prototype ready for testing before my term ends this summer, and I hope a functional site will be ready for next year’s renewals. The MSA Treasurer will have to coordinate with Allen to get the payments processed, but I think that this can be easily incorporated in our current procedures. Allen does not have immediate plans to offer online renewal to their clients, so this will be something that MSA will be exploring on its own. Including an endowment contribution form with annual member renewals has had a positive effect on donations this year. Eight donors contributed $775 to the endowment with their renewals this year. The details of getting the information from Allen to Judi Ellzey so that donors can be thanked and the correct named fund credited has worked very smoothly.

I think we have done a reasonable job of being fiscally responsible over the past three years. The Society has maintained a positive balance sheet while at the same time increasing levels of student awards, symposium support at annual meetings, and cooperation with affiliated societies. MSA has made
improvements to Mycologia, and absorbed increased expenses associated with the Mycologia editorial office. This has been possible partly through increased revenues from page charges, maintaining subscriber and sustaining member numbers, and following a very prudent investment plan. The Society continues to be financially very healthy. However, it is unlikely that we can continue to have the same rate of growth in page charge revenues as over the past two years. Institutional subscriber levels still have not returned to the pre 1998 level, and restoring institutional subscribers should be a top priority. Our investment portfolio is well insulated from market fluctuations, so income from investments should remain strong. However, the only way to increase our investment income is through continued growth in endowment contributions, which have diminished in the past few years. Having an endowment base of $300,000 should be set as an explicit short term goal (two years) and aggressive steps should be taken to meet it. A longer term, say 10 year, goal should be to reach $500,000.

If the costs of producing Mycologia continue to increase and are not matched by continued growth in revenues, the MSA may soon be in a position where another increase in membership dues must be considered. A dues increase should not be undertaken without deliberation, but we have sufficient information to make reliable budget forecasts. We now have the experience of two full years of being on our own with Mycologia, and have much more fiscal information available than ever before. This should enable the MSA to make long term financial projections and plan for the future. It would be prudent to look ahead to 2003 or 2004, the end of the next Treasurer’s term, for a possible dues increase. The MSA has to continue to be very careful to keep its expenditures in line with income, and this will become more challenging as expensive endeavors like online publication are undertaken.

Respectfully submitted,
Jeffrey K. Stone, Treasurer

MOTION (tabled): Treasurer Stone suggested that the family membership price ($80 for first member and $40 for each additional member) is too high. Linda Kohn moved, and Tim Baroni seconded, that Council consider reducing family membership fees for additional family members. (Votes 4 approved, 1 “seconded” [sic]). President Miller then moved, and Jeff Stone seconded, to table action until after presentation of Electronic Publishing later in the meeting.

MOTION (approved unanimously): Jeff Stone moved, and John Taylor seconded, that the Executive Council accept Don Glassman’s offer to index Volume 93 of Mycologia for an estimated $5200.

An extensive discussion ensued as to why the 2000 MSA meeting in Vermont was so “profitable.” Linda Kohn suggested that (i) meetings cost less when held on a university campus instead of at a large convention center, (ii) a larger than usual number of late registrants paid late fees, and (iii) more people than usual attended. Tim Baroni noted that MSA is not in the business to make money but agreed that we should continue to meet alone every three years.

Treasurer Stone, who noted that we appear to have fewer institutional subscribers at present, was informed that Mary Palm has been contacting lapsed institutional subscribers to discover why they no longer subscribe. President Miller reminded the Executive Council that (i) subscriptions issued through a subscription service are not submitted to AMM until March and (ii) the New York Botanical Gardens (as part of the severance package with MSA in 1997) retain 93 institutional subscriptions for a ten year period. This accounts for almost all of the “missing” institutional subscribers.

MOTION (approved unanimously): Linda Kohn moved, and John Taylor seconded, to accept the Treasurer’s Report.

Policies dealing with named endowment funds were reconsidered. The correspondence on the part of the Society President, President-elect, Treasurer, and Martin-Baker Fund member June Wang was discussed. President Tim Baroni will personally address Dr. Wang’s concerns and contact the co-chairs of the new Research Awards Committee (which combines the old Martin-Baker Fund and Alexander H. and Helen V. Smith Fund committees) Arthur Weldon and Joe Ammirati.

COMMITTEE REPORTS
(pro parte)

Finance Committee – Orson Miller, Chair

At this point, Phyllis Albritton, (of First Union Securities, 200 Country Club Drive, Blacksburg VA 24060) who is handling the MSA portfolio, arrived to meet the Executive Council, review the portfolio, and answer any questions A thumbnail description of the portfolio follows:

Our investment strategy involves two ladders composed of 5 five-year federal notes (bonds) with a total of $277,300.70. One series is dedicated to endowment funds and the second to operating funds. Additionally, the Society has an American Fund Mutual Fund – Fundamental Investors Inc. (ANCFX) with 2,278.45 shares worth $70,996.53 and 297.81 shares of Vanguard Index Trust worth $36,196.75 – worth $107,166.28. We also have $54,326.83 in our money market account (readily available cash). The total portfolio value is $438,793.81. Total estimated income is $23,056.40 ($1297.23 from mutual funds; $16,606.25 from bonds; $5152.92 from money market). Estimated income is down somewhat from last year because we have moved our shares in Income Fund of America (INCO) to a more aggressive Fundamental Investors Inc. (ANCFX) fund. We realized somewhat less in dividends without the heavy investment
in bonds, insurance, and energy companies from INCO, but we have a better chance for the increase in share value with Fundamental Investors (ANCFX). Both are conservative funds.

We have two five year bond ladders—one a 25,000 bond ladder and the second a 20,000 ladder—with one bond in each ladder due each year. We have purchased a $45,000 bond due in 2004 and a $45,000 bond due in 2005. (In other words, we have increased the value of each bond in the 4th and 5th year to a total of $45,000.) Each year one endowment fund bond and one operating fund bond come due. New five-year bonds are purchased each year at auction, which renews the two five-year ladders. Since interest rates have risen, we have been able to purchase our bonds at a higher rate than previously. Our most recent bonds have been purchased at 6.5% interest and 6.87% (up from a previous 5.7% and 6.1%), which means more income for the Society.

Endowment Committee – Judi Ellzey, Chair

Judi Ellzey submitted a report [Inoculum 52(2): 8] noting that Esther McLaughlin, head of the Mentor Pledge Drive, has compiled a list of callers to solicit endowment contributions. Unfortunately, Dr. McLaughlin, who does not have time to complete her term and has resigned, needs to be replaced.

MOTION (approved unanimously): Linda Kohn moved, and Tim Baroni seconded, to accept the Endowment Committee report.

PUBLICATIONS REPORTS AND REQUESTS

Mycologia – Joan Bennett, Editor-in-Chief

It was noted that Mycologia Editor-in-Chief Joan Bennett, Managing Editor Jim Ginns, and EIC Assistant Mary Langlois were granted funds (in a previous email poll) to attend an editorial training session at Allen Press in Lawrence, Kansas this April.

Currently each Associate Editor has a 3-year term that can be renewed for a second 3-year term. The EIC Bennett sent in a request that these term lengths be increased. After much discussion, the Executive Council decided to leave the term length policy as is. It was suggested that existing Associate Editors be asked to recommend future Associate Editors from their most astute and reliable reviewers, particularly younger and newer members.

MOTION (passed unanimously): Linda Kohn moved, and Tim Baroni seconded, that the Executive Council recognize Rick Howard for his fine work on the color cover. President Miller will commend Dr Howard in his upcoming President’s Column in the Inoculum.

MOTION (passed unanimously): Tim Baroni moved, and Linda Kohn seconded, that President Miller travel to Allen Press at the same time as the EIC and ME to enter into new contract negotiations with AP and Allen Marketing & Management.

A request for financial assistance to Third World mycologists from the MSA International Affairs Committee was discussed. Executive Council members viewed existing policies and noted that these do not include direct subsidies for individual memberships. The suggestion that MSA encourage members to give individual gift memberships if they so desire will be forwarded to the International Affairs Committee.

Electronic Publishing Ad Hoc Committee – John Taylor

Dr. Taylor summarized the description of electronic publishing services from High Wire, noting that additional Allen Press cost estimates are still necessary to complete the package. He also presented information from Bio One, an alternate electronic publishing service. [See summary report attached.]

Ways and means to support this endeavor were thoroughly discussed. No decisions were made at this time.

MOTION (passed unanimously): John Taylor moved, and Jeff Stone seconded that

(i) John Taylor summarize the Executive Council discussion regarding establishment of contracting with High Wire Press for the purpose of electronic publication of Mycologia;

(ii) John Taylor circulate the resulting summary to the Executive Council for input and approval; and

(iii) President Miller circulate the document to the entire MSA Council for approval by the third week in March.

Web Page – no report
MOTION (passed unanimously): Linda Kohn moved, and Tim Baroni seconded, that a policy statement be added to the online teaching slide collection web page instructing anyone wishing to use images for publication to contact the donor directly for permission.

Allen Press/Allen Marketing & Management – Linda Hardwick, Association Manager

AMM representative Hardwick requested direction on whether or not to rent the MSA mailing list and asked what, if any, costs should be levied upon Sustaining Members. The Executive Council decided to continue to follow AMM’s policy of charging $250 per one time only use and agreed that everyone, including Sustaining Members, must follow that policy.

MEETING INFORMATION AND PARTICIPATION

MSA 2001 – Salt Lake City, Utah
Program Chair Jim Anderson sent in a report regarding distribution of Symposia funds. The Executive Council, after discussing whether to publish the abstracts in the APS publication or in the MSA newsletter, Inoculum, decided to continue publication of MSA abstracts in Inoculum. The rationale was that even members who do not attend the meeting would have easy access to the abstracts, while abstracts published in the APS publication would be available only to meeting attendees.

Medicinal Mushrooms 2001 – Kiev, Ukraine
Professor Solomon Wasser has requested funding for a Medicinal Mushrooms meeting to be held in Kiev [Ukraine]. The Executive Council noted that in keeping with Society guidelines for funding non-MSA meetings, more information must be obtained before a decision can be made.

MOTION (passed unanimously): Jeff Stone moved, and Linda Kohn seconded, that MSA allocate up to $1500 to host a joint reception with the BMS at IMC7.

MSA 2002 [mid-June] – Corvallis, Oregon
Co-Coordinator Jeff Stone reported that the meeting will be a 3-day meeting. Facilities are arranged, a Web Site Registration form is being planned, and a foray will still be held. Linda Kohn has agreed to make a checklist of things she found helpful when dealing with a stand-alone meeting at a university.

Botanical Society of America [BSA] – Mycology Section
David Hibbett, President of the BSA Mycology Section, submitted a request for direction from the Executive Council regarding the failing attendance of mycologists at BSA meetings. The Executive Council felt that MSA does not wish to become involved in the support of a section in another society. MSA President Miller will notify Dr. Hibbett accordingly.

BMS [British Mycological Society]/MSA 2003 – Asilomar, California
MSA President Miller has renewed the request forms to the convention center for space at the meeting.

MISCELLANEOUS BUSINESS

Distinctions Committee – Ian Ross, Chairman
1. Criteria for Fellows and Distinguished Mycologist Award: The Executive Council reviewed the report of the Distinctions Committee and decided that the guidelines set forth by MSA Council in 2000 at the annual meeting be followed as published in the minutes (Inoculum 51(5): 21). The subject will be addressed again by full Council at MSA 2001 in Salt Lake on August 24.

2. Chair Ian Ross requested that number of committee members be increased from the current number of four to five so as to avoid time-consuming ties in the future. The Executive Council decided that as the MSA President is already an ex officio member of the committee, he/she should be informed of all votes and be available for a tie-breaking vote if needed.

Culture Collection Proposal
Dr. Richard Humber has submitted a proposal for a new culture collection facility, based upon his belief that current microbial germplasm facilities are inadequate. He asked for any support for this proposal that the culture committee and/or MSA Council would be willing to provide. Culture Committee members do not support this proposal. The Executive Council decided that it is not the position of MSA to judge the capabilities or status of existing culture collections and facilities.

Education Committee – Michael Tansey
The Executive Council expressed its approval for the initiative shown by Dr. Tansy and the Education Committee in designing a brochure. The Executive Council also requested that it receive a draft of the information to be included in the brochure.

MOTION (passed unanimously): Jeff Stone moved, and Tim Baroni seconded, that MSA allot up to $1500 to be spent on producing an educational brochure.

Mycological Memoirs – John Zak, David Padget
Committee member John Zak proposed that there be an expanded role for Mycologia Memoirs. His main suggestion was inclusion of conference
Midyear Meeting of the MSA Executive Council

The Executive Council recommended that the Memoirs Committee submit proposals not normally included in the Memoirs to the Executive for final approval.

David Padget, who is finishing and updating Dr. Terry Johnson's unfinished work on Saprolegnia, sent in a request for publication support. The Executive Council recommended that he submit a request for support to the Research Awards Committee.

UNFINISHED BUSINESS

Jeff Stone reconsidered the motion regarding family memberships tabled earlier in the meeting.

MOTION (passed unanimously): Jeff Stone moved, and Tim Baroni seconded, that the Executive Council recommend the costs for family membership fee be decreased for the second member from $40 to $20. Should Full Council approve this dues change, the General Membership will consider this proposal at the August MSA 2001 meeting.

MOTION (passed unanimously): Linda Kohn moved, and John Taylor seconded, that the MSA Executive Council midyear meeting be adjourned.

President Miller adjourned the meeting accordingly at 6:30 PM.

Respectfully submitted,
Hope Miller, Acting Secretary

An Important Notice for Presenters of Contributed Presentations at the MSA Annual Meeting in Salt Lake City:

Audiovisual support for contributed presentations at the MSA Annual Meeting in Salt Lake will consist of SLIDE PROJECTION only. The individual meeting rooms will not be set up for Power Point presentations. Other services are available on request for symposium presentations. Questions about AV should be directed to Faye Labatt < flabatt@SCISOC.ORG > at APS.

Jim Anderson
Program Chair
Mentor Travel Awards Committee — Final Report

On behalf of the MSA Mentor Travel Awards Committee for the 2001 Salt Lake City meeting I offer the following report.

1. The 2001 committee consisted of Jim Clark (University of Kentucky) as chair, Jose Herrera (Truman State University) chair in 2002, Rosalind Lowen (N.Y. Botanical Garden), and Greg Thorn (University of Western Ontario).

2. Committee guidelines were revised and officially submitted to President — Elect Timothy J. Baroni.

3. Requests for applications were published in Inoculum 52(1) February 2001 with awards set at $500 and having an April 1st deadline.

4. A total of 23 applications were received and were ranked by the committee using the criteria established in the new guidelines.

5. Endowment Committee Chair Judi Ellzey informed the committee that 16 awards (1 Alexopoulos, 1 Barksdale/Raper, 4 Bigelow, 1 Butler, 2 Denison, 1 Fitzpatrick, 1 Fuller, 1 Korf, 1 Luttrell, 1 Thiers, 1 Uecker, 1 Wells) could be funded and the committee assigned the top 16 applicants to the appropriate mentor. A list of the 16 winners of the 2001 Mentor Travel Awards appears to the right of this report.

6. All applicants and their major professors who wrote supporting letters were informed of the committee’s decision by mail and winners were encouraged to write letters of appreciation to mentors or their survivors as has been done in previous years.

7. Award winners will be given biographical sketches of their travel award mentors as they are recognized at the Business Meeting.

Respectfully submitted,
Jim Clark, Chair

2001 MENTOR TRAVEL AWARD WINNERS
(The entry for each awardee includes: Name of mentor award, winner’s name, affiliation, degree in progress, major advisor, and title of presentation. Awards are listed alphabetically by name of the mentor.)

C.J. Alexopoulos Award: Rebecca Belling, Virginia Polytechnic Institute and State University, Ph.D., Orson Miller, The role of naturally occurring ectomycorrhizae in revegetation of a trace metal stressed site in southern Virginia.

A. Barksdale/J. Raper Award: Travis Clark, University of Toronto, M.S., James Anderson, Adaptation in long term cultures of Schizophyllum commune.

H. E. Bigelow Award: Sarah Bergemann, University of Wyoming, Ph.D., Steven Miller, Phytogeography and population biology of Russula brevipes.

H. E. Bigelow Award: Martin Coetzee, University of Pretoria, Ph.D., Brenda Wingfield, Phylogeny of the southern hemisphere Armillaria species.

H. E. Bigelow Award: Daniel L. Czederpiltz, University of Wisconsin, Ph.D., Glen Stanosz, The statistical comparison of species diversity among fungal communities.

H. E. Bigelow Award: Steven Trudell, University of Washington, Ph.D., Robert Edmonds, Nitrogen isotope ratios in sporocarps of ectomycorrhizal fungi: influence of phylogenetic and environmental factors.

E. E. Butler Award: Patrick Westfall, The University of Georgia, Ph.D. Michelle Momany, the Aspergillus nidulans septin AspB localizes to areas of new growth pre- and post-mitotically.

W. C. Denison Award: Jenny Tan, University of California Berkeley, B.S., Tom Bruns, Examination of genet size of two mycorrhizal fungi from the southern Sierra Nevada: Gaetveria monicola and Suillus (Gastrosuillus) suilloides using AFLP markers.

W. C. Denison Award: Todd Osmundson, Montana State University, M.S., Cathy Cripps, Preliminary systematics and ecological observations of Rocky Mountain alpine species of Laccaria.

M. S. Fuller Award: Merlin White, University of Kansas, Ph.D., Robert Lichtwardt, Exploring the relationships of gut fungi (Harpellales) using ribosomal DNA.

M.S. Fuller Award: Martin Coetzee, University of Pretoria, Ph.D., Gary Samuels, Biocontrol species of Trichoderma have Hypocrea telomorphs with green ascospores.

E. S. Luttrell Award: Ning Zhang, Louisiana State University, Ph.D., Meredith Blackwell, Population genetics of dogwood anthracnose fungus (Discula destructiva Relin).

H. D. Thiers Award: Terry Henkel, Duke University, Ph.D. Rytas Vigalys, Dicymbe forest as habitat islands for ectomycorrhizal fungi in the Pakaraima mountains of Guyana.

F. A. Uecker Award: Patrik Inderbitzin, University of British Columbia, Ph.D., Mary Berbee, Aliquandostipitaceae (Dothideomycetes, Ascomycota), a family with dimorphic ascomata and unusually wide hyphae.

K. Wells Award: Daniel Henk, Duke University, Ph.D. Rytas Vigalys, Systematics of Septobasidium Pat.
Article I. MEMBERSHIP

The Society shall consist of (A) individual members, (B) student members, (C) emeritus members, (D) life members, (E) family members, (F) sustaining members, and (G) honorary members. Any person or group interested in the study of fungi shall be eligible to apply for membership when endorsed by at least one member of the Society, except for Sustaining Members or Honorary Members who must be approved or elected as described below. A person may become associated with the Society as an Associate Member (H), and societies may become (I) Affiliated Societies. Members, Associate Members, and Affiliated Societies may be approved or elected by majority vote at any annual meeting of the Society or by Council by majority vote. All members in good standing are entitled to receive publications of the Society as stipulated below. Dues of those otherwise qualified may be paid as a gift by any member.

(A) Individual Member: Any person interested in the study of fungi. Application for membership must be endorsed by at least one member of the Society. Privileges of individual membership include the right to vote on Society business, to hold office, to attend meetings of the Society, to appear on the program of such meetings, and to receive one subscription to each of the following: the official journal of the Society, the official newsletter of the Society, the membership directory, and other occasional publications.

(B) Student Member: A full-time student in good standing endorsed by his or her major professor or department chair. Students qualify for individual membership with all privileges at a reduced rate for a maximum period of seven years.

(C) Emeritus Member: A person who has retired from active professional employment after having been an individual member of the Society for fifteen years or more. The individual must make a request to the Secretary, and upon recommendation of the Council, Society members may elect such members to emeritus status. Emeritus Members shall not pay dues, but shall retain all the privileges of individual members with the exception that they will not receive the journal. An Emeritus Member may be an Emeritus Member Subscriber who elects to receive the journal at a reduced rate.

(D) Life Member: An individual member who pays a one-time life membership fee in an amount determined by the Council. A Life Member, upon election by the Society, shall have all the privileges of an individual member.

(E) Family Members: Family members qualifying for individual membership. One full membership fee and a reduced fee for each additional member entitles the family to a single journal and newsletter subscription; otherwise, each family member has the full privileges of an individual member.

(F) Sustaining Member: An individual or corporation recruited and recommended for sustaining membership by the Committee on Sustaining Membership. Sustaining members must be approved by Council. A sustaining member shall have the privileges of an individual member as well as those specified by the Committee on Sustaining Membership.

(G) Honorary Member: Distinguished, senior scientist with a long record of significant contributions to the study of fungi.
the science of mycology and who resides and works in a country other than the United States and Canada. There will be no more than 35 living honorary members at any time. Any member of the Society may submit nominations, accompanied by a detailed documentation of the credentials of the nominee, to the Committee on Honorary Members. The Committee will review the nominations and report its recommendations to the Council. After evaluation of the Committee’s recommendation, the Council will present nominees selected for election to the membership at the annual business meeting. Honorary members shall have all of the privileges of an individual member but shall not pay dues. A notice of election will be placed in the Newsletter and new Honorary Members will be notified by the Secretary.

(H) **Associate Member**: An individual who wishes to receive the newsletter of the Society and/or attend the annual meetings of the Society. Associate members will not receive the official Journal of the Society and may not vote in Society elections or hold office. Applications for Associate membership must be endorsed by a regular individual member of the Society.

(I) **Affiliated Society**: An organization which represents a community of interest in some aspect of mycology. Approval by Council required. Each affiliated organization shall pay annual dues as an individual member. It will receive one subscription to each publication of the Society, and it shall be entitled to one vote in the business of the Society through its president or other officially designated representative. Members of affiliated organizations shall be eligible to attend all meetings of the Society, but shall not be eligible to hold office in the Society or to vote on the business of the Society unless qualified under some other category of Society membership.

**Article II. DUES**

(A) Each **active membership** shall be maintained through the payment of dues to the Society as defined herein. The membership year and the publication year of the Society’s official journal shall run concurrently with the calendar year. Bills for dues shall be mailed to members, affiliates, and associates several months prior to December 31 and shall be payable in advance on or before December 31. Delinquency in payment of dues shall be sufficient grounds for the removal of the member from the Society rolls. Late renewal fees may be assessed.

(B) The **schedule of dues** for the different classes of members shall be determined by the Council and voted on by the Membership. Dues information will be published regularly in the Newsletter. The current dues schedule is:

- **Individual Member** $80, annually.
- **Student Member** $40, annually.
- **Emeritus Member Subscriber** $40, annually.
- **Family Member** $80 plus $20 annually for each additional member.
- **Sustaining Member** $250 or more annually.
- **Life Member** single payment of $1000.
- **Affiliated Society** $80, annually.

**Emeritus and Honorary Members pay no dues.**

A **gift** of a membership may be given at a rate appropriate to the status of a qualified recipient by any member.

**Article III. ELECTION OF OFFICERS AND COUNCIL MEMBERS**

**New officers**, including Vice-President, Secretary and Treasurer, and Council Members are elected from two slates of nominees by the following procedure:

(A) The Vice-President, as election manager, shall mail to each member of the Society at least **four months** prior to the annual meeting a request for the nomination of officers and council members.

(B) At least **three months** prior to the annual meeting, the nominating committee will provide to the Vice President a second slate of candidates for officers and council members.

(C) Generally the **nominees** of the membership and of the nominating committee shall be the individuals receiving the largest number of votes in each nomination race. In some cases it may be necessary for the Vice-President to coordinate the nominations in the following manner. Should the nominee of the nominating committee and the one of the membership be the same, the nominee receiving the second highest number of votes from the membership shall be placed on the ballot. Should the nomination votes received by a candidate place him or her among the two highest nominees for more than one office, the nominee shall decide for which office he or she wishes to be nominated. Permission from each of the individuals nominated by membership and the nominating committee shall be obtained by the Vice-President before a nominee is placed on the ballot.

(D) The Vice-President shall provide to the Secretary the **final ballot** with information about the candidates. At least two months before the annual meeting the final ballots shall be mailed by the Secretary to all members. The ballots shall be returned to the Vice-President who will oversee their counting. A majority of those voting shall elect. A tie vote for any office shall be resolved by Council. Those elected will be notified by the Vice-President so that they may attend the Council Meeting as observers prior to their assumption of office.

(E) Any officer or councilor unavailable, unable, or unwilling to fulfill the responsibilities of office may be **replaced** by Council with another person to serve out the remaining term of office.

**Article IV. EDITORS, COMMITTEES, AND REPRESENTATIVES**

(A) The President with approval of the Council shall appoint the **Editor in-Chief** of the official journal, the **Managing Editor** of the journal and editors of other official Society publications. The terms of office for the Editor-in-Chief and the Managing Editor shall be 5 years, with the possibility of
enewal for one term. The Editor-in-Chief, with approval of Council, shall appoint associate editors for three-year terms, with the possibility of one renewal. No associate editor shall serve for more than 6 consecutive years, although long-serving associate editors may be appointed again after a lapse of two years. The Newsletter Editor shall serve for a term of three years.

(B) The Executive Council shall consist of the immediate Past-President, President, President Elect, Vice-President, Secretary, and Treasurer. The Executive Council will meet as necessary, usually annually in early Spring, and will 1) monitor progress of MSA committee activities, 2) prepare a budget forecast, and 3) attend to all other pressing business of the Society. Any member of the Executive Council may refer a decision of that body to the full Council for consideration.

(C) Committees. There shall be three types of committee in the Society: temporary (ad hoc), rotating, and standing. Unless otherwise stipulated, the President appoints members annually to fill vacancies on committees. Terms of service on committees begin at the time the member is appointed and end at the annual business meeting in the final year of the term. Each committee will normally consist of 3-5 members, with terms staggered such that normally no more than 1, and never more than 2 positions become vacant in any given year. In case of resignations the President will appoint a replacement to serve the remainder of the term for the vacant position.

(D) Temporary Committees may be established by the President to complete some specific task; members normally serve for a term of one year. Such committees may be reappointed by a new President for an additional term if more time is necessary to complete the task.

(E) There shall be Rotating Committees for General Service - Nominations, Program, the Karling Lecture, and Liaison with Amateur Mycological Clubs And Societies; Rotating Committees with specific expertise - Environmental Health and Medical Mycology, Phytopathology, Ecology, Biodiversity, Culture Collections, and Rotating Committees on awards - Student Awards, Mentor Travel Awards, Senior Research Awards, MSA Distinctions, Honorary Membership. The Chair of a Rotating Committee is that member serving his/her final year on the committee. The most recent past-chair of a rotating committee retains ex officio, non-voting status on the committee for one year to assure smooth transitions in committee leadership.

(1) Nominations: 4 members, all recent past-presidents of the Society, each serving a 4-year term. Service limited to one term. This committee provides one of two slates of candidates for the annual election.

(2) Program: 4 members, which represent each of the Society interest areas, each member serving a 4-year term. This committee is charged with making arrangements for holding the annual MSA meeting.

(3) Karling Lecture: 3 members, each serving a 3-year term. The committee submits a slate of three ranked nominees for the Karling Lectureship to Council for its approval one year in advance of the lecture, then contacts nominees in order of ranking until one nominee has accepted.

(4) Liaison with Amateur Mycological Clubs And Societies: 3 members, each serving a 3-year term. The committee facilitates communication with amateur clubs and societies.

(5) Committees providing subject area expertise: Environmental Health and Medical Mycology; Phytopathology; Ecology; Biodiversity; Culture Collections. 4 members on each committee, each member serving a 4-year term. These committees provide liaison with other biological societies, brief articles to the Newsletter, advice to the Society and government agencies on matters of public policy, and answers to inquiries. They may also organize symposia and other sessions at annual meetings.

(6) Committees on Awards: Student Awards; Mentor Travel Awards; Research Awards; MSA Distinctions; Honorary Membership. These committees solicit nominations and choose winners for the various awards and distinctions offered by the Society annually.

a) Student Awards. 4 members, each serving a 4-year term and representing, if possible, the four subject interest sections in the Society. This committee shall choose winners of the MSA Graduate Fellowships, the NAMA Fellowship, the M.P. Backus Award, and awards for best student poster and lecture presentations at the annual meetings.

b) Mentor Travel Awards. 4 members, each serving a 4-year term. This committee chooses recipients of Mentor Travel Awards and attempts to match the research interests of recipients with the mycologist in whose name the award was established.

c) Research Awards. 6 members, each serving a 3-year term. The committee distributes funds from the H.V. and A.H. Smith and Martin-Baker Research Endowments based on the merits of applicants’ proposals. The number and monetary value of the awards may vary from year to year. Two members will rotate to the position of co-chair each year, each person facilitating one of the awards.

d) Mycological Society Distinctions. 4 members who are past recipients of Society distinctions, each serving a 4-year term. The President serves as an ex officio member of the committee, voting only in the case of tie votes among the regular members. The committee decides on recipients of the Alexopoulos Prize, the Distinguished Mycologist Award, and the Weston Award. The Alexopoulos Prize is given to a junior member of the Society within ten years of his or her terminal degree
based on outstanding contributions to mycology early in his/her career. The Distinguished Mycologist Award is presented to one or more senior members of the Society based on a record of sustained outstanding research in mycology. The Weston Award is presented to one member a year for excellence in teaching. The committee may choose to make no award(s) in any given year if no satisfactory nominations are received.

c) Honorary Membership: 3 members, all past-presidents of MSA, each serving a 3-year term. The committee calls for nominations, screens, and recommends nominees for Honorary Membership to Council. Nominees are officially voted to membership in the Society at the annual general business meeting.

(F) There shall be Standing Committees which deal with the following areas: Endowment, Education, Finance, International Affairs, MSA WebPage and Electronic Communication, Mycologia Memoirs, Sustaining Membership, and Nomenclature. The committee chair is appointed by the President, or, where stipulated, Council, and serves as chair until the end of his or her term on the committee. The most recent past-chair of a standing committee retains ex officio, non-voting status on the committee for one year to assure smooth transitions in committee leadership.

1) Education: 4 members, each serving a 4-year term. This committee carries out initiatives of the Society pertaining to teaching, training, and education in mycology. The President Elect of the Society serves as an ex officio member.

2) Endowment: 4 members, each serving a 4-year term. President and Treasurer serve as ex officio members. The committee solicits contributions to MSA endowment funds and undertakes all other fund-raising activities on behalf of the Society.

3) Finance: 4 members appointed by Council, each serving a 4-year term. The chair may be appointed for additional terms. The committee oversees the management and investment of the Society’s funds and makes suitable recommendations to the Executive Council. The Society’s President and Treasurer serve as ex officio members.

4) International Affairs: 4/5 members, each serving a 4-year term. This committee acts as an advocate for non-US/Canadian members of MSA and proposes initiatives which will lead to long-term collaborations between MSA and other mycological associations and societies. It serves primarily to spur the growth of mycological expertise in countries where it is lacking and to facilitate interactions among MSA members in the international community.

5) Electronic Communication and WebPage Management: 4 members, each serving a 4-year term. The newsletter editor serves as an ex officio member. The committee oversees the operation and maintenance of an electronic bulletin board, the MSA WebPage, the Mycologia WebPage, the online directory, and any other centralized online services. The committee also considers contracts for hardware services and provides information and advice to Council on policy issues involving electronic communication and the MSA image on the web.

6) Mycologia Memoirs: 4 members, each serving a 4-year term. The chair may be reappointed, but for one additional term only. This committee serves as a Board of Editors, soliciting and facilitating the publication of book-length monographs.

7) Sustaining Membership: 4 members, each serving a 4-year term. Members solicit sustaining memberships from corporate sponsors and ensure that corporate support is acknowledged by letter, listing in the journal, and links on the Society WebPage. The chair monitors renewals and recommends prospects for new sustaining members.

8) Nomenclature: 3 members, each serving a 3-year term. The committee advises MSA members on nomenclatural issues, answers queries, publishes educational articles on fungal nomenclature in the Newsletter, and represents the Society in international forums where nomenclatural questions are decided.

(G) Society Representatives. The President appoints representatives to the following organizations. Terms of office are for three years, except where otherwise stated.

American Association for the Advancement of Science, Committee of Biology
American Institute of Biological Sciences, Council
American Institute of Biological Sciences, Public Responsibility
American Mushroom Institute
American Type Culture Collection
Association of Systematic Collections
International Mycological Association
International Union of Biological Societies (Correspondent)
International Union of Microbiological Societies, U.S. National Committee
(Society forwards a nomination to National Academy of Sciences, 4-year term)

(H) Assignments, Ex Officio Committees

1) Historian. Appointed by Council for indefinite term. Maintains Society archives and provides historical information about the Society to Council and the President on request.

2) Liaison for Society Incorporation. Appointed by Council for indefinite term. Should reside in or near Washington D.C.

3) Foray Coordinator. Appointed by the President for a term of three years. Arranges for forays before or
after each annual meeting.

(4) Local Arrangements Coordinator. Appointed by the President for a term of one year. This person(s) work closely with the program and endowment chairs to assure adequate facilities for the annual meeting.

(5) Committee on Publication of Memorials. Ex officio committee consisting of Editor-in-Chief, President, and Historian. The committee insures that timely Memorials of recently deceased members are published in the Society’s journal.

Article V. MEETINGS

(A) An annual meeting for the transaction of Council and Society business and for the presentation of scientific papers shall be held at such time and place as the Council may decide. Collecting forays may be held each year at a time and place to be selected by the Foray Coordinator. Additional meetings, including special or local meetings for the presentation of papers or the carrying out of forays, may be arranged by the Council at its discretion. A quorum of the Council for transaction of business at its annual meeting, or in the interim by mail, shall be eight. A quorum of the Society for the transaction of business at any general meeting shall be a minimum of twenty five members entitled to vote.

(B) Programs for annual or other meetings shall be arranged by the Council. Responsibility for the scientific portion of the meeting will be delegated to the Program Committee.

(C) Members wishing to make presentations at the annual meeting shall submit to the Chairman of the Program Committee any information requested in advance of the annual meeting. When meetings are held jointly with another society, forms containing the formal intention to present and the abstract plus any required fee will be submitted to a designated program authority. Such information shall be due on or before an appropriate date listed in the call for presentations, and the Chair of the Program Committee shall be authorized to refuse any titles received after that date. Except by invitation, no member shall offer more than two presentations at any one meeting; presentations of joint authorship are attributed to the presenting author.

Article VI. PUBLICATIONS

The Journal of the Society shall serve as its official outlet for disseminating mycological information. It shall also serve for the publication of Memorials, reports on the audits of the Society, and any other items deemed germane to the business of the Society by the Editor-in-Chief. The Society Newsletter shall publish short informal articles, meeting abstracts, Society notices, letters, and any other material deemed appropriate by the Newsletter Editor. Book-length monographs may be published as Mycologia Memoirs. Other publications may be authorized by the Council.

Article VIII. GENERAL PROHIBITIONS

Notwithstanding any provision of the Constitution or by-laws which might be susceptible to a contrary construction:

(A) The Society shall be organized exclusively for scientific and educational purposes;

(B) The Society shall be operated exclusively for scientific and educational purposes;

(C) No part of the net earnings of the Society shall or may under any circumstances inure to the benefit of any private shareholder or individual;

(D) No substantial part of the activities of the Society shall consist of carrying on propaganda or otherwise attempting to influence legislation;

(E) The Society shall not participate in or intervene in (including the publishing or distributing of statements) any political campaign on behalf of a candidate for public office;

(F) The Society shall not be organized or operated for profit;

(G) The Society shall not

1) Lend any part of its income or corpus without the receipt of adequate security and a reasonable rate of interest to,

2) Pay any compensation, in excess of a reasonable allowance for salaries or other compensation for personal services actually rendered, to,

3) Make any part of its services available on a preferential basis, to

4) Make any purchase of securities, or any other property for more than adequate consideration in money or money’s worth from,

5) Sell any securities or other property for less than adequate consideration in money or money’s worth to, or

6) Engage in any other transaction which results in a substantial diversion of its income or corpus to any officer, member of the Council, or substantial contributor to the Society.

The prohibitions contained in this Section G do not mean to imply that the Society may make such loans, payments, sales, or purchases to anyone else, unless such authority be given or implied by other provisions of the constitution or by-laws.

Article IX. FINANCES

(A) All funds of the Society shall be deposited to the credit of the Society in such banks, financial firms, or other depositories as the Council shall direct.

(B) All checks, drafts, or other orders for the payment of money in the name of the Society shall be signed by such officer of the Society and in such manner as the Council shall direct.

(C) The annual accounting period of Society funds shall begin on August 1 and end on July 31 of the succeeding calendar year.

(D) Prior to each annual meeting the Treasurer shall prepare a summary of
the Society's financial status. At the conclusion of the Treasurer's term, normally every three years, the Treasurer will commence a professional audit. This audit shall include all financial activities of the society, including the publication of the official journal, endowment funds, and operating budget. The Treasurer's report shall be read at the annual business meeting and published in the Society's newsletter.

(E) Receipts from membership dues shall be used exclusively for the stated purposes of the Society and serve as the primary source of revenues for operational costs. The Endowment Fund shall be comprised of the Restricted Endowment and the General Endowment. The Restricted Endowment is a restricted account maintained for the purpose of providing earned investment income to support specific activities of the society: memorial lectures, graduate student fellowships, research awards, and student travel awards. Subfunds included within the restricted endowment include the Alexopoulos Prize Fund, the A.H. and Helen V. Smith Award Fund, the Martin-Baker Research Award Fund, the M.P. Backus Award Fund, the Karling Lecture Fund, the named Mentor Travel Award funds and others, as established. The General Endowment is a restricted account with earned investment income used to support regular activities of the society and special projects (e.g., special publications, workshops) that enhance mycology as a discipline and serve the other goals of the Society, as approved and allocated by vote of Council.

Article X. USE OF THE SOCIETY'S NAME

Unauthorized use of the name of the Mycological Society of America for advertising or other business ventures is prohibited. The circulation of any unauthorized literature shall be taken as prima facie evidence of the violation of the intent and purpose expressed in this By-law. Any member may be expelled from the Society either by a majority vote of the Society at its meetings or by a majority vote of the Council such for a violation.

Article XI. AMENDMENTS

These by-laws may be amended by a majority vote of the members voting by a mail ballot to be submitted by the Secretary at the direction of the Council, provided that suggested amendments have been brought to the attention of the Council in time to be mailed to all members of the Society at least one month previous to the date established as the deadline for return of marked ballots.

MSA Council Email Express

Since March 6, 2001, Executive Council and Council have taken the following actions:

Email Council Poll 2001-03 – On March 6, Executive Council granted Treasurer Jeff Stone’s request to contract with a student at Oregon State University to develop an online MSA membership renewal form (for an estimated upper expenditure of $375).

Email Council Poll 2001-04 – On March 9, a motion requesting additional funding was withdrawn after Executive Council members found the projected symposium budget to be adequate.

Email Council Poll 2001-05 – On March 6, Executive Council approved MSA's contributing $1000 financial support to the IV Latin American Congress of Mycology in Xalapa, Veracruz, Mexico on May 13-17, 2002.

Email Council Poll 2001-06 – On April 5, MSA Council approved Drs Paul Bayman and Nicholas Money as new Mycologia Associate Editors.

Email Council Poll 2001-07 – On April 10, Executive Council approved an expenditure of up to $1000/year for a work-study student to help Joan Bennett and Mary Langlois with Mycologia clerical duties.

Email Council Poll 2001-08 – On April 13, in consideration of anticipated budgetary limitations resulting from hosting two MSA annual meetings in one fiscal year, Executive Council decided not to help underwrite the September, 2001, Kiev Medicinal Mushrooms conference.”

Other Council Actions:

Council has been apprised of the Executive Council’s recommendations regarding on-line publication of Mycologia. The Society will be notified as to Council’s final decision in the next Inoculum.

During the past two years, anyone has been able to enter address corrections or additions to any address on the MSA On-line Directory. Unfortunately, apparent hacker corruption of the Directory was discovered on March 30. Consequently, David Farr and Linda Hardwick will need to implement security measures. Until the site can be safely secured, those wishing to enter directory information will need to send their corrections/additions to Linda Hardwick. (Contact information for Linda is provided on the website.)

— Lorelei Norvell
MSA Secretary
From the Editor . . .

Every now and then I receive copy to advertise free mycological books, back issues of Mycologia, etc. for graduate students in the Society. It has been brought to my attention that everyone in the Society does not receive their copies of Inoculum at the same time, and thus, some feel they are not receiving an equal chance to obtain these valuable materials. Because of this disparity, in the future I will place an advertisement concerning free materials on the MSA Bulletin Board on or about the first day of the month that Inoculum is to be mailed (for example, May 1, 2001 for this issue). Everyone can reach the Bulletin Board from the MSA Home Page. This will give everyone equal opportunity to obtain these materials. Additionally, I will run the advertisement in Inoculum for that month.

-- Donald Ruch
Editor of Inoculum

Embarrassing Additions, Omissions and Corrections

1. Additional Comments on the MSA 2000 Foray. I have two comments (apologies) to make in reference to the feature article concerning “MSA Foray 2000: Indian Brook Conservation Area, Essex Junction, Vermont (Inoculum 52(2):4-6). First, Pat Leacock (PL) was listed as the identifier for many of the mushrooms collected. Pat asked that I clarify this. He was recording species identified by other mycologists during the foray and the lab. Many of the species listed with “PL” were identified by other people, but he didn’t keep track of whom, just the species names. Thus, he was more of a recorder in a sense. Second, the identifier listed as “JM” in Table 1 stands for John McPartland. I inadvertently left his name off the list of identifiers and apologize to John. As foray coordinator, I wish to extend my appreciation to the time and effort both Pat and John, as well as the other identifiers, put forth to record the specimens collected.

2. The American Mushroom Institute-MSA Liaison/representative Rick Kerrigan was inadvertently left off the official MSA roster (MSA Committees and Officers, Inoculum 51(6):12-14). This is a new Liaison that was added in 2000 after publication of the 1999-2000 Roster. The complete MSA Roster will be published in the next issue of Inoculum.

3. As indicated in the last two issue, you can assist greatly the Inoculum editor in one very important ways. I ask each of you to carefully edit any material before you send it to me. It would be a good idea to have one of your colleagues review the material before sending it to the editor. The deadline for the next issue (52(4)) is Friday, June 15, 2001.

-- Donald Ruch
Editor of Inoculum

David Sime, 1999
ADAMS, GERARD C.1 AND WINGFIELD, MICHAEL J.2 1Dept. Plant Pathology, Michigan State University, East Lansing, MI 48824, USA; 2Forestry and Agricultural Biotechnology Institute and Tree Pathology Co-operative Programme, University of Pretoria, Pretoria 0002, South Africa. Morphology and molecular phylogenetics of Cytospora species on Eucalyptus.

Cytospora species isolated from cankers on Eucalyptus were collected from five continents. Phylogenetic analysis of sequence from the internal transcribed spacers of the ribosomal DNA operon clustered isolates into several distinct clades. The morphology of representative isolates of each clade was examined on host tissue and in culture using microtome sectioning. Cytospora species with morphological characteristics of sections Cytophoma, Cytospora, Leucocytospora and Torsellia were represented. Additionally, several different species were distinguishable in section Cytophoma. Species descriptions are emended and the morphology of teleomorphs compared where possible. Contributed Presentation

ADRIAN LEUCHTMANN1 AND BULTMAN, THOMAS L.2 1Geobotanisches Institut ETH, Zollikonerstrasse 107, CH-8008 Zurich, Switzerland; 2Division of Science, Truman State University, Kirksville MO 63501 USA. Epichloe grass endophytes and their interaction with a symbiotic fly.

Epichloe species are self incompatible (heterothallic) and need to be fertilized by spermatia of opposite mating type. Female flies of the genus Botanophil a act as vectors of spermatia which they ingest and defecate onto the fungal stroma after oviposition. Larvae feed and develop on the stromata and thus maintain a symbiotic relationship with Epichloe fungi. Dependence on fertilized stromata as food source could promote specialization of flies to single compatible host species. Observations made in experimental field plots and ascospore progeny analysis indicated prevalence of specific matings between stromata of the same host suggesting that flies are species-specific in their visitation behavior. However, genetic analyses of spermatia contained in the faeces of individual flies did not support this hypothesis. Botanophil a flies appear to visit hosts that are available and defecate a mixture of spermatia. Differences in competitiveness among spermatia from different species or host races on a particular stroma may favor fertile mating interactions between spermatia and stroma of the same species. Poster

AIME, M. CATHERINE1 AND HENKEL, TERRY W.2 1Department of Biology, Virginia Tech, Blacksburg, VA 24061; 2Department of Biology, Duke University, Durham, NC 27708. Species diversity of saprotrophic macromycetes in the Pakaraima Mountains of Guyana.

Several recent studies have documented the occurrence of ectomycorrhizal (EM) basidiomycetes and leguminous EM trees in neotropical rainforests of the Pakaraima Mountains of Guyana, South America. These studies have indicated that a diverse community of EM fungi associates with these host trees, with an estimated 50-75% of the EM fungal taxa appearing to be new to science. Diversity and species richness for saprotrophic macrofungi remain unreported. During the rainy seasons of 2000-01, plot surveys were designed within monodominant forests of the EM legume Dicynbe corymbosa, and within mixed forest stands lacking EM trees, to determine the saprotrophic macrofungal component of these unique communities. During the first sampling season sporomes of approximately 284 morphotaxa of saprophytic fungi were recorded, with most distributed in both forest types. Presumed saprotrophs accounted for 71-78% of macrofungal species diversity within the forest types dominated by D. corymbosa; 29% of these belong to the Tricholomataceae s.l. Other speciose families (sensu Singer) include the Hygrophoraceae (7%), Canodermataceae (6%), Polyporaceae (8%) and Xylariaceae (5%). Abundance, frequency, and substrate preference of the various morphospecies will be discussed. Contributed Presentation

ALBEE-SCOTT, STEVEN AND FOGEL, ROBERT. Department of Biology and Herbarium, University of Michigan, Ann Arbor, MI 48109, USA. Panmixia in the false-truffle Hymenogaster subilacinus (Basidiomycota, Cortinariaceae) rejects the persistence hypothesis of conifer biogeography in the Great Basin.

Restriction Fragment Length Polymorphism (RFLP) from Hymenogaster subilacinus populations were used to test two competing biogeography hypotheses formulated by P.V. Wells, and by Axelrod and Raven to explain conifer distributions in the Great Basin. Wells hypothesized that low elevation conifers reinvaded the central Great Basin after pluvial lakes flooded their habitats. Axelrod and Raven hypothesized that the lower montane forests persisted in the Great Basin during the Wisconsin glaciation. H. subilacinus is an obligate ectomycorrhizal associate of several conifers and its population structure should therefore provide an independent test of the two competing biogeography theories. The ribosomal InterGenic Spacer 2 (IGS-2) of H. subilacinus was amplified with the primers CNS1 and SSAr. The amplification products were digested using endonucleases TAQ I and APO I. A network analysis on the resulting IGS-2 RFLP data showed that gene flow has occurred among disjunct populations of H. subilacinus. This provides support for the Wells hypothesis that lower montane conifers reinvaded from forest “mainlands” in Utah. Panmixia is not a prediction if the disjunct populations had persisted as hypothesized by Axelrod and Raven. We are beginning a detailed analysis of the relationship among populations by sequencing the IGS-2 and other regions. Poster


The effectiveness of a plant extract and several fertilizers for controlling powdery mildew, caused by Sphaerotheca pannosa var. rosea, was tested under greenhouse conditions in young rose plants. The foliar application of an aqueous leaf extract (1:10 w/v ratio) from Swinglea glutinosa (Merr. Rutaceae) reduced the
number of leaves affected by powdery mildew and the number of colonies of *S. pannosa* var. *rosae.* In the presence of high disease incidence, no significant differences were found between the commercial fungicide (Elosal, 80% sulfur) and the tabog-based biofungicide. Individual applications of aqueous solutions of potassium and sodium phosphate also reduced disease incidence and severity consistently. Potassium di-phosphate induced resistance in the rose cultivar Livia but not in Classy. These results show that alternative measures to conventional methods can effectively control powdery mildew of roses. *Poster*

ALVAREZ, E. AND MEJIA, J.F. Centro Internacional de Agricultura Tropical, A.A. 6713, Cali, Colombia. Assessing virulence and genetic variability of *Sphaceloma manihoticola,* causal agent of superelongation in Cassava, in Brazil and Colombia, using RAMS and AFLP.

Twenty-nine single-spore cultures of *Sphaceloma manihoticola* from center-south Brazil and northeastern Colombia were used to study the genetic and pathogenic variability of the fungus. Variation in virulence was determined in the greenhouse by inoculating 15 cassava (*Manihot esculenta*) genotype differentials. High variation in virulence was observed among Brazilian isolates. Five cassava genotypes were identified as differential varieties. Using RAMS and primers ACA and CCA, 17 genetic groups were distinguished among the isolates. Based on RAMS, Brazilian isolates were not found in Colombia and vice versa. With the exception of one municipality, all sample sites have their own genetic group of *S. manihoticola.* This high genetic variation was also observed in AFLP analyses, using combinations of primers EAC/MA, EAC/MC, and EG/MA. The correlation observed between geographical origin and polymorphism detected by RAMS was +0.62. *Poster*


The cereal pathogen *B. sorokiniana* secretes an extracellular matrix (ECM) that is thought to be important for adhering the fungus to the host surfaces. The ultrastructure and composition of the ECM were investigated using electron and light microscopy based methods. The ECM labelled intensively for both proteins and polysaccharides but the proportion of these compounds changed with the morphological stage of the fungus. A series of experiments studying the adhesion of *B. sorokiniana* to artificial solid surfaces provided evidence that glycoproteins in the ECM mediated germling adhesion. ECM proteins were labelled with a membrane impermeable biotinylating agent and extracted using a HCl-glycine buffer. Two-dimensional gel electrophoresis revealed the presence of about 40 proteins on the fungal cell surface. Four of the ECM proteins were isolated, *in gel* digested with the enzyme trypsin and sequenced by MS/MS. No significant sequence similarities to proteins in NCBI databases were obtained. *Symposium Presentation*

BAE, H.N., LIM, C.K. AND HUR, J.H. Division of Biological Environment, College of Agriculture and Life Sciences, Kangwon National University, Chunchon, 200-701, Republic of Korea. Identification of soybean sprout rot pathogens and their control with pesticides.

Soybean sprout, one of the traditional foods in Korea, has a problem of rot disease under humid and closed cultivation condition. Identification of pathogens of soybean sprouts and effectiveness of pesticides for their control have not been reported, however. In this study, *Pectobacterium carotovorum* subsp. *carotovorum* and *Pseudomonas* spp. were identified as bacterial pathogens, while *Psarotium oxysporum,* *Alternaria* spp., *Rhizoctonia* spp. and *Mucor* spp. were identified as fungal pathogens. *F. oxysporum* was found as a major pathogen of soybean sprouts. Two bactericides, streptomycin and oxolinic acid, were effective for the control of both bacterial pathogens and their similar effectiveness were observed. Among four tested fungicides, carbendazim, thiabendazole and thiram showed effective for *F. oxysporum,* *Rhizoctonia* spp., and *Mucor* spp. respectively, but not for *Alternaria* spp. *Poster*

BANIK, MARKT, *MICALES, JESSIE A. AND BURDSALL, HAROLD H. JR. USDA Forest Products Laboratory, One Gifford Pinchot Dr., Madison, WI 53705. Differences between *Laetiporus hurnoniensis* and *L. conifericola,* two species occurring on conifer in North America.*

*Laetiporus sulphureus* sensu lato has recently been divided into five species based on morphological, ecological, molecular biological, and incompatibility data. Two of these species, *L. hurnoniensis* and *L. conifericola,* are primarily separated by the former occurring in eastern North America and the latter in western North America. They both fruit exclusively on standing or fallen conifer trunks and are morphologically indistinguishable. Additional information is needed to clarify the taxonomic position of these species. Preliminary results of pairings between single spore isolates from 5 collections of each species exhibit about 20% nuclear exchange based on allozyme analysis. Tissue cultures of *L. conifericola* isolates grow 9.6 mm/d at 24°C, produce abundant conidia and are buff in color when grown in light. Tissue isolates of *L. hurnoniensis* isolates grow 5.2 mm/d at 24°C, do not produce conidia, and are bright orange when grown in light. Sequence analysis of the ITS region of the nuclear rDNA show two 6bp insertions in the *L. conifericola* isolates which are absent in the *L. hurnoniensis* isolates. Similarly, a 16 bp insertion occurs in the mitochondrial small-subunit rDNA of *L. conifericola,* but not *L. hurnoniensis.* Based on this additional information it is apparent that *L. conifericola* and *L. hurnoniensis* are reproductively isolated and are worthy of species status. *Poster*

PCR assays for a panel of almond pathogens were implemented as part of a testing service for confirmation of disease identification in suspect almond tissues*. New assays for the detection of Colletotrichum acutatum, Cladosporium carpophilum, Alternaria alternata, and Monilinia spp. in almond tissues were developed. These assays were shown to differentiate the target species from each other as well as from other common almond pathogens. Samples were sent to our testing lab from almond growers and Pest Control Advisors (PCAs) in California and diagnostic results were returned. Data for three years of testing for Colletotrichum acutatum** and Monilinia spp. are documented as well as initial results for the 2001 testing season for Cladosporium carpophilum and Alternaria alternata. *These tests were performed pursuant to licensing arrangements with the Perkin-Elmer Corp. under patent rights owned by Hoffmann-La Roche Ltd. and Hoffmann-La Roche, Inc. **Adaskaveg, J. E. and Martin, R. J. 1997. Phytopathology 87: 979-987. Poster

*BARONI, TIMOTHY J., MONCALVO, JEAN-MARC, AND KRAUSE, NATHAN J. 1Department of Biological Sciences, State University of New York - College at Cortland, Cortland, NY USA 13045; 2Department of Botany, Duke University, Durham, NC 27708 USA. A phylogenetic profile of some Clitopilus species (Agaricales) based on ITS rDNA sequences.

We have previously determined that the Entolomataceae appears to be a monophyletic group based on nlsu rDNA sequences. We now have some support to recognize two distinct clades, perhaps subfamilies, within the Entolomataceae. One of these clades consists of those members of the Entoloma sensu lato group with distinctly angled basidiospores in all views, while the other clade contains Rhodocybe and Clitopilus. These later two genera have completely different basidiospore morphologies and their separation from Entoloma sensu lato was expected. An analysis of the ITS region of rDNA sequences for selected species of Clitopilus reveals two clades which follows the two distinctive patterns of basidiospore ornamentation seen in this genus. However, numerous different examples of Clitopilus kobsonii, from widely different locations, do not consistently cluster with each other. The scattering of this “taxon”, which possesses very few truly distinctive morphological traits, through the tree generated from ITS sequences, indicates a need to reevaluate the morphological species concept of C. kobsonii and taxa with similar phenotypic traits. Poster

BEARD, CHARLESE AND ADLER, PETER H. Department of Entomology, Clemson University, 29634. Trichomycetes from black flies in northwestern South Carolina are seasonal.

Trichomycete fungi are common in many aquatic dipteran larvae, but their ecology is little known. We investigated the seasonality of trichomycetes in larval black flies (Diptera: Simuliidae) from three streams in northwestern South Carolina. Trichomycetes colonized 94% of two species of larval black flies. At least eight species of trichomycetes were found. Harpella melusinae, Simulomyces microsporum, and Paramoebidium spp. had significant differences in their seasonal prevalences. The lowest mean prevalence for Harpella melusinae occurred in winter (67%) versus the other seasons (96-100%), whereas mean prevalence for Simulomyces microsporum was lowest in summer (1%) versus the other seasons (2-21%) and for Paramoebidium spp. mean prevalence was lowest in summer (9%) versus the other seasons (45-67%). Paramoebidium chattoni had significantly different seasonal levels of intensity of colonization at one site. Sexual reproductive structures were most prevalent in the spring. Contributed Presentation

*BEILING, REBECCA A. AND MILLER, ORSON K. Department of Biology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061 USA. The role of naturally occurring ectomycorrhizae in revegetation of a trace metal stressed site in Southwest Virginia.

Elevated levels of copper and zinc are highly phytotoxic in acidic soils, where they have high mobility and bioavailability. Seedlings are sensitive to environmental stress and are particularly affected by high metal levels. Laboratory data suggest that ectomycorrhizal colonization promotes seedling establishment in stressed sites, yet difficulties arise when considering the mycorrhizal impact in the field. While these fungi are generally more tolerant of elevated metal concentrations than host plants, the diversity of ectomycorrhizal species results in variable responses to soil metals. Species diversity in nature also creates competition among fungi for host colonization sites. Plant success depends on the presence of a correct mycobiont for the host plant as well as one that will survive harsh conditions. We have examined several Pinus virginiana and Pinus strobus seedlings from an acidic, metal contaminated site in Virginia for percent mycorrhizal colonization. Additionally, molecular analysis of the root tip DNA allows us to identify the mycobiont species by comparison to sequences deposited in an international database (GenBank) as well as sequences of positively identified cultures present in our own collection. The data will provide vital information toward understanding of the mycorrhizal role in establishment and succession on metal stressed sites. Contributed Presentation


Phylogeography is an extension of population biology and ecology that examines the processes that shape the distribution of gene lineages across the geographic range of the species. Concordance in multiple, unrelated taxa strongly support historical biogeographical factors that shaped the phylogenetic relationships but to our knowledge, have never been tested in an ectomycorrhizal/host association. In these associations, it would
ECM using the primers ITS1-f and ITS4. Amplified products were digested with the enzymes HinfI and AluI. Thirty-nine assumed distinct morphotypes were examined, revealing several types which had the same RFLP patterns. Two of these types are suspected to be immature C. geophilum. Ectomycorrhizal RFLP types, sporocarp occurrence and sclerotia abundance were compared with occurrence of tree species. These data reveal that although several species are common as ECM, sclerotia, and sporocarps in both forest types (C. geophilum, E. muricata), others appear to be unique to one forest as ECM. Poster

*BIRD, CLAIRE E. AND MCCLENEGHAN, S. COLEMAN. Department of Biology, Appalachian State University, Boone NC 28608. *Ectomycorrhizal morphotypes of red spruce/FSrver fir and northern hardwood forests on Roan Mountain, NC/TN.

Ectomycorrhizal (ECM) have been assumed present on Roan Mountain because of host tree presence (Picea rubens, Abies fraseri, Fagus sylvatica, Betula sp.) and by occurrence of ectomycorrhizal epigean and hypogean sporocarps. Direct observations of ECM formed in spruce-fir and northern hardwood forests were performed in this study. Soil cores were taken from each forest type during fall, 1999 and early spring, 2001. Ectomycorrhizae were present in every core, with the majority of root tips mycorrhizal. These morphotypes were separated based on features examined in a microscope, to be identified further using molecular techniques. Over thirty morphotypes have been described. *Cenococcum geophilum was present in both forest types, and was the most abundant and frequent morphotype observed. Other predominant morphotypes include an ochre monodapal pinnate basidiocarps and a red tortuous morphotype with an indistinct mantle. Spruce-fir forest shows a trend towards higher diversity and higher quantity of ECM morphotypes. The identification of ECM types in these two forests is important for red spruce restoration, and to continue the recovery plan of the Carolina northern flying squirrel, an endangered mycophagous rodent which occurs in these forest types. Contributed Presentation

*BISCHOFF, J.F., SULLIVAN, R., WHITE, J.F. JR., HYWEL-JONES, N. L. 1. 1Department of Plant Pathology, Rutgers University, New Brunswick, NJ, 08901 USA; 2National Centre for Genetic Engineering and Biotechnology, Rajabindee, Bangkok, 10400, Thailand. Phylogenetic evidence for the monophyly of particular entomogenous Cordyceps and the genus *Polycyphalomyces*.

The genus *Polycyphalomyces* is characterized as having determinate synnemata, more or less awl-shaped terminal phialides, and single-celled conidia that are produced in a yellow-orange pool at the apex of the synnema. One species (*P. ramossiss*) produces fusiform, lateral B-conidia. There has been much confusion regarding host specificities and telomorphic affinity of the genus *Polycyphalomyces*. *Polycyphalomyces* has in the past been linked to Cordyceps and one species (*P. cylindrosorus*) has been recognized as a pathogen of insect orders Hemiptera, Formicidae...
and Coleoptera. However, more recently the genus *Polycephalomyces* has been considered a mycoparasite of *Cordyceps* and *Hirsutella*. Single ascospore isolations of *Cordyceps kanzashiana* and an unidentified *Cordyceps* (Thailand) revealed anamorphic characteristics homologous with that of *P. ramosus* (Mexico), *P. formosus* (Poland) and *P. tomentosus* (NY, USA). Preliminary molecular analysis (28s rDNA) of this group and other clavicipitaleans support the monophyletic grouping of *Polycephalomyces* and certain entomogenous species of *Cordyceps*. Poster

*BLACKWELL, M.¹, LONGSTRETH, D. J.¹, DAVID, C.², AND BARKER, S. A.². ¹Dept. of Biological Sciences, Louisiana State University, Baton Rouge, LA 70803, USA; ²Analytical Systems Laboratory, Dept. of Comparative Biomedical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA, 70803, USA. Glycine betaine in fungi.

Glycine betaine is a compatible osmolyte that is synthesized by a diverse group of organisms under conditions of environmental stress (e.g., drought, cold temperature, and high salinity). Although glycine betaine has been reported from fungi, including ascostomes and basidiomycetes, other potential fungal osmolytes have received more attention from physiologists. In this study we use the improved analytical methods, including spectrophotometry and LC/MS/MS analysis, to support the hypothesis that high concentrations of glycine betaine in certain basidiomycetes may function to increase water activity in the rapidly-developing basidiomata of polyposes and agarics. Furthermore, the results support the suggestion that the dextrinoid (red) pericipient of Melzer’s solution (IKI), used routinely in fungal taxonomy, may be due to the presence of glycine betaine. In addition to the discovery of glycine betaine in previously unreported basidiomycetes with dextrinoid basidiomatal tissues, glycine betaine in stressed mycelium of *Rhizopus* also is correlated with a dextrinoid reaction. Contributed Presentation

*BOEHM, E. W. A.¹, FREEMAN, S.², SHABEL, E.² AND MICHAILIDES, T. J.¹. ¹University of California, Kearney Agricultural Center, Parlier, CA 93648; ²Department of Plant Pathology, ARO, The Volcani Center, Bet Dagan 50250, Israel. Population structure of Israeli *Venturia inaequalis*.

The apple scab pathogen *Venturia inaequalis* has pronounced low temperature requirement for the initiation of the asciigorous or sexual stage. In temperate regions, the primary spring inoculum responsible for early infection has repeatedly been demonstrated to be ascospore, derived from pseudothecia produced on overwintered leaves. In Israel, the climatological conditions prerequisite for the initiation of the asciigorous stage are found only in apple orchards situated in the Upper Galilee and the Golan, where pseudothecia are common. In contrast, apple orchards at lower elevations rarely if ever experience low winter temperatures and pseudothecia have never been recovered from these orchards. Three microsatellite primers were used to analyze the population structure of 76 representative Israeli *V. inaequalis* isolates. Both cluster and parsimony analysis indicated the presence of asexual clonal lineages in populations sampled from the coastal plain with little gene flow between orchards. In contrast, populations originating from the Golan showed high genotypic diversity. The data support field observations that this pathogen does not reproduce sexually in regions characterized by the absence of low winter temperatures and may have bearing on control strategies of the disease in Israel. Poster

*BOELLMANN, JOERG AND SCHOLLER, MARKUS Arthur & Kriebel Herbaria, Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907-1155. Preliminary studies on the spread of the Rust Fungus *Puccinia glechomatis* in North America.

Ground-ivy (*Glechoma hederacea*, Lamiaceae), a native to Eurasia, was introduced to North America in the first part of the 19th century. It is a weed mainly in shady meadows. In 1998 an introduced Eurasian rust fungus, *Puccinia glechomatis*, was found for the first time on *G. hederacea* in North America (New York State; Scholler 2000). Further studies indicated that this microcyclic rust fungus covered a broader area in northeastern U.S. To reconstruct the spread in the past and to make future estimates we checked for rust infections on 800 *G. hederacea* specimens obtained from herbaria. Records from field studies were considered as well. Preliminary results are: 1. *P. glechomatis* was possibly introduced at...
The phytopathogenic fungus Ustilago maydis exhibits a dimorphic life style. Haploid sporidia grow yeast-like by budding and are non-pathogenic. After fusion of compatible haploid cells a dikaryon is formed which is pathogenic and grows as a filament. U. maydis is very amenable for genetic analysis and therefore serves as a model system for the study of fungal dimorphism and pathogenicity. A number of mutants have been identified that are concentrated on mutants that are specific for members of the STE20-like protein kinases. The Ras-like GTPase Cdc42 is supposed to be involved in this regulatory cascade. We could show that Don1 and Don3 control the growth of a secondary septum, which is required to form a fragmentation zone. To characterize the role of Cdc42 in more detail we have generated mutant alleles of cdc42. Expression of dominant activated Cdc42 in wild type cells results in filament formation whereas dominant negative mutants induce lateral budding.

*BRAGA, GILBERTO U.L.*, MILLER, CHARLES D., KWON, SUN-H., ROBERTS, DONALD W. AND ANDERSON, ANNE J. 5305 Old Main Hill, Department of Biology, Utah State University, Logan, UT, 84322-5305 USA. **UV-B irradiation of mycelium of the insect pathogenic fungus Metarhizium anisopliae impairs catalase activity.**

The commercial use of the insect pathogenic fungus *Metarhizium anisopliae* is restricted because of the high susceptibility of the spores to inactivation by the UV-A and UV-B components of sunlight. Sensitivity to UV-B exposure from lamps varied with the strain: conidia of isolate ARSEF 324 survived exposure better than ARSEF 2575 and ARSEF 23. Isolate 324 expressed two isozymes of catalase at increasing levels as mycelium developed. Exposure of 24 h mycelium of 324 to between 1 to 4 h of UV-B decreased the catalase activity. Native gel electrophoresis determined this loss in catalase activity was in the faster migrating catalase isozyme. This decrease in catalase was not apparent when more mature (30 h) mycelium was irradiated with UV-B. The superoxide dismutase activities were not altered by the UV-B exposure. Whether reduced catalase activity renders the fungus more susceptible to oxidative stress caused by UV-B is being investigated. *Poster*

*BREM, DOMINIK AND LEUCHTMANN, ADRIAN. Geobotanical Institute, ETH Zurich, Zollikerstr. 107, 8008 Zurich, Switzerland. **Transition of a pathogenic endophyte to a mutualist by host shift.**

Grass endophytes are generally thought to be beneficial to their hosts. However, obligate sexually reproducing endophyte species of genus *Epichloë* are clearly pathogenic, because they sterilize their hosts (stromata formation). Such an association is formed by *E. bromicola* genotypes infecting *Bromus erectus*. Other genotypes of the same endophyte species infect *B. benekenii* and *B. ramosus*. They grow asymptomatically and are transmitted clonally through the seeds of the host plants. Therefore, these associations are thought to be mutualistic. Cross-inoculation experiments with endophyte genotypes, isolated from the three different host species and their F1 hybrids revealed that isolates from *B. erectus* and the intraspecific hybrids are capable of infecting the other two *Bromus* hosts, while the reversed was not possible. Further, an AFLP clustering analysis revealed that clusters correspond to the host species from which the isolates have been obtained. This suggests that the asymptomatic, clonally transmitted strains might be highly specialized descendents of chosing isolates of *B. erectus*, which is supported by a phylogeny based on *tub2* sequences. Asexual descendents could be in the initial stage of speciation initiated by a host shift and involving the transition from a pathogenic to a mutualistic grass-fungus association. *Contributed Presentation*

*BRUHN, JOHANNN., MIHAEL, JEANNED., WETTEROFF, JAMES J. JR, AND CLARK, TRAVIS A. Department of Plant Microbiology & Pathology and University of Missouri Center for Agroforestry, 108 Waters Hall, Columbia, MO 65211. **Evaluating management practices for log-grown shiitake production in midwestern agroforestry.**

Agroforestry buffers filter agricultural runoff, improving water resource quality. Specialty mushroom cultivation, one possible component of agroforestry programs, is a compelling incentive to some landowners. We have established a program to evaluate management practices for specialty mushroom cultivation in agroforestry, including shiitake (*Lentinula edodes*). The experiments described here allow comparison of autumn 1999 and spring 2000 inoculations, 3 host species harvested during the dormant and growing seasons, 3 strains of *L. edodes*, and 3 inoculum forms. These experiments will continue through 2002. Fruiting commenced mid- and late-August 2000 for the autumn and spring initiated experiments, respectively. As of December 2000, biological efficiency (BE) was greatest with the wide-range strain in both experiments, exceeding 1.0% in the autumn initiated experiment. While no difference between host species was detected for the autumn inoculations, *Quercus alba* bolts developed a higher BE in the spring initiated experiment than did bolts of *Acer saccharum* or *Q. rubra*. No differences between inoculum form (sawdust or dowel
for autumn inoculation, sawdust or "thimble" for spring inoculation had developed. Bolt surface area, inversely related to BE, was a useful covariate. Relationships between BE progress and air and soil temperature and precipitation fluxes will be explored. *Poster*


In the last six years below-ground studies have begun to yield a more detailed understanding of the taxonomic, genetic, and spatial structure of fungal ectomycorrhizal communities. Across site comparisons of mature pinaceous forests show that members of the Russulaceae, Thelephoraceae, and various non-thelephoroid resupinate taxa are often dominant. While in fire-disturbed communities Ascomycetes and Suillus taxa are the typical dominants. There is good evidence that many of the latter are present in soil spore banks prior to disturbance. Within individual sites, species-level community composition varies at all spatial scales, and correlates with distance only at scales below two meters. Individual species can exhibit clumped or nearly random distributions. Genet mapping of species in the Russulaceae, Amanitaceae, and Thelephoraceae, reveal that individuals are spatially restricted, and that even in undisturbed forest settings spore colonization must be an important ongoing process. The fact that patterns are often seen at higher taxonomic levels, could lead one to conclude that many species are substitutable or "redundant". However, the one to one correspondence between many non-photosynthetic mycoheterotrophic plants and various fungal species, shows that individual fungal species may often have subtle, but direct, effects on plant community composition. *Symposium Presentation*

**BUSSABAN, B.1, LUMYONG, S.,1, LUMYONG, P.,2, MCKENZIE, E.H.C.3 AND HYDE, K.D.4. 1Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand; 2Department of Plant Pathology, Faculty of Agriculture, Chiang Mai University, Chiang Mai, Thailand; 3Herbarium PDD, Landcare Research, Private Bag 92170, Auckland, New Zealand; 4Centre for Research in Fungal Diversity, Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong, China. Endophytic fungi from Zingiberaceae: Alpinia malaccenses.**

Endophytic fungi were isolated from apparently healthy organs of the wild ginger *Alpinia malaccenses*, including leaves, pseudostems, and rhizomes, collected from two sites in Suthep-Pui National Park, Chiang Mai, Thailand. Endophytes were relatively common with colonization rates of 71-84 % at the two sites sampled in the wet and dry seasons. The endophyte assemblages from the different sites were diverse and comprised 8 ascomycetes and 23 mitosporic fungi. *Colletotrichum gloeosporioides, Glomerella spp.*, and *Phomopsis spp.* were consistently dominant as endophytes on *Alpinia malaccenses*, but many rare species and mycelia sterilia were also recorded. There were significant differences between the number of isolates recovered from leaves containing vein and intervein tissues, independent of leaf age of samples collected from Peak Suthep Pui in the wet and dry seasons. There were also significant differences between the number of isolates recovered from different tissue types, with the exception of the samples collected from Huay Kok Ma in the wet season. Most taxa showed a preference for either leaf tissue or pseudostems. Two new ascomycetes species, *Gaeumannomyces amomi* and *Leiophaerella amoni* were discovered from leaves and pseudostems, and three new species of *Pyricularia* were isolated from leaves. *Poster*

**CAFARO, MATIAS.J. Department of Ecology & Evolutionary Biology, University of Kansas, Lawrence KS 66045. Species richness patterns in symbiotic gut fungi (Trichomycetes).**

Spatial diversity patterns of organisms were observed early on by biologists. The most common pattern indicates that diversity (species number) increases with area and can be represented as species-area curves following a power model equation. Biogeographers and ecologists have observed this relationship both among larger areas of single biotas and among islands of one archipelago. Species-area relationships have not been well established for fungal communities. The few studies that exist show heterogeneous results. A preliminary attempt to test the species-area relationship in Trichomycetes was made for data collected between 1960 - 1998. During this period forty six species from different counties in Kansas, Missouri, Oklahoma and Arkansas were isolated. Species numbers were plotted against county area as sample plots. Extra sample points were included by adding contiguous counties to simulate a nested plot sampling. The data fit to a power regression curve with a high correlation coefficient (r^2 = 0.92). This might indicate a strong biogeographic signal for the species-area relationship of these symbiotic fungi. Alternatively, the increase in fungal diversity could be attributable to host diversity increase with sampled area, a well-established pattern in insect species richness. *Poster*

**CAMARA, MARCOS P.S.,1, ONEILL, NICHOLE R.1, VAN BERKUM, PETER2. 1United States Department of Agriculture, Agriculture Research Service, Molecular Plant Pathology Laboratory, Beltsville, MD 20705-2350; 2United States Department of Agriculture, Agriculture Research Service, Soybean and Alfalfa Research Laboratory, Beltsville, MD 20705-2350. Molecular phylogeny of *Stemphylium* spp. based on ITS and glyceraldehyde-3-phosphate dehydrogenase gene sequences.**

The phylogenetic relationships among 43 isolates representing 16 species of *Stemphylium* were inferred from ITS and glyceraldehyde-3-phosphate dehydrogenase (gpd) gene sequence data. The results generally agree with morphological species concepts. Species that are primarily pathogenic to alfalfa are resolved into two separate groups. *Stemphylium botryosum* and two isolates with morphological characters similar to *S. globuliferum* had identical sequences at both loci. These two loci in *S. vesicarium, S. alfaiae*...
and S. herbarum are nearly identical but differ from S. botryosum. Stemphylium lycopersici and S. xanthosomatis have a single nucleotide difference in the gpd region and identical ITS sequences. Morphological and developmental characters such as sizes and shapes of the conidia, the conidiophores and the ascospores and the size and time of maturation of pseudothecia are useful for diagnosing species. However, other morphological characters such as septum development and small variations in conidium wall ornamentation are not as useful. Poster

CAMPBELL, JINX AND SHEarer, CAROL A. Department of Plant Biology, University of Illinois, 265 Morrill Hall, 505 South Goodwin Avenue, Urbana, Illinois, USA, 61801. Annulatascaceae pruned.

Annulat ascaceae was introduced to accommodate a group of tropical freshwater fungi with distinctive apical rings. Some of the genera are delineated on the basis of only one character, raising the question of whether they may be congeneric. Other genera are so morphologically different from the type genus that their placement in the family is doubtful. Phylogenetic analyses were performed on the large sub-unit (28S) nuclear ribosomal DNA (rDNA) of freshwater, marine and terrestrial ascomycetes to resolve the familial placement of the genera currently assigned to Annulat ascaceae. These analyses indicate that Annulat ascaceae is polyphyletic and the re-assignment of four genera (Aquatimica, Phuminicola, Cateractispora, Verticicola) to new families is warranted. The type genus, Annulatus, is also polyphyletic and the re-assignment of species, in accordance with morphological characters, is discussed. Contributed Presentation


Over 800 species of Phomopsis have been described primarily on the basis of host. The value of morphological characters in distinguishing species is limited due to the reduced features of the conidiomata. A further complication is that strains, even newly isolated ones, may not form pycnidia or perithecia in culture. Biologically, strains of Phomopsis are known to function as plant pathogens, endophytes or saprotrophs. Current molecular approaches to defining taxa in Phomopsis focus on analysis of the ITS rDNA, although it has not been particularly informative. Using an approximately 350 base pair region of the translation elongation factor-1 alpha gene, we found six closely related, well-supported groups among Phomopsis isolates from cucurbits. Three groups correspond to named taxa, P. longicolla, Diaporthe melonis, and the D. phaseolorum complex. Other isolates grouped with strains from diverse hosts and may represent endophytic species. The application of appropriate names to the unidentified genetically distinct taxa is problematic due to the absence of distinct morphological and/or cultural characters and biological information. Poster

*CASTLEbury, L.A. AND CARRIS, L.M.2. Systematic Botany and Mycology Lab, USDA ARS, Beltsville, MD 20705; 3Department of Plant Pathology, Washington State University, Pullman, WA 99164. Reevaluating generic limits in Tilletiales.

Tilletiales is an order within subclass Exobasidio mycetidae(Ustilaginomycetes) comprising genera Tilletia, Neovossia, Conidiosporomyces, Ingoldiomyces, Oberwinkleria and Erratomyces. Morphological characters used to distinguish Neovossia from Tilletia include local infection, large number of non-conjugating basidiospores, lack of sterile cells and absence of trimethylamine odor. However, at least 20 species with intermediate basidiospore characters are known, but only the type species, N. molinia, lacks both sterile cells and trimethylamine. Ingoldiomyces and Conidiosporomyces are monospecific genera distinguished by forcibly discharged primary basidiospores and Y-shaped soral conidia, respectively. Partial nuclear large subunit rDNA sequences of 25 species representing five of the six genera were analyzed in order to examine generic limits. Sequence analysis does not clearly separate Tilletia, Neovossia and Ingoldiomyces; Conidiosporomyces formed a basal branch without a strongly supported group containing the other taxa. These results suggest that a reevaluation of characters currently used to delimit genera is required. Contributed Presentation


Anastomosis group 3 (AG-3) of R. solani is associated with diseases of potato and tobacco. Isolates from the two hosts are taxonomically related, but differ in their biology, pathogenicity, somatic compatibility, fatty acid composition, AFLP patterns and rDNA. The genetic divergence between populations of R. solani AG-3 from potato and tobacco is not known. In this study, field populations of R. solani AG-3 from potato and tobacco were examined using sequence analysis of two cloned anonymous genomic DNA fragments (pP42, with 385 bp, and pP89, with 1090 bp). Isolates from three randomly selected populations of R. solani AG-3 were analyzed: 18 potato isolates from eastern NC, 9 tobacco isolates from central NC and 11 tobacco isolates from southern Brazil. The potato sample was genetically diverse with a high frequency of heterozygosity. In contrast, limited to no genetic diversity was observed within the tobacco sample from NC and Brazil. All tobacco isolate from both NC and Brazil were homozygous. With only one exception (isolate TBR24), all NC and Brazilian isolates shared the same alleles but no alleles were shared between potato and tobacco populations of R. solani AG-3, indicating no gene flow between them. These results
suggest that potato and tobacco populations of R. solani constitute genetically distinct groups within AG-3. *Poster*

CERESINI, PAULO C.¹, SHEW, H. DAVID², VILGALYS, RYTAS³, ROSEWICH, U. LIANE⁴, AND CUBETA, MARCA.⁵ ¹UNESP, FEIS, Dept. Biologia, 15385-000, Ilha Solteira, SP, Brazil; ²UNESP, Plant Pathology, Raleigh, NC 27695; ³Duke University, Dept. Biology, Durham, NC 27708; ⁴USDA-ARS, Cereal Disease Laboratory, Saint Paul, MN 55108; ⁵NCSU, Dept. Plant Pathology, Plymouth, NC 27962. Detecting migration using multilocus genotypes and its effects on gene flow in populations of Rhizoctonia solani Kühn AG-3 from potato in North Carolina.

This study describes the application of a population genetics-based statistical method for detecting migration (Rannala B., and Mountain, J. L. 1997. Proc. Natl. Acad. Sci. USA 94:9197-9201) on populations of the plant pathogenic fungus Rhizoctonia solani anastomosis group 3 (AG-3) using polymerase chain reaction multilocus restriction fragment length polymorphisms (PCR-RFLPs) genotypes. The effect of migration from source populations of the pathogen on potato seed tubers on a recipient (soil population) in North Carolina was examined. Analysis of genetic data indicated that the North Carolina population of R. solani AG-3 has experienced recent migration. Unidirectional migration from source population(s) followed by establishment of migrant genotypes in the recipient population is postulated to explain the high level of gene flow observed. *Poster*


Until recently, little attention has been paid to chytrid molecular systematics. Current studies have used genes that are incorporated in the study of "higher" fungi, such as the Basidiomycetes and Ascomycetes, to make phylogenetic hypotheses and species diagnoses. Thus, it seems necessary that the sensitivity of these genes and methods currently being utilized should be examined to see which gene or set of genes are the most informative for deducing taxonomic and phylogenetic hypotheses. In this study, the 18s, 28s, ITS1, ITS2, Beta tubulin, Mitochondrial Large rDNA genes are being used to evaluate their rates of evolution as compared to one another. Ten genera of chytrids are being used to examine these questions, and these genera should give us an accurate representation of the sensitivity of these genes to determine different taxonomic levels. Therefore, a better understanding of the molecular characters applied to future phylogenetic analysis will be gained, and this will facilitate the construction of better trees as well as elucidate better ways to diagnose species. Additionally, analysis of these molecular characters will indicate morphological and ultrastructural characters that should be examined further. *Contributed Presentation*

*CHAVERRI, PRISCILA¹, SAMUELS, GARY J.¹, AND STEWART, ELWIN L.². ¹United States Department of Agriculture, Agricultural Research Service, Systematic Botany and Mycology Lab., Rm. 304, B-011 A, BARC-W, Beltsville, MD 20705; ²The Pennsylvania State University, Department of Plant Pathology, 212 Buckhout Lab., University Park, PA 16802. Biocontrol species of Trichoderma have Hypocrean teleomorphs with green ascospores.

Trichoderma virids and T. harzianum are widely used in biological control of soil-borne plant pathogens. Until recently, the teleomorphs of these economically important species of Trichoderma were not known. Recent studies suggest that T. harzianum is a species complex. The anamorph of Hypocrea nigeriana sensu lato is morphologically indistinguishable from T. harzianum. Sequence analysis of ITS rDNA and translation elongation factor genes indicates that ascospore isolates of H. nigeriana form a clade with asexual isolates of T. harzianum. The teleomorph of T. virids was considered to be H. gelatinosa, based on the similarity of the gliocladium-like conidiophores and relatively large, dark green conidia. However, more intense scrutiny reveals that the two are phenotypically similar but distinct. Previous sequence analysis of ITS rDNA showed that T. virids and H. gelatinosa were not closely related. The anamorph of a newly described species of Hypocrea with green ascospores is phenotypically indistinguishable from T. virids. This new species forms a clade with asexual isolates of T. virids, based on ITS rDNA and translation elongation factor gene trees. Thus, the newly described species of Hypocrea is considered the teleomorph of T. virids. *Contributed Presentation*

CHEN, F.J. AND CHEN, S.Y. University of Minnesota Southern Research and Outreach Center, Waseca, MN 56093. Mycoflora in cysts, females and eggs of the soybean cyst nematode in Minnesota.

During 1996-1997, mycoflora in cysts, females, and eggs of the soybean cyst nematode, Heterodera glycines, were investigated in 45 fields from 26 counties in Minnesota. Overall, fungi colonized 55% (29-89%) of cysts. Cylindro-carpon destructans, Fusarium solani, Pyrenochaeta terrestres, Fusarium oxysporum, and Cylindrocarpon oolidum were the most common fungi colonizing cysts. The frequency of fungi encountered in cysts was positively related with egg density in the field. Only 3.4% of females were colonized by fungi. Oidiodendron cerealis, F. solani, F. oxysporum, C. destructans, P. terrestres were the most common fungi in females. Only 1% of eggs yielded fungi. Overall average fungal parasitic index (EPI at a scale from 0 to 10 to measure fungal parasitism of eggs) in the fungus-colonized cysts was 2.0, and average EPI in females was 1.8. The EPI was positively related with percentage of cysts colonized by fungi and egg density in the fields. The Simpson’s diversity index (at a scale from 0 to 1) was low (average 0.25), indicating a highly diversified fungal community in the cysts. Average similarity index (at a scale from 0 to 1) for mycoflora in cysts among fields in Minnesota was 0.53 (range 0.13 to 0.85). The mycoflora in cysts were more similar within the state than among states in the USA. *Contributed Presentation*
MSA 2001 ~ ABSTRACTS

*CHEN, YUE-QIN, QU, LIANG-HU AND ZHOU, HUI. The Key Lab of Gene Engineering of the Education Ministry, Biotechnology Research Center, Zongshan University, Guangzhou 510275 P.R. China. Determination of the Anamorph of Cordyceps sinensis Inferred from the Analysis of the Ribosomal DNA Internal Transcribed Spacers and 5.8S rDNA.

The anamorph determination of Cordyceps sinensis remains problematic due to the lack of clear links between the sexual and conidial forms of the fungus. In this study, we applied molecular approaches to analyze the genetic variation of Cordyceps sinensis and its allies to identify the anamorph & teleomorph connection. The sequences of the internal transcribed spacers (ITS1 and ITS2) and 5.8S ribosomal RNA gene of Cordyceps sinensis (teleomorph) and several related assexual conidial forms were determined. Sequence comparison showed that Cordyceps sinensis was most closely related to Hirsutella sinensis, and was clearly divergent from Paecilomyces sinensis, Stachybotrys sp. or Tolypocladium sp.; Distance values, estimated according to Kimura two-parameter models between Cordyceps sinensis and Hirsutella sinensis, were extremely low (<0.02), whereas distance values between Cordyceps sinensis and Paecilomyces sinensis, Stachybotrys sp. and Tolypocladium sp. were 0.34, 0.21 and 0.25, respectively. Taken together, Hirsutella sinensis and Cordyceps sinensis are the different stages of the life cycle stages of the same organism. Hirsutella sinensis is therefore the anamorph of Cordyceps sinensis, rather than Paecilomyces sinensis or other species. The possible reasons as to why different taxa can be obtained when culturing Cordyceps sinensis are also discussed. Poster

CHEN, YUE-QIN, WANG, NING, ZHOU, HUI AND QU, LIANG-HU. The Key Lab of Gene Engineering of the Education Ministry, Biotechnology Research Center, Zongshan University, Guangzhou 510275 P.R. China. Multiple Evolutionary Origins of Cordyceps (Clavicipitales) Within the Ascomycota Radiation: Evidences from 5.8S rDNA and ITS Region Sequence Analysis.

The Cordyceps species, which are widely used in Chinese traditional medicine, are well known pathogens of a diverse assemblage of insect hosts, they display a diversity of morphological properties, and little is known about the phylogenetic relationship among these parasitic ascomycetes. The nucleotide sequences of rDNA ITS and 5.8S ribosomal DNA from several representative species of Cordyceps were determined and compared with the sequences of published. Based on sequence data, the phylogenetic trees were constructed by the neighbor-joining and parsimony method. The results clearly showed that Cordyceps is not a monophyletic taxon, they are polyphyletic within the ascomycetes radiation, having species associated with at least four currently recognized ascomycetes orders, which implied that they are multiple origin. Morphologically distinctive characters of this taxon were possibly the results in greater selective pressure to adapt to the host's immune response in highly specific niches. Molecular phylogenetic studies may present new insights into traditional concepts of the genus Cordyceps. In addition, the study demonstrated that rDNA ITS region may be a useful genetic marker to better understand the evolutionary connection between anamorph and teleomorph of entomogenous fungi of Cordyceps. Poster

*CLARK, JIM AND HASKINS, EDWARD F. 1 Department of Biology, University of Kentucky, Lexington, KY. 40506; 2 Department of Botany, University of Washington, Seattle, WA 98198. Biosystematics of the myxomycete Badhamia gracilis.

Sixty-four isolates which conformed to the general morphological description of Badhamia gracilis were isolated from a number of arid regions. Five of these isolates were heterothallic and could be divided into two separate biological species with multiple allelic mating systems: A1 consisting of 3 isolates from Arizona, and A2 consisting of 2 isolates from New Mexico. The remaining 59 isolates were nonheterothallic. All of the isolates had similar culture characteristics in that they all had white plasmodia which grew rapidly and sporulated at a relatively small size. While all of the isolates generally conformed to the standard species description, there were several fairly common variations: the sporangial head was often laterally flattened instead of globose, the spores averaged 10 microns instead of 15 microns in diameter, and the capilla often appeared physaroid instead of badhamoid. This study indicates that Badhamia gracilis is probably a widespread species complex consisting of a number of morphologically variable local sexual populations and numerous asexual clones adapted to arid conditions. Poster

*CLARK, TRAVIS A. AND ANDERSON, JAMES B. Department of Botany, University of Toronto at Mississauga L5L 1C6 Canada. Adaptation in long-term cultures of Schizophyllum commune.

The impact of ploidy on the rate of adaptation in an organism is an important question in evolutionary biology. The basidiomycete dikaryon is functionally equivalent to a diploid, but maintains the two gametic genomes in separate nuclei. Experimental populations of Schizophyllum commune were founded to address two questions: (i) Do dikaryotic and monokaryotic mycelia adapt to a novel environment under natural selection for increased growth? (ii) Do the haploid components of the dikaryon adapt reciprocally to one another's presence? The progenitor for all cultures was a single dikaryotic cell. Six dikaryotic and six monokaryotic lines (three of each nuclear type, recovered from the progenitor) were serially transferred on a minimal medium every two weeks over a period of nine months. The dikaryons diverged substantially in growth rates. In addition to small incremental changes, at least two nuclear mutations causing a large increase in growth rates were observed in two of the dikaryotic lines. No significant change in growth rate occurred in any of the monokaryotic lines. Matings will now be performed among haploids recovered from: the evolved dikaryons, the evolved monokaryons, and the progenitor dikaryon. Increased growth rate observed only in dikaryons from matings of haploids that evolved together in dikaryons would give evidence of co-adaptation. Poster
preliminary analyses indicate that each chanterelle species has distinct habitat associations. **Contributed Presentation**

**COUCH, BRETT AND KOHN, LINDA M.** Botany Department, University of Toronto. **A multilocus molecular marker system for studying population subdivision in the rice blast fungus, Magnaporthe grisea.**

The fungus, *Magnaporthe grisea*, is the causal agent of rice blast and gray leaf spot of grasses. It is one of the most important pathogens of rice due to its widespread occurrence and potential for serious crop losses when conditions are conducive to disease development. *M. grisea* comprises a number of host specific populations, based on studies utilizing DNA fingerprinting, RFLPs, and DNA sequence from the ITS region. As well, populations on rice are predominantly clonal based upon DNA fingerprinting studies. The possibility for sexual reproduction and recombination exists in populations on non-rice hosts. These observations raise two interesting questions. First, how did rice-infecting populations originate? Second, are rice-infecting populations genetically isolated or are migration and gene flow occurring between rice-infecting populations and populations on other hosts? I have developed a molecular marker system suitable for addressing these questions. Fifteen polymorphic DNA genomic regions were identified by direct sequencing of these regions from a set of over half of the sites), with the lowest numbers of spores at desert and urban sites and the highest numbers at residential, urban, agricultural, and desert. **Contributed Presentation**

**COUSINS, JAMAICA R., WHITCOMB, SEAN A. AND STUTZ, JEAN C.** Department of Plant Biology, Arizona State University, Tempe AZ 85287 USA. **Arbuscular mycorrhizal fungal species composition, richness and abundance in the Phoenix metropolitan area.**

Little is known about arbuscular-mycorrhizal fungi (AMF) in urban ecosystems, but with a worldwide increase in the size and number of urban areas there is a growing need to understand AMF diversity and functioning in these systems. This project sought to characterize AMF species composition, richness, and abundance at twenty sites located in the Phoenix, Arizona metropolitan area. Sampling sites were selected to represent four predominant land use types found in the metro area: residential, urban, agricultural, and desert. AMF spores were extracted and identified from soil samples and trap cultures that were established from soil collected at each site. Spore abundance in soil samples was low (less than 50 spores/100 cubic cm at over half of the sites), with the lowest numbers of spores collected from residential and desert sites. Species richness ranged from 2 to 9 AMF species detected per site. The greatest number of species was detected at desert and urban sites and

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COETZEE, M.P.A., WINGFIELD, B.D., BLOOMER, P. AND WINGFIELD, M.J. Department of Genetics, Tree Pathology Co-operative Programme (TPCP), Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, Pretoria, 0002, South Africa. **Phylogeny of the Southern Hemisphere Armillaria species.**

*Armillaria* (Fr:Fr.) Staude is a cosmopolitan plant pathogenic fungus that causes root rot in a variety of hosts. The phylogenetic relationship between *Armillaria* spp. from the Northern Hemisphere is well studied. In contrast very little is known about the phylogenetic relationships between species from the Southern Hemisphere. The aim of this study was firstly to determine the phylogenetic relationship between *Armillaria* species from the Southern Hemisphere and the Northern Hemisphere; secondly, to determine the interspecific relationship between the Southern Hemisphere species. Isolates included in this study originated from Africa, Asia, Australia, New Zealand and South America. Phylogenetic analyses were based on DNA sequences from the large subunit (LSU), the internal transcribed spacer (ITS) regions and the intergenic spacer one (IGS-1) region of the ribosomal RNA operon. Phylogenetic trees generated separated the species from the Southern and the Northern Hemisphere into two strongly supported monophyletic clades. *Armillaria* spp. within the Southern Hemisphere clade showed a higher interspecific diversity than the Northern Hemisphere species. Based on our analysis we believe that the Southern Hemisphere *Armillaria* group is much older than the species from the Northern Hemisphere. **Symposium Presentation**

**COLLINS, KELLY P., DUNHAM, SUSIE, ODELL, T. AND MOLINA, R.** Department of Forest Science, Oregon State University, Corvallis, OR 97331 USA. **Habitat associations of three Cantharellus species in the Oregon Cascade Mountains.**

Widespread concern over conservation of forest fungi necessitates understanding species response to disturbance. Many forests in the Pacific Northwest are a mosaic of forest stands of varying age and disturbance history. This offers an opportunity to investigate the changes in fungal community structure. Our lab has chosen the ectomycorrhizal *Cantharellus* spp. as model species because of the longevity of their sporocarps in the field, their ubiquity in the Pacific Northwest, and their economic importance. In 1997 and 2000, we collected over 500 fruit bodies of the Pacific Golden Chanterelle (*Cantharellus formosus*), the white chanterelle (*C. subalbidus*), and a newly described, cryptic chanterelle (*C. cascadiensis*) from 9 old growth and 9 second growth Douglas fir (*Pseudotsuga menziesii*) – western hemlock (*Tsuga heterophylla*) forest stands at the HJ Andrews Experimental Forest, a Forest Service Long Term Ecological Research (LTER) site in the Cascade Mountains. These three species were identified by unique RFLPs of the nrDNA ITS region. Our
the least number detected at residential and agricultural sites. Eighteen species of AMF were identified, with thirteen from the genus *Glomus*, four from *Acaulospora*, and one from *Entrophospora*. The results of a Geographic Information System (GIS) analysis of the relationships between AMF species richness and composition, land use history, and soil properties in Phoenix will be presented. *Poster*


We have established replicate experimental populations of the pathogenic yeast *Candida albicans* to study the dynamics, fitness consequences, and molecular mechanisms of adaptation to the azole antifungal agents. The experimental populations were founded from a single drug-sensitive cell and reared over 330 generations with inhibitory concentrations of fluconazole. While all populations adapted to the presence of drug, as indicated by an increase in MIC of fluconazole, they followed strikingly different trajectories, associated with distinct overexpression patterns of four genes implicated inazole resistance. The experimental populations diverged in fitness, measured in direct competitions between each evolved population and a genetically marked version of the progenitor. Genome-wide expression profiles of three populations evolved with drug and one population evolved without drug were measured relative to the ancestor using DNA microarrays with 90% coverage of the genome. With ten replicate microarray experiments for each population, we have identified considerable parallelism in the pattern of constitutive changes in gene expression relative to the ancestor among two of the populations evolved with drug; many of the genes overexpressed in these two populations are of unknown function. There were few expression changes identified in the remaining two populations. *Contributed Presentation*

*CRIPPS, CATHY L., HORIZX, EGON AND OSMUNDSON, TODD.* 1Plant Sciences Department, Montana State University, Bozeman, MT 59717 USA; 2Geobotanic Institute ETH, Herbarium Z+ZT, Ch 8008 Zurich, Switzerland. *Rocky Mountain Alpine Project: documenting Agarics above tree line.*

This update on the NSF Biotic Surveys and Inventories project to document the diversity of agarics in the Rocky Mountain alpine reports nearly 1000 collections of macromycetes (Agaricales) from 12 sites in 3 states. The agarics exist well-above treeline beyond the krummholz conifer zone, in one of the harshest climates on earth. Desiccating winds, cold temperatures, a short growing season, and high UV radiation prohibit many life forms. Yet over 100 species of fleshy fungi in 30 genera and 12 families inhabit the open landscape of rocks, fell fields, alpine meadows, snowbeds, and wetlands. Particularly diverse are ectomycorrhizal communities of Cortinarius, *Inocybe*, *Hebeloma*, *Laccaria*, *Entoloma*, *Amanita*, *Lactarius*, and *Russula* associated with *Salix planifolia*, *S. reticulata*, and *S. nivalis*. Fungi particular to bog birch such as *Leccinum rotundifolium* also occur. *Dryas octopetala* is primarily mycorrhizal with *Cenocyccrum graniforme*, and hosts the saprophyte *Marasmius epidryas*. *Musciicolus genera Rickenella, Galerina, Arrhenia, Mycena, and Omphalina are ubiquitous. The Arctic and Alps are known to host many of the same cold-climate fungi, yet this is the first attempt to systematically document the mycoflora of the NA alpine from Montana to Colorado. A progress report including several interesting *Amanita* and over 25 species of *Inocybe* (not all named yet!) will be displayed. *Poster*

*CROUS, PEDRO W., KANG, JI-CHUAN AND SCHOCOCH, CONRAD L.* Department of Plant Pathology, University of Stellenbosch, P. Bag X1, Matieland 7602, South Africa. *Species concepts in Cylindrocladium based on sequence data, sexual compatibility and morphology.*

Species of *Cylindrocladium* have Calonectria teleomorphs, and are pathogenic to a wide range of host plants in tropical and subtropical regions of the world. Much
Attention has recently been devoted to the delimitation of species units in *Cylindrocladium*. The present study focuses on taxa within the *Cv. floridanum, Cv. spathiphylly* and *Cv. quinqueseptatum* species complexes. Maximum parsimony analyses of DNA sequences of ITS, beta-tubulin and histone regions of rRNA genes, mating experiments and morphological comparisons revealed several species, identifiable as phylogenetic, biological and morphological entities, to be present in what was formerly accepted to be well-defined species. Whereas most of the former species were accepted to have a worldwide distribution, the newly defined taxa appear to be restricted in their distribution, correlating with specific geographical regions or continents. These findings have important implications for plant quarantine, but also for plant pathologists involved with the identification of genotypes correlating with specific geographical regions or continents. These genotypes may represent new plant pathogens, fungus-growing ants have a symbiotic association with actinomycetes. These filamentous bacteria produce antibiotics that suppress the growth of *Escovopsis* in vitro, and experimental evidence indicates that these bacteria are a third mutualist. Thus the attine symbiosis appears to be a coevolutionary ‘arms race’ between the garden parasite, *Escovopsis*, on the one hand, and the tripartite mutualism on the other. *Poster*

**Mycosphaerella based on ITS rDNA sequence and morphology.**

A combination of characters is used to distinguish anamorph genera of *Mycosphaerella*, namely conidiomatal structure, the nature and arrangement of conidiophores, conidigenesis, dehiscence scars and pigmentation. Based on these features close to 50 genera have been reported as anamorphs of *Mycosphaerella*, 19 of which are included in this study. A phylogeny derived from ITS DNA sequence data suggests that *Mycosphaerella* is monophyletic. Many of the morphological characters defining different anamorph genera evolved more than once and for the most part do not represent true groups within *Mycosphaerella*. Based on these results a reduced set of informative criteria and genera are proposed. The degree of scar thickening, darkening and refraction, as well as the presence or absence of pigmentation in conidiophores and conidia still appear to be useful features delimiting anamorph genera of *Mycosphaerella*. *Contributed Presentation*

**CROUS, PEDRO W., KANG, JI-CHUAN AND BRAUN, UWE.**

1Department of Plant Pathology, University of Stellenbosch, P. Bag X1, Matieland 7602, South Africa; 2Martin-Luther-Univers., FB. Biologie, Inst. Geobotanik und Botanischer Garten, Neuwerk 21, D-06099 Halle (Saale), Germany. **Redefining anamorph concepts in *Mycosphaerella* based on ITS rDNA sequence and morphology.**

**CURRIE, CAMERON R.** Integrative Biology, University of Texas at Austin, Austin TX 78712 USA. **Agaries, ants, actinomycetes, and Escovopsis: a 50 million-year-old quadripartite symbiosis.**

The highly evolved mutualism between fungus-growing ants (Attini) and their fungi (mostly Lepiotaceae) is a textbook example of symbiosis. The ants carefully tend the fungus, which serves as their main food source. This fascinating mutualism has traditionally been viewed as a bipartite symbiosis, with the two symbionts occurring in near isolation. However, recent evidence establishes the presence of two additional and highly evolved microbial symbionts within this association. First, the fungus gardens of attine ants are host to a specialized, virulent, and highly evolved fungal pathogen in the genus *Escovopsis*. Experimental work demonstrates that the presence of this pathogen within gardens significantly reduces the growth rate of leaf-cutting ant colonies. In addition to this garden pathogen, fungus-growing ants have a symbiotic association with actinomycetes. These filamentous bacteria produce antibiotics that suppress the growth of *Escovopsis* in vitro, and experimental evidence indicates that these bacteria are a third mutualist. Thus the attine symbiosis appears to be a coevolutionary ‘arms race’ between the garden parasite, *Escovopsis*, on the one hand, and the tripartite mutualism on the other. *Poster*

**DASZAK, PETER, KANG, JI-CHUAN AND BRAUN, UWE.**

1Department of Plant Pathology, University of Stellenbosch, P. Bag X1, Matieland 7602, South Africa; 2Martin-Luther-Univers., FB. Biologie, Inst. Geobotanik und Botanischer Garten, Neuwerk 21, D-06099 Halle (Saale), Germany. **Redefining anamorph concepts in *Mycosphaerella* based on ITS rDNA sequence and morphology.**

**Currie, Cameron R.** Integrative Biology, University of Texas at Austin, Austin, Texas 78712 USA. **Agaries, ants, actinomycetes, and Escovopsis: a 50 million-year-old quadripartite symbiosis.**

The highly evolved mutualism between fungus-growing ants (Attini) and their fungi (mostly Lepiotaceae) is a textbook example of symbiosis. The ants carefully tend the fungus, which serves as their main food source. This fascinating mutualism has traditionally been viewed as a bipartite symbiosis, with the two symbionts occurring in near isolation. However, recent evidence establishes the presence of two additional and highly evolved microbial symbionts within this association. First, the fungus gardens of attine ants are host to a specialized, virulent, and highly evolved fungal pathogen in the genus *Escovopsis*. Experimental work demonstrates that the presence of this pathogen within gardens significantly reduces the growth rate of leaf-cutting ant colonies. In addition to this garden pathogen, fungus-growing ants have a symbiotic association with actinomycetes. These filamentous bacteria produce antibiotics that suppress the growth of *Escovopsis* in vitro, and experimental evidence indicates that these bacteria are a third mutualist. Thus the attine symbiosis appears to be a coevolutionary ‘arms race’ between the garden parasite, *Escovopsis*, on the one hand, and the tripartite mutualism on the other. *Poster*

**CzederPiltz, Daniell L., Stanosz, Glen R. AND Nordheim, Erik V.** 1Department of Plant Pathology, UW-Madison, Madison WI 53706; 2Department of Statistics, UW-Madison, Madison WI 53706. **The statistical comparison of species diversity among fungal communities.**

Although the study of species diversity has played a central role in ecology for decades, statistical methods are lacking that directly compare species diversity among communities. Researchers generally have to choose between characterizing communities in terms of “overall diversity” (e.g. diversity indices), or breaking down diversity into richness and evenness components. We have developed a method that compares diversity based on species abundance distributions, thus incorporating both richness and evenness information. This method begins with the null hypothesis that two observed abundance distributions represent different samples from the same overall distribution. The “distance” between the two observed abundance distributions is then calculated using one of six scoring methods (likelihood ratios, Shannon or Simpson index, etc.), and this distance is compared to a distribution of distances calculated by simulation (parametric bootstrap) from a suitable null model. Significance is determined by comparing the observed distance to the bootstrap distribution of distances. We have used simulation to do basic testing of the Type I error rate and power of the different scoring methods, and have applied this technique to two fungal data sets. *Contributed Presentation*

**CzederPiltz, Daniell L., Stanosz, Glen R. AND Nordheim, Erik V.** 1Department of Plant Pathology, UW-Madison, Madison WI 53706; 2Department of Statistics, UW-Madison, Madison WI 53706. **The statistical comparison of species diversity among fungal communities.**

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**DASTOOR, FARAHAD P., ANNIS, SEANNA L., DASZAK, PETER, LONGCORE, JOYCE E., JONES, MARK S. AND MUTHS, ERIN.** 1Department of Biological Sciences, University of Maine, Orono, ME 04469; 2Institute of Ecology, University of Georgia, Athens, GA 30602; 3Colorado Division of Wildlife, Fort Collins, CO 80526; 4USGS-BRD, Fort Collins, CO 80525. **PCR assay to detect Batrachochytrium on amphibians and in the environment.**

Chytridiomycosis caused by *Batrachochytrium dendrobatidis* (Chytridiomycota) has been implicated in die-offs of amphibians around the world. We have developed a PCR-based assay to detect *Batrachochytrium* on animals and in the environment. We cultured *Batrachochytrium* from captive and wild amphibians across North America and sequenced the variable ITS 2 region of the rDNA. We have identified a 20 nucleotide primer (its2A) that appears to be specific for *Batrachochytrium* and not present in other fungi. PCR amplification using its2A and the conserved its4 primers produced a 200bp fragment from *Batrachochytrium* DNA but not from DNA of other chytrid clades. In a two-step amplification protocol, as little as 100 fg of *Batrachochytrium* DNA or 100 zoospores can be
Transmission of Phytophthora associated with Sudden Oak Death in California.

A new species of Phytophthora has been found causing extensive mortality of Lithocarpus densiflorus and Quercus spp. in California. An important step in controlling this new Phytophthora involves understanding how it is spread. In laboratory culture, the new Phytophthora readily produces chlamydospores. On V8 agar, the pathogen will also produce sporangia. These types of spores have yet to be observed on infected oak bark in nature or in laboratory moist chambers. However, observations of the disease in the field suggest a distinct aerial phase to the disease. The pathogen has been isolated up to 20 m in mature trees and cankers of infected Q. agrifolia during winter, 2001. Phytophthora has been recovered from rain captured from 6 of 8 trees, showing that the disease could be spread in rainwater. Colony forming units in positive samples ranged from 0.25 - 7 per liter. Phytophthora also was isolated by baiting soil and litter collected from the base of diseased Q. agrifolia trees.

Contributed Presentation

*DERCKS, WILHELM1, KEUCK, ANNA1, SCHMATZ, RUEDiger2, ORLICZ-LUTHARDT, ANNA1 AND HENNING, FRANK2, FH Erfurt, Dept. of Horticulture, D-99085 Erfurt, Thuringia State Agency of Agriculture, Dept. of Plant Protection, Kuehnhaeuser Strasse, D-99189 Erfurt-Kuehnhausen, Institute for Vegetable and Ornamental Crops, Dept. of Plant Health, Kuehnhaeuser Strasse, D-99189 Erfurt-Kuehnhausen, Germany. The biocontrol technology transfer project.

In Germany, only one chemical (dazomet) is registered for soil disinfestation. Some companies offer BCAs for control of soilborne plant pathogens. These may be registered as plant protection products (proof of efficacy required) or plant strengtheners (no proof of efficacy required). Since most of the BCAs are registered as plant strengtheners, many of them show insufficient activity when critically tested. This has damaged the reputation of BCAs in general. The objective of this project is to promote use of active BCAs in horticultural crops. The steps are: 1) Identification of key pathogens in key crops (survey completed); 2) Identification of active BCAs in trials (started); 3) Product development and optimization of protocols for use (in collaboration with producers; running); 4) Demonstration and advice to growers by extension (future). The project is a cooperation of 7 partners from scientific, administrative, and extension institutions with 4 companies and 30 nursery members. First trials are underway in greenhouse and field crops. In cyclamen, FO 47 (non-pathogenic Fusarium oxysporum-strain) and FBZ 24 WG (Bacillus subtilis-strain) are evaluated for prevention of Fusarium oxysporum f. sp. cyclaminis. In sunflowers and larkspur, Contans (Coniothyrium minitans-strain) is tested for bioremediation of Sclerotinia sclerotiorum. All BCAs are checked against chemical standards. Poster


The filamentous fungi include a number of organisms that cause disease in agricultural crops. Although there is a paucity of full genome information for these fungi, recent advances in DNA-based technologies allow for large-scale gene function analyses. At Paradigm Genetics, Inc. we have developed one such approach that is comprised of a rapid mutagenesis and gene identification method, Transposon Arrayed Gene Knock Out (TAGKO(TM)), a
bioinformatics pipeline, and a broad spectrum high throughput phenotypic analysis program. We will show recent results using this technology in the pathogenic fungi Magnaporthe grisea and Mycosphaerella graminicola, the causal agents of rice blast and wheat blotch respectively. Symposium Presentation

*DICKMANN, M.B., ROLLINS, J.A., MEMMOTT, S., CHEN, C., AND HA, Y.-S. Department of Plant Pathology, University of Nebraska, Lincoln, NE 68583. Signaling during pathogenic development in Sclerotinia and Colletotrichum.

The ability to respond to developmental and environmental cues is a characteristic that extends from single cells to complex multicellular organisms. We are studying signal transduction during pathogenic development in two fungal patho-systems. Colletotrichum trifoli, causal agent of alfalfa anthracnose, co-opt host surface cuticular lipids to activate gene expression (via a specific protein kinase), which is required for infection structure (appressorium) formation. Appressorium development is essential for colonization of intact host tissue. Sclerotinia sclerotiorum is an extremely broad host range pathogen which acidifies its environment by producing oxalic acid. Oxalic acid is an essential virulence determinant and in addition, the reduction in pH appears to be important for a number of activities related to pathogenesis including sclerotia formation and the suppression of the host plant oxidative burst. Experimental data supporting these observations will be presented. Symposium Presentation

DINER, ALEX M. Southern Institute of Forest Genetics, Saucier, MS 39574 USA. Carbon source-enhanced axenic growth of Cronartium quercuum f. sp. fusiforme.

Essentially all obligately parasitic rust fungi show rapidly staling vegetative growth in axenic culture. This has not hampered in vitro studies of host-pathogen interaction insofar as timely use of a vegetative inoculum of the microorganism has proven to be pathogenic. However, studies of the genetics and life cycle of these fungi have been limited by staling as well as by failure to sporulate in culture. This author's preliminary attempts to promote rapid axenic growth of the fusiform rust fungus from basidiospores employed "Polycosote" (Abbott Laboratories, Columbus, OH), glucose polymers from controlled hydrolysis of corn starch. Growth rate and colony diameter were double that on glucose. Other potential carbon sources employed included sucrose, soluble starch, lactose, inositol, dextrin (type I from potato, dextrin (type I from corn), and some combinations of these. Growth was most rapid on Polyose (2-4%) and glucose (2-3%), with characteristic white, aerial mycelia. Colonies on Polyose grew to 2-3 cm diameter in 6 weeks, then slowed without staling through 4 additional weeks when measurements were terminated. Colony morphology on the other carbon sources varied; in some cases growth was exclusively sub-surface in the medium. In all cases, it was significantly less than on glucose or polyose. These studies are continuing. Poster

*DIEGUEZ-URIBE ONDO, JAVIER", GIERZ, GERHARD" AND BARTNIICKI-GARCIA, SALOMON" Depts. of Plant Pathology and Mathematics, University of California, Riverside, CA 92521. USA; *CICESE, Centro de Investigaciones Científicas y Estudios Superiores de Ensenada, 22830 B.C. MEXICO. Morphogenesis and apical surface gradients in saprolegniaceous hyphae.

Because of their wide range of apical morphology, saprolegniaceous fungi were chosen to analyze gradients of surface extension during tip growth. As we showed previously, hyphae are generated by a sharp gradient of wall construction centered at the apical pole. The hyphid equation \( y = x \cot (x/V) \) describes both the gradient of exocytosis and cell shape. All hyphal tips of Saprolegnia parasitica analyzed conformed closely to the hyphid equation. Concordance extended for hyphal lengths up to 230 \( \mu m \). By contrast, most hyphal tips of Achlya spp. matched the hyphid equation only in the apical region (ca 6 \( \mu m \)); beyond the apex, most hyphae adopted a conoid shape. Hyphae of Aphanomyces astaci and Leptolegnia approximated the hyphid shape but their tips tended to be more rounded. Since all 4 species were capable of growing hyphoid shapes, we conclude that the tip growth mechanism in oomycetous fungi must be basically the same as that predicted for higher fungi, i.e. controlled by a VSC (vesicle supply center). The departure from the hyphid shape in Achlya denotes an exocytosis gradient that is not tightly centered around a discrete VSC but tapers more gradually into the subapex. A mathematical model was developed that stretched part of the VSC to generate a more gradual gradient of surface growth; the model duplicated well the conoid shape of Achlya hyphae. Contributed Presentation


Trichoderma sect. Trichoderma is one of five sections of Trichoderma. It includes three species viz. T. viride, T. atroviride and T. koningii. Recent ITS sequence data indicated that they hardly differ from each other and might even be considered one species. This is supported by the fact that the T. viride phenotype was found in two ITS sequence types. Moreover, their Hypocrea teleomorphs all fit the H. rufo species phenotype and are, therefore, morphologically similar and possibly indistinguishable. For this study we sequenced the ITS rDNA and the translation elongation factor (tef-1-alpha) genes of 180 Trichoderma/Hypocrea putative members of T. sect. Trichoderma and of the paraphyletic T. sect. Pachybasium. Comparison of sequence data from the ITS-1 region revealed a strongly supported, but unresolved, clade consisting of T. asperellum (T. sect. Pachybasium) and T. hamatum (T. sect. Pachybasium), plus the T. viride, T. atroviride and T. koningii. Preliminary results from the examination of tef-1-alpha sequences revealed the resolution of more species, in particular T. atroviride. However, the T. koningii and to a lesser extent the T. viride phenotypes remained dispersed among diverse genotypes. To
conclude, results to date indicate that there are more than the three currently recognized species within T. sect. Trichoderma. Poster

DONG-HEE, LEE AND HA-WON, KIM 90 Jeonmung-Dong Seoul 130-743, Korea. Effect of Cordyceps sinensis on the on the proliferation of HeLa cell.

Metanolic fraction of Cordyceps sinensis (MCS) was isolated and its antitumor effect was studied on HeLa cell. When incubated in a media containing MCS (5 microg/ml), HeLa cell showed the growth inhibition rate up to 55%. HeLa treated with the MCS was shown to enhance cell cycle related genes: Mad1 and Mad2. In 293 cells, the original levels of interferon gamma, interleukin-1, tumor necrosis factor were very low. When 293 cells were incubated with MCS, however, those three factors were greatly boosted according to the Northern blotting procedure. The most pronounced growth inhibition was found when HeLa and 293 cell were co-cultured in MCS media. The growth of HeLa cell was specifically inhibited. The effect of MCS was further investigated whether natural ingredients may elevate the anticancer strength. For this purpose, aqueous extract of green tea (TE) was supplemented into the MCS media. The growth inhibition on HeLa was very dramatic (up to 75%) and dose-dependent for the green tea extract. The gene expression level of three factors, especially IFN and TNF, was greatly enhanced for MCS-TE media compared to the MCS only counterpart. This indicates the two extracts have a synergistic effect on inhibition of the HeLa cell growth. Further study is necessary to investigate whether other cancer related gene expression coincides with those shown in this study. Poster

*DUGAN, F.M. AND PEEVER, T.L. USDA-ARS Western Regional Plant Introduction Station; *Department of Plant Pathology, Washington State University, Pullman WA 99164. Morphological and cultural differentiation of described species of Alternaria from Poaceae.

Twelve graminicolous species of Alternaria are described, illustrated and keyed by cultural and morphological characters. Ex-type, authentic or representative living material of Alternaria alternata, A. cei, A. infectoria, A. longissima, A. metachromatica, A. oregonensis, A. padwickii, A. tenissima, A. tritecicola, A. tritecimaculans, and A. tritecina furnish the basis for descriptions and illustrations, as do type or authentic exsiccati of A. longissima, A. padwickii and A. sapara. Sporulation and other characters in available cultures and/or exsiccati of A. gramimum, A. pegionis, and A. maritima were insufficient for construction of reliable descriptions. Five names are listed for well-characterized species that are of only incidental occurrence on Poaceae; an additional four names are listed for which material was unavailable. Strains of small-spored, chain-forming Alternaria spp. isolated from uncultivated grasses in Washington and Idaho, or from USDA-ARS seed accessions, frequently conformed to A. infectoria or A. tenissima but only infrequently to A. alternata. No strains in precise conformity to A. alternata sensu Simmons were recovered. Not all strains conformed to descriptions derived from ex-type, authentic or representative material. Results from these morphological and cultural studies will be treated as hypotheses for work based on molecular methods. Poster


The Northwest Forest Plan has drawn attention to conservation needs for many species of fungi including the commercially harvested golden chanterelle (Cantharellus formosus). In broadly distributed species like C. formosus, knowledge of within-population genetic structure is a prerequisite for planning larger scale studies upon which management decisions are based and contributes to our understanding of life history parameters difficult to measure without genetic data. Fruit bodies from 167 C. formosus individuals were mapped and collected from a 50 year old, 50 ha stand of naturally regenerated douglas fir (Pseudotsuga menziesii) and western hemlock (Tsuga heterophylla). Sixty-five unique genotypes resulted from scoring these collections at four microsatellite loci. The spatial distribution of the 10 most frequent alleles was studied using Moran's I statistic. Significant but weak spatial autocorrelation was detected in the four smallest distance classes. We estimate a 250-400 m local genetic neighborhood patch size for C. formosus. This result indicates that either limited spatial dispersal possibly coupled with inbreeding, long lived individuals fragmented over large areas, or some interaction between these processes works to maintain fine scale genetic structure in this species. Poster


Chanterelles are popular edible fungi commercially and recreationally harvested from the wild throughout western North America. In the Pacific Northwest, yellow chanterelles have long been referred to as C. cibarius. Recent evidence supports the idea that the most common yellow chanterelle in the Pacific Northwest is C. formosus. A second yellow chanterelle species, C. cibarius var. rosbecanum, also has been recognized from the region but is far less common and thought to be restricted to spruce and pine forests. This poster presents data that identify and characterize a third, previously undescribed, species of yellow chanterelle from the central Cascade mountains of Oregon. Phylogenetic analyses of the nuclear rDNA large subunit and ITS regions show that this new yellow species, along with two other yellow species, are more closely related to white chanterelles (C. subalbidus) than they are to the common yellow species (C. formosus). Data from two microsatellite loci provides evidence that the local species do not interbreed when they co-occur in Douglas fir- Western Hemlock forests and thus fit into biological species concepts as well as
phylogenetic species concepts. Morphological studies indicate that only the color of the pileus and hymenium can be used to separate the three yellow species now known to occur in Oregon. Poster

EL-MELEIGI, MOHAMED A. Plant Protection Department, College of Agriculture, King Saud University, Gassim Branch, Buryadah, Saudi Arabia. Integration of physical, chemical and biological methods for control of wheat root and foot rot caused by Fusarium graminearum and Cochliobolus sativus.

Dryland root and foot rot caused by F. graminearum and C. sativus is the most destructive disease of wheat in Saudi Arabia causing up to 30% annual grain losses. Soil solarization, biological and chemical control methods were tested in field plots for two consecutive years. Experimental design was RCBD with four replicates for each treatment. Soil solarization treatment was applied during July and August every summer. Wheat seeds of Yeora rojo cultivar were treated with Bacillus polymyxa or a mixture of Carboxin and Thiram prior to seeding. Foliar was with the fungicide Epoxyconazol. Root rot incidence and severity and yield components were determined. Soil solarization combined with chemical or biological treatments were highly effective in controlling the disease. Highest grain yield (6.58 ton/ha) was found in solarized and chemically sprayed treatment, followed by solarized and B. polymyxa coated seeds. The lowest grain yield (4.63 ton/ha) was found in non-treated seeds sown in non-solarized soil. The percentage of root rot infected plants was reduced from 88% in non-treated check treatments to 22% in chemically or biologically treated plants. Contributed Presentation

*ELMER, WADE H.1, GEISER, DAVID, M.2 AND WESLOH, RON. M.1. 1CT Agr. Exp. Sta., New Haven, CT 06504; 2Pennsylvania State University, University Park, PA 16802-4507. Diversity within Fusarium polyphialidicum.

Fusarium polyphialidicum was first described as a soil saprophyte in South Africa in 1986 (Mycologia 78:678). During the 1990s, Fusarium polyphialidicum was isolated from dead gypsy moth (Lymantria dispar) larvae and pupae in the northeastern US (Mycologia 85:937). In 2000, Fusarium polyphialidicum was isolated from dead gypsy moth larvae in Connecticut. Four reference isolates of Fusarium polyphialidicum including the type specimen (MRC 2405) were obtained and compared to a group of gypsy moth isolates for morphology, growth rates, pathogenicity to gypsy moth larvae, and molecular assays. Morphological differences between isolates in the two groups were observed in the macroconidium. At 30°C, the gypsy moth group grew significantly slower (57%) than the group of reference isolates. Neither group was highly pathogenic to laboratory reared larvae of L. dispar (mean 33% mortality, gypsy moth group compared to mean 22% referenced isolates). Studies with AFLPs and DNA sequencing are underway. Based on these assays, there reason to separate the isolates associated with gypsy moths from Fusarium polyphialidicum. Poster

EPSTEIN, LYNN. Department of Plant Pathology, University of California, Davis, CA 95616-8680. Extracellular fungal matrix: role in adhesion.

Many fungi produce glues that spread and cure while under water. Adhesion of macroconidia of Nectria haematococca (anamorph, Fusarium solani) is consistent with the following model. Within 5 min of incubation in an adhesion-inducing medium, at the macroconidial apices, the spores secrete a sticky lower-molecular-weight and more-water-soluble precursor of a 90 kDa glycoprotein. At the spore apex, the glycoprotein is partially polymerized by a transglutaminase into a somewhat sticky 90 kDa form. After 1-2 h, the 90 kDa glycoprotein is excocellularly modified so that it is no longer sticky. After 2 h, adhesion is no longer localized at the spore apex; the macroconidia adhere along the entire lower spore surface, and later along the germ tube substratum interface. Mutant analysis suggests that compounds other than the 90 kDa glycoprotein are involved in this later stage of adhesion. However, inhibition of both spore and germling adhesion by anti-90 kDa IgGs suggest that related compounds may be involved in spore and germling adhesion. The 90 kDa compound is hydrophobic, contains mannose, has N-linkages, and has an amino acid composition with approx. 38% hydrophobic and 62% hydrophilic residues. Symposium Presentation

*FALLAH, P.M.1 AND SHEARER, C.A.2. 1Environmental Microbiology Laboratory, 1800 Sullivan Ave. suite 209, Daly City, CA 94015; 2University of Illinois, Department of Plant Biology, 505 South Goodwin Ave., 265 Morrill Hall, Urbana, IL 61801. Ascomycetes from north temperate lakes and bogs in Wisconsin.

The ascomycota on submerged herbaceous and woody debris of five lakes and two bogs in northern Wisconsin was investigated. Eighty-two ascomycetes were found with little species overlap among the seven aquatic habitats. Of the 38 taxa identified to species, 12 were new species. Only one species, Phaeosphaeria typharum, occurred in all five lakes and one bog. Ceriospora caudae-suis and Macrospora scrpicola occurred in four of five lakes, and Phaeosphaeria barraie and Phomatospora berkeleyi occurred in three of five lakes. The ascomycota of the bogs differed from that of the lakes with only two species, Ascochinocapsa stelligera and Protoventuria myrtilli, occurring in both. Species occurrences were generally highest in spring and fall and lowest in summer and winter. Substrate availability influenced species numbers more than substrate diversity. Among herbaceous substrates, the greatest numbers of species were found on Typha latifolia (7), Scirpus brevicaudatus (4) and Scirpus validus (4).

*FARMAN, MARK L. Department of Plant Pathology, University of Kentucky, Lexington KY 40546 USA. The molecular basis of field resistance to QoI fungicides in Puccinia grisea.

Gray leaf spot (gls) of perennial ryegrass caused by Puccinia grisea has rapidly become one of the most destructive turfgrass diseases. Control of gls is dependent on the use of preventative
fungicide treatments. Strobilurin-based (QoI) fungicides, which inhibit the mitochondrial enzyme cytochrome b, have proven very effective against gts. However, in 2000, QoI fungicide resistance was found in P. grisea on 2 golf courses in the USA - one in Lexington, KY and the other in California. Nucleotide sequence analysis of the cytochrome b gene (Cytb) in a number of isolates from affected turf, revealed two mutant cyt b alleles, each carrying a single point mutation. The first mutation causes an G143A alteration in the peptide sequence, while the other results in a F129L change. These substitutions have previously been associated with QoI fungicide resistance in Venturia inaequalis and Saccharomyces cerevisiae. In P. grisea, mutants possessing the G143A substitution had >10 fold higher levels of resistance than those with F129L. DNA fingerprint analysis of several resistant P. grisea isolates found on a single QoI fungicide-treated golf course revealed that they were genetically distinct. Therefore, the occurrence of disease on this course was not caused by dispersal of a single resistant clone. Contributed Presentation


Mushroom poisoning continues to be a problem faced by poison control centers. Decisions regarding treatment following mushroom ingestion are usually made without a firm identification of the fungal species and tend to be more aggressive than necessary. Since actual identification of mushrooms is usually beyond the scope of emergency departments or poison center staff, the expertise of a professional mycologist is essential to make an accurate identification. The use of digital images sent over the Internet may provide an important tool for more rapid ID and therefore facilitate optimum patient care. The efficacy of using digital images in the identification process was tested in a pilot project. We describe three of the cases in which digital images, verbal descriptions, and the corresponding mushroom specimens have been obtained. We also present the protocols currently being used by the Illinois Poison Center. While standard digital images alone will not permit positive identification, they often contain sufficient information to help the clinician rule out the possibility of a severely toxic species. Data accumulated to date indicate that digital imaging can be an important tool in the diagnosis and treatment of mushroom ingestion. This technology also has potential for use with exposures to other biologicals such as plants, insects, and reptiles. Poster

*GARBELOTTO, M.; RIZZO, D.M.; DAVIDSON, J.M. 1. Department of Environmental Science, Policy and Management, Ecosystem Science Division, 151 Hilgard Hall, University of California, Berkeley, CA 94720; 2. Department of Plant Pathology, One Shields Ave., University of California, Davis, CA 95616. Studies in the genetics of a new Phytophthora species associated with Sudden Oak Death in California.

A species of Phytophthora with semipapillate, deciduous sporangia has been found causing extensive mortality of Lithocarpus densiflorus and Quercus spp. in California. Sequences of the internal transcribed spacer (ITS) of nuclear ribosomal DNA were identical for isolates from L. densiflorus, Quercus, and Rhododendron sp. No matching ITS sequences were found in the GenBank database. Based on the ITS sequence, the new species falls into a clade of primarily non-papillate and non-deciduous, soil-borne Phytophthoras. The closest species is P. lateralis, a presumed exotic currently causing significant mortality of Chamaecyparis lawsoniana in native stands in Oregon and California. The color, size and attachment of the chlamydospores and the temperature requirements are very similar to that of P. lateralis. However, P. lateralis has non-deciduous, non-papillate sporangia, is a root pathogen, and has a very different host range. We are now examining the population structure of Phytophthora sp. using AFLPs to determine variability within pathogen populations. The use of genetic data has also allowed for the development of species specific diagnostic PCR primers. Using these primers, we have successfully identified the pathogen from infected plant tissue from which culturing was impossible. Contributed Presentation

GEVENS, AMANDA J. AND NICHOLSON, RALPH L. Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47906. Visualization of the extracellular matrix and conidial morphology of Pestalotia malicola.

Pestalotia malicola conidia incubated on artificial and natural substrata release extracellular matrix (ECM) material. SEM imaging has indicated the presence of ECM beneath conidial appendages and suggests the presence of ECM beneath the germinal segment of the conidium. Indoxyl acetate staining for non-specific esterase activity reveals that enzyme activity occurs initially at the site of the conidial appendages. Later in conidial development, enzyme activity moves to the inner wall of the germinal segment. Gelatin surface lifts observed with light microscopy and SEM indicate that a strong initial conidial adhesion occurs at the site of the sticky appendages which flank the conidium. These lifts also indicate cuticular erosion beneath hyphal segments. That the ECM and enzyme activity were seen beneath firmly adhered conidial appendages suggests that both components have a role in adhesion. SEM reveals the structural morphology of the segmented conidia in addition to the smooth surface features of conidial walls. Symposium Presentation


During a survey of tropical Ascomycetes from Mexico, an interesting fungus was isolated from sandy beach soil collected from the Gulf of Mexico seacoast. The fungus
produces a rudimentary ascoma with oblate, smooth-walled, unornamented, greenish ascospores and lacks a distinctive peridium surrounding the ascospores. These characteristics place the fungus in the Oomygeales (Gymnocolaceae). Comparison with published species descriptions indicate that it is an undescribed species, and therefore we are proposing a new species to accommodate this fungus. Based on morphological characters and phylogenetic analysis of 18S rDNA sequences, this fungus is close to but separate from Gymnascella species. Generic placement, however, is complicated by nomenclatural problems, which are discussed in the paper.

*GRAND, EDWARDA., PETERSEN, RONALD H. AND HUGHES, KAREN W. Dept. of Botany, University of Tennessee, Knoxville, TN 37996-1100, USA. **Lentinus tigrinus is a circum-global species.**

We employed single-basidiospore isolates (SBIs) of *Lentinus tigrinus* (Bull. : Fr.) from nine widely scattered geographic locations. For six collections, spores were isolated from fresh, field-collected basidiomata. For the other three collections, 20-30-year-old dikaryon cultures were fruiting in vitro, and spores were collected from fruiting basidiomata. SBIs from each collection were paired with those of all other collections (n = 4 or 8) to ascertain mating intercompatibility. Results showed complete infraspecific compatibility among collections, indicating that all collections represented the same biological species. Likewise, morphological studies indicated that all collections were of the same morphospecies. Although infraspecific crosses showed complete intercompatibility, nrDNA ITS1-5.8S-ITS2 sequences indicated divergence between North American and Eurasian collections (~95% homologous). Sequence homologies were less than would have been expected of infraspecific collections. These data indicated that criteria for separating species based on sequence variability may be misleading in light of biological and morphological data.

GRAND, L.F. AND VERNIA, C.S. Dept. of Plant Pathology, Box 7616, North Carolina State University, Raleigh NC 27695-7616 USA. **New reports and biogeography of poroid wood-decay fungi in North Carolina.**

In a continuing study of the biodiversity and biogeography of poroid fungi in North Carolina a notable number of species previously not reported in the state were collected. Reported for the first time in North Carolina are 2 spp. in the Hymenochoaetaeae, 11 spp. in the Polyporaceae, 1 sp. in the Albatrellaceae and 1 sp. in the Corticiaceae. Distribution maps are presented for the following species found in North Carolina: *Phellinus chrysoloma*, *P. contigus*, *P. everhartii*, *P. ferreus*, *P. igniarius*, *P. pomaceus*, *P. punctatus*, *P. robiniae*, *P. viitcola*, and *P. wahlbergii*; *Fomes fasciatius*, and *F. fomentarius*; *Fomitopsis cajanderi* and *F. pinicola*; and *Inonotus dryadeus*, *I. dryophilus*, and *I. hispidus*. Annual updates of distribution maps of these and other species for North Carolina will be made.

GUTIERREZ, H.E AND KUTI, J.O. Hort. Crops Research Lab., Texas A&M University-Kingsville, TX 78363. **Use of random amplified polymorphic DNA (RAPD) markers to differentiate faba bean genotypes with resistance and susceptibility to Orobanche crenata.**

Orobanche crenata Forsk. is an important parasitic weed of faba bean in Egypt. Control of the weed is best achieved by the use of resistant varieties. Even though 'Giza 402' was identified as a possible resistant faba bean variety, little is known about genetic variations among the resistant and susceptible genotypes. Ten selected Egyptian faba bean genotypes, with wide range of reactions to *Orobanche*, were screened using random amplified polymorphic DNA (RAPD) markers to characterize genetic variations for resistance and susceptibility among the genotypes towards *Orobanche* parasitism. Genetic similarity among the genotypes was estimated on the basis of common DNA bands. While distinct polymorphic DNA bands corresponding to either resistance or susceptibility were observed in five PCR primers used, we do not know whether these DNA segments express solely as resistant or susceptible traits in faba bean to *Orobanche* parasitism. However, PCR assays may be potentially useful to identify resistant and susceptible plants.

*HALLEN, HEATHER E. AND ADAMS, GERARD C. Department of Plant Biology, Michigan State University, East Lansing, MI 48824-1312 USA. **Identity of Amanita species infected by Hypomycetes hyalinus.**

Agarics in the genus *Amanita* can be parasitized by the pyrenomycete *Hypomyces hyalinus*. Parasitized sporocarps are misshapen and aborted severely enough to preclude identification of the host organism. A basidiomycete-specific primer was used to isolate the *Amanita* species from the ascomycete parasite during polymerase chain reaction (PCR) amplification of the internal transcribed spacer region of the ribosomal DNA operon. The *Amanita* hosts were identified based on RFLP pattern and sequence homology with uninfected *Amanita* species. Reports in the literature often state that the parasitized species is primarily *A. rubescens*. Numerous species of *Amanita*, including species in several sections and both subgenera of the genus, were found to be hosts. Additionally, several species of *Amanita* were found to be infected in one restricted locale during a two week interval in a single season. **Contributed Presentation**

*HARBIN, MARSHA AND VOLK, THOMAS J. Dept. of Biology, Cowley Hall, University of Wisconsin- La Crosse, La Crosse, WI 54601. **Recycling of spent grains from beer and ethanol production into media for mushroom production.**

One constant problem with beer and ethanol production is the large amount of spent grain that must be dumped, landfilled or sold as animal feed for as little as $10-30 per ton. Because of the ever-increasing popularity of cultivated specialty mushrooms, we investigated methods for recycling of these spent grains into inexpensive substrates for mushroom cultivation. The spent grains,
consisting of wheat or barley combined with hops, were obtained from three different beer-processing plants, and spent corn from an ethanol production plant. We determined the chemical compositions of each substrate and compared the mycelial growth and the fruit body yields on various combinations of these substrates, plus other additives where necessary. Fungal species evaluated as inoculants were Lentinula edodes, Pleurotus ostreatus, P. populinus, Hericium coralloides, H. erinaceus, Ganoderma lucidum, Clitocybe nuda, Grifola frondosa, and Stropharia rugoso-annulata. We present data on our attempts to cultivate mushrooms on these substrates, including methods for sufficient sterilization and unique media combinations and additives for each individual inoculant. 

*HARKNESS, JENNIFER, INDERBITZIN, PATRIK AND BERBEE, MARY L. University of British Columbia, Department of Botany, #3529-6270 University Blvd., Vancouver, British Columbia, Canada, V6T 1Z4. How old is homothallism in Stemphylium?*

In this study, we are investigating the distribution of the mating type genes MAT-1 and MAT-2 in 55 isolates of the genus Stemphylium. The mating types were assessed with two primer sets amplifying the diagnostic alpha and HMG box of the MAT-1 and MAT-2 genes respectively. So far, 23 isolates have been screened, and both MAT-1 and MAT-2 were demonstrated in each isolate. In the genus Cochliobolus which is closely related to Stemphylium, the occurrence of both mating type genes in one isolate is indicative of homothallism. In Stemphylium, several species are known homothallics, including S. vesicareium and the anamorph of the type species of Pleospora, S. herbarum. Both S. vesicareium and S. herbarum were represented by one isolate in this study. The remaining 21 isolates were of unknown species. Phylogenetic analyses based on partial GPD sequences have shown that our Stemphylium isolates are genetically diverse, implying that an entirely homothallic genus Stemphylium cannot be excluded. Since homothallism is generally thought to arise from heterothallism, it may be possible that homothallism evolved before the genus Stemphylium. 

*HAWKINS, LAURAINNE K. AND BRANTLEY, ELIZABETHA. Penn State Mont Alto, Mont Alto, PA 17237 USA. Air quality in a science building.*

Indoor air quality has been a growing concern over the past several years. Fungal spores and other airborne particulates can be potent allergens and sometimes cause more serious health problems. Students on our campus have lodged repeated health complaints over a particular classroom in the science building. To investigate the validity of these complaints, we sampled air and surfaces in this classroom, an office, and a bathroom in this building. Samples also were collected in other buildings and outdoors for comparison. Levels of particulates (dust, pollen, spores, etc.) and fungal inocula were quantified using adhesive particle collector tapes and Petri plates. Our poster presents the outcome of our surveys. 

*HAWKSWORTH, DAVID L. Departamento de Biología Vegetal II, Facultad de Farmacia, Universidad Complutense, E-28040 Madrid, Spain; and MycoNova, 114 Finchley Lane, Hendon, London NW4 1DG, UK. Trouble with lichen.*

The concept of 'lichen' as a biological not a systematic category still causes problems. As composites they have no names, while their components do; the fungal name serves as a surrogate. Some of the fungi have different biologies at different stages, from parasites to separate lichens. A single genus can include lichen-forming, lichen-dwelling (lichenicolous), and bark saprobic species. While the taxonomy of the fungus logically should be based on its own characters, features from the composite thallus are commonly used even at genus level. In the Parmelioid lichens thallus characters and chemistry have been used to separate increasing numbers of new 'genera', but many have not been accepted as they were not based on differences in the reproductive structures similar to those employed as generic criteria in other fungi. rDNA gene sequences have failed to resolve the problem, but the mtDNA SSU appears to do. The results of analyses of 31 new sequences, including ones from the type species of 23 generic names, show that some segregates are distinct, but others come together. The emerging groups appear to correlate with differences in ascospores, conidia, wall carbohydrate chemistry, and ultrastructure. But trouble extends to species level, where complex patterns of variation in rDNA genes occur in morphospecies, including clones with wide geographical ranges. 

*HEMMES, DON E. AND DESSIARDIN, DENNIS E. Biology Department, University of Hawaii at Hilo, Hilo, HI 96720 USA; Department of Biology, San Francisco State University, San Francisco, CA 94132 USA. Mushrooms and other fungi of Casuarina forests in the Hawaiian Islands.*

The branchlet duff under coastal and montane Casuarina forests in Hawaii supports a population of over thirty agarics and gasteromycetes. The nitrogen-fixing species Casuarina equisetifolia was introduced to Hawaii in the late 1800’s, especially along the windward coastlines, where it helps reduce the effects of trade winds and salt spray. The most commonly encountered species of agarics include Gymnopus luxurians and G. menenhuwe, which form arcs and fairy rings in the duff, and Lepiota like Chlorophyllum molybdites, Lepiota besseyi, and Leucocoprinus bimbaunii. Agaricus subrufescens and the newly described A. rotalis appear in scattered clusters throughout these areas, along with Amanita marmorata. Lactocollybia epila, Cypriotrama asprata, and Gymnopilus subtropicus develop on fallen twigs and branches. Earthstars, especially Geastrum pectinatum, G. berkeleyi, G. fimbriatum, and G. minimum appear in scattered groups, whereas Vascellum floridanum develops in large clusters. The netted stinkhorn, Dictyophora multicolor, is characteristic of these areas. In montane Casuarina forests the species composition is different.
Amanita marmorata, Marasmius radiatus, Mycena papyracea, and a Leucocoprinus are the most prominent agarics. Additional species found in these unique vegetation zones will be shown. Poster

*HENK, DANIELA. AND VILGALYS, RYTAS. Dept. of Biology, Duke University, Durham NC 27708 USA. Systematics of Septobasidium Pat.

The heterobasidiomycete genus Septobasidium Pat. contains approximately 180 described species which symbiotically associate with scale insects. Little recent systematic attention has been given to Septobasidium, and groups of species within the genus have not been well defined. This study sought to address infrageneric relationships in Septobasidium using morphological and molecular data. Type specimens of most Septobasidium species and recently collected specimens from temperate and tropical regions were obtained. We used phylogenetic analysis of nuclear rDNA sequences to address the relationships among species of Septobasidium. We found that outgroup choice affected inferred relationships among species in the genus, and long-branch attraction was a factor in our data set. We then address the evolution of morphological traits which have been suggested to characterize groups of species within Septobasidium or genera within the Septobasidiaceae. Some of these characters, in particular septation of the basidium and persistence of the probasidium, were found to be poor indicators of natural groups. Poster

*HENKEL, TERRY, TERBORGH, JOHNNY AND VILGALYS, RYTAS1. 'Department of Biology, Duke University, Durham, NC 27708; 2Center for Tropical Conservation, Duke University, Duke University, Durham, NC 27708. Dicymbe forests as habitat islands for ectomycorrhizal fungi in the Pakaraima Mountains of Guyana.

Recent field studies documented the occurrence of neotropical ectomycorrhizal (EM) basidiomycetes and EM trees in a circum-scribed area of the Pakaraima Mountains of Guyana, South America. Along transects, basidiomes from 75 species or morphtypes of putatively EM macrofungi were spatially associated with leguminous host trees. These fungi belonged to the Boletaceae, Amanitaceae, Russulaceae, Cortinariaceae, Cantharellaceae, Clavulinaceae, and Entolomataceae. Ectomycorrhizae were confirmed on four leguminous tree species. Three of these species, Dicymbe corymbosa Spruce ex Benth., Dicymbe alstonii Sandw., and Dicymbe jenmanii Sandw., are members of the Caesalpinaceae, tribe Amhersteae. The fourth species, Aldina insignis (Benth.) Endl., is a member of the Papilionaceae, tribe Swartzieae. A variety of other co-occurring caesalpinaceous trees failed to exhibit ectomycorrhizae. Transect surveys indicated that ectomycorrhizal tree species, in particular D. corymbosa and D. alstonii, were: 1) highly clumped and dominant at specific sites; 2) spatially associated with basidiomes of ectomycorrhizal fungi; and 3) occurred on diverse soils. EM fungal basidiomes were highly restricted to groves of EM trees, while saprotrophic macrofungi were more equitably distributed. Groves of EM trees function as habitat islands for EM fungi in an otherwise anecotrophic forest matrix. Contributed Presentation

*HERR, JOSUA R., METHVEN, ANDREW S. AND MILLER, STEVEN L. 1. Department of Botany, University of Wyoming, Laramie, WY 82071 USA; 2Department of Biological Sciences, Eastern Illinois University, Charleston, IL 61920 USA. Molecular systematics of the genus Lactarius (Russulaceae, Russulales) from North America.

The genus Lactarius, a group of ecologically and economically important ectomycorrhizal fungi, is distinguished from Russula in temperate regions by the presence of latex. Although several taxonomic treatments have been recently published, no studies of the molecular phylogeny have been accomplished for Lactarius. North American species of Lactarius, representing all infrageneric taxa, were sequenced in the ITS rDNA region for phylogenetic comparison. The subgeneric classifications of Hesler and Smith and Singer were used as a foundation for comparisons. The molecular data were subject to maximum parsimony analysis using PAUP* (Swoford, 1999). Preliminary results indicate that many Lactarius subgenera, such as Lactarius, Plinthogalus, and Russularia appear to be most basal. Morphological characters used in the taxonomy of Lactarius including taste and latex color changes were mapped onto the molecular phylogeny and will also be discussed. Contributed Presentation

*HERRERA, JOSE AND HAYES, SARAHA. Division of Science, Truman State University, Kirksville, MO 63501 USA. Effect of storage depth and fungal infection on viability and germinability of Sporobolus cryptandrus.

Fungal infection of the seeds of Sporobolus cryptandrus offers banner-tailed kangaroo rats (Dipodomys spectabilis) the opportunity to decrease the viability and germinability of seeds stored within their burrows. Seeds packaged in wire capsules were placed on the soil’s surface, or at 0.25 or 0.75m within rodent dens. Seeds retrieved after only 10 days from these dens were significantly less viable and germinable than those stored above the soil’s surface. Seeds retrieved after 56 days exhibited a similar pattern. Communities of fungi infecting seeds were segregated based on the depth at which the seeds were stored. We suspect that by storing and moving seeds within their dens, kangaroo rats may expose developing seed embryos to fungal ability to sterilize the seed without affecting the palatability or nutritional value of the energy-rich endosperm. Poster

*HIBBETT, DAVID S. AND BINDER, MANFRED. Biology Department, Clark University, Worcester MA 01610 USA. Evolution of corticioid homobasidiomycetes.

Homobasidiomycetes produce some of the most complex fruiting bodies in the fungal kingdom, including elaborate, developmentally integrated structures, such as veiled agarics (e.g., Amanita)
and various gasteromycetes (e.g., Dictyophora, Sphaerobolus). Homobasidiomycetes also include relatively simple corticioid fungi, whose resupinate fruiting bodies can be little more than a layer of reproductive hyphae on a substrate. Corticioid homobasidiomycetes are clearly not monophyletic, but their precise relationships have been obscure. We are using phylogenetic analyses of a large molecular dataset to understand the historical pattern of switching between corticioid and pileate-erect forms. We are particularly interested in resolving whether the ancestor of the homobasidiomycetes was corticioid (as has been suggested). Finally, using maximum likelihood methods, we are investigating whether there is evidence of an evolutionary bias toward elaboration or reduction in the evolution of fruiting body forms in homobasidiomycetes. Symposium Presentation

HOCH, H.C. Department of Plant Pathology, Cornell University, New York State Agricultural Experiment Station, Geneva, NY 14456 USA. Nanobiotechnology: Applications and opportunities for cell biology.

Nanobiotechnology is an emerging area of scientific and technological advances that meld nano- and microfabrication with biological systems. It is an area that brings together collective efforts of biologists, engineers, physicists, and chemists. The ability to fabricate materials and pattern surface chemistry at small dimensions are the fundamental technologies on which the field of nanobiotechnology is based. It provides new analytical tools for interrogating biological systems (fungi, bacteria, mammalian cells, etc.) with unprecedented spatial resolution and sensitivity. Among the explorations being pursued in nanobiotechnology are development of tools to detect and analyze small numbers of biologically relevant molecules and sparse cells, of bioselective surfaces on which site specific topographies and chemistries are created to influence and understand interactions between cells and their environment, of bioselective filtration devices for separating complex mixtures of molecules, and of molecular motors to power micro-devices useful in cell biology. Fabrication methodologies include lithography, micro-contact printing, and reactive etching in a wide array of materials. Research activities in this new area are the driving force for the Nanobiotechnology Center which is comprised of an aggregate of six universities and institutes (http://www.nbtc.cornell.edu). Symposium Presentation

*HORN, BRUCE W. AND DORNER, JOE W. National Peanut Research Laboratory, USDA, ARS, Dawson, GA 31742 USA. Effect of competition and adverse culture conditions on aflatoxin production by Aspergillus flavus through successive generations.

Strains of Aspergillus flavus often degenerate with serial transfers on an enriched medium, resulting in morphological changes and loss of aflatoxin production. However, high percentages of aflatoxigenic A. flavus from soil and crops in some regions of the United States suggest that such degeneration does not readily occur in nature. In this experiment, three aflatoxin-producing strains of A. flavus were serially transferred using conidia for 20 generations (three independent generation lines per strain) on an enriched medium (potato dextrose agar at 30 C). The rate of degeneration was compared to that of cultures grown in the presence of competing fungi (A. terreus, Penicillium funiculosum and the yeast, Pichia guilliermondii) and under adverse conditions of elevated temperature, reduced water activity, low pH, and nutrient deprivation. Retention of morphological characters and aflatoxin production over generations varied considerably according to strain and the generation line within each strain. In strains highly sensitive to degeneration on potato dextrose agar, aflatoxin-producing ability was maintained to varying degrees under adverse culture conditions but not when A. flavus was competing with other fungi. Poster

*HOSAKA, KENTARO1, COLGAN III, WESLEY2, CASTELLANO, MICHAELA.2 AND SPATAFORA, JOSEPH W.1 1Dept. of Botany and Plant Pathology, Oregon State University, Corvallis, OR 97331, USA; 2School of Biological Sciences, Louisiana Tech University, Ruston, LA 71272, USA; *US Forest Service, PNW Research Station, Corvallis, OR, 97331, USA. Molecular phylogenetics of the genus Hysterangium and the Gomphales/Phallales fungi.

Hysterangium (Basidiomycota, Phallales) comprises more than 40 species of fungi, which produce sequestrate and hypogeous sporocarps. Species of Hysterangium are distributed worldwide, but most species are restricted to a single continent. The genus is ectomycorrhizal and possesses a wide host range that includes the Pinaceae, Fagaceae, and Myrtaceae. Molecular phylogenetic studies of nuclear and mitochondrial rDNA supported a close relationship between the Phallales and Gomphales, which is the another morphologically diverse group including Ramaria, Gomphus, and Clavariadelphus. However, many of the more basal phylogenetic relationships within the Gomphales/Phallales clade remain unresolved, as do many character state polarities within the Phallales such as hypogeous/epigeous sporocarp habit and mycorrhizal/saprobic nutritional modes. In order to resolve these relationships more clearly and to develop more robust hypotheses for morphological and ecological character state evolution, we have initiated a multigene phylogenetic study of Hysterangium and related taxa. We will present results from phylogenetic analyses of nucleotide sequence data determined from the nuclear LSU rDNA and mitochondrial SSU rDNA and ATP6 for an expanded taxon sampling of Hysterangium and the Gomphales/Phallales clade. Contributed Presentation

*HOWARD, RICHARD J., BOURETT, TIMOTHY M., DUNCAN, KEITH E., SWEIGARD, JAMES A. AND CZYMMIEK, KIRK J.1 Dupont Crop Genetics, Wilmington, DE 19880-0402; 2Department of Biological Sciences, University of Delaware, Newark, DE 19713. Trends in imaging fungal pathogens for cell biological studies of plant disease.

Advances in instrumentation and technique have accelerated the evolution of imaging in cell biology. This presentation will include examples of our recent work, and will cite examples from other laboratories, highlighting several new imaging applica-
tions in studies of fungal plant pathogens. The use of cryo-based preparative procedures remains the standard for fixed specimens at the tissue and cellular levels, for both light and electron microscope studies. For example, we have used immunocytochemistry to map the microtubule cytoskeleton in whole, intact, cryo-fixed hyphae, documented in three dimensions using digital imaging and confocal laser scanning microscopy. CryoSEM, as well as TEM after high-pressure freezing, continue to be important tools for investigations of host-pathogen ultrastructure. CLSM brings another dimension to the study of pathogenesis, in allowing for 3-D documentation of spatial relationships throughout the disease process. We demonstrate the utility of this approach for imaging infection hyphae in (a) fixed, cleared tissues, and (b) living or fixed tissues invaded by fungal transformants expressing spectral variants of green fluorescent protein. We anticipate an ever-increasing role for laser imaging, including multiphoton microscopy, and the use of living specimens to achieve maximum spatial and temporal resolution in studies of fungi. Symposium Presentation

HSIEH, HUEI-MEI AND *JU, YU-MING Institute of Botany, Academia Sinica, Nankang, Taipei, Taiwan 115, Republic of China. A new fruticulous trichocormaceus fungus *Penicilliosis pseudocordyceps*, the teleomorph of *Pseudocordyceps seminicaolae* and *P. clavariaeformis*

Among the four synnematous genera *Pseudocordyceps*, *Sarophormum*, *Stilbodendron*, and *Stilbothamnium* that were positively or circumstantially connected to *Penicilliosis* by Samson and Seifert in 1985, *Pseudocordyceps* was the only form-genus that lacked evidence of a teleomorphic connection. It is a monotypic genus known only from several collections made in Zaire in the 1930's. We collected *Sarophormum palincuba* and *Pseudocordyceps seminicaolae* in southern Taiwan from seeds of Diospyros discolor on which two immature stromatic fungi were also found. The collecting site was revisited two months later and the mature stroma of the two fungi were recovered: one was *Penicilliosis clavariaeformis* and the other was a new species of *Penicilliosis*. We obtained cultures from these two *Penicilliosis*, *Sarophormum palincuba* and *Pseudocordyceps seminicaolae* were produced in cultures of *P. clavariaeformis* and the new *Penicilliosis*, respectively. We thus propose the name *Penicilliosis pseudocordyceps* for the new fungus. The teleomorph of *P. pseudocordyceps* was produced on oatmeal agar in six weeks and is much like that from natural substrate. *Poster*

HYDE, KEVIN D.1, LACAP, DONNAC.2 AND LIJEW, EDWARD C.Y.1. 1Centre for Research in Fungal Diversity, Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong, China; 2Department of Biology, Ateneo de Manila University, Philippines. An evaluation of the fungal 'morphospecies' concept based on ribosomal DNA sequences.

In studies of fungal endophyte communities, mycelia sterilia are commonly isolated from plant substrates and grouped into 'morphospecies' on the basis of cultural characteristics. The validity of these 'morphospecies' as taxonomic groups has been verified. One hundred and sixty-nine strains of mycelia sterilia were isolated from *Polygonum multiflorum* and grouped into 27 'morphospecies'. Six randomly selected 'morphospecies', each with 2-3 representatives, were subsequently subjected to ribosomal DNA sequence analysis. Nucleotide sequence similarity of the rDNA internal transcribed spacer (ITS) region and the 5.8s gene were compared using (Unweighted Pair Group Method with Arithmetic mean) UPGMA analysis. Comparison of nucleotide sequences revealed high levels of similarity (>99.2%) among strains within 'morphospecies'. Similarities between 'morphospecies' were 83.2-90.1%. The ITS and 5.8S sequences of species within various genera from GenBank was also obtained to estimate levels of nucleotide similarity within and between well-established genera and species. On the basis of these results, an evaluation of 'morphospecies' as valid taxonomic groups is presented. *Poster*

INDERBITZIN, PATRIK AND BERBEE, MARY L. Department of Botany, University of British Columbia, #3529-6270 University Blvd., Vancouver, British Columbia, Canada V6T 2Z4. *Aliquandostipitaceae* (Dothideomycetes; Ascomycota), a family with dimorphic ascomata and unusually wide hyphae.

Species of the genus Aliquandostipite in the Dothideomycetes are characterized by the presence of two morphologically divergent types of ascomata side by side on the substratum. The conventional ascomata are erumpent from the substratum, whereas the second type is subtended by a stalk. The stalks are up to 50 μm wide and 1.6 mm long, and arise directly from the substratum, or are continuous with a superficial mycelium. The mycelium is formed by a network of up to 40 μm wide hyphae. In one species, single ascospore isolates from sessile ascomata formed sterile stalked ascomata in culture. Common morphological features of the species of Aliquandostipite include an ascomatal wall consisting of large, light-colored cells, fissitunicate ascii, pseudoparaphyses, and ascospores with appendages. Both species of *Aliquandostipite* were found on decaying wood in wet tropical or subtropical habitats: *A. khaoyaiensis* from the ground of a tropical rain forest in Thailand, and *A. sunyi* from a stream in southern China. Some members of the genus *Jahnula* are known from comparable habitats, have a similar ascomatal wall as species of *Aliquandostipite*, and structures which resemble the wide hyphae in *Aliquandostipite*. We are currently using morphological and molecular means to investigate the relationship of the two genera, as well as their closest relatives. *Contributed Presentation*

*JACOBS, KARIN, HOLZMAN, KIMBERLEY M. AND SEIFERT, KEITH A. Eastern Cereal and Oilseed Research Centre, Agriculture and Agri-Food Canada, Ottawa, Canada, K1A 0C6. *Glioccephalis hyalina*: An obligate parasite of *Fusarium* species.*

*Glioccephalis hyalina* Matruchot 1899 is the single species of the hyphomycete genus, *Glioccephalis*, characterized by the production of *Aspergillus*-like conidiophore with conidia produced in slime. This species is morphologically similar to *Goidaniella*
barronii, from which it is distinguished primarily by the absence of septa and pigmentation in the stipe. Glioccephalis hyalina has been reported only three times, each time in association with other fungi and bacteria. Attempts to purify the fungus led to the loss of the cultures. Recently, an isolate of G. hyalina was obtained from soybean roots on the Central Experimental Farm in Ottawa. The fungus would not grow alone, and could only be maintained in mixed culture with Fusarium, leading to the hypothesis that it is an obligate parasite. SEM and TEM were used to determine the mode of infection. Fusarium strains grown in the presence of G. hyalina showed no change in growth rate or colony morphology. Several other soil-borne fungi were tested as possible hosts, but G. hyalina appears to be specific to Fusarium species. We also attempted to clarify its phylogenetic position in the fungal kingdom and compared it to other Aspergilloid genera such as Goidanichielia, Aspergillus, Escovopsis, Knoxiaviae, Glioccephalotrichum and Gibellula based on the ITS and 18S ribosomal gene sequences. Contributed Presentation

*JACOBS, KARIN, SEIFERT, KEITHA, HARRISON, KEN J. AND KIRISITS, THOMAS. 1ECORC, Agriculture Canada, Ottawa, Canada, K1A 0C6; 2NRC, Canadian Forest Service, Atlantic Forestry Centre, Fredericton, NB, Canada E3B 5P7; 3Institute of Forest Entomology, Forest Pathology and Forest Protection, Universitat fur Bodenkultur Wien, Hasenauerstrasse 38, A-1190 Vienna, Austria. Ophiostomatoid fungi associated with Tetrophium spp. (longhorn beetles) in Atlantic Canada.

Species in Ophiostoma are well known for their ability to cause stain in living trees and lumber, and as devastating pathogens, for example O. ulmi and O. novo-ulmi, which are responsible for Dutch elm disease. Ophiostoma spp. occur in close association with insects, especially bark beetles in the family Scolytidae, which may function as specific vectors. Recently, red spruce (Picea rubens) trees in a small area of the Halifax Regional Municipality in Nova Scotia, Atlantic Canada, were found to be infested by Tetrophium fuscum, an Eurasian species of longhorn beetle in the family Cerambycidae. Tetrophium fuscum was infesting and killing red spruce trees that do not occur in the insect’s native range. An unidentified species of Ophiostoma occurred with this beetle. The aim of this study was to identify the fungus associated with T. fuscum in Halifax and compare it with ophiostomatoid fungi associated with T. fuscum (Tetrophium spp.) in Europe. Ophiostoma species associated with T. cinnamopterum (indigenous to and transcontinental in Canada) were also compared to those with T. fuscum. Species were compared based on morphological and molecular characters. Ophiostoma tetropii appears to be the major species associated with T. fuscum in Canada. A single earlier report of this fungus exists for Canada, and it was compared to the isolates from Atlantic Canada. Poster

*JACOBS, KARIN AND WINGFIELD, MICHAEL J. 1Eastern Cereal and Oilseed Research Centre, Agriculture and Agri-Food Canada, Ottawa, Canada, K1A 0C6; 2Forestry and Agricultural Biotechnology Institute, University of Pretoria, Pretoria, 0002, South Africa. Leptographium species: tree pathogens, insect associates and agents of blue-stain.

Species in Leptographium are morphologically similar and are all characterized by dark mononematous conidiophores with conidia in slimy droplets at the apex of a complex conidiogenous apparatus. Several species in Leptographium are known for their ability to cause blue-stain in conifer timber, and a few species are associated with tree diseases. Species in Leptographium have a worldwide distribution and are in most cases associated with insects, especially bark beetles. The lack of a comprehensive key to species makes this an especially difficult genus with which to work. Incorrect identification of possible pathogens can have serious economic implications. This presentation is a summary of a recent study that has culminated in the first monograph on Leptographium. The study reviews the taxonomy and ecology of species in the genus and also provides keys to all species. Keys are supported by detailed descriptions, photographic illustrations as well as line drawings. It is our hope that the monograph, which will appear later in 2001, will aid foresters, pathologists and entomologists in working with Leptographium species. Poster

JACOBSON, D.J., BARTON, M.M., DETTMENA, J.R., POWELL, A.J., SAENX, G.S., HIRSCH, J.C., TAYLOR, J.W., GLASS, N.L. AND NATVIG, D.O. 1Dept. of Biological Sciences, Stanford University, Stanford CA 94305 USA; 2Dept. of Plant and Microbial Biology, University of California, Berkeley CA 94720 USA; 3Dept. of Biology, University of New Mexico, Albuquerque NM 87131 USA. Neurospora in western North America: a model system in the backyard.

Species of Neurospora have been found mostly in the moist tropics and subtropics. During 2000, we observed Neurospora in the arid western United States as a primary colonizer of trees and shrubs killed by wildfires, significantly expanding the known geographic range and habitats of the genus. Neurospora colonies were observed in 23 forest fire sites in habitats ranging from cottonwood stands along the Rio Grande to mountain forests in New Mexico, California, Nevada, Idaho, and Montana to the Canadian border. Colonization occurred beneath the bark of diverse deciduous and conifer hosts. The combined 2000 collection includes 314 isolates from 35 degrees to near 49 degrees north latitude and from 750 m to 2400 m altitude. To date, 134 isolates have been identified to species; 130 (97%) are N. discreta. Within a site, mating type among individuals is often significantly skewed from a 1:1 ratio. The occurrence of Neurospora under these circumstances raises fundamental questions with respect to ecology and population biology: How does Neurospora gain access beneath apparently intact tree bark? How is it dispersed or vectored? How and where does it survive for decades between forest fires? What are the reproductive or genetic factors that cause the skewed mating type distribution? The 2000 collection provides a resource to begin addressing these questions. Poster
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*JAMES, TIMOTHYY*, KUES, URSULA, AND VILGLAYS, RYTAS. Dept. of Biology, Duke University, Durham, NC 27708 USA; 2Institute of Microbiology, Swiss Federal Institute of Technology, CH-8092 Zurich, Switzerland. *mip as a Tool for Cloning Hymenomycete Mating-type Genes.*

The mitochondrial intermediate peptidase (*mip*) gene was isolated in the mushroom *Schizophyllum commune* as a metalloproteiase physically adjacent to the A-alpha mating-type locus (Stankis et al. 1992, PNAS 89:7169). While the linkage of *mip* to the A-alpha locus is extremely tight (<1 kbp), transformation experiments have shown that *mip* does not function in mating or sexual differentiation processes. Hymenomycete mating-type genes are present at difficult to clone because of the extreme level of sequence divergence between alleles both among as well as within species. The positional cloning of mating-type genes has been accomplished by using the more conserved neighboring genes, such as *mip*, to isolate the chromosomal region containing the A-alpha mating locus of *Coprinus* spp. In this study we discuss the potential for this strategy to be applied to a wider group of hymenomycete taxa by exploring linkage relationships of *mip* to the A mating-type locus in other hymenomycetes. In addition, we suggest the gene might be useful as a marker for understanding mating systems of less genetically tractable mushroom species. 

**Contributed Presentation**


Sudden death syndrome (SDS) of soybean results in severe crop losses in Midwestern United States under favorable environmental conditions. The disease is caused by a soil borne fungus *Fusarium solani* (Mart.) Sacc. *F. sp. glycine* (Burk.) Snyder & Hans. which infects the roots resulting in leaf symptoms and losses in crop yield. We identified genes involved in phenylpropanoid pathway such as O-methyl transferase, reductases involved in deoxychalcone synthesis (NAD(P)H dependent 6-deoxychalcone synthase), cinnamic acid 4-hydroxylase, some basic peroxidas and elicitor and stress related genes by differential display of mRNA and subtraction hybridization from soybean roots inoculated with *F. solani* pathogen. We used a total of 4600 genes from a roots cDNA (4,224 clones were obtained from Research Genetics and 384 clones from a subtraction library) for micro-array analysis. We used 8 rat liver cDNA clones generated in our laboratory as negative control on the arrays. The results of micro-array analysis performed with the probes from soybean (varieties resistant and susceptible to SDS) roots will be discussed in the poster.

**Poster**

JAVEDIQBAL, M.*, TRIWITAYAKORN, KANOKPORN*, ZHANG, HONGBIN*, SHULTZ, JEFFRY*, MEKSEM, KHALID* AND LIGHTFOOT, DAVID*. 1Dept. of Plant, Soil and Gen. Agric., Southern Illinois University, Carbondale, IL 62901-4415 USA; 2Dept. of Soil and Crop Sciences, Texas A & M University, College Station, TX 77843-2123 USA. *The Integrated Genetic and Physical Map of Soybean: Toward a Functional, High Density Disease Resistance Gene Map.*

The development of robust techniques for gene-physical mapping of entire complex genomes provides an alternative strategy to whole genome sequencing. Using a fingerprinting method we are developed physical maps of several plant, animal and fungal genomes, and integrated them with genetic maps. These include soybean, *Fusarium solani* and *Ustilago maydis*. Recent work has focused on integrating EST libraries (60% of the genes) and predicted paralogs (40% of the genes) with the soybean physical map. Predicted genes have been annotated by position in the genome and presence in the transcriptome. Predicted genes absent from the transcriptome can be detected in the hypomethylated DNA fraction and the hyperacetylated histone fraction. Combined we can detect and annotate about 85% of the genes in the soybean genome. STS integration has greatly assisted the isolation of candidate genes underlying complex traits like disease resistance. Gene physical maps can be used to increase the efficiency of whole genome sequencing by providing a minimum tile path for DNA sequencing, identifying gaps in a genomic clone libraries and identifying regions with high gene content for selective sequencing.

**Poster**

*JEADOW, RAJESH V., LIEW, EDWARD C.Y., SMITH, GAVIN J.D., HODGKISS, I. JOHN AND HYDE, KEVIN D. Centre for Research in Fungal Diversity, Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, HONG KONG. Phylogenetic relationships of Pestalotiopsis and allied genera inferred from ribosomal DNA sequences.*

The phylogenetic relationships of *Pestalotiopsis* and allied genera *Bartalina*, *Discosia*, *Monochaeta*, *Pestalotia*, *Seimatosporium*, *Seiridium* and *Truncatella* were investigated. A data set of 888 aligned sites from the 5' end of the 28S rDNA gene for 31 ingroup taxa and 6 outgroup taxa from different orders was employed to infer phylogenies at the intergeneric level. In addition a data set of 600 aligned sites from the faster evolving ITS regions were used to assess infrageneric relationships among 35 strains of *Pestalotiopsis*. Phylogenetic analyses were conducted using different optimality criteria, including parsimony and maximum likelihood. Results of the 28S phylogenetic scheme showed that *Bartalina, Pestalotiopsis, Seimatosporium, Seiridium* and *Truncatella* represent distinct monophyletic clades with high bootstrap values. Well-supported clades corresponding to groupings based on conidial morphology were resolved and results verify that these genera should be recognized as distinct genera except for *Monochaeta* and *Discosia* where further taxon sampling is required. Further discussion includes the taxonomic implication of
the analyses based on the ITS regions to resolve infrageneric relationships within Peatloptopsis. Contributed Presentation

KABIR, Z., BHAT, R.G. AND SUBBARAO, K.V. UC Davis, 1636 E. Alisal St. Salinas, CA 93906. Optimizing polygalacturonic acid in NP-10 medium to improve Verticillium dahliae recovery from soil.

Polygalacturonic acid (PGA) is an important constituent of Sorensen’s NP-10 medium used to estimate population density of V. dahliae. Different types of PGA are available, but not all of them favor the growth of V. dahliae. Unavailability of PGA sodium salt from orange (P-1879, Sigma Chemical Co.) has created an unprecedented problem for the quantification of microsclerotia (MS) of V. dahliae in the soil. The PGA from orange (P-3889) that is now available does not support the growth of V. dahliae. Therefore, P-3889 was added to NP-10 medium amended with different concentrations of NaOH. The pH of the medium increased from 2.63 to 8.41 as the concentration of NaOH increased from 0 to 0.035N. Seven soils were assayed for MS, and 8 isolates of V. dahliae were evaluated for growth on these media and the original NP-10 medium. P-3889 in NP-10 medium with NaOH @ 0.035N reduced mycelial growth and MS production, but did not reduce recovery of MS from soils. P-3889 in NP-10 medium with 0.025N NaOH consistently yielded similar colony numbers of V. dahliae from test soils and supported similar colony growth compared with the original NP-10 medium. *Poster


Puccinia graminis, a serious disease of small grains in North America. It's most important alternate host, was essentially eradicated from the north-central states after over 30 years of effort and a cost of millions; however, it's gradually making a comeback. By eliminating the barberry one source of spores to infect the cereals in spring was taken away and also the sexual cycle was broken. The U.S.D.A. APHIS has foreign and domestic quarantines in place to prevent the entry and interstate movement of spp. and cultivars (plants and plant parts) that are not proven resistant to stem rust. The U.S.D.A. ARS Cereal Disease Lab in Minnesota tests all new cultivars for APHIS; only those that are immune are released into the trade. Results are published in the Federal Register and the Code of Federal Regulations periodically. Various states also check nurseries to see that they don't stock susceptible plants. Mahonia cuttings for decorative purposes are exempt from the quarantine. These measures help protect American agriculture. Poster

KENNEY, MIKE. USDA, JFKIA, Jamaica, NY 11430 USA. Rusts intercepted at U.S. Ports of Entry.

Plant diseases are present on foreign plants entering the U.S. as cargo or with passengers. Pathologists at U.S. Dept. Agriculture Inspection Stations determine which are of concern to American agriculture. This poster focuses on exotic rusts: Sphenospora/Puccinia on orchids, Uredo on Selaginella (VChina), Puccinia on Carpodet us (NZ)/Uncaria (Dom.Rep), Phakopsora and Kerkampella on Phyllanthus (Peru, China), Pucciniastrum on Picea (Slovenia) Puccinia (China) on bamboo, and Puccinia hioriana on Chrysanthemum (Europe, Latin America). These are just a few of the diseases discovered (some of which could become a problem to agriculture if they became established); these data also add to our scientific knowledge. *Poster

*KLEINSCHMIDT, C. E.1, PATAKY, J. K.1, MARAGOS, C. M.2 AND WHITE, D. G.1. 1Dept. of Crop Sciences, University of Illinois, Urbana IL 61801, 2USDA-ARS Mycotoxin Research Unit, Peoria IL 61604. Evaluation of food-grade dent corn and sweet corn hybrids for susceptibility to Fusarium ear rot and fumonisin production.

Fusarium ear rot of corn caused by Fusarium verticillioides (syn = F. moniliforme) and F. proliferatum is of concern due to production of the mycotoxin fumonisin B1. In 2000, 33 white, 7 blue and 28 yellow food-grade dent corn hybrids and 20 sweet corn hybrids were evaluated for susceptibility to Fusarium ear rot and fumonisin production. Ears were inoculated by injecting a spore suspension of three isolates each of F. verticillioides and F. proliferatum into the side of the primary ear one week after pollination. Ears of sweet corn hybrids were harvested ten days after inoculation and were dried, shelled and ground. The food-

43
grade dent corn was harvested 87 days after inoculation, rated for percent ear rot and shelled. Grain from each sweetcorn and food-grade dent corn plot were analyzed for fumonisin content with an ELISA. Ear rot differed significantly among food-grade hybrids (P < 0.0001) and among sweet corn hybrids (P = 0.0065). Fumonisin production differed significantly among food-grade hybrids (P = 0.0725). Ear rot ranged from 1 to 52% of the total ear and fumonisin ranged from 3.9 to 254.6 ppm, 29.5 to 162.4 ppm and 3.5 to 252.4 ppm, for white, blue and yellow food-grade dent corn hybrids. Fumonisin ranged from 1.4 to 5.6 ppm for sweetcorn hybrids. Poster

KLICH, MAREN A. USDA/ARS/Southern Regional Research Center, New Orleans, LA 70124 USA. A new identification key for the common Aspergillus species. For researchers screening large numbers of microfungi, morphology-based identification systems are still the most rapid and economical. Macro- and micro-morphological characters were assessed for five isolates of each of 45 different Aspergillus species and their teleomorphs. Macro-morphology, including color, texture and diameter was observed after 7 days incubation on each of four media, one of which was incubated at two temperatures. Micro-morphological characters were assessed using a light microscope, including sporiation, and the size, shape, color and surface texture of spores, stipes and vesicles. These data, as well as previously published information, were used to create new species descriptions and as the basis for a new identification key. The new key was evaluated by participants in an identification workshop and revised accordingly. The revised key is presented herein. Poster

KO, EUN M., LEEM, YOUNG E., *CHOI, HYOUNG T. Department of Microbiology, Kangwon University, S. KOREA. Biochemical characterization of laccase isozymes of Ganoderma lucidum. A Ganoderma lucidum monokaryon which was isolated in Korea secreted three laccase isoforms (Galc1, 2, 3) in a complete liquid medium without any induction. We have successfully purified these isoforms through the anion exchange chromatography, preparative electrophoresis and native PAGE. These isoforms had almost same mobility in the native- and SDS-PAGE, and even in urea-PAGE which was a mild denaturing condition of proteins. They showed quite similar biochemical properties: optimum temperature of each isoform was 20°C, and optimum pH was 3.5. Their molecular weights were estimated 65-70 kDa by the gel filtration and SDS-PAGE analysis. Their N-terminal amino acid sequences were same as G-l-G-P-T. Km value of an isoform (Galc3) for o-tolidine, which showed the fastest mobility in the native-PAGE, was 0.402 mM, and Vmax value was 0.02 (OD/min/unit). When the isoforms were treated with N-glycosidase or Endoglycosidase, deglycosylated proteins moved as one band in SDS-PAGE. Poster

*KOHN, LINDA M. AND CARBONE, IGNAZIO Dept. of Botany, University of Toronto, Mississauga, Ontario, Canada L5L 1C6. Origins and epidemiology of Sclerotinia sclerotiorum genotypes on Southeastern US canola: the power of multilocus DNA sequence data, combined datasets and phylogeographic statistical approaches.

Commercial crops of canola were introduced to northern Georgia in the 1980's and to southern Georgia, Alabama, Florida and South Carolina in the 1990's. Severe losses attributed to Sclerotinia have occurred in wet years. Rosette infections, in addition to the typical stem lesions, are relatively common. With Dan Phillips and Scott Gold (Univ. Georgia), we determined that infection by Sclerotinia sclerotiorum caused all symptoms observed. Was Southeastern US canola infected by introduced (dispersed) or by endemic S. sclerotiorum genotypes? Using a combination of coalescent and cladistic methods (Carbone & Kohn, Molecular Ecology (2001) 10: 947-964) we demonstrated that both dispersed and endemic genotypes infected SE US canola. Three pathogen populations were identified based on common ancestry and origin in a common phylogeographic event as determined by cladistic inference. Multilocus haplotypes, IGS size, DNA fingerprints and MCGs are significantly associated in all three populations represented on SE US canola. Further chi-square permutation testing indicates significant association of endemic and of dispersed pathogen genotypes with specific symptom types and canola varieties. Cladistic and coalescent methods are used to determine whether any pattern of infection is recurrent and to examine patterns of gene flow. Contributed Presentation

KONURU, H.B. AND KUTI, J.O. Hort. Crops Research Lab., Texas A&M University-Kingsville, TX 78363. Antifungal activity of extracts from osage orange Maclura pomifera fruits. Aqueous and organic (acetone and 95% ethanol+10%acetic acid) extracts were prepared from the skin, the pulp, the seed and milk of osage orange (Maclura pomifera) fruits and used to evaluate their antifungal activity on ten common postharvest pathogens (Aspergillus niger, Alternaria alternata, Botrytis cinerea, Fusarium oxysporum f.sp. cepa, Geotrichum candidum, Mucor piriformis, Myrothecium roridum, Penicillum expansum, Rhizopus stolonifer and Trichoderma viride) of fruits and vegetables. Organic and aqueous extracts from the skin, pulp and the seed generally exhibited better growth inhibition of most of the fungi tested at 1 to 3% concentrations. Both aqueous and organic extracts of the milk were less inhibitory at 10% concentration. The antifungal constituent of the extracts is probably maclurin, an alkaloid, which has the potential as a natural fungicide to prevent postharvest rots of fruits and vegetable. Poster

KRETZER, ANNETTE M., MOLINA, RANDY?, GRUBISHA, LISA C. AND *SPATAFORA, JOSEPH W.‡. Dept. of Botany and Plant Pathology, Oregon State University, Corvallis, OR, USA; *US Forest Service, PNW Research Station, Corvallis, OR, USA; ‡Dept. of Plant & Microbial Biology, University of California, Berkeley, CA, USA. Clone size, fine-scale population structure, and phylogenetic species in the ectomycorrhizal

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false-truffle Rhizopogon vinicolor complex.

A population genetic study was initiated to study population dynamics of the ectomycorrhizal false-truffle Rhizopogon vinicolor. *R. vinicolor* is host specific with *Pseudotsuga menziesii* and produces hypogeous sporocarps and nonforibly discharged spores that are dispersed through small mammal mycophagy. It is the only false-truffle reported to produce tuberculate mycorrhizae, which consist of clusters of ectomycorrhizal root tips ensased in a peridium. These tuberculate mycorrhizae are relatively easy to sample in nature and are more widely distributed than sporocarps. We developed numerous microsatellite markers to address several questions including clone size and distribution, fine scale population structure, and gene flow in the context of isolation by distance and barriers. Our initial results supported that clone size ranged from less than 5 m to approximately 15 m in diameter. More exhaustive sampling and analyses revealed that two sympatriqually distributed *Rhizopogon* species produce tuberculate mycorrhizae. The latter results were corroborated by the lack of shared alleles across microsatellite loci, and through phylogenetic analysis of the ITS rDNA. We will also present preliminary data on fine-scale population structure at the watershed level and relative rates of inbreeding. Contributed Presentation


The basidiomycetes *Ustilago maydis* and *Ustilago hordei* (smauf fungi) are useful for studying the role of mating and signaling in fungal virulence. In these fungi, the a and b mating-type genes control cell fusion as well as subsequent establishment and maintenance of the filamentous, infectious dikaryon. The a and b genes are on separate chromosomes in *U. maydis* (tetrapolar mating) and on the same chromosome in *U. hordei* (bipolar mating). We are comparing the mating-type regions to identify conserved features and the underlying genomic differences that distinguish bipolar and tetrapolar mating. This work led to the discovery that the MAT region in *U. hordei* is at least 500-kb in size. We have constructed a physical map of the *U. hordei* genome by BAC clone fingerprinting. This map will serve as a platform for genomic comparisons between *U. maydis* and *U. hordei* and for sequencing the MAT-1 region. We are also studying signaling in the smut fungi and we are characterizing downstream targets of cAMP signaling in *U. maydis*. This work identified the product of the hgl1 gene as a potential regulatory factor that controls dimorphism, pigmentation, and sporulation. We also identified the lip1 gene as a direct or indirect target of regulation by the hgl1 product. The lip1 gene also influences pigmentation and morphogenesis. Symposium Presentation

*KRUEGER, DIRK, HUGHES, KAREN W. AND PETERSEN, RONALD H. Dept. of Botany, University of Tennessee, Knoxville TN 37996-1100, USA. Phylogeny of biological species of *Polyporus* subg. *Polyporellus*.

The genus *Polyporus* comprises several infrageneric groups, including *Polyporellus*; which, in turn, contains several species. Previous research in *Polyporellus* has been limited to morphological species-rank taxonomy, with only few studies using tests of sexual compatibility. Monokaryotic single-spore isolates of *Polyporus arcularius, P. brumalis,* and *P. ciliatus* from different geographic locations confirm a match of biological and morphological species. There was some variation in compatibility of randomly selected monokaryons. In *P. tricholoma*, conversely, at least two intersterility groups have been detected in the Caribbean basin region. RFLP markers are being developed to distinguish between members of the two *P. tricholoma* groups. Additional information on the phylogeny of *Polyporellus* comes from rDNA sequence analysis. Poster

*KUBOTA, M., MCCONIGLE, T.P. AND HYAKUMACHI, M. . 1'Gifu University, Japan; 2'Idaho State University. *Clethra barbinervis* in the Ericales forms arbuscular mycorrhizae.

In the order Ericales, mycorrhizal of the ericoid, arbutoid, and monodisperm types are found among the various families, with ericoid mycorrhizae in the Ericaceae, Empetreaceae, and Epacridaceae. The mycorrhizal status of the family Clethraceae within the Ericales is unknown. This study investigated the mycorrhizal of *Clethra barbinervis* trees growing naturally in Japanese secondary forests. In addition to field samples taken year round, colonization of *C. barbinervis* seedlings challenged with inocula under controlled condition was evaluated. *C. barbinervis* roots collected from forests were colonized by arbuscular mycorrhizae with the Paris-type morphology. Similar results were found for cultured seedlings. Fungal hyphae entered roots by forming appressoria on the surface of epidermal cells, from which penetration hyphae developed. Hyphal coils were produced extensively in the cortex. Colonization in the field was usually of the order of 50-80% of root length, with arbuscules typically found across 10-30% of root length. Vesicles were also seen. This study is to our knowledge the first report of the mycorrhizal status of a plant in the Clethraceae, and the first report of well-developed arbuscular mycorrhizae in any member of the Ericales. These data are consistent with the interpretation that arbuscular mycorrhizae are the ancestral form. Poster


When liquid cultures of *Macrohomina phaseolina* (Tassi) Goidanich, a soil-borne fungus causing charcoal rot of guayule rubber plant (*Parthenium argentatum*), were supplemented with aqueous extracts of susceptible guayule plant tissue, pronounced effects on both growth and *in vitro* production of phaseolinone...
toxin were apparent. Low levels of susceptible plant extract stimulated mycelial growth and higher levels markedly stimulated microsclerotia and toxin production. The extracts from resistant guayule plants generally suppressed mycelial growth and did not significantly affect microsclerotia and toxin production. Extracts of non-host plant species generally did not have stimulatory effect on microsclerotia production or on toxin synthesis. Poster

LEBRON, LIGIA1, *LODGE, D. JEAN2, LAUREANO, SUGE3 AND BAYMAN, PAUL3,4, 1Institute for Tropical Ecosystem Studies, UPR, PO Box 363682, Rio Piedras PR 00936-3682; 2Center for Forest Mycology Research, USDA Forest Service, Forest Products Lab. PO Box 1377 Luquillo PR 00773-1377; 3Dept Biology, University of Puerto Rico-Rio Piedras, PO Box 23360, San Juan PR 00931-3360; 4Western Regional Research Center, USDA, 800 Buchanan St., Albany, CA 94710. Where is the gate to the party?

It is not generally known how endophytic fungi reach the interior of plants, especially leaves. It is believed that fungi are vertically transmitted through the seed in grasses (Clay, 1988), and horizontally transmitted via airborne or rainborne spores in dicotyledonous plants (Lodge et al., 1996, Bayman et. al., 1998). We grew coffee plants in sterile media in an environment free from fungal spores and compared these to plants grown in an open environment. Ten leaves per plant were sampled over a 9-mo period. Fifty percent of the area of surface sterilized leaves was removed with a 2.5-mm cork borer and plated on Rose Bengal agar. A variety of endophytic fungi were isolated from leaves of plants grown in the open while only one fragment grown in the closed environment produced an isolate of Biospora. Our results are consistent with the hypothesized transmission of fungal endophytes from airborne spores to dicotyledonous plants. Poster

*LEE, SEONJU AND CROUS, PEDRO W. Dept. of Plant Pathology, University of Stellenbosch, Private Bag X1, Stellenbosch 7602, South Africa. Biodiversity of saprobic fungi occurring on Proteaceae in the Cape Floral Kingdom of South Africa.

The Cape Floral Kingdom which is located at the southern and south-western tip of South Africa has a Mediterranean climate, and represents the world’s smallest and most diverse plant Kingdom. The Fynbos, the major vegetation type of the Cape Floral Kingdom, contains distinctive plant groups found nowhere else in the world such as Proteaceae, Ericaceae, and Restionaceae. The Proteaceae is one of the most prominent flowering plant families in the Southern Hemisphere. Approximately 400 species occur in South Africa, with an endemic ratio close to 96 %. Previous studies on the pathogens of Proteaceae have indicated them to be highly diverse and unique. A similar degree of diversity in saprobic fungi was hypothesized, and this study was therefore initiated to determine which saprobic fungi are associated with the Proteaceae. Leaf and twig litter and inflorescences of 30 Protea species were collected over a two-year period, and approximately 600 saprobic fungi were isolated. Details are provided as to the distribution and incidence of fungal taxa associated with the different host plants and substrates. Preliminary data suggest, however, that although there is high species diversity among the saprobic fungi, there is a relatively low diversity relating to the number of new genera encountered. Poster

*LETCHER, PETER M, CHAMBERS, JAMES G. AND POWELL, MARTHA J. Department of Biological Sciences, The University of Alabama, Tuscaloosa, AL 35487 USA. Criteria for species delimitation in the chtrid genus Rhizophydium.

Taxonomy of chytrid genera is based on morphological characters as well as host and substrate usage. Many gross morphological characters exhibit plasticity, making it difficult to distinguish genera such as Rhizophydium, Chytridium, and Phlyctochytrium. Furthermore, the range of host usage and substrate association has not been fully explored for most taxa. Ultrastructural studies of zoospores have provided stable morphological characters, but at what taxonomic level they resolve is not clear. We are exploring molecular gene sequences to identify genes which augment resolution of species. Isolates of Rhizophydium (as a “morphological genus”) from a wide geographic range have been cultured and provide an experimental framework for this analysis. The results of this study provide a basis for determination of species limits with a better understanding of the hierarchical level at which ultrastructure and molecular characters are informative. Contributed Presentation

*LEWIS, ELIZABETHA, SULLIVAN, RAYMOND, WHITE, JAMES F. JR. Department of Plant Pathology, Rutgers University, New Brunswick, NJ 08901 USA. Characterization of an extracellular, endogluanase purified from Chaunopycnis spp.

Cellulose is the most abundant energy source on earth. Microorganisms capable of degrading cellulose produce endoglucanase, exoglucanase, and B-glucosidase. The Clavicipitaelean fungus Chaunopycnis spp. was found to produce an active cellulase system that appears to include a cellulosome-like complex. Endoglucanase activity was initially indicated by a zone of clearing produced after flooding with 1% congo red on carboxymethyl-cellulose media. The enzyme was purified with an HIC trap column and temperature and pH profiles of the enzyme were determined. Substrate specificity was also examined. In addition, the possibility of using such purified proteins to indicate monophyletic grouping amongst closely related Clavicipitaceae will be presented. Poster

LI, LEI. XU, JIN-RONG. Dept. of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907 USA. Cloning and Functional Characterization of the Cla4 Homologue in Magnaporthe grisea.

The yeast p21-activated kinase Cla4 is involved in a signaling network that negatively regulates polarized growth during mitosis and budding. In Candida albican, the Cla4 homologue is the determinant of hyphal formation, which is critical for virulence. To understand the role of the Cla4 homologue (CHM1) in the rice blast fungus Magnaporthe grisea, we isolated and sequenced both
CHM1 and genomic clones. The CHM1 gene is 61% identical to *Yarrowia lipolytica* protein kinase (ClA4) in the C-terminal region. Two gene replacement mutants of CHM1 have been isolated and confirmed by southern blot analysis. Both mutants are significantly reduced in hyphal growth on oatmeal agar and rarely produce any conidia. However, preliminary data indicated that delta chm1 mutants are still infectious on wounded rice leaves. Interestingly, the delta chm1 mutants typically form many sectors in colonies grown on oatmeal agar, indicating that these delta chm1 mutants are not stable. Further characterization of the delta chm1 mutants and spontaneous sectors to define the role of CHM1 in *M. grisea* are in progress. 

*Poster*

LIGHTFOOT, DAVID A., RUBEN, E, TRIWITAKORN, K, AZIZ, J, AFZAL, J, ARELLI, P AND MEKSEM, K. 1Soybean Center for Excellence. Dept. of Plant Soil and Gen Ag, So. IL University, Carbondale, IL 62901 USA; 2Dept of Agron, University of MO, Columbia, MO 65211. Evolution of resistance breakdown and gene evolution: Soybean cyst nematode and rhg1.

Resistance to soybean cyst nematode (SCN) is subject to breakdowns caused by a nematode adaptation. One gene, rhg1, is in every cultivar with resistance to SCN. Alleles derived from plant introduction 88.788 dominate ~90% of resistant cultivars in the US (~10% derive from ‘Forrest’). Candidate gene sequences from positional cloning were used to isolate alleles and paralogs from several sources of resistant and susceptible cultivars. The Forrest allele contains 76 leucines in 13 extra-cellular GXXP motifs a transmembrane domain and a kinase on the intracellular domain with homology to Xa21. The PI88788 allele appears to be truncated like Cf2. A gene closely homologous to the PI88788 rhg1 is found in the Forrest Rhg4 interval. Gene duplication and LRRs repeats implies the rhg genes function by dimerization, which can explain the breakdowns, specificity and temperature sensitivity of host-pathogen recognition. This research was supported by the USB and ISPOB. *Poster*

LIM, YOUNG WOON AND *JUNG, HACK SUNG.* School of Biological Sciences, Seoul National University, 56-I Shillim-dong, Kwanak-gu, Seoul 151-742, Korea. Phylogenetic relationships of *Xylobolus* and allied genera based on ITS1-5.8S-ITS2 sequences.

To elucidate phylogenetic relationships of *Xylobolus* and allied genera, sequences of the nuclear ribosomal ITS1-5.8S-ITS2 region from 24 strains were analyzed. The species of *Xylobolus* as well as *Acanthophysium ahmadii* formed a monophyletic group and then clustered with the other group containing the members of *Stereum* and *Acanthophysium*, which was forming a main *Stereum* clade microscopically characterized by ellipsoid to cylindrical spores in common. However, *S. reflexuum, S. peculiare* and *X. illudens* belonging to the *Stereum* subgenus *Acanthostereum* described for the presence of acanthophydia were not related from one another and the subdivision of *Stereum* based on hyphidium types thus didn’t prove to be natural. In addition, *Stereum peculiare* occupied a basal position of the main clade and, in terms of molecular taxonomy, was found to have no phylogenetic relationships with *Stereum, Xylobolus* or *Acanthophysium*. *Stereum peculiare* developed an independent lineage in the evolutionary pathway of studied steroid fungi and a re-evaluation based on molecular data was accomplished on this rare and interesting *Stereum. *Poster*

*LIN, XIAORONG, SHAW, BRAIN D. AND MOMANY, MICHELLE.* Dept. of Botany, University of Georgia, Athens, GA 30602 USA. Mitotic and meiotic mapping of *Aspergillus nidulans swo* mutants.

When the spores of filamentous fungi break dormancy, they grow isotropically, adding cell wall material uniformly in every direction. Later they switch to polarized growth, with new material added to the tip of an emerging germ tube. The *swo* mutants were isolated in order to identify genes involved in the synthesis and localization of cell wall material in filamentous fungi. Based on previous work, *swoC, D* and *F* are involved in polarity establishment; *swoA* plays an important role in polarity maintenance and *swoA, F, B* and *H* are essential for hyphal morphogenesis. In order to further study the function of *swo* genes, it is important to clone them. Mitotic and meiotic mapping were used to assign each *swo* gene to a chromosome. *swoC* is near the centromere of chromosome III and *swoH* is on the left arm of chromosome II as defined by meiotic mapping. Based on database searches, *swoC* is Centromere Binding Factor 5. Further characterization is underway. *Contributed Presentation*

*LINDAHL, A.E., ALLEN, M F, EGERTON-WARBURTON, L.M., LANSING, J.L, AND TENNANT, T.* Department of Biology, University of Riverside, California, Riverside CA 92521. Linking into CMNs: the effects of position and host preference on ecto- and arbuscular mycorrhizal colonization of oak seedlings.

Common mycorrhizal networks (CMNs) are thought to link plants, via their mycorrhizal fungi, in meaningful ways. Some oak species are capable of dually hosting both ecto- and arbuscular mycorrhizal (AM) fungi, and may link into CMNs of varying form and function over the course their maturation. The mycorrhizal status of seedlings may also be largely determined by the mycorrhizal status of their immediate plant neighbors. For example, oak seedlings that colonize AM grassland ecosystems usually become highly colonized with AM fungi. As seedlings are planted closer to established, mature oaks, they are more likely to share the ectomycorrhizae of these fungal hosts. This trend was observed in three oak species (*Quercus agrifolia, Q. garryana*, and *Q. douglasii*) transplanted into a southern Californian oak (*Quercus agrifolia*) ecosystem. Although approximately 15 ectomycorrhizal morphotypes were shared by both seedlings and the mature, host trees, seedling
mycorrhizae typically corresponded with those fungi found in the immediate vicinity on the mature oak. RFLP data collected from seedling and mature oak root tips showed similar trends. The diversity and identity of the CMNs found with transplanted seedlings appears to be largely regulated by the position of planting rather than by seedling preference. Poster

*LINDEMUTH, RALF AND LUMBSCH, H. THORSTEN. FB9/ Botanik, University of Essen, Germany. **Major lineages of loculoascomycetes (Ascomycota) inferred from multiple-gene-analyses.**

Loculoascomycetes are defined by ascoma development and ascus type. Previous molecular studies suggested a distinction in Chaetothyriomycetes and Dothideomycetes. We used 46 new sequences of nu SSU-, nu LSU-, and mt LSU-rDNA from 23 species to re-evaluate the monophyly of loculoascomycetes and to investigate the phylogeny of Dothideomycetes. Combined data sets were analysed phylogenetically in different ways and constrained topologies tested with parametric bootstrapping. A Chaetothyriomycetes/ Eurotiomycetes sister-group with 97% bootstrap-support and a rejected constrained topology clearly support that loculoascomycetes are not monophyletic. Within Dothideomycetes the pseudoparaphysate taxa, Pleosporales incl. Melanomnatales, form a well-supported clade and their separation can be rejected. The apophysate taxa contain a new and strongly supported distinction of Dothideales s. str. and Capnidiiales, the latter with Myriangiales as sister-group, and comprising both can be rejected as well as a subdivision of loculoascomycetes based on form and opening of the ascomata and ascus. Contributed Presentation

LIU, Y.-R., AND CHEN, S.Y. University of Minnesota Southern Research and Outreach Center, Waseca, MN 56093. **Nutritional requirements of Hirsutella rhossiensis.**

Six natural media, 20 carbohydrates, 18 nitrogen compounds, and nine vitamins were tested for the growth, sporulation, and spore germination of the nematophagous fungus Hirsutella rhossiensis in solid and/or liquid cultures. Variations in nutritional requirements existed among the fungal isolates. In general VA, CMA and PDA were good media for growth, and MEA, VA and YDA were good for sporulation of all six isolates tested. Glycogen was the best carbon source for growth and sporulation of the three tested isolates ATCC46487, OWVT-1 and JA16-1. No isolate could utilize D(+)-xylose. The best carbon source for sporulation was D(+)-trehalose for ATCC46487, D-sorbitol for OWVT-1, and D(+)-cellulobiose for JA16-1. Casein was the best nitrogen source for growth of ATCC46487 and OWVT-1, while peptone was the best for JA16-1. Spore germination of all isolates was well supported by most nitrogen compounds but was inhibited by L-cystine. No significant difference in sporulation of ATCC46487 was observed among the nitrogen sources. DL-threonine was the best nitrogen source for sporulation of OWVT-1, and L-phenylalanine was the best for JA16-1. Vitamins generally enhanced the fungal growth and sporulation, with thiamine having the greatest influence. However,
excluding some vitamins individually from the medium containing all other test vitamins increased growth and/or sporulation of certain isolates. Poster


Soil microbial biomass (predominantly fungal), fine root length and nitrogen availability were compared in paired soil samples taken under and 0.5 m away from decomposing logs in the Luquillo Experimental Forest, Puerto Rico. Four logs each from Hurricanes Hugo and Georges (Sept. 1989 & 1998, respectively) were sampled in April 1999 and Sept. 2000 (two paired replicates, 0-10 cm depth). Little or no differences were found between logs of different ages. Microbial biomass was significantly higher under than 0.5 m away from logs in April (P=0.02), but the reverse was true in September (P<0.1). Fine root length was significantly lower under than 0.5 m away from logs of both ages in April (P=0.001), but the reverse was true in September (P=0.001). The inverse relationship of microbial biomass and fine root length suggests a negative interaction. Soil carbon was highest under logs. These and other data suggest that soil microbial biomass and fine root length suggests a negative interaction. Soil carbon was highest under logs. These and other data suggest that at times the carbon from decomposing wood may have stimulated growth of soil microbes which outcompeted tree roots for nitrogen and other nutrients. When soil microbial populations were low, however, soil under decomposing logs may have become favorable microsites for root uptake. Although total soil nitrogen was significantly higher under than away from logs in April 1999, it may have been immobilized by fungi and bacteria and was thus unavailable to tree roots. Contributed Presentation

MANAGBANAG, JIM R.12 AND *TORZILLI, ALBERT P1.
1Biology Department, George Mason University, Fairfax, VA 22030
2American Type Culture Collection, Manassas, VA 20110. An analysis of trehalose, glycerol and mannitol accumulation during heat and salt stress in a salt marsh isolate of Aureobasidium pullulans.

Previous work in our laboratory has shown a correlation between the synthesis of heat shock and salt shock proteins and the acquisition of stress tolerance in a salt marsh isolate of Aureobasidium pullulans. To further explore the mechanisms involved in the induction of stress tolerance we have investigated solute accumulation in A. pullulans under the same regime of heat and salt stress used in the earlier study. Intracellular solutes from cells exposed to stress conditions of heat, salt, and simultaneous heat and salt were extracted, identified, and quantified. Results from both thin-layer chromatography and high performance liquid chromatography showed that the cellular concentration of trehalose increased in heat stressed and in simultaneously heat and salt stressed cells but not in cells subjected to salt stress alone. Mannitol increased under all stress conditions, while an increase in intracellular glycerol was apparent only in the salt stressed cells. These results suggest a role for these solutes in the induction of heat and osmotic tolerance in A. pullulans, adding to a growing list of physiological attributes which support an active role for this fungus in salt marsh ecosystems. Poster

*MARTINEZ-ESPINOZA, ALFREDO 12, RUIZ-HERRERA, JOSE2, LEON-RAMIREZ, CLAUDIA G3 AND GOLD, SCOTTE1.
1Plant Pathology Department, University of Georgia. Athens GA, 30602-7274, USA.; 2Departamento de Enperiences Genetica, CINVESTAV-IRAPUATO. Apartado Postal 629, 36500 Irapuato, Gto. Mexico. Signal transduction in the in vitro dimorphic transition of Ustilago maydis (corn smut).

In its haploid saprophytic phase, the fungus Ustilago maydis grows as a budding yeast. A pathogenic dikaryotic mycelium is produced after fusion of compatible sporidia. Alternatively to mating, media with an acid pH can induce the yeast to mycelium dimorphic shift. Analyses of mutants in two important signal transduction pathways (cAMP dependent and mitogen activated, protein-kinases) suggested how the mycelial induction through acid pH might be operating. Filament formation in vitro was inhibited by the addition of exogenous cAMP in all growth conditions. cAMP levels drop significantly and were maintained at low levels when the fungus was grown at pH 3.0. Mutants defective in rpK showed a mycelial phenotype at low pH and was still inhibited by addition of cAMP. With respect to the MAP kinase pathway, mutations in any of the members: MAPK, MAPKK, MAPKKK or a putative adaptor protein, lost their capacity to form mycelia in vitro. Mutation of the pheromone responsive transcriptional regulator pprf, was capable of forming mycelium under acidic conditions. These results suggest that the normal condition of growth of U. maydis is budding, which is maintained at least in part, by a mechanism of repression exerted through PKA signaling. When levels of cAMP decrease, the fungus exhibits a filamentous morphology using a mechanism that requires the MAPK pathway. Symposium Presentation


During the last three years collybioid mushrooms have been collected in oak forests along the Talamanca Mountain range in southern Costa Rica. Single basidiocarp isolates could be obtained from basidiomata of some collections in order to conduct mating type studies and compatibility tests. Here, we report on the mating systems of at least six morphological species placed in Collybia sensu lato. Poster

*MIAIDLIKOWSKA, JOLANTA AND LUTZONI, FRANCOIS. Dept. of Biology, Duke University, Durham, NC 27708 USA. Evolution of symbiotic associations within peltigerous lichens (Peltigerineae, Ascomycota).

The suborder Peltigerineae includes lichens representing all major lichen symbiotic associations: bi-membered with cyanobacteria (cfr. Nostoc), bi-membered with green algae and tri-membered with both cyanobacteria and green algae. The common
occurrence in this lineage of associations with two different types of photobionts offers a unique opportunity for studying coevolutionary trends between mutualistic fungi and photoautotrophic organisms. Phylogenetic studies were carried out on SSU and LSU nrDNA of the mycobiont, cyanobiont and phycobiont found in a broad selection of 31 species belonging to 13 genera within the Peltigerineae. Ancestral symbiotic states for peltigerous lichens were associated with plants and algae during the evolutionary history of Peltigerineae was investigated. Phylogenetic relationships among symbiotic cyanobacteria and green algae were determined using maximum likelihood (DISCRETE) coupled with a Bayesian-Markov-Chain Monte Carlo sampling method (BAMBE). The pattern of transmission (horizontal versus vertical) of cyanobacteria and green algae during the evolutionary history of Peltigerineae was investigated. Phylogenetic relationships among symbiotic cyanobacteria associated with plants and fungi and their relationships with free-living cyanobacteria were examined. Rates of evolution of the LSU nrDNA for all bions were compared. Contributed Presentation

*MICALE, J. A.1, BANIK, M. T.1, AND GRAHAM, R.2 1USDA-FS, Forest Products Laboratory, Madison, WI 53705 USA; 2USDA-FS, Forestry Sciences Laboratory, Moscow, ID 83843. Slash decay fungi associated with thinning treatments in northern Idaho.

A preliminary survey of wood decay fungi was made in plots thinned for fire control in the Priest River Experimental Forest in northern Idaho. The four different thinning treatments retained varying amounts of slash on the forest floor in order to determine the effect of slash decay on soil nutrients and recovery of vegetation. Three months and 15 months after treatment, samples of slash displaying fungal fruiting bodies were collected randomly throughout the one-acre plots. Lightly and moderately decayed slash was also collected and cultured for identification of brown- and white-rot fungi. Fungal identifications were made using a combination of morphological characteristics, traditional cultural techniques, RFLPs, and ITS sequencing. Common white rot fungi associated with the sites included Stereum sanguinolentum, Trichaptum abietinum, and three different species of Tubulocriptis. Brown rotters included Postia placenta, Fomitopsis pinicola, Antrodia heteromorpha, Serpula himantoides, and Sistotrema brinkmanii. This preliminary information will be used to develop techniques for rapid identification of common decay fungi for use in more statistically rigorous future surveys. Poster

*MILLER, ANDREW N.1,2 AND HUHNDOEHR, SABINE M.2 1Department of Biological Sciences, University of Illinois at Chicago, Chicago, IL 60607-7060; 2Department of Botany, The Field Museum of Natural History, Chicago, IL 60605-2496. The use of multi-gene phylogenies and morphology in establishing species boundaries in the Lasiosphaeria ovin a (Lasiosphaeriaceae, Sordariales, Ascomycetes) species complex.

The pyrenomycete genera *Lasiosphaeria* and *Cercophora* have been distinguished solely on ascospore morphology and have been shown to be polyphyletic in molecular phylogenetic analyses. However, these analyses indicated that taxa from both genera occur in the *Lasiosphaeria ovin a* species complex, which contains the type species of *Lasiosphaeria, L. ovin a*. A number of taxa distinguished by slight variations in ascostal hair and centrum characters and ascospore morphology occur in this complex. In order to test hypotheses of character evolution and species delineation within this group, morphological and molecular data sets were generated for six morphospecies within this complex as well as several other taxa representing additional morphological variation in ascostal wall and hair and ascospore morphology. The morphological data set included 25 teleomorph characters and the molecular data sets were generated by sequencing two nuclear ribosomal (ITS, LSU) and two protein-coding (Beta-tubulin, RPB2) genes. Maximum parsimony and Bayesian analyses of separate and combined data sets suggested that this complex is a well-supported monophyletic group represented by taxa with a 3-layered ascostal wall in which the outermost wall layer is hyphal. At least two well-supported clades representing distinct morphological and phylogenetic species occur within this complex. Contributed Presentation

*MILLER, STEVEN L.1, MCCLEAN, TERRY M.1 AND BUYYCK, BART2 1Botany Department, University of Wyoming, Laramie WY 82071 USA; 2Museum National d'Histoire naturelle, Laboratoire de Cryptogamie, 12 rue Buffon, 75005, Paris, France. Molecular examination of the Russula/Lactarius interface.

*Russula* and *Lactarius* are distinctive agarics that have been recognized since the time of Persoon. In temperate regions they are distinguished primarily by two characters: *Lactarius* contains an abundant latex and relatively few sphaerocysts, while *Russula* generally contains no latex and has abundant sphaerocysts. Worldwide, however, only one character serves to adequately separate the two genera, namely *Lactarius* possesses secretion hyphae that end in pseudocystidia in the hymenium, whereas pseudocystidia are never present in *Russula*. No molecular phylogeny has been aimed specifically at elucidating the relationship between *Russula* and *Lactarius*. In this study ITS sequences from over 250 species of *Russula* and *Lactarius* from North America, Europe, Africa, Madagascar, Guyana, Australia and Malaysia representing all described infrageneric taxa in both genera were analyzed using maximum parsimony. *Lactarius* appeared to form a monophyletic group within *Russula* arising from a well supported clade containing Sections *Heterophyllae* and *Ingratae*. This *Lactarius* clade formed a sister group to the Section *Nigricansae* of *Russula*. The results will be discussed and compared with previous hypotheses concerning the phylogeny of these two genera. In addition, characters important to the taxonomy of *Russula* and *Lactarius* will be reevaluated in light of these new findings. Contributed Presentation

*MILLER, STEVEN L.1, MCCLEAN, TERRY M.1 AND BUYYCK, BART2 1Botany Department, University of Wyoming, Laramie WY 82071 USA; 2Museum National d'Histoire naturelle, Laboratoire de Cryptogamie, 12 rue Buffon, 75005, Paris, France. Molecular phylogeny of the genus Russula in Europe with a comparison of modern infrageneric classifications.
Many infrageneric classification systems for Russula have been developed to accommodate European taxa. These systems are largely arbitrary and incongruent. Using rDNA sequences for 83 species representing all infrageneric taxa described from Europe, phylogenetic relationships among these species were examined. Cladistic analysis of the ITS region showed four basal clades and one large apical clade arising from the deeper nodes, none of which has been previously recognized in toto at the subgeneric level. Two of these groups, the Compactae and Lactarioidaeae, previously recognized as subsections of Section Compacta, were not closely related. Decay values indicated that collapse of the tree would result in two large groups consistent with the classical concept of the Eurussulae and a Compacta-like group. The topology confirmed some previously described infrageneric taxa at the section and subsection level. The analysis also indicated many interesting new relationships. Mapping of characters such as spore print color, taste, and presence of acid-resistant incrustations, used to define infrageneric taxa in Russula, onto the phylogeny identified patterns consistent with hypotheses regarding pleisiomorphic and apomorphic characters. However, because of potential loss or reversal of character states, this analysis did not support their unequivocal use in infrageneric classification. Contributed Presentation


Botrytis blight, caused by B. cinerea (Bc), is an important disease on roses (Rosa hybrida) grown in plastic houses in Brazil. Biocontrol with C. rosea (Cr) applied to leaves and crop debris to reduce pathogen sporulation can complement other control measures for disease management. Two experiments each with a rose cultivar were conducted in a plastic house. For ’Red Success’ four treatments were compared: 1. control, 2. fortnightly sprays of Cr, 3. weekly sprays of mancozeb, and 4. weekly sprays of either Cr or mancozeb, to the lower third of the plants and the debris. For ’Sonia’, treatment 4 was not included. Samples from debris (leaves and petals), taken at ten 15-day intervals, were plated on PCA medium, and sporulation of either fungus was assessed. Incidence of Botrytis blight on buds was also assessed. For both cultivars Cr treatments significantly (PE0.05) reduced Bc sporulation. However, disease incidence was not reduced, probably because no sanitation was conducted. Continuous application of Cr on debris in plastic houses could reduce Bc sporulation and disease incidence in the buds. Poster

*MUNKACSI, ANDY AND MCLAUGHLIN, DAVID J. Dept. of Plant Biology, University of Minnesota, St. Paul MN 55108 USA. Evolutionary relationships of Pterula and Deflexula within Agaricales sensu stricto and their relationships with the tricholomataceous attine fungi.

Systematics of two genera in the Pterulaceae, Pterula and Deflexula, were analyzed to understand the evolution of clavariaceous fungi within Agaricales sensu stricto. Bootstrap-supported maximum parsimony and maximum likelihood analyses of the nuclear large subunit of the ribosomal DNA gene suggest the genera are monophyletic, and that Pterulaceae may be polyphyletic. Attine fungi include several lineages within Lepiotaceae and one tricholomataceous lineage. We report the discovery that the Pterula clade and three isolates of tricholomataceous attine fungus Group 2 are sister taxa. Ancestral state reconstructions for clavariaceous and agaric fruit body morphologies are in progress to understand the origins of clavariaceous morphology. Poster

MURRIN, FAYE. Department of Biology, Memorial University of Newfoundland, St. John’s, NF, A1B 3X9, Canada. Integrating cytoskeleton function in the insect-pathogenic zygomycete, Entomophaga aulicae.

Integrins are a family of integral proteins of the mammalian plasma membrane which mediate cell-substrate and cell-cell attachment, and which are involved in signalling events. Recent evidence for integrin-like proteins in several fungi suggests their involvement in attachment of the plasma membrane to the cell wall and in the attachment of pathogens to host cells. In
Entomophaga aulicae, and closely related entomopathogens, naturally occurring protoplasts multiply in the hemolymph of host larvae and there is evidence that they attach to internal host tissues during disease progression. We have identified a protein in protoplast extracts of E. aulicae which cross-reacts with antibodies to a mammalian beta-one integrin. On SDS-PAGE gels a reactive band migrates at 71 kDa and its mobility is not influenced by DTT. Fluorescently tagged antibodies localize to the cell periphery, as would be predicted, although non-specific staining is problematic. We are currently attempting to isolate and sequence the gene for this protein, using reverse transcriptase PCR, in order to compare it with the only integrin-like protein sequence available in Gateway F.,

NEKOUEI, F.¹, EL-ZAWAIRY, A.² AND KUTI, J.O.¹. Hort. Crops Research Lab., Texas A&M University-Kingsville TX 78363 USA; ²Dept. Plant Pathology, Assiut University, Egypt. ELECTROPHORETIC STUDIES OF Fusarium species isolated from onion fields in Egypt.

Many pathogenic species of Fusarium have wide geographical distributions and host ranges that are broad and overlapping. Soluble mycelial proteins of sixteen isolates of Fusarium species recovered from soil samples and symptomatic plants collected on several onion fields in Assiut region of Egypt were quantified and subjected to polyacrylamide gel electrophoresis. Each isolate had one or more distinct bands, in addition to many common bands of protein. The major protein bands were detected with Commassie blue and silver stains. Silver staining increased detection of proteins one or more distinct bands, in addition to many common bands of protein. Of the sixteen Fusarium isolates, three banding patterns of F. oxysporum, F. moniliforme and F. solani were evident. This study demonstrated the utility of mycelial protein electrophoresis in distinguishing three related species of Fusarium. Poster

NIELSEN, KARSTEN AND YOHALEM, DAVIDS. Danish Institute of Agricultural Sciences. Botrytis aclada, causal agent of onion neck rot, consists of two genetically distinct subgroup and one subgroup is a polyploid hybrid.

Botrytis aclada is divided into two subgroups, AI and AII, based on morphological, cytological and molecular data. Subgroup AI has conidia dimensions 4-6 x 6-12 microns, contains 16 chromosomes and has two Sphl restriction sites in rDNA internally transcribed spacer (ITS) amplicons; subgroup AII has spore sizes of 5-8 x 7-17 microns, 32 chromosomes and a single Sphl restriction site in the ITS. Universally primed PCR (UP-PCR) DNA fingerprints were used to generate Nei’s coefficient of genetic differentiation (G Stanton) for each group, and a likelihood ratio chi-square test (G2) demonstrates that B. aclada AI and AII were significantly different (P<0.001). Both subgroups of B. aclada were significantly different (P<0.001) from B. byssoida. Primers designed from a sequence characterized UP-PCR fragment were used for direct sequencing of isolates of B. aclada (AI and AII), B. byssoida, B. squamosa, and B. cinerea. Twenty-three positions in the sequence contained a mixture of two nucleotides in all AII isolates, suggesting that subgroup AII is a hybrid. Pair-wise comparison of the sequences of the four Botrytis species showed that a hybridization event between B. aclada (AI) and B. byssoida could explain all 23 positions with mixed nucleotides. UP-PCR fingerprints also supported the hypothesis that B. aclada AII is intermediate between B. aclada AI and B. byssoida. Contributed Presentation

OAKLEY, BERL. R. Dept. of Molecular Genetics, Ohio State University, Columbus, OH 43210 USA. How mitotic spindles form in Aspergillus.

We have investigated the mechanisms of regulation of mitotic spindle formation and of the establishment of bipolar spindles in Aspergillus nidulans. We have found that there is a rapid movement of tubulin into the nucleus immediately before spindle formation. This suggests that regulation of the movement of tubulin across the nuclear envelope may be an important component of the regulation of spindle assembly. Once the tubulin enters the nucleus, microtubule assembly is nucleated by gamma-tubulin. Microtubules that assemble from the two adjacent spindle pole bodies are initially parallel and for spindles to become bipolar they must be pulled or pushed into an antiparallel configuration. We have found that the C-terminal motor domain kinesin-like protein, KLPA, plays a major role in the establishment of spindle bipolarity. We have also found that KLPA is a minus-end-directed microtubule motor that is also capable of bundling microtubules. If KLPA is absent, a second, less efficient, mechanism establishes spindle bipolarity. Surprisingly, gamma-tubulin is essential for the operation of the second mechanism and it is also essential for the movement of chromosomes to poles in anaphase. Symposium Presentation

OSMUNDSON, TODD W. AND CRIPPS, CATHY L. Department of Plant Sciences and Plant Pathology, Montana State University, Bozeman MT 59717 USA. Preliminary systematic and ecological observations of Rocky Mountain alpine species of Laccaria.

An in-depth examination of Laccaria species with Rocky Mountain alpine distributions has been initiated as part of a NSF BSI survey of the Alpine Mycota (Agaricales) in the Rocky Mountains. Laccaria is an important mycorrhizal genus recorded with Salix, Dryas, and Betula in arctic-alpine habitats which are characterized by low temperature extremes, high levels of ultraviolet radiation, and low oxygen pressure. Two species, L. montana and L. pumila, are considered to be restricted to arctic, alpine, and boreal habitats. A number of other species such as L. laccata, L. bicolor, L. tortills, L. proxima, and L. trullisata have been recorded from arctic-alpine habitats in the European Alps, Greenland, Iceland, Svalbard, and Alaska, but are generally known to have wider physiographic distributions. There is a recognized need for further examination of species by mycologists working in these cold-dominated habitats. This report gives preliminary data on Laccaria species collected at study sites above tree line in the San Juan Mts. and Front Range of Colorado, and the Beartooth
PARK, G., XU, J. R., HAMER, J. E. 1Dept. Botany & Plant Path., Purdue Univ., W. Lafayette, IN 47907; 2Paradigm Genetics, RTP, NC 27709. The transcription factor Ste12 homolog is not involved in appressorium formation in Magnaporthe grisea.

In M. grisea, a MAP kinase gene PMK1 is known to regulate appressorium formation and infectious hypha growth. Since PMK1 is homologous to FUS3 and KSS1 that regulate transcription factor Ste12 in yeast, our goal is to determine the function of the Ste12 homologue during appressorium formation and infection. The Ste12 homologous gene (MST12) was isolated. The amino acid sequence at the homeodomain of MST12 is 68% identical to Ste12 and 93% identical to Aspergillus nidulans steA. Gene replacement mutants of MST12 were isolated. In all five mst12 deletion mutants examined, no obvious defect in vegetative growth, conidia germination, or appressorium formation was observed. It appears that MST12 is not the downstream transcription factor regulated by PMK1 for appressorium formation. However, MST12 may be involved in regulating conidiation and female fertility because mst12 mutants are female sterile and slightly reduced in conidiation. Further phenotypic characterization of these mutants is under the way to determine the role of MST12. Poster

PERRY, BRIANA, AND DESJARDIN, DENNIS E. 1Department of Organismic and Evolutionary Biology, Harvard University, 22 Divinity Ave., Cambridge MA 02138 USA; 2Department of Biology, San Francisco State University, San Francisco, CA 94132 USA. A taxonomic investigation of the genus Mycena (Agaricales, Basidiomycota) in California.

The genus Mycena (Pers.: Fr.) Roussel forms a large component of the agaric diversity present in the coniferous and hardwood forests of California, yet remains largely undocumented within the state. Published material relating to the genus within California is limited to Dr. Alexander Smith’s monograph on North American species of Mycena, published in 1947, and more recently R. A. Maas Geesteranus’ investigation of type specimens for Mycena species described from the northern hemisphere. These works pertain to very large geographic ranges, and neither presents a complete survey of the Mycena species found within California. The aim of our investigation was, therefore, to present a taxonomic survey of the genus within the state, thereby providing a resource for the identification of Mycena species. During the course of this study we made approximately 250 collections, and examined an additional 150-200 collections made by other investigators. Our results indicate that a minimum of 56 Mycena species occur within California, distributed over 24 sections. In addition to these species 4 varietal taxa, and 2 undocumented species which are suspected to occur within the state. Fifteen species are first reports for California. Four taxa were previously undescribed and will be published as species new to science. Poster

PETerson, KriSTin R. Dept. of Organismic & Evolutionary Biology, Harvard University, Cambridge, MA 02138 USA. Literature survey of the tropical and subtropical Agariceae.

Members of Tribe Agariceae, the dark-spored Agariceae, are notoriously difficult to identify to species. Agariceae collections from the tropics and subtropics present significant challenges to investigators attempting to identify them, partly because there is no worldwide monograph of the tribe. Additional complications arise from the great number of Agariceae species found in the tropics and subtropics and the imposition of European species names upon certain of them. In order to begin to overcome these challenges, I have compiled a comprehensive list of the published names of the tropical and subtropical members of the Agariceae and the places and publications from which they are described or reported, thus providing tropical and subtropical distribution information and a bibliography of accompanying literature. Based largely upon the important work of Paul Heinemann, this survey includes more than 300 names of tropical and subtropical Agariceae, with about three-quarters belong to the cosmopolitan genus Agarius and most of the rest belonging to the largely tropical genera Hymenagaricus and Micropsalliota. Poster

PHILLIPS, ANITAN. Mycology Laboratory, ATCC, Manassas VA 20110 USA. A discussion of lesser-known and complex laboratory techniques for the efficient revival, propagation, and preservation of fungal cultures.

The American Type Culture Collection is celebrating its 75th anniversary as one of the world’s leading bioresource centers and conservatory of biological materials. In the course of acquiring and preserving almost 50,000 fungal strains spanning 1,500 genera and more than 6,800 species, a great wealth of knowledge has been passed down through the years. Due to the complex methodology often involved in maintaining fungal cultures, the Mycology Laboratory, in particular, must rely on past and present biologists’ techniques when handling strains which are difficult to culture, identify, and/or preserve. A brief summary of the methods used to prepare some of the more unique or difficult ATCC strains for preservation has been gleaned from a wide variety of sources, including word of mouth, and reduced to basic yet comprehensive instructions. Issues addressed include, but are not limited to, pheum production in Physarales, minimal and rich media inducing sporulation, freeze vs. freeze-dry preservation, decontamination, human pathogenic fungi, nutrient media for reviving old, dried up, or stubborn cultures, cryopreservatives, Oomycetes and their unfortunate lack of septa, 2-member slime mold/bacteria cultures, inducing sporulation with light, and why filter paper? Poster

PHOTITA, W., LUMYONG, S., LUMYONG, P., MCKENZIE, E.H.C. AND HYDE, K.D. 1 Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand; 2 Department of Plant Pathology, Faculty of Agriculture, Chiang

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Mai University, Chiang Mai, Thailand; 1 Landcare Research, Private Bag 92170, Auckland, New Zealand; 4 Centre for Research in Fungal Diversity. Microfungi on Musa acuminata from Mae Hong Son, Thailand.

The microfungi that inhabit decaying parts of Musa acuminata have been investigated. Dead leaf, pseudostem and petiole samples were collected from Mae Hong Son province, Thailand and 32 fungal taxa were identified, comprising two ascomycetes, one basidiomycete and 29 mitosporic fungi. Two hyphomycetes; Dityosporum sobmeiensis and Berklesniu sobmeiensis were new species. The most commonly recorded fungi were Canalisporium caribense, Periconia digitata and Thielavia polygonoperda. Memnoniella subsimplex and Graphium putredinis were common colonizers of decaying banana leaves, while Canalisporium caribense was the most common taxon on pseudostems. Canalisporium caribense and Periconia digitata were the most common species on petioles. Differences in the mycota between tissue types were observed and will be discussed. Poster

PIOTROWSKI, JEFF S., ANNIS, SEANNA L. AND LONGCRO, JOYCE E. Dept. of Biological Sciences, University of Maine, Orono ME 04469 USA. Physiology, zoospore behavior, and enzyme production of Batrachochytrium dendrobatidis, a chytrid pathogenic to amphibians. Batrachochytrium dendrobatidis (Chytridiales) has been implicated as a cause of global amphibian declines; however, little is known about its basic biology. Knowledge of temperature and pH effects, zoospore behavior, nutrition, and extracellular enzyme production of B. dendrobatidis could be useful in understanding pathogenicity and predicting disease outbreaks caused by the fungus. We examined the effects of temperature and pH on the growth of isolates of B. dendrobatidis from captive frogs in Washington D.C. and wild frogs from California and Colorado. In pure culture the chytrid grew fastest between 20-25 C, and at a pH from 6-7. Zoospores, indicating reproducing thalli, were present after two weeks in unbuffered media from pH 4 to 9. Cultures of B. dendrobatidis survived in broth for 7 months at 6 C; however, exposure to 30 C for 4-6 days killed the chytrid. Preliminary studies did not reveal a chemotactic or phototactic response in zoospores; currently we are testing more attractants. Carbohydrate preferences also are being tested. Preliminary protease assays indicate that the chytrid produces an extracellular protease, and we are examining its activity. Poster

PLATT, J.L., GEISER, D.M. AND TAYLOR, J.W. University of California Berkeley & Pennsylvania State University. Genetic homogeneity in Aspergillus fumigatus. As a first objective in our effort to understand the reproductive mode and population genetics of Aspergillus fumigatus, we are re-examining the species boundary in this asexual opportunistic pathogen. Previous phylogenetic studies of several human pathogenic fungi have shown that species traditionally defined on the basis of morphology may actually represent more than one genetically isolated species. A total of 51 loci have been screened for polymorphic sites using exemplar isolates, representing both clinical and environmental samples. We have conducted phylogenetic analyses of over thirty loci in order to test the current species concept. Nucleotide sequence data from protein-coding loci, uncharacterized loci, and microsatellite flanking regions reveal that A. fumigatus is a genetically homogeneous lineage. Phylogenetic analyses under our taxon and character sampling reveal that the traditional morphological species A. fumigatus is indeed a single genetically isolated species. These findings differ from previous studies which indicate that cryptic speciation may be relatively common in fungi. We are now working towards a better understanding of the population genetics of this species using microsatellite markers and population genetic analyses. Contributed Presentation

PRYCE MILLER, JANIE E.1, BAINBRIDGE, BRIAN W.1, FRANKLAND, JULIET C.2, ROBINSON, CLAIRE H.1 1Division of Life sciences, King's College, 150 Stamford Street, London, UK; 2Centre for Ecology & Hydrology, Grange over Sands, Cumbria, UK. Taxonomic biodiversity and community structure of saprotrophic fungi in improved and unimproved upland grasslands. Saprotrophic fungi play a key role in nutrient recycling from dead organic matter in soil. Aims of this study are: to investigate which fungal species is present on a resource, to assess if it is active and to find its location in a soil or litter fraction. Soil and litter samples were collected from an upland grassland field site, Roxburghshire, UK, in year one and two of nitrogen and/or lime addition (improved) and control (unimproved) plots. Traditional culture methods showed that the full spectrum of fungi isolated was usually present in control and improved plots. Species richness decreased down the soil profile in control and limed plots; species number was greater in improved plots. Striking differences in frequently isolated genera between soil and litter were seen - Penicillium, Trichoderma and Absidia commonly occurred in the soil where as Mucor, Fusarium and Cladosporium were mainly found in the litter. Species most frequently isolated from improved and unimproved plots were mostly the same, except Absidia coerulea, which was extremely common from limed soil. Eight frequently occurring fungi, which may use different substrates, were chosen for further study. Terminal Restriction Fragment Length Polymorphism analysis of samples collected in year three of treatment addition will be used to determine with which soil/litter fraction the eight key species are associated. Contributed Presentation

RAGSDALE, ASHLEY F., CHAMBERS, JAMES C., LETCHER, PETER M., AND POWELL, MARTHA J. Dept. of Biological Sciences, The University of Alabama, Tuscaloosa, AL 35487. Species delineation in the chytrid genus Powellomyces. Members of the Order Spizellomyctae (Phylum Chytridiomycota) are predominantly inhabitants of soil, while
members of the Order Chytridiales are found in both soil and aquatic systems. The genus *Powellomyces* (Spizellomycetales) was segregated from *Entophysytis* (Chytridiales) on the basis of fundamental differences in zoospore ultrastructure as compared to the type species, *E. apiculatata*. Two species of *Powellomyces* (*P. variabilis* and *P. hirtus*) have been described and are differentiated primarily on the basis of rhizoidal structure. An earlier study determined that extensive morphological plasticity was exhibited by three isolates of *P. variabilis* (originally described as *Entophysytis variabilis*). In that study the two species *P. variabilis* and *P. hirtus* would have been considered the same species because of overlap in fundamental differences in zoospore expression of thallus characters. In our study, we examine a range of isolates of *Powellomyces* from different geographic locations and compare molecular sequences of three genes: nuclear large subunit rRNA, small subunit rRNA, and the mitochondrial large rRNA gene. This investigation should help resolve the delineation of species in the genus. *Poster*

RAJA, HUZEF.A. AND SHEARER, CAROLA. Department of Plant Biology, University of Illinois at Urbana-Champaign, 265 Morrill Hall, 505 South Goodwin Avenue, Urbana, IL 61801. A preliminary report of freshwater ascomycetes from the Great Smoky Mountains National Park.

As part of the All-Taxa Biotic Inventory of the Smoky Mountains, investigations of freshwater ascomycetes were initiated. Submerged woody debris was collected in July 2000 from lentic and lotic habitats at elevations ranging from 800 to 4300 ft. Samples were incubated in moist chambers and examined periodically over six months for the presence of fruiting bodies. Twenty-two ascomycete taxa have been found thus far. *Annulatuscus triseptatus, Aquaticola ellipsoidae, Aquaticola hyalomura, Massarina australiensis, Massarina purpurascens, Rivulicola aquatica and Submersisphaeria aquatica* are reported for the first time from North America. Heretofore, these species were known only from the paleotropics and/or tropical Australia.* Anhrostomella franciscae, Coniochaeta scatigera* and *Lasiosphaeria munkii* are reported from freshwater for the first time. *Annulatuscus triseptatus, Aquaticola ellipsoidae, Ceriospora caudae-suis, Massarina ingoldiana* and *Submersisphaeria aquatica* were most frequently collected species and occurred throughout the elevational gradient sampled. Distribution maps are presented for the most commonly occurring species and new and noteworthy species are illustrated. *Poster*

RANGEL, Y. AND JUNG, G. University of Wisconsin, Madison. Genetic relationship among three genetically distinct groups of *Typhula ishikariensis* using tester monokaryons assays.

*Typhula ishikariensis*, the causal agent of speckled snow mold, is an important turfgrass pathogen in northern regions of the United States. Recently, three genetically distinct groups have been detected by DNA marker analysis among isolates of *T. ishikariensis* collected from Wisconsin. The purpose of this study was to understand the genetic relationship among these groups and the known biological species from other countries using monokaryons mating experiments. To fulfill this objective, 12 monokaryons representing four mating types of *T. ishikariensis* were obtained from sclerotia of each genetic group from Wisconsin. The 12 monokaryons were paired in all combinations with seven known testers from Japan, North America and Norway. Different mating responses were obtained and their analysis is presented as an attempt to clarify the relationship among different genetic groups of this fungus. *Contributed Presentation*

RAVISHANKAR, J.P., MILLWARD, LAURIE, DAVIS, CHRISTOPHER M., DAVIS, DIANA J., MAKSELAN, S.D., MACDONALD, ERIN, AND MONEY, NICHOLAS P., Department of Botany, Miami University, Oxford, Ohio 45056, USA; Department of Chemistry and Physical Science, College of Mount St. Joseph, Cincinnati, Ohio 45233, USA. Progress toward a comprehensive picture of tissue invasion in human mycoses.

*Pythium insidiosum* is an oomycete fungus (Kingdom Stramenopila) that causes a rare, but potentially lethal human infection, and is reported frequently as a pathogen of domesticated mammals. Hyphae of this microorganism colonize cutaneous and subcutaneous tissues, causing intestinal lesions, invade blood vessels, and can proliferate within bone. In common with other filamentous fungi, invasion is thought to involve the application of physical force to the hyphal apex coupled with the secretion of tissue-degrading proteinases. We report comparisons between direct measurements of the pressures exerted by single hyphal apices of *P. insidiosum* and corresponding data on tissue strength. Growing hyphae exerted maximum pressures of 0.3 MPa at 37 degrees C. Measurements of tissue strength from samples of cutaneous and subcutaneous tissue from fresh human cadavers showed values of mechanical resistance ranging from 20 to 37 MPa. The strength of skin samples from the lower limbs of slaughtered horses ranged from 7 to 34 MPa. These experiments prove that *P. insidiosum* does not exert sufficient force to penetrate intact skin mechanically, but must exploit preexisting wounds or reduce tissue resistance by proteinase secretion. *Poster*

*REDHEAD, SCOTTA. Systematic Mycology & Botany, ECORC, Agriculture & Agri-Food Canada, Ottawa, ON, Canada, K1A 0C6. Matter and antimatter - the clash between field mycology and the lab bench.*

Biological systematics is undergoing a revolution because of our new understanding of phylogeny. Mycological systematics has always been more difficult than other fields, which explains why only in mycology is there a nomenclatural article (Art. 59) that allows for alternative scientific binomials, and exceptions to that exception (lichens, Mucorales, etc.), and possibly an exception to the exception of the exception (basidiolichens). Nowhere is there greater upheaval in classification than among the macrofungi, i.e. those with macroscopic fruitbodies. The naming of these fungi goes back furthest in time and affects more lay persons than the naming of other fungi. Radical changes now pit field
mycology (amateurs, field ecologists, and all previous field guides) against phylogenists, phylogenists against morphologists, nomenclaturalists against all, and leaves industry aghast. Is there a bright light at the end of the tunnel or is it simply the flash of nuclear self-destruction of matter, antimatter, and hardly-matters? Contributed Presentation

*ROBERSON, ROBERT W., RIQUELME, MERITXELL,1 MCDANIEL, DENNIS P., AND BARTNIKI-GARCIA, SALOMON2. 1Department of Plant Biology, Molecular and Cellular Biology Program; 2W.H. Keck Bioimaging Laboratory, Department of Biology, Arizona State University, Tempe, Arizona 85287-1601; 3Department of Plant Pathology, University of California, Riverside, California 92521-0122. The ropy-1 mutation disrupts cytoplasmic organization and intracellular motility in mature hyphae of Neurospora crassa.

To better understand the role(s) of dynein during hyphal tip growth, we have used light and electron microscopy to document the cytoplasmic effects of the ropy (ro-I) mutation in mature hyphae of Neurospora crassa. The hyphal tip of wild-type N. crassa was divided into four regions based on cytoplasmic organization and behavior. Small vesicles exhibited anterograde and retrograde saltatory motility in subapical regions. Microtubules (MTs) were primarily solitary and occupied all cytoplasmic regions. The Neurospora Spk was composed of a cloud of secretory vesicles surrounding a central. Discrete cytoplasmic regions were not recognized in ro-1 hyphae and saltatory vesicle motility was rarely observed. In the ro-1 mutant, MTs were less abundant, exhibited increased bundling, and were generally reduced in length relative to those observed in wild-type hyphae. Microtubule concentration was highest in regions of the cytoplasm in which nuclei were clustered. The number of secretory vesicles associated with the Spk was greatly reduced in ro-1 hyphae. The size of the Spk core was less susceptible to the effects of the mutation. Dynein deficiency in the mutant causes profound perturbation on cytoskeleton organization and organelle dynamics that, in turn, leads to severe reduction in growth rate and altered hyphal morphology. Poster


While several studies have examined population diversity within Fusarium graminearum (teleomorph: Gibberella zeae), a causal agent of head blight of wheat and other cereals, so far, none have used a co-dominant marker system. We have identified nuclear RFLPs by screening a genomic library of single-insert clones. Screening of the initial 83 clones resulted in 12 probes, which are polymorphic within lineage 7 (U. S. isolates) or lineage 6 (isolates from China). Interestingly, no repetitive probes have been encountered so far, suggesting that transposable elements or other middle or highly repetitive sequences are relatively rare in this species. The 12 polymorphic probes are currently being hybridized to DNA from 1,100 F. graminearum strains. Of these, 861 isolates were obtained from 7 U. S. states (47 counties) in 1999 and 2000. In addition, 239 isolates of F. graminearum originating from four wheat fields located in 3 counties in China also are being examined. Population genetic analysis of both lineages will be presented, especially in regard to gene flow and the degree of recombination within populations. Contributed Presentation


The objectives of this research were to assess (i) the occurrence of Xylella fastidiosa(Xf) in weed plants, (ii) the presence of sharpshooter leafhopper vectors, and (iii) orchards infected with Citrus Variegated Chlorosis (CVC) at Rio Grande do Sul State. In the first experiment, weeds from three 6-year-old commercial sweet orange cv. Valencia orchards, located in Capao do Leao, Jaguari, and Tenente Portela, were collected, identified and the presence of Xf tested by dot immunobinding assay (DIBA). In the second experiment, the populations of sharpshooter leafhoppers were determined in seven orchards in five counties, from Oct 1999 through Oct 2000. In the third experiment, sweet orange leaves were received from different counties and the presence of Xf tested by DIBA and PCR. Among 43 species of weed plants identified, 40 had X. fastidiosa. Out 11 reported Xf vector species of sharpshooter leafhoppers 10 were found in the citrus orchards. CVC was only detected in orchards in the Sub-Region 7C of Central Low Land (Depressao Central) and regions of Alto Urugua and Missioniera. The absence of CVC in orchards of Cai and Taquari Valleys, the main production areas, may be associated with the low diversity and frequency of vectors in these areas due low temperatures. Poster

*ROSSMAN, AMY, FARR, DAVID F., AND CASTLEBURY, LISA A. Systematic Botany and Mycology Laboratory, USDA-ARS, Beltsville, MD 20705, USA. Phylogenetic relationships among obscure microfungi: why does it matter?

The majority of plant-associated microfungi occur on non-economic plants and, for the most part, are understudied or not yet discovered. With the increased use of molecular systematics, the relationships of these relatively unknown fungi to those of importance to humankind have become evident. Species of Herpotrichiella that produce minute, black ascomata on rotten wood have been found to produce anamorphs that are the human pathogenic black yeasts. Likewise, Stachybotrys, an anamorphic genus that includes S. chartarum, the toxic air pollutant, belongs in the hypocrealean family, Niesiellaceae, which are little known and rarely collected. The teleomorphs of several important biocontrol species of Trichoderma have recently been discovered and described as new species of Hypocreata that produce inconspicuous fructifying bodies on wood. The daiporthalean genus Schizoparme is
the teleomorph of Coniella, a genus that includes a strain that has the potential to control purple loosestrife, an invasive weed. In most cases the connection was based on morphological studies with sequence data supplying additional evidence. Research that clarifies the phylogenetic relationships among these fungi contributes to understanding their biology and facilitates their use or control. Symposium Presentation

SACADURA, NUNOT, AND SAVILLE, BARRY J. University of Toronto at Mississauga, 3359 Mississauga Rd N., Mississauga, ON Canada L5L 1C6. Gene Expression During Ustilago maydis Teliospore Germination.

The long-term survival of a fungal pathogen depends on its ability to persist in the environment between periods of growth and reproduction in the host. During these non-growth stages the pathogen must resist stresses imposed upon it by changes in environmental conditions. In many fungal pathogens specialized resistant structures such as spores and sclerotia have evolved to fill this role. These dormant structures have thick cell walls and greatly reduced metabolic activity. In order to infect a host, the pathogen must switch from this dormant state to a metabolically active state. This switch is thus a prerequisite for infection. There is limited information on gene expression during this critical transition in pathogenesis. In spores the switch coincides with germination. We are using the resistant diploid teliospore produced by the corn smut pathogen, Ustilago maydis, as a model to investigate gene expression during germination. We will investigate gene expression through the creation of expressed sequence tag (EST) libraries. We will report on our progress in constructing EST libraries from the dormant teliospores and from teliospores induced to germinate for an eight-hour period. Genes identified in these libraries give insight into molecular events during spore dormancy, the transition out of dormancy and the establishment of pathogenesis. Contributed Presentation

*SAENZ, G.S., BERBEE, M.L. AND TURGEON, B.G. 1. Department of Plant Pathology, Cornell University, Ithaca, NY 14853; 2. Department of Botany, University of British Columbia, Vancouver, BC V6T 2C9. Evolution and functional analysis of mating type genes (MAT) in sexual (Cochliobolus) and asexual (Bipolaris) fungi.

Mating type genes (MAT) in heterothallic fungi determine whether individuals can undergo sexual reproduction. Asexual fungi either lack the ability for sexual reproduction or it is cryptic. Since mating type genes have been identified in asexual species, we can assess the mating potential of presumably asexual fungi by direct examination of MAT. MAT genes of sexual Cochliobolus heterostrophus provide a basis for comparison with MAT genes from closely related asexual species, Bipolaris sacchari & Balansia sorgei. Do Bipolaris spp. have functional MAT genes and thus the potential to undergo sexual reproduction? We are sequencing both MAT-1 & MAT-2 and their flanking regions from these asexual fungi to detect accumulating mutations with respect to C. heterostrophus. MAT gene sequence variation may also reveal if MAT genes evolve at different rates and modes in sexual and asexual fungi. The accumulation of mutations may result in the loss of MAT gene function. If so, then MAT genes may serve as markers for distinguishing species boundaries in asexual fungi. We will also test function of MAT genes from these asexual species by expressing them in a MAT deletion strain of C. heterostrophus. If Bipolaris MAT genes can function in Cochliobolus, this is evidence that Bipolaris either maintains the ability to outcross or that MAT genes are selectively maintained for other cellular functions. Contributed Presentation

*SCHADT, CHRISTOPHER W. AND SCHMIDT, STEVEN K. EPO Biology, University of Colorado, Boulder CO 80309-0334 USA. Characterization of the ectomycorrhizal fungi associated with Kobresia myosuroides.

Kobresia myosuroides is an alpine and Arctic member of the Cyperaceae and is the only known member of this family to form ectomycorrhizae (ECM). Three dominant morphotypes of ECM have been observed in Colorado over the last three years. The identity of these fungi has been investigated using phylogenetic analysis of DNA sequences of the full small subunit (SSU), 5.8S, and the internal transcribed spacer (ITS) regions of ribosomal DNA. The most abundant of these fungi fits the traditional morphological and previous molecular descriptions of Cerococcum geophilum. The second most abundant type is placed within a Euascomycete order Leotiales and Erisphales using SSU rDNA analysis. This ECM fungus appears to be closely related several fungi reported recently that have the ability to form both ericoid and ECM type mycorrhizae and forms a unique clade with these isolates in ITS analyses compared to other taxa in the Leotiales. The third morphotype represents at least two phylotypes related to the basidiomycete families Russulaceae and Cortinariaceae. All of these fungi form an ECM morphology similar to that of woody angiosperms, including a shallow Hartig net. These results and other recent data on the ability of such fungi as Hymenosypos etrichae and Geopixus carbonaria to form ECM associations, suggest that the mycorrhizal status of the Euascomycetes needs further attention. Contributed Presentation

*SCHADT, CHRISTOPHER L., MACHADO, CAROLINE AND WANG, JINGHONG Dept. Plant Pathology, University of Kentucky, Lexington, KY 40546-0091. The gene for the determinant step in ergot alkaloid synthesis by Neotyphodium coenophialum and other grass endophytes.

Ergot alkaloids produced by some mutualistic, seed-borne fungal symbionts of grasses (the Neotyphodium spp. endophytes) are associated with livestock toxicosis, including "tall fescue toxicosis" associated with endophytic N. coenophialum. A potential solution involves disrupting the endophyte gene (dmeW) for the first commitment step in ergot alkaloid biosynthesis, namely, dimethylallyltryptophan (DMAT) synthase. We cloned this gene from two Claviceps spp., Balansia obtecta, and three Neotyphodium spp. Two dmeW copies were identified in N.
coenophialum. Transcripts of both copies were detected from cDNA libraries of tall fescue symbiotic with N. coenophialum, but not from the cultured fungus that failed to produce ergot alkaloids, nor from endophyte-free tall fescue. Among 19 endophyte species analyzed by Southern blot and PCR, all ergotalkaloid producers investigated contained dnaW homology and most ergotalkaloid non-producers lacked such homology. The dnaW gene was replaced with an inactive copy in a Neotyphodium endophyte of ryegrass. Similar mutation of the N. coenophialum genes is underway to test the role of ergotalkaloids in tall fescue toxicity, and potentially to utilize such a modified endophyte in new cultivars. USDA-NR198-35303-6663. Poster


Whenever resistant genes are used alone over significant areas, the corresponding virulence to these genes appears and increases in the leaf rust Puccinia triticina pathogen population. This study was conducted to monitor the appearance of new rust races and changes in virulence frequency of P. triticina, in Nebraska for 1999 and 2000. Urediniospore isolates of Puccinia triticina were obtained from wheat leaf collections made in four wheat-growing regions in Nebraska. Using 16 Thatcher lines that are near-isogenic for leaf rust resistance, 50 virulence phenotypes were found among 192 single uredinal isolates in 1999, and 44 virulence phenotypes were found among 212 isolates in 2000. The most prevalent phenotype in 1999 was TDBM (virulent on Lr1, 2a, 2c, 3, 3ka, 10, 11, 23, 24 and 30). In 2000 virulence phenotypes TDBM (virulent on Lr1, 2a, 2c, 3, 10, 23, and 24) was the most prevalent. No virulence was found to Lr9 in 1999 or to Lr16, or 21 in either year. Virulence decreased from greater than 60% to 56% and 52% respectively for Lr11, and 30. New virulence phenotypes were detected in 1999 that were not found in 2000. Poster

Schmit, J. P. And Shearer, Carola. Department of Plant Biology, University of Illinois, 265 Morrill Hall, 505 S Goodwin Ave. Urbana, IL 61801. Factors influencing the distribution of mangrove fungi.

As part of a multidisciplinary study of biocomplexity in mangrove forests, we have reviewed the existing literature on fungi that are associated with mangrove plants. Over 500 fungal species are known to inhabit the wood, leaves, roots or soil of mangroves worldwide. Previous studies, based primarily on fungi that decay mangrove wood, indicate that mangrove fungi show little host preference and few, if any, are host specific. Similarly, mangrove fungi seem to have wide geographic distributions, often including non-mangrove habitats. Depth of water, however, has often been cited as an important factor in the vertical distribution of mangrove fungi. Based on reports in the literature, we have created a database of distribution patterns of mangrove fungi and fungus-host relationships. The database was analyzed using ordination techniques to determine the effects of host plant, geography, and water depth on the distribution of mangrove fungi. Preliminary results indicate that host phylogeny and geography have little impact on fungal distributions. Although some fungi appear to have limited host and geographic ranges, this is likely the result of limited sampling. Contributed Presentation

Schoch, Conrad L., Gillian Turgeon, B., Yoder, Olen C. And Aist, James R. Dept Plant Pathology, Cornell University, Ithaca, NY; Torrey Mesa Research Institute, La Jolla, CA. Evolutionary relationships of fungal motor proteins.

Kinesins are mechanochemical proteins able to move cargo along microtubules by ATP hydrolysis. Together with dyenins and myosins they are motor proteins, involved in a number of vital cellular processes such as organelle transport, chromosome segregation and cytokinesis. A large number of genes and proteins from a wide range of eukaryotes have already been described and analyzed. So far a relatively small number of proteins have been isolated from fungal systems. The purpose of this study is to utilize the data from fungal genome sequences at Syngenta and public databases in order to catalogue and compare kinesin related proteins over a wide range of fungi. Poster

*Schurko, Andrew M.,1 Levesque, C. Andre,2 Desaulniers, Nicole L.,2 Mendaza, Leonel,3 De Cock, Arthur W. A. M.,4 and Klassen, Glen R.,1 1Department of Microbiology, University of Manitoba, Winnipeg, Manitoba, Canada; 2Agriculture and Agri-Food Canada, Ottawa, Ontario, Canada; 3Department of Microbiology, Michigan State University, East Lansing, Michigan; 4Centraalbureau Voor Schimmelcultures, Utrecht, Netherlands. Intraspecific variation of Pythium insidiosum based on ITS sequence analysis.

Pythium insidiosum is the only species of the genus known to infect mammals. It is the etiological agent of pythiosis, causing cutaneous and subcutaneous granulomatous lesions in animals and humans in tropical and subtropical regions of the world. The internal-transcribed spacer (ITS) of the ribosomal DNA repeat unit was sequenced for 28 isolates of P. insidiosum from a variety of animals representing a wide geographic distribution. Phylogenetic analysis of the sequence data showed the isolates essentially formed clusters reflecting their geographic origin. Three major clusters were formed comprised of isolates from: (1) North and South America, (2) Asia and Australia, and (3) Thailand. In addition, strains of P. destruens clustered with the Asia and Australia isolates, supporting previous evidence that P. insidiosum and P. destruens are synonymous species. These results suggest that different varieties of P. insidiosum may exist which are specific to various regions of the world, or perhaps that P. insidiosum is comprised of more than one species which may represent a new branch of Pythium species comprised of mammalian pathogens. Poster
**SHAW, B.D., LIN, X. R. AND MOMANY, M. Department of Botany, University of Georgia, Athens, GA, 30602, USA.**

Cloning and characterization of *Aspergillus nidulans* swoA and swoF genes involved in cell polarity.

Germination of *Aspergillus nidulans* conidia involves isotropic (nonpolar) expansion of the cell through the first two nuclear divisions. Subsequent growth is polar with production of a germ tube and establishment of vegetative growth. Seven temperature sensitive swo (swollen cell) mutants which are defective in either polarity establishment or polarity maintenance were previously identified. A genomic plasmid library containing the AMA sequence for plasmid autonomous replication, and the pyrG marker was used to complement the ts defect of swo pyr strains. Plasmids complementing swoA and swoF were recovered in *E. coli*. Random insertion of a Tn7 based transposon, followed by sequencing with outward facing Tn primers allowed for full sequence determination of the complementing plasmids. swoA has between 45-50% amino acid identity with *Saccharomyces cerevisiae* proteins PMT2, PMT3, and PMT6, protein mannosyl transferases which are endoplasmic reticulum resident proteins, involved in O-mannosylating proteins bound for secretion. swoF shares 51% amino acid identity with *S. cerevisiae* NMT1 (N-myristoyl transferase), a cytoplasmic protein that catalyzes the transfer of myristate from myristoyl-CoA to the N-terminal glycine of various proteins including some signal transduction elements.

Further characterization of swoA and swoF genes is underway.

**SHEARER, CAROL A.**, ANDERSON, JENNIFER L. AND PRINGLE, CATHY M.1 2 Department of Plant Biology, University of Illinois, 505 South Goodwin Ave., Urbana, IL; 2 Institute of Ecology, University of Georgia, 711 BioSciences Bldg., Athens, GA. **Is there a pantropical freshwater ascomycota?**

Collection of ascomycetes from tropical freshwater habitats has been almost exclusively from the paleotropics and tropical Australia. These collections have resulted in the description of a new family, Anulatatacaceae, and numerous new genera and species. It is not known, however, if these taxa are exclusively tropical and whether the same taxa occur in neotropical freshwater habitats. Tropical records were compared to those from new collections we made from streams at La Selva Biological Station, Costa Rica and throughout North America. A remarkably high percentage of the ascomycetes reported from the paleotropics also occur in streams at La Selva Biological Station, supporting the idea of a pantropical freshwater ascomycota. Ascomycete species reported from freshwater habitats in the tropics comprise three groups: species that appear to be limited to the tropics; species that occur in the tropics and low latitude temperate areas; and cosmopolitan species. A list of the species collected from La Selva and their worldwide distribution patterns will be presented. **Poster**

SHRESTHA, R., J.H. HUR, AND C.K. LIM. Division of Biological Environment, College of Agriculture and Life Sciences, Kangwon National University, Chunchon, 200-701, Republic of Korea. **The Effects of Temperature and pH on the Growth of Asian Pear Pathogen, Erwinia pyrifoliae.**

*Erwinia pyrifoliae*, which causes necrotic symptoms in branches of Asian pear tree, was first reported from Chunchon, South Korea in 1999. Chunchon has its unique climate, severe cold in the winter upto -20 C and over 38 C in the summer. The effects of temperature and pH on the growth of *E. pyrifoliae* are reported here for the first time. Growth rates were measured in vitro by an automated turbidimetric system Bioscreen C, at 3 intervals over the range of 12 - 39 C. The maximum (36 C) and optimum temperatures (27 C) were estimated with a doubling time of 2.69 hours and 1.53 hours respectively. Similarly, growth at different pH over the range of 2.0-9.0 with intervals of 0.5 units was observed in Mannitol Glutamic Yeast (MGY) broth medium. Maximum growth was measured at pH 7.0-7.5. No significant differences in the growth of *E. pyrifoliae* were observed in maximum and optimum temperatures, and acidic condition when compared with those of *E. amylovora*, the fire blight pathogen. Instead, *E. pyrifoliae* showed higher growth rate at low temperature and slightly alkali condition in comparison to *E. amylovora*. **Poster**
Relationships of families within the Xylariales, and those families with putative affinities, were investigated using sequence data obtained from 18S rDNA. Twenty-five taxa from the Amphisphaeriaceae, Apiosporaceae, Boliniaceae, Cainiaceae, Clypeosphaeriaceae, Hyponectriaceae, Graphostromataceae, Hypocreaceae, and Xylariaceae were included in the parsimony, maximum likelihood and other analyses. Members of the families Amphisphaeriaceae, Apiosporaceae, Boliniaceae, Cainiaceae, Clypeosphaeriaceae, Hyponectriaceae and Xylariaceae are included in the Xylariales. Preliminary results reveal that many of the families do not represent monophyletic groups. The validity of the families in the Xylariales as monophyletic groups, and the familial relationships within the Xylariales, will be discussed.

CONTRIBUTED PRESENTATION

Molecular systematics of the Xylariales inferred from 18S rDNA sequence data.

Smith, GAVIN J.D., LIEW, EDWARD C.Y., JEEWON, RAJESHW, AND HYDE, KEVIN D. Centre for Research in Fungal Diversity, Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, HONG KONG. Molecular systematics of the Xylariales inferred from 18S rDNA sequence data. Relationships of families within the Xylariales, and those families with putative affinities, were investigated using sequence data obtained from 18S rDNA. Twenty-five taxa from the Amphisphaeriaceae, Apiosporaceae, Boliniaceae, Cainiaceae, Clypeosphaeriaceae, Hyponectriaceae, Graphostromataceae, Hypocreaceae, and Xylariaceae were included in the parsimony, maximum likelihood and other analyses. Members of the families Amphisphaeriaceae, Apiosporaceae, Boliniaceae, Cainiaceae, Clypeosphaeriaceae, Hyponectriaceae and Xylariaceae are included in the Xylariales. Preliminary results reveal that many of the families do not represent monophyletic groups. The validity of the families in the Xylariales as monophyletic groups, and the familial relationships within the Xylariales, will be discussed. Contributed Presentation

SNETSELAR, KAREN M. AND MCCANN, MICHAEL P. Biology Department, Saint Josephs University, 5600 City Ave, Philadelphia PA 19131. From bud to appressorium: Morphology of the Ustilago maydis transition from saprobic to parasitic growth.

Under growth-limiting conditions and in the presence of pheromone, haploid cells of U. maydis stop budding and instead form mating filaments. These filaments grow toward higher concentrations of compatible pheromone, often in a zig-zag pattern. Compatible filaments locate each other precisely and complete the mating process by fusing. The resulting dikaryotic filament is larger in diameter than the mating filaments, and in liquid and solid media it tends to grow straight and up into the air. Dikaryotic filaments elongate more quickly in response to exogenous pheromone but they do not grow directionally toward pheromone sources. Infection filaments adhere to epidermal cells and may grow on their surfaces for long distances. Entrance into the plant is preceded by formation of an appressorium, usually over the junction between two cells. Ustilago maydis appressoria do not appear to be melanized although their walls may persist after the fungal cytoplasm has left the filament. After the two nuclei move into the appressorium it becomes delimited from the surface hypha by a septum. Infection filaments enter the leaf between two epidermal cells, immediately penetrate anticlinal cells, and then begin intracellular growth. Mutations in genes involved in pheromone signaling and response result in deficiencies in one or more of these mating and infection behaviors. Symposium Presentation

SOHN, K. D. AND YOON, K. S. Department of Microbiology, Kangwon University, Chunchon 200-701, South Korea. Ultrastructural study on the early stage of cleistothecium development in Emericella nidulans.

To understand the details of cleistothecial development in Emericella nidulans, a homothallic species, young cleistothecia at the different developmental stages were examined with the electron microscope. In this presentation we report our findings on the early stages of cleistothecial formation. The progresses of early cleistothecial development were morphologically impressive in growth of core cell and wall hyphae. Very young cleistothecial initials, ca. 8um diam, were a coiled structure with a slightly swollen cell with a tail hypha wrapped with a layer of extensively branched hyphae. As the size of cleistothecia are enlarged to 20um diam, the number of layers of the wrapping hyphae are increased to 3-4 (6um) and reached up to 8-10 layers (14-15um) when young fruit body became 40um in diameter, in which the thickness of the wall layers appears to occupy 3/4 of the diameter of young fruit body. The core cells of the young cleistothecia were one-celled with 4 nuclei within a broad cell at the earlier stage, but at the later stage, it became 4-celled and also the number of nuclei per cell were increased to 8 nuclei. Wall hyphae were multinucleate and contain extremely dense cytoplasm. Results from analyses of these findings and further study which is underway will be discussed. Poster
Morphological and molecular studies indicate white pine is hosting up to 40 species of fungal endophytes. A few species make up the large majority of the isolates. Endophyte fungal biodiversity and distribution in relation to location will be presented.

*STEPHENS, STEVEN L.* AND *JOHNSTON, PETER R.* 1Dept. of Biology, Fairmont State College, Fairmont, WV 26554 USA; 2Landcare Research, Private Bag 92170, Auckland, New Zealand.

**Myxomycetes associated with alpine snowbank habitats in New Zealand.**

A distinctive ecological group of myxomycetes (plasmodial slime molds) is associated with melting snowbanks that occur during late spring and early summer in alpine regions of the temperate zone. The species that occupy this rather special and very limited microhabitat are usually referred to as "snowbank" myxomycetes, since they produce fruiting bodies only during the relatively brief period of time when the special microenvironmental conditions associated with melting snowbanks and apparently required for their growth and fruiting exist. During the period of mid-November...
to mid-December of 2000, visits were made to a number of localities in the mountains of New Zealand where snowbank myxomycetes might be expected to occur. Eight different localities, all located between 42 and 45 degrees south latitude in the South Island, yielded a total of more than 150 collections. This is the largest series of collections of snowbank myxomycetes known for any region in the entire southern hemisphere. Because the treeline in New Zealand mountains is relatively low and usually does not extend into the alpine habitats where snowbanks occur, the species of snowbank myxomycetes typically associated with coarse woody debris were not represented among the specimens we collected.

Poster

*SUNG-OUI, M., MCCHUGH, J.V. AND BLACKWELL, M.*

1Dept. of Biological Sciences, Louisiana State University, Baton Rouge, LA 70803, USA; 2Dept. of Entomology, University of Georgia, Athens, Georgia 30602, USA. Yeasts from the gut of Coleoptera: taxonomic characteristics and molecular phylogeny.

Over one hundred yeasts have been isolated from the gut of mushroom-associated beetles (Erotylidae, Tenebrionidae, Nitidulidae, Ciidae, Scarabaeidae, Mycetophagidae, Derodontidae). Based on phylogenetic analysis of partial sequences of 26S rDNA (D1/D2 region, about 600bp), the yeasts do not form a monophyletic group but rather occur in over 30 different clades. In addition to molecular characters, the physiological characteristics from assimilation of 45 carbon and 10 nitrogen substrates, vitamin requirements, and additional physiological tests indicate that the vast majority of the isolates belong to the Saccharomycetales but several are basidiomycetous yeasts. Most of the yeasts are undescribed species, and one major clade previously represented only by *Candida tanzawaensis* was discovered. Within this clade the yeasts from different host beetles (eryotlid, tenebrionid, and ciid) may be closely related to each other; however, no yeast isolates from different beetle families are identical. This pattern may indicate that host switching and divergence of yeasts have occurred among beetles inhabiting the same mushrooms. Some yeasts show specificity for a single beetle species. Contributed Presentation

*SUNG, CH-HO, HODGE, KATHIE, AND SPATAFORA, JOSEPH W.*

1Dept. of Botany and Plant Pathology, Oregon State University, Corvallis, OR, USA; 2Dept. of Plant Biology, Department of Biology, Cornell University, Ithaca, N.Y., USA. A Multigene phylogeny for *Cordyceps* and the Clavicipitaceae.

*Cordyceps* is a morphologically and ecologically diverse genus of entomopathogenic and fungicidal fungi classified in the Clavicipitaceae. The family includes pathogens of nine orders of arthropods, the grass family Poaceae, and the truffle genus *Elaphomyces*. This disparate host range is the major basis for the current subfamilial classification of the family. To test familial, subfamilial, and generic classifications and to develop phylogenetic hypotheses for the evolution of host affiliation, we have initiated a multigene phylogenetic study of *Cordyceps* and the Clavicipitaceae. Nucleotide sequence data was determined for the small and large subunit rDNA, beta-tubulin, and elongation factor 1-alpha. In addition to species of *Cordyceps*, we also sampled species of other entomopathogenic (e.g., *Torrubiella*) and plant-associated (e.g., *Epichloe*) telemorphs and numerous entomopathogenic, nematophagous, and fungicolous anamorphs (e.g., *Verticillium*). Phylogenetic analyses of separate and combined data sets do not support the monophyly of *Cordyceps*, which is represented in at least three separate clades. In addition, these results reject the ecologically based subfamilial classification of the Clavicipitaceae. The use of multigene phylogeny to infer ancestral ecologies will be discussed. Contributed Presentation

TAYLOR, J.W. AND BERBEE, M.L.

1Department of Plant and Microbial Biology, University of California, Berkeley, CA 94720 USA; 2Department of Botany, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada. Geological time, the common currency of systematics.

Genera, families, orders and other fungal taxa above the species rank can be difficult to compare because different taxa of the same rank may contain different numbers of species and different levels of genetic diversity. When comparisons are made outside the fungi, the problem is worse. A solution to this problem may be found in molecular phylogenetic studies that have provided estimates of the rate of nucleotide substitution for various genes. These rates can be

*TAN, JENNY, GRUBISHA, LISA C., CAMACHO, FRANCISCO J. AND BRUNS, TOM D.*

Department of Plant and Microbial Biology, University of California, Berkeley, CA 94720 USA. Examination of genet size of two entomocoryphal fungi from the southern Sierra Nevada: *Gauteria monticola* and *Suillus (Gastrosuillus) sulloides* using AFLP markers.

We are investigating the genet sizes of *Gauteria monticola* and *Suillus (Gastrosuillus) sulloides*, two species of entomocoryphal fungi found in mixed conifer stands from the southern Sierra National Forest. The study of the genet sizes of these two species will help us gain a better understanding of their population biology. Basidiocarps from three sites for each species were mapped, collected, and analyzed with AFLPs to generate genetic fingerprints for the fruitbodies. We screened multiple primer pairs and chose two primer combinations for each species. Preliminary analyses suggest that the two species have different population structures. Within a single population, *Gauteria monticola* forms several small genets often with several clustered fruitbodies, whereas *Suillus sulloides* has fewer but occasionally larger genets, the largest spanning 10 meters between fruitbodies. Within the space of the large genet are smaller genets. The small size of *Gauteria* genets corresponds to previous reports of small *Gauteria* mats found in young Douglas-fir stands, while the size of *Suillus sulloides* genets are within the range seen in other *Suillus* species. *Suillus sulloides* has low AFLP similarity between populations, relative to within populations. This suggests low gene flow between sites, which is similar to what has been reported in its sister taxon *Suillus tomentosus*. Contributed Presentation

TAYLOR, J.W. AND BERBEE, M.L.

1Department of Plant and Microbial Biology, University of California, Berkeley, CA 94720 USA; 2Department of Botany, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada. Geological time, the common currency of systematics.

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used to date the origins of fungal taxa. If fungal taxonomic names were followed by an estimate of the date of origin, mycologists and other biologists would have a means of comparing taxa throughout the fungi and beyond. For example, Coccidioides immitis (11 ma) would tell the reader than this fungus last shared a common ancestor with the other species in the genus 11 million years ago.

Symposium Presentation

THACKER, JASON. HENKEL, TERRY W. AND VILGALYS, RYTAS. Department of Biology, Duke University, Durham, NC 27708. Extremeg morphological variability among sympatric neotropical species of Clavulina and Craterellus.

Recent systematic studies have revealed that the homobasidiomycete genera Clavulina J. Schrøt. and Craterellus Pers., although morphological dissimilar, are closely related. Nutritional habit of both these genera is thought to be exclusively ectomycorrhizal (EM). The majority of species in both genera have been described from temperate regions, though recent studies have uncovered a wealth of new and unusual taxa from neotropical forests of Guyana. Clavulina and Craterellus are species-rich in the Pakaraima Mountains of Guyana and basidiomes of each are some of the most abundant and frequent in forests dominated by EM Dicymbe spp. (Caesalpinaceae). Clavulina is especially speciose at this site, with 10+ species, most of which are undescribed, recorded from a small collecting area. Basidiomes among sympatric Guianese Clavulina species exhibit extreme macromorphological variability, including monopodial, highly branched corals, and funnel-shaped, Craterellus-like forms. Craterellus basidiomes range from typically infundibuliform to astipitate, pleurotoid forms fruiting on standing deadwood. Molecular systematic studies investigated the phylogenetic relationships of neotropical and temperate Clavulina and Craterellus, examined the mycorrhizal status of certain taxa, and assessed their macro- and micromorphological plasticity. Contributed Presentation

*TRUDELL, STEVENA.1, RYGIEWICZ, PAUL.2, EDMONDS, ROBERT.1. 1 Ecosystem Science Division, College of Forest Resources, Box 352100 University of Washington, Seattle, WA 98195-2100. 2 Western Ecology Division, National Health and Environmental Effects Research Lab, US Environmental Protection Agency, 200 SW 35th Street, Corvallis, OR 97333. Nitrogen stable isotope ratios in sporocarps of ectomycorrhizal fungi: influence of phylogenetic and environmental factors.

It has been suggested that nitrogen stable isotope ratios (expressed as delta 15-N) of fungus sporocarps, in conjunction with delta 15-N data from other ecosystem compartments, can be used to elucidate key processes in forest N-cycling. Although results of previous studies generally support this idea, they also show that the large number of factors that influence delta 15-N can complicate interpretation of the data. To date, there has been no integrated study of the relative degree to which the different sources of variation contribute to the observed delta 15-N of fungus sporocarp samples. Here, we report initial delta 15-N measurements on a large number of sporocarp collections from two conifer forests located in contrasting environmental zones on the Olympic Peninsula, Washington. Based on these data, we provide estimates of variance in delta 15-N for individual species and genera of ectomycorrhizal fungi and assess the degree to which phylogenetic and environmental factors appear to influence delta 15-N values. The results of our overall study, of which this work is one component, will increase the usefulness of stable isotope ratios in understanding N-cycling and, hopefully, help draw greater attention to the critical ecosystem roles played by fungi. Poster

TSUI, CLEMENT K.M., HYDE, KEVIN D. AND HODGKISS, LI. Center for Research in Fungal Diversity, Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong, China. Longitudinal and temporal distribution of freshwater ascomycetes and dematiaceous hyphomycetes in the Lam Tsuen River, Hong Kong.

Longitudinal and temporal distribution patterns of freshwater ascomycetes and dematiaceous hyphomycetes on submerged wood were investigated along the Lam Tsuen River in Hong Kong. Two hundred and six species were recorded. Ascomycete genera were dominated by Anulatascaceae, Halosphaeriaceae, Lasiosphaeriaceae, Lophiostomataceae and Magnaportheaceae; the most common taxa were Anipodora cheapeakensis, Aquaticola rhomboidea, Massarina purpurascens, M. thalasieoida, Ophioceras commune and Sporochalina unistepatum. There were no significant differences (p 0.05) in total number of species among sites, but the number of species in Halosphaeriaceae (p < 0.01) and Lasiosphaeriaceae (p higher at downstream sites, whereas Anulatascaceae was dominant at upper sites. The downstream changes in species composition were strongly correlated with elevated concentrations of nitrate, ammonia and phosphorus due to human disturbances. The variation in species composition was also weakly affected by other physico-chemical characteristics. Species diversity fluctuated temporally but did not change (p 0.05) between dry and wet seasons. Frequency of occurrence for certain dominant taxa appeared to decline after heavy rainfall associated with El Niño, possibly due to the effects of heavy rainfall on river discharge, which washed away well-colonized woody substrates. Contributed Presentation

*TSUI, CLEMENT K.M., HYDE, KEVIN D. AND CHEN, STEVEN F.1, 1 Department of Botany, The University of Hong Kong, Pokfulam Road, Hong Kong, China, 2 Centre for Research in Fungal Diversity, Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong. Biodiversity of nematophagous fungi in Hong Kong.

Nematodes cause serious problems in agriculture and forestry. Yields of banana and tobacco are seriously reduced due to infection by root nematodes in China, whereas in Hong Kong pine wood nematodes virtually eliminated local Pinus massoniana. In collaboration with the Yunnan University we are investigating the diversity of nematode-trapping fungi

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and trying to identify new chemicals that can be used as nematicides from Hong Kong macrofungi. To date, ten nematode-trapping fungi have been identified, e.g. *Arthrotrichys japonica*, *A. oligospora*, *Monacrosporum eudermatum*. By screening fungi we have isolated several *Pleurotus* spp. that are good producers of nematostatin and expect to discover novel bioactive compounds against nematodes. By carrying out these investigations, it should be possible to develop an environmental friendly chemical to control nematode problems. 

**Poster**

**VENIER, V.**, MYBURG, S. AND WINGFIELD, B.D. Tree Pathology Co-operative Programme (TCP), Forestry and Agricultural Biotechnology Institute (FABI), Department of Microbiology and Plant Pathology, Genetics, University of Pretoria, Pretoria, South Africa.

*Cryphonectria cubensis* represents a new genus comprised of three species.

The fungus *Cryphonectria cubensis* causes cankers on *Eucalyptus* spp., *clavus* (*Syzygium aromaticum*) and *Tibouchina* spp. Recent studies based on ITS1/ITS2 sequences, have shown that *C. cubensis* phylogenetically groups separately from other *Cryphonectria* species. Subsequent studies using sequences from the ITS1/ITS2 region, beta-tubulin and histone genes, have furthermore shown groups linked to isolates from South East Asia, South America and Southern Africa. The aim of this study was to determine whether *C. cubensis* is appropriately placed in *Cryphonectria* and whether the phylogenetic sub-clades represent distinct species. This was done by considering the morphology of herbarium specimens. Relevant morphological differences between collections of *C. cubensis* and other *Cryphonectria* species included a dark colored *Dendrophoma*-like anamorph and black perihecal necks in *C. cubensis*. In contrast to the orange, multilocular, stromatal anamorph and orange perihecal necks of other *Cryphonectria* spp. Spore shape and size, and pycnidial appearance differ between the geographical sub-clades. Morphological evidence supports extensive molecular comparisons and suggests that *C. cubensis* represents a genus apart from *Cryphonectria*. The three geographical sub-clades for isolates of *C. cubensis* can also be distinguished morphologically and appear to represent three distinct species. 

**Poster**

**WALKER, JOHN F. AND MILLER, ORSON K., JR.** Dept of Biology, Virginia Tech, Blacksburg, VA 24061, USA. 

**Ectotrophic symbionts of tree seedlings across *Rhododendron* maximum gradients in the Appalachian Mountains.**

Seedling biomass and mycorrhization (% root tips associated and mycorrhizal ramification) are reduced in *Rhododendron maximum* thicket (*RmT*), where light availability is also lower than similar locations without *RmT*. However, differences in mycorrhization, and more importantly seedling biomass, in vs. out of *RmT* do not appear to be related to light availability alone. In contrast, ECM spore communities are similar in +RmT and—RmT sites. Species composition did vary with other environmental parameters that have been considered important in defining sporecrow distributions traditionally. To resolve this apparent conflict between ECM sporulation and seedling root colonization, ECM species composition on seedling roots across gradients through ericoid shrub thickets is being assessed. Correlation between seedling root symbionts, ericoid shrub density, host tree influence, light availability, and edaphic conditions will be discussed in relation to seedling suppression in ericoid shrub thickets.

**Contributed Presentation**

**WEISBERG, W.**, **VON DER WEIS, L.**, **WINGFIELD, B.D.** Tree Pathology Co-operative Programme (TCP), Forestry and Agricultural Biotechnology Institute (FABI), Department of Microbiology and Plant Pathology, Genetics, University of Pretoria, Pretoria, South Africa.

Ectomycorrhizal fungal diversity in a native oak savannah: an initial view from below ground.

We have begun to analyze the ectomycorrhizal fungal diversity in a native oak savanna at a Long Term Ecological Research site, Cedar Creek Natural History Area, to compare the fungal community structure in a savanna subject to frequent fires with an unburned woodland. For 35 years plots have been subjected to fires in nine years out of ten, or have been left unburned. Previous studies on these plots have shown that frequent burning affects the soil chemistry by lowering the nitrogen content, decreasing organic matter, and increasing the pH, thus restoring niches that were present before European settlement. Examination of fruiting bodies has revealed high species diversity and species differences between the two plot types. The initial belowground analysis has involved random sampling of ectomycorrhizae from soil cores randomly distributed within a burned and unburned plot. Restriction fragment length polymorphisms of the ITS region were produced using two restriction enzymes and compared with patterns derived from fruiting bodies collected in the same plots. Initial identifications have shown several mushroom families associated with the roots. Comparisons between the aboveground and belowground results will be presented.

**Poster**

**WEBER, D.J., STRUNNIKOVA, OLGA AND TYPAS, M.A.** Department of Botany and Range Science, Brigham Young University, Provo, Utah 84602, Research Institute for Agricultural Microbiology, St. Petersburg, Russia 189620, Department of Biology, University of Athens, Athens, Greece TK 15701. 

**Molecular variation among species of *Verticillium*.**

The genus *Verticillium* within fungi imperfecti contains a heterogeneous group of asexual species. Many of these species are important plant pathogens or entomopathogens. The classification is based on morphology of the vegetative reproductive organs namely conidiophores, conidia and resting structures. Some analyses have been done on *Verticillium* using immunochemical and RFLPs methods. We analyzed the variation of the nuclear ribosomal internal transcribed spaces (ITS) of the following species: *V. albo-atrum*, *V. dahliae*, *V. longisporum*, *V. lamenicola*, *V. fungicola*, *V. catenulatum*, *V. tricopus*, *V. nigrescens*, *V. chlamydosporium*, *V. theobromae*, *V. eoricoides*, and *V. eolicum*.
Aspergillus to each other was determined. Poster sequencing apparatus. The relationship of the different species of Saccharomyces and Aspergillus nidulans septin AspB localizes to areas of new growth pre- and post-mitotically.

The septin family of proteins acts as organizational scaffolding in areas of cell division and new growth. Originally discovered in Saccharomyces cerevisiae, septins have also been characterized in numerous other organisms such as fruit flies, mice, and humans. In S. cerevisiae, septins were first described as a series of 10nm filamentous rings found at the neck of a budding cell. Septins play a role in such processes as cytokinesis, bud site selection, polarity establishment, and spore formation. Five septin homologues have been found in the filamentous fungus, Aspergillus nidulans. The current project focuses on characterization of one of these, aspB. Null alleles of aspB are lethal. Localization studies using polyclonal antibodies show that aspB localizes to areas of new growth in distinctive patterns. Furthermore conditional mutants have been generated and, based on phenotypic studies, support a role for aspB in septum formation, branch initiation, and asexual development. Ongoing work includes identification of proteins that can interact with aspB and sequence analysis of conditional aspB alleles.

Contributed Presentation

*WESTFALL, PATRICK J. AND MOMANY, MICHELLE Dept. of Plant Biology, University of Georgia, Athens GA 30602 USA. The Aspergillus nidulans septin AspB localizes to areas of new growth pre- and post-mitotically.

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Contributed Presentation

*WESTMORELAND, SEAN AND VOLT, THOMAS J. Department of Biology, University of Wisconsin-La Crosse, La Crosse WI 54601 USA. A preliminary study of Hydnellum (Thelephoraceae Basidiomycota) using morphological and pigment characteristics.

Hydnellum is a genus of stipitate hydnaceous fungus that can be recognized by their brown, ornamented basidiospores, leathery texture, and indeterminate, mycorrhizal growth habit. Although previous taxonomic works have been useful, there are many disagreements between authors as to the correct delimitation and placement of Hydnellum species. Since there has been only one limited taxonomic study of Hydnellum in the past fifteen years, a re-examination of the species is warranted. For that reason we have begun a morphological and molecular study of Hydnellum species. The macroscopic and microscopic characteristics have been compared to published descriptions of the species. Molecular characters will later be used to support or reject these preliminary placements. Another novel character we have investigated for delimiting species of Hydnellum is pigment production; these pigments have been utilized for centuries throughout northern countries for dyeing wool. Since some Hydnellum species produce different pigments, this provides an additional character to be exploited for the delimitation of species. We report some preliminary data on morphology and pigment characteristics in this presentation.

Poster


Rusts are obligate biotrophic fungi that include some of the most devastating plant pathogenic fungi. Hypotheses relating to relationships amongst groups of rusts and these are based primarily on morphology and biological characteristics. Given the importance of these fungi, and the speed at which molecular characterisation has developed in recent years, it is important that the rusts have been considered in terms of their molecular phylogeny. One reason is surely linked to their biotrophic nature and the consequent difficulty in obtaining sufficient DNA material for analysis. Recent advances in PCR based techniques, however, allow for smaller sample sizes. Through substantial international collaboration and unique quarantine facilities, we were able to undertake this study where DNA was obtained from more than 30 species of rust fungi, many of international significance. These included representatives from 13 of the 14 currently recognised families within the Uredinales and representative genera within these families. This DNA was used to amplify regions of the LSU and SSU rRNA genes. The DNA sequence of these fragments was then determined.

WHITE, MERLIN M. Department of Ecology and Evolutionary Biology, University of Kansas, Lawrence, Kansas 66045-2106. Exploring the relationships of gut fungi (Harpellales) using ribosomal DNA.

The class Trichomycetes (Zygomycota), gut fungi, occur worldwide as symbionts of Arthropoda. Gut fungi belong to three fungal orders (Harpellales, Asellariaceae and Ecerinales); sequence data have confirmed that a fourth order (Amoebidiales) consists of protists. The 33 genera and 143 species of Harpellales, with one exception, have evolved as endobions of larval aquatic insects. One species is pathogenic to mosquito larvae and a few others are known to produce ovarian cysts in certain adult Diptera, but generally they are considered to be commensalistic. Presumably, gut fungi have undergone considerable selective pressure and convergent evolution as they adapted to grow in host guts. Previously, 18S rDNA sequence data of four different genera of culturable Harpellales indicated that the order is a monophyletic sister group to the Kickxellales (Zygomycetes). Last year, a broader sampling of axenic cultures representing 24 of 52 known species of Smittium, the largest harpelliid genus, revealed five distinct lineages suggesting that the genus may not be monophyletic. The focus of these molecular studies is to expand the taxa sampling within the Harpellales to elucidate their relationships within the Trichomycetes and Zygomycota. This report is the first to include ribosomal DNA sequence data from unculturable species of Harpellales to infer phylogenetic relationships of the group.

Contributed Presentation

*WESTMORELAND, SEAN AND VOLT, THOMAS J. Department of Biology, University of Wisconsin-La Crosse, La Crosse WI 54601 USA. A preliminary study of Hydnellum (Thelephoraceae Basidiomycota) using morphological and pigment characteristics.

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Phylograms derived from the analysis of the DNA sequences show that very few of the families allocated based on morphology, represent well-defined phylogenetic lineages and the majority of rust families are clearly polyphyletic. Contributed Presentation


Inspections of US Forest Service campgrounds in southwestern Colorado suggested that Armillaria root disease is common and widely distributed. We initiated a study to determine frequency of the disease inside and outside campgrounds, spatial distributions, host associations, symptomatology and population structure. We intensively surveyed and mapped the pathogen in 2 campgrounds on the San Juan National Forest and 1 on Grand Mesa N. F. (GMNF). Data were also obtained from 4 additional campgrounds on the GMNF. Crown thinning and dieback were useful symptoms, but basal resinsis was the most efficient symptom indicating infection. Infection of live trees (based on mycelium under the bark) on all 7 campgrounds averaged 8.0% (range 1-11). In 3 campgrounds, infection averaged 10% (9-11) inside and 15% (3-27) outside. Although subalpine fir is considered more susceptible than spruces and Douglas-fir in this area, live subalpine fir had lower infection (7.5%) than Engelmann spruce, blue spruce and Douglas-fir (11, 12 and 16%, respectively). This was true in each of 6 campgrounds where subalpine fir co-occurred with Engelmann spruce, the only species with which subalpine fir commonly occurred. We collected isolates that will be used to assess population structure. The disease poses difficult obstacles to long-term management of safe vegetation in developed recreation sites. Contributed Presentation

WRIGHT, PAUL T. Dept. Soil Science, The University of Western Australia, 35 Stirling Hwy, Crawley, Western Australia, 6009. Effects of dissolution of grass cuticle layers.

Dissolution of follicle cuticle in couch *Cynodon dactylon* and bent *Agrostis stolonifera* grass treated with "Citowett" (ai: Allylarylpolyglycol Ether). The aim of the treatment was to eradicate couch with minimum disruption to bent on a golf green. Citowett was used to dissolve cuticle layers to permit absorption and allow maximum surface contact of a herbicide/plant growth regulator mix consisting of Stanane (Fluroxypyr) and Primo (Trinexapac-ethyl). Results of this investigation show: 1. Increased sensitivity of the target grass to the herbicide/plant growth regulator mix. 2. Relatively less sensitivity of bent. 3. Although there was extensive removal of cuticle by the Citowett treatment, the level of dissolution was not adequate to allow an increase in invasion of the leaves by foliar pathogens or pests. Poster

WU, B. M. AND SUBBARAO, K. V. Dept. of Plant Pathology, UC Davis, 1636 E. Alisal St., Salinas, CA 93905. Mycelium compatibility grouping of *Sclerotinia minor* populations from lettuce in central California.

To determine the population diversity of *Sclerotinia minor* (causal agent of lettuce drop) in central California and to assess the risk of pathogen spread to other areas, more than 200 isolates collected from commercial fields in the Salinas, Santa Maria, and San Joaquin Valleys were characterized using mycelium compatibility grouping (MCG). Although many groups were detected in the three Valleys, most groups consisted of very few isolates. More than 70% of isolates could be placed in four mycelium compatibility groups, and about 50% of isolates belonged to one group. Isolates in this dominant group were distributed in all the three Valleys, suggesting a common origin for the pathogen populations. The spatial distributions of other groups were more or less localized, implying that the distant populations might have evolved separately. Further spatial analyses will be performed using geographic information systems. Poster

WU, JIANGUO, ROBBERTSE, BARBARA, YODER, OLENC. AND *TURGEON, GILLIAN.* 1Torrey Mesa Research Institute, 3115 Merryfield Row, San Diego, CA 92121 USA; 2Department of Plant Pathology, Cornell University, Ithaca, NY 14853 USA. Identifying the pathogenicity gene set in *Cochliobolus heterostrophus*.

We are taking a genome-wide approach to the identification of the pathogenicity gene set in *Cochliobolus heterostrophus*, a pathogen of maize. The project involves three elements: (1) Sequencing the fungal genome; (2) Directed mutagenesis aimed at
evaluating candidate genes whose products are suspected of being involved in fungal pathogenesis, and (3) Saturation mutagenesis of the genome by random deletion of 8-10 kb fragments. Availability of genome sequences grants access to the transcriptome, proteome, and metabolome, and the combined knowledge contributes to basic understanding of not only the mechanics of disease development but also the evolution of pathogenicity. Symposium Presentation

XUE, C.Y. AND XU, J.R. Dept. Botany & Plant Pathology, Purdue University, W Lafayette, IN 47907. Functional Analysis of Two Genes Regulated by the PMK1 MAP Kinase Pathway in Magnaporthe grisea.

In M. grisea, the PMK1 MAP kinase gene regulates appressorium formation and infectious hyphae growth. To further understand this important MAP kinase pathway, we have constructed a subtractive library enriched for genes regulated by PMK1. After sequencing over 300 clones from this library, we selected MBE5 and MBC4 for further analysis. Genomic and full-length cDNA clones of MBE5 and MBC4 were isolated and sequenced. Both genes are homologous only to an Erysiphe graminis gene feg16. MBE5 and MBC4 are 33% and 45% amino acid identical to feg16, respectively. Northern analyses indicated that none of them are expressed in the pmk1 mutant RNA. In the wild type, both MBE5 and MBC4 are specifically expressed at appressorium formation stage. These data confirmed that MBE5 and MBC4 are regulated by PMK1. Gene replacement mutants of both genes have been isolated. Preliminary analyses indicated that MBE5 and MBC4 are dispensable for appressorium formation and vegetative growth. However, MBE5 may be essential for appressorial penetration and infection. Further phenotypic characterization of these mutants are under way. Poster

*YAHRI, REBECCA AND DEPRIEST, PAULA T. 1 Duke University, Department of Biology, Durham NC 27708 USA; 2Smithsonian Institution, National Museum of Natural History, Washington DC 20560 USA. Contrasting phyleogeographic pattern in Florida endemic lichen fungus Cladonia perforata and its photobionts.

Species which share the same geographic distribution may share a similar distribution of genetic variation, given similar reproductive modes and dispersal. Furthermore, intimate symbionts such as lichen fungi and their photosynthetic partners are expected to share similar geographic structure. This study was undertaken to document phyleogeographic patterns of genetic variation in the lichen fungus Cladonia perforata and compare them with those of its photobionts (Trebouxia). ITS sequences were analyzed for multiple samples from each of 9 populations from both partners. No variation was detected within populations for the fungi, and all but the closest populations showed fixed differences among populations. Algal genotypes are likewise invariant within populations, but even some distant populations shared identical genotypes. Low diversity and strong geographic structure are consistent with clonal reproduction and short dispersal of bulky clonal propagules containing both partners and with severe population bottlenecks, probably resulting from disturbance due to fires and hurricanes. These results must be interpreted cautiously, however, since 1) ITS may not provide enough resolution to clearly describe genetic variation present in either partner; and 2) algae are shared across several to many species of Cladonia, offering an incomplete picture of geographic structure. Poster


About 700 soil samples were collected from 32 Arkansas counties in a survey from natural plants in 1999-2000. Nematodes were extracted from samples by combining the rolling sieving and sugar centrifugation methods. Longidorus was found in 196 samples and the most frequently encountered species was L. diadectus, and a few males were found for the first time. Longidorus elongatus, L. breviannullatus, L. fragilis, L. crassus also were identified. One hundred populations from 23 species obtained from all over the world were compared with the Arkansas specimens. Several new species also were found in these samples. Discriminating between Longidorus species is very difficult because their diagnostic morphometric characters often greatly overlap. A PCR assay with ribosomal DNA primers derived from the ITS region has been developed and intraspecific polymorphism was present and distinguishable by RFLP. Cloning and sequencing of amplified products in order to distinguish the species and examine their relationships is still in progress. Contributed Presentation

*ZHANG, NING AND BLACKWELL, MEREDITH Dept. of Biological Sciences, Louisiana State University, Baton Rouge, LA 70803, USA. Population Genetics of Dogwood Anthracnose Fungus (Discisa destructiva Redlin).

Dogwood anthracnose caused by Discisa destructiva affects several native dogwood species in North America, especially flowering dogwood (Cornus florida) in the east and Pacific dogwood (C. nuttallii) in the west. Since the first reports of the disease in the 1970s, infections have spread to British Columbia and over twenty states in the U.S. The fungus was believed clonal; however, our studies using DNA fingerprinting by amplified fragment length polymorphisms (AFLPs), sequences of the internal transcribed spacer of nuclear ribosomal DNA (ITS), and pathogenicity tests detected variation in the D. destructiva populations. Twenty genotypes were identified among 72 isolates from both western and eastern United States. Analysis using distance methods separated the western from the eastern isolates. Seventeen genotypes were detected among eastern isolates, but only three from the west, indicating that the eastern populations may be more diverse. Among 11 isolates collected in 1999 from an area
of approximately ten square kilometers in Catoctin Mountain Park, Maryland, we found eight different genotypes. Compared to collections made at the same locality in 1990, the diversity has not changed significantly. Therefore, although a few clones have spread widely and are dominant in certain populations, the fungus has retained its overall variability. Poster

*ZHONG, ZHIHONG AND PFISTER, DONALD H. Harvard University Herbaria, 22 Divinity Ave., Cambridge, MA 02138, USA.

A challenge to traditional classification of Leotia species - phylogenetic and biogeographic studies of Leotia species by ITS and RPB2 sequences.

Micro-morphological and anatomical characters have proven unhelpful in distinguishing species in the genus Leotia. 30 collections of Leotia representing various color forms were sampled from around the world. Phylogenetic relationships were inferred from ITS and partial RPB2 sequences. ITS and RPB2 trees generated with maximum parsimony were similar. None of the three species commonly recognized are monophyletic. Two collections recognized as L. atrovirens form the most basal group, which is characterized by lacking gel in the stipe. There are five well supported groups of L. lubrica; L. viscosea is nested within L. lubrica groups. Basal to these are two groups with some form of green pigmentation. One includes three light green-colored L. atrovirens from North America, and the other includes a group of Leotia with yellow apothecia which become dark green when dried. Some groups are geographically divergent and include collections from two or more continents; other groups are represented exclusively by collections from one geographical area. Apothecial color and stipe gel provide information in the classification of the basal groups, but are not as useful in others. Both genes provide useful information in phylogenetic and biogeographic studies of Leotia. Providing a formal classification for these taxa will require reconciliation of meager morphological data with sequence data. Contributed Presentation

*ZOLLER, S. AND LUTZONI, F. Dept. of Biology, Duke University, Durham, NC 27708 USA. Faster rates of nucleotide substitution observed in mutualistic fungi (Omphalina, lichenized Basidiomycetes) when compared to their symbiotic green algae (Coccomyxa).

To test the hypothesis of a low rate of genetic change in the inhabitant of mutualistic symbiotic systems, we investigated substitution rates in the nuclear ribosomal spacer region of the Omphalina/Coccomyxa lichens. Thallus fragments of six lichenized Omphalina species were collected in Greenland, Iceland, and in Eastern Canada. The average number of substitutions per 100 sites in the Omphalina ITS1 portion was 25.7, 2.8 in the 5.8S portion, and 25.5 in the ITS2 portion. The corresponding substitution rates for Coccomyxa were 1.6 (ITS1), 0.8 (5.8S) and 1.0 (ITS2). On average, rates in ITS1 were 23.4 times higher in Omphalina compared to Coccomyxa, 3.6 times higher for 5.8S, and 29.9 times higher in ITS2. This finding is in accordance with the hypothesis that the lichen inhabitants have lower rates of genetic change when compared to their exhabitants. A comparison of rates between lichenized and free living sister species revealed that the rate differences observed between the mycobiont and photobiont is explained in part by an accelerated rate in the lichenized fungi. No shifts in rates were detected between free living and lichenized algae. Based on the extremely low variation among Coccomyxa ITS sequences and on morphological evidence (Friedl, pers. comm.), we believe that the Coccomyxa isolates belong to a single species. Contributed Presentation

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Daniel Arthur Henk Receives NSF Graduate Fellowship Award

The list of National Science Foundation Graduate Fellowship Awards for Fiscal 2001, issued March 20, 2001, includes Daniel Arthur Henk with the institutional affiliations “Louisiana State U & A&M College and Duke U.”

Daniel has lots of LSU connections. His parents are Cindy and Bill Henk, and while he was an undergraduate at LSU, Daniel worked on obligate fungi associates of termites. Two publications from that work currently are in manuscript form and being readied for publication. His work was supported by the NSF REU program and the Howard Hughes Medical Institute grant. The study upon which his award was based will investigate the nutritional interactions and evolutionary relationships of species basidiomycete fungi in the genus Septobasidium, and the scale insects with which they are associated. The group has not been studied seriously since 1938, when John N. Couch, University of North Carolina, published a taxonomic monograph of the group. NSF Predoctoral Fellow Daniel will apply molecular methods in his study of the fungi and their hosts.

Daniel Henk at LSU in 1999

Mushroom Genome and Mycodiversity Preservation Project Award

The Mushroom Genome and Mycodiversity Preservation Project has awarded $2500 towards a study of Bridgeoporus nobilissimus. Meg Cowden, a Master’s degree student in the Department of Forest Resources, Oregon State University has been selected to receive the first award from this new private research fund. Meg’s research will focus on host and decay-class specificity of the “most noble polypore” (Bridgeoporus nobilissimus). This information is crucial to learning how to maintain populations of this rare fungus.

Paul Stamets, co-author of the classic text The Mushroom Cultivator and author of Growing Gourmet and Medicinal Mushrooms, has again demonstrated his leadership and pioneering approach to mycology by establish this fund to aid students in their mycological research. Paul is actively soliciting donations to the fund and aims to become a major sponsor of mycological research. Students interested in applying to this fund should visit http://www.mycodiversity.org. Mr Stamets is founder and CEO of FungiPerfecti (www.fungi.com), a leading supplier of mushroom cultivation supplies and sustaining member of the MSA, and has written four books on mycology.

Thom O’Dell, Ph.D.
MSA Biodiversity Committee

Mycological Progress: a New International Journal of Fungal Sciences

Mycological Progress, the international journal of fungal sciences, is now ready to start with Volume 1(1) which will be published in February 2002. Manuscripts for this issue should be submitted by the end of June 2001 at the latest. Further issues are scheduled for May, August and November of 2002.

The Editor-in-Chief and the German Mycological Society will be composing attractive issues with articles in all fields of mycological science. Mycological Progress generally accepts contributions to systematics, taxonomy, mycodiversity, evolution, ecology, symbiosis (lichens, mycorrhizae, animals), pathology (pathogens of plants, animals, humans), cell biology, function, physiology, biotechnology and applied mycology. All currently applied methods are accepted: e. g. morphology, anatomy, ultrastructure, (TEM, SEM), genetics, molecular biology. Review articles are also welcome, and contributions on novel methods and trends in mycology are always appreciated.

Whether Mycological Progress becomes a noteworthy and a generally accepted publication organ of mycology is dependent upon the contributing authors and whether they submit timely manuscripts of immediate mycological interest. We therefore encourage all mycologists throughout the world to use Mycological Progress as a discussion forum for mycological experts and to regard Mycological Progress as one of the most important mycological journals on their book-shelf.

The rather low price of Mycological Progress, the short publication time, and a strict review system will be contributing factors to worldwide distribution of this international journal of fungal sciences.

We respectfully invite you to submit manuscripts for Volume 1(1) and for further issues, scheduled for May, August, and November a year. Please ask also your young researchers, coworkers and colleagues whether they could contribute to Mycological Progress.

Instructions to Authors’ are published in the home page of Mycological Progress at http://www.botanik.biologie.uni-muenchen.de/botsvst/mypro.html and http://www.mycology.net/index.cfm.

Dr. Franz Oberwinkler
Editor-in-Chief
Dr. Reinhard Agerer
German Mycological Society, President

Meredith Blackwell, Ph.D.
Louisiana State University
Rob Samson in South Africa

Rob Samson (CBS) recently attended a meeting of the IUMS executive in Cape Town, South Africa. Following the meeting he had the opportunity to examine some fynbos in the Western Cape Province with Pedro Crous. Here he is in front of a *Protea* *niriifolia* bush in Kirstenbosch Botanical Garden, at the foot of Table Mountain.

Professor Pedro W. Crous
University of Stellenbosch

Participants of the Mid-Atlantic States Mycology Conference

Athens, Georgia

Change of Address

Priscila Chaverri has changed her address. Her new address is Systematic Botany and Mycology Lab, Room 304, B011A, BARC-West, 10300 Baltimore Avenue, Beltsville, MD 20705. Phone (301) 504-5280; Fax: (301) 504-5810; email: pxc215@psu.edu or priscila@nt.ars-grin.gov.

Katherine Glew is no longer at the Field Museum in Chicago. Her new address is Katherine A. Glew, Ph.D., Department of Biology, University of Puget Sound, 1500 North Warner, Tacoma, WA 98416. Voice: 253-879-3132; FAX: 253-879-3352.

Thomas O’Dell has moved from the Regional Mycologist position with the USDA Forest Service Forest Mycology team in Corvallis Oregon to take the position of Science Program Administrator at the Grand Staircase-Escalante National Monument in Kanab, Utah. His current address is GSENM, 1808 W 300N, Kanab, UT 84741. Phone 435-644-4316; Email Thomas_O’Dell@ut.blm.gov. Thom is a member of the MSA Biodiversity Committee.

Upcoming Mycological Events

Inaugural Fungimap Australia Conference

FUNGIMAP is an Australia-wide network of volunteer recorders who collect data on the distribution and ecology of target species of fungi (currently 100 species). See: http://calcite.apana.org.au/fungimap/

The Inaugural National Fungimap Conference will be held in Denmark, Western Australia from 22-26 June 2001. The Conference provides an opportunity to present and share information for those interested in fungi at all levels. The Conference will include a day of speakers, as well as workshops and excursions. Field trips are planned to surrounding areas, including ancient eucalypt forest and coastal woodland. Speakers and workshop leaders include Neale Boughey (CSIRO Perth), Teresa Lebel and Tom May (Royal Botanic Gardens Melbourne), Bettye Rees (University of New South Wales) and Katrina Syne (Fungimap Coordinator, WA).

The Conference is being organised by the Denmark Environment Centre. For further information and registration details please go to http://www.wt.com.au/~environ or contact: Fungimap Conference, Denmark Environment Centre, PO Box 142, Denmark, Western Australia 6333. Email: fungidenmarkwa@wn.com.au

Dr. Tom May
Senior Mycologist
Royal Botanic Gardens Melbourne

Third Brazilian Mycological Congress

The Sociedade Brasileira de Micologia (SBM) will sponsor its Third Brazilian Mycological Congress next August 19-23, 2001. It will be held in the Monte Real Hotel, Águas de Lindoia, SP, located 100 miles north of São Paulo City. For additional information, see our site at www.eventus.com.br/micologia.

Adauro I. Milanez
Member of the Organizing Committee

Minnesota Mycological Society is Hosting NAMA

The Minnesota Mycological Society will be hosting the 2001 North American Mycological Association (NAMA) foray, July 5-8, 2001 at St. John’s University in Collegeville, MN, about 70 miles northwest of the Twin Cities. Tom Volk will be the chief Mycologist, and will also present a 2-day workshop on polypore identification after the foray. The NAMA foray is a great place to learn many species of fungi in a short amount of time. Many guest mycologists will be there to lend their expertise. See tomvolkfungi.net for more information or email volk.thom@awlax.edu.

Tom Volk
University of Wisconsin-La Crosse

Summer Workshops -- Mushrooms

Fungi of the Adirondacks

July 14-27, 2001 Fungi of the Adirondacks is a credit bearing course in field mycology at the State University of New York – College at Cortland’s Outdoor Education Center at Raquette Lake. Emphasis on field and laboratory techniques used in identifying macrofungi. For more information please contact Dr. Timothy J. Baroni (BaroniTI@Cortland.edu), Department of Biological Sciences, SUNY – College at Cortland, PO Box 2000, Cortland, NY 13045.

- Timothy J. Baroni

Mushrooms of Sleeping Bear Dunes

August 5-10, 2001. Mushrooms of the Sleeping Bear Dunes, Leelanau Center for Education, Glen Arbor, Michigan. This week-long workshop will emphasize identification of edible and poisonous mushrooms in the forests surrounding the Sleeping Bear Dunes National Lakeshore using keys written for the mushrooms which occur in these woods in early August. Equal time will be spent in the field and the classroom where microscopes will be available for use in identification. Tuition with meals and lodging in dormitories is $480 (double) or $530 (Single). Tuition only (program and
THE MYCOLOGIST’S BOOKSHELF

In this issue we review “Lichens” by W Purvis, “Mushroom Science XV, Science and Cultivation of Edible Fungi” by LJLD. Van Griensven (ed); “North American Boletes. A Color Guide to the Fleshy Pored Mushrooms” by AE Bessette, WC Roody, AR Bessette, “Synopsis Of Fossil Fungal Spores, Mycelia And Fructifications” by RM Kalugutkar and J Jansonius, feature books received from February through April 2001, and list previously featured books received since October 2000. Reviews are needed for several new books. If you have the time over the next month, check the list, send me an Email at YZJOZ@TTACS.TTU.EDU and I will try to accommodate your request.

Please address ALL book review requests and comments to the Book Review Editor. John Zak, BOOK REVIEW EDITOR

REVIEW


This beautiful book on lichens is dynamite! Filled with gorgeous colored photographs, this book should increase the visibility of lichens if only for their aesthetics. I found the prose to be interesting and informative even to a mycologist somewhat knowledgeable about lichens. The basic information about lichens, i.e. a symbiosis that allows growth in harsh environments, the variability about their morphology, mainly ascomycetes plus a few basidiomycetes, is presented in an easily understood manner. With rarely a full page of text to read, many points are illustrated with colorful diagrams and graphs such as “how water and nutrients are absorbed by lichens.” Newer ideas are presented such as the ability to form mechanical hybrids in which lichen thalli of different species may grow together and fuse. The book moves on to the importance of lichens, for example, that “vegetation dominated by lichens covers about 8% of the Earth’s land surface...especially throughout the arctic tundra” p. 49. Other topics include the role of lichens in rock weathering and their use in biomonitoring, e.g., in detection of metals in rocks, for measuring the increase/decrease in air pollutants, and for monitoring contamination by radioactive elements derived from nuclear bomb testing. The historical idea that the biblical manna—desert bread of life—was a lichen is given credence by an amazing photograph of a field of the orange, shrubby lichen Teloschistes covering the desert floor in Namibia. The book concludes with a chapter on practical projects with lichens that students could undertake. These include collecting lichens, assessing the impact of air pollution through lichen biodiversity, and measuring lichen growth on trees or gravestones using photography. My recommendation is that every mycologist purchase this book, read it, and require that your mycology students do the same.

—Amy Y. Rossman
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While I would like to say these two books are useful to everyone interested in all phases of mushroom cultivation, the fact is that they are useful only to those who read them with caution. These books are proceedings, of primarily contributed papers, of the 15th International Congress of Science and Cultivation of Edible Fungi, held in Maastricht, the Netherlands in May 2000. To the uninitiated, the title would seem to be Science and Cultivation of Edible Fungi, Volume 1 and 2. Unfortunately, although that is in big print on the cover, the correct title is in small print, Mushroom Science XV, on the cover and is not repeated until Volume 1, page xv where we learn that rather than Volume 1 and 2, they are Part 1 and 2 of Volume XV. On the cover it says that Van Griensven is the editor, but on page xviii we learn that it was edited by Marie-Louise van den Munckhof, Marion Festen and Monique Kersten; apparently three very competent office secretaries. Proceedings are often published with
THE MYCOLOGIST’S BOOKSHELF  

vanity-editors and no referee examination or the like. It is only important that the reader understand that these books are of that sort.

The real Volume 1 was 111 pages, published in England in 1950. Twenty-three people from the U.S., England, France, Denmark, Switzerland and the Netherlands got together and talked about how they grew _Agaricus_. In 1953 it grew to 36 people and Volume 2 was 183 pages. In 1974 the 9th Congress was held primarily in Japan, with additional sessions in Taiwan; it was the first to issue two-part proceedings. The proceedings from Japan (Part 1) totaled 883 pages and from Taiwan (Part 2), 271 pages. The 2nd Congress included a report of other genera, but at the 9th Congress they became common and scientific content had increased. The 10th Congress, held in France in 1978 was the largest. That meeting published Part I - Symposium (science)(1065 pages) and Part 2 - Congress (cultivation technology)(902 pages). Until the 13th Congress the proceedings titles were only _Mushroom Science_, the volume and part numbers as their title. Since then, all have had identical cover-format with Volume 1 and 2 in large letters. Each real volume has had a different color with the _Volumes_ matching each other. Confused? Someone must have thought the object was to confuse. If you should wish to contact an author for clarification, you will find that the included addresses are also generally inadequate.

The first papers in these books is a keynote by Prof. J. Poppe. At the 13th Congress in 1991, one night after dinner, Prof. Poppe, gave my wife and I a marvelous and humorous talk. All three of us had a wonderful laugh. In a regular session, Prof. Poppe presented, _First commercial growing of ornamental mushrooms and its use in floristry [sic]_. His audience laughed the entire time. He told us how, for the previous eight years, he was the first to develop the art of displaying mushrooms in the way we had seen in Taiwan 17 years earlier, in 1974. How he must have surprised colleagues from Asia and central America who have ancient art with mushrooms used as decoration. Again in 1995 at the 14th Congress, Prof. Poppe kept us laughing with his presentation. I enjoy Prof. Poppe, he is a great entertainer, but no researcher, not even in a library. So why was he the keynote speaker for the Maastricht Congress? Unfortunately, many apparently thought the whole thing was a big joke. Prof. Poppe is not the only one who did not read the literature. Worse, many use the proceedings as a method to publish sloppy work that would never be accepted by any responsible scientific journal. There is also a large amount of work that has previously been published other places, often several times. Finally, there is the kind of work, found in many scientific journals, that is nothing more than a progress report of the activities of unnamed technicians and computers.

Some of the work reported is of high quality, so a cautious reader can find real value in these volumes. An additional value is that it includes a greater amount of recent research on cultivated macromycetes than any other single source.

— Ralph Kurtzman, Jr.
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Macroscopic and short microscopic descriptions of around 300 species of Boletes, occurring in North America north of Mexico, are provided in the text. Almost all taxa are illustrated with color pictures, some variable taxa with several. Dichotomous keys, divided into two main parts (for the western and the eastern part of the continent), lead to each species, or to a group of several species. The taxa are alphabetically ordered, by genus and by species. The following genera are treated: _Austroboletus, Boleteus, Boletus, Chalciporus, Fuscoboletinus, Gastroboletus, Gastroleccinum, Gastrosuillus, Gyrodon, Gyroporus, Leccinum, Meiorganum, Paragyrodon, Phylloporus, Pulveroboletus, Sirohilomyces, Suillus, Tylopilus_, and _Xanthoconium_; several related or those with similar macroscopic characters are briefly mentioned, and illustrated. Literature references in the descriptions are limited to the original description, the paper in which the particular combination was made, or the sanctioning publication (without mentioning the author). Seven new species are described in the book, and pictures of a further 27 newly discovered, but yet unnamed species conclude the body of the book. Short introductions to American boletology and the boletes in general are given; appendices treat chemicals, microscopic characters, cooking and preserving; a list of references, a
glossary and indices complete the book.

This book is - as stated clearly in the chapter “How to use this book” - intended to serve as a guide to the field identification of boletes; hence the emphasis on macroscopic characters, pictures, and ecological notes. That is the strength of the book - especially the presence of the high quality photographs. For those who want to know more, detailed references and where to find more information on a particular species is absent in most cases. Fortunately, Both’s overview of all the American bolete literature is available and that work forms a very valuable companion (Both, E. 1993. The Boletes of North America - A compendium. Buffalo Museum of Science, Buffalo, New York. 436 pp.). Indeed, the present work is warmly dedicated to Ernst Both. The user of the book should also be aware that not all species described or reported from North America are treated in the present text and that at 1,653 grams, the books size might not be appropriate for actual field use.

The genus Boletus is represented with more than 120 species. Unfortunately, the alphabetical arrangement of both the descriptions and the pictures is not helpful, as closely related species may not be listed together. The Boletus novice will find it hard to get a grip on this group based on the arrangement in the text, especially as genus concepts keep shifting. The more initiated reader will get a sense of the ongoing development of our knowledge of the group, while the numbers of newly described and the yet to be described species, invite the reader to become involved in bolete research.

The pictures are of good quality, and the fact that variable species are accorded several photos is very helpful indeed. Of course it would have been nice to have larger pictures, as many species have fruitbodies, which are many times bigger than the 5.4 x 8.3 cm format.

Despite the shortcomings in references and author citations, this book is an excellent example of a much needed effort to provide nation-wide mycological information. I do hope that the North American Boletes will be the beginning of a series, comparable to Fungi Europaei.

— Else C. Vellinga
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Editors Note: The previously published review of this book (Inoculum 52:18-19) was a commentary on the book written by the co-author J Jansonius. The following review appeared with minor variations in the last issue of the AASP Newsletter and is presented here as a review of the book.

At last there is a modern compilation of fossil fungal palynomorph names. The authors present a compendium of most of the microscopic fungal parts described in the literature. The authors bring together some 950 validly published names and there are 1008 specific epithets in Appendix II. They have validated the nomenclature where necessary and included at least one new genus and many new species. Their effort is commendable. Kalgutkar and Jansonius have definite impressions of where the taxa should be classified “OUR CLASSIFICATION:”, but the systematics section does not reflect any classification scheme Rather, the genera and species under each genus are presented in alphabetic order which allows much greater ease in looking them up.

Kalgutkar was responsible for the conception and original scope of the effort. He intended a simple catalog, simple but enormous in scope in terms of the amount of published literature available on the subject of fossil fungal palynomorphs. Jansonius has imparted his particular preciseness in putting everything in its place in terms of nomenclature. Both authors deserve our thanks for the years of effort that went into this project.

Everyone interested in fossil fungi or fossilizable modern fungi will want this compilation on their desk or at hand in their reference/academic library. At $33.00 this synopsis is a bargain, but somewhat bulky in its format - the 3-ring binder does allow easy layout and reading of the sheets, but be warned: the 3-ring binder doesn’t balance well in one hand at the microscope or computer.

There is an alphabetical list of species, but no list of genera. There should be a separate list of genera, or at least a comprehensive index. There are 423 pages of mostly double-column text and no index! The combination of lack of an index or page headings, and using initials instead of generic names in the specific epithets leads to a plethora of confusion throughout the text for this reader, especially in those portions of the text treating the larger genera.

At least one of their gen. nov. is not NEW. In the case of Multicellites, the authors chose to use the name from shortcourse manuals (Elsik, 1992, 1993a-b) and validate sans 'ex' Kalgutkar & Jansonius in spite of my disclaimer (1993a). Elsik, W. C. 1992, The morphology, taxonomy, classification and geologic occurrence of fungal palynomorphs with References to fossil and selected extant fungi; including keywords and a few annotations. The American Association of Stratigraphic Palynologists, Inc., Shortcourse, February 26-28,

SYNOPSIS OF FOSSIL FUNGAL SPORES, MYCELIAS AND FRUCTIFICATIONS. 2000. RM Kalgutkar and J Jansonius, Copies can be ordered from: Vaughn M. Bryant, Jr., Secretary AASP Foundation, c/o Palynology Laboratory, Texas A & M University, College Station, Texas 77843-4352, U.S.A. (fax: 979-845-4070; e-mail: vbryant@neo.tamu.edu), 423 pp. Price: $33.00 US.
THE MYCOLOGIST'S BOOKSHELF con’t

Houston, unpublished manual, 190 + 97 p., 88 text-fig., 1 pl., 100 35mm color transparencies.


Unfortunately the authors' have chosen to use only an initial for the genus in specific epithets throughout the systematic portion (p. 19-311). Perhaps this was done during initial ‘input’ to save time. Perhaps it was done during editing to conserve space. The result is a publication now replete with unacceptable species epithets, e.g.: H. africanus Salard-Cheboldaeff, hoc loco, H. ater (Kumar) comb. nov., H. ellipsoideus Salard-Cheboldaeff, in hoc loco. H. kumarii nom. nov., H. xyliaroides Salard-Cheboldaeff, in hoc loco.

This is going to be a nightmare for future workers when genera/species are reshuffled and lists of synonymy are created.

There is no mention of Locquin’s (e.g. 1983) numerous proposed form genera, nor is the paper listed in the bibliography (Locquin, M. V. 1983, Classification phonemique, calculable et descriptive des Mycota, spores dispersae. 105 Congr. nat. Soc. sav., Caen, 1980, fasc. 1, p. 255-269, 7 pl.)

There are undoubtedly other minor irritations than the few I noticed. There is a problem with the consistent spacing of species headings, e.g. page 292 there is no space between lines 19 and 20 from the bottom of column 1. Elsik et al. (1983) on p. 338 was NOT “a short course presented under the auspices of The American Association of Stratigraphic Palynologists.” It WAS the work of an official AASP Workgroup.

My recommendation is “Buy the synopsis, and have a go at it.” Like me, you will be impressed with the content.

— William C. Elsik
The MycoStrat Connection
PO Box 549
Snook, TX 77878
wmceelsik@txcyber.com

BOOKS AND PUBLICATIONS RECEIVED FEBRUARY THROUGH APRIL 2001

• A Laboratory Guide To Common Penicillium Species, 3rd ed. 2000. JI Pitt, Copies available from Dr. JI Pitt, Food Science Australia, 16 Julius Avenue, Riverside Corporate Park, Delhi Road, PO Box 52, North Ryde NSW, 1670 Australia, john.pitt@foodscience.afisc.csiro.au, 197 pp. Price: $65 US including shipping. Review needed.


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PREVIOUSLY LISTED BOOKS FROM OCTOBER 2000


• Armillaria Root Rot: Biology and Control of Honey Fungus. 2000. RT Fox (ed.). Intercept Limited, PO Box 716, Andover Hants, SP10 1YG, UK, intercept@andover.co.uk, or Lavoisier Publishing Inc., c/o Springer Verlag Customer Service, PO Box 2485, Secaucus, NJ 07096, orders@springer-ny.com, 240 pp. Price: 47.50GBP and $88 US. Book in review.


• Bio-Exploitation of Filamentous Fungi. 2000. SB Pointing and KD Hyde (eds.), Fungal Diversity Press, The center for Research in Fungal Diversity, Department of Ecology & Biodiversity, Kadoorie Biological Sciences Building, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China, kdh@hkucp.hku.hk, Price: $100 US. + $16 for air mail. Requested from publisher.

• Check List of Hong Kong Fungi. 2000. BS Lu, KD Hyde, WH Ho, JE
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Taylor, KM Tsui, MKM Wong, Y Zhou and DQ Zhou (eds.), Fungal Diversity Press, The center for Research in Fungal Diversity, Department of Ecology & Biodiversity, Kadoorie Biological Sciences Building, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China, kdyde@hkuc.hku.hk. 376 pp. Price: $20 US. + $8 for air mail. Requested from publisher.


- Genera of Ascomycetes from Palms. 2000. KD Hyde, JE Taylor, J Frolich (eds.). Fungal Diversity Press, The center for Research in Fungal Diversity, Department of Ecology & Biodiversity, Kadoorie Biological Sciences Building, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China, kdyde@hkuc.hku.hk. Price: $100 US. + $16 for air mail. Requested from publisher.


Marine Mycology – A Practical Approach. 2000. KD Hyde and SP Pointing (eds.). Fungal Diversity Press, The center for Research in Fungal Diversity, Department of Ecology & Biodiversity, Kadoorie Biological Sciences Building, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China, kdyhyde@hkuec.hku.hk. 376 pp. Price: $100 US. + $16 for air mail. Requested from publisher.


Palm Microfungi. 2000. J Frolich and KD Hyde (eds.). Fungal Diversity Press, The center for Research in Fungal Diversity, Department of Ecology & Biodiversity, Kadoorie Biological Sciences Building, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China, kdhyde@hkuec.hku.hk. Price: $100 US. + $16 for air mail. Requested from publisher.


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MYCOLOGY ON-LINE

Mycological Progress: A New Mycological Journal

http://www.botanik.biologie.uni-muenchen.de/botsyst/mycpro.html

The German Mycological Society has established a new international journal of fungal sciences in the English language for contributions from all fields of mycology. Mycological Progress publishes papers on all aspects of fungi, including lichens. It is primarily a research journal that publishes articles of taxonomic, systematic, evolutionary, cell biological, ecological, pathological (plants, animals, humans), and biotechnological relevance. Results of all current methods are accepted, e.g., morphology, anatomy, ultrastructure (TEM, SEM), genetics, molecular biology, chemistry, and physiology. Review articles are also accepted but authors should consult the editor-in-chief before preparation (submission) of a manuscript. Contributions about novel methods and trends in mycology are always appreciated. Only papers written in English are considered. For additional information, see page 69 of this issue. [Scott A. Redhead]
MYCOLOGY ON-LINE DIRECTORY

Below is an alphabetical list of websites featured in Inoculum during the past twelve months. Those wishing to add sites to this directory or to edit addresses should Email <druch@dlsu.edu>. Unless otherwise notified, listings will be automatically deleted after one year (at the editors discretion). * = New or Updated info (most recent Inoculum Volume-Number citation)

**ASCOMYCOTA—NEW CLASSIFICATION (51-5)**
http://194.131.255.3/cabipages/Names/
FundicNew.asp

**ASOCIACION LATINOAMERICANA DE MYCOLOGIA (51-5)**
http://www.ecologia.edu.mx/alm/

**BIBLIOGRAPHY OF SYSTEMATIC MYCOLOGY (51-6)**
http://194.131.255.3/cabipages/BSM/bsm.htm

**CORTBASSE (51-3)**
http://www.systbot.gu.se/database/cortbase/
cortbase.html

**EUROPEAN POWDERY MILDWEWS (52-2)**
http://nt.ars-grin.gov

**FRIENDS OF THE FARLOW (51-4)**
http://www.herbaria.harvard.edu/fot/
friends.html

**GENEALOGY OF NORTH AMERICAN MYCOLOGISTS (51-1)**
http://lsb380.plbio.lsu.edu/Genealogy/

**GOOGLE: NIFTIEST GENERAL SEARCH ENGINE (51-6)**
http://www.google.com

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**MYCOLOGY ON-LINE DIRECTORY concluded**

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**CALENDAR OF EVENTS**

Event dates and descriptions precede event locations (italic boldface), contacts (plain font), and Email/Websites (bold face, no brackets). Those wishing to list upcoming mycological courses, workshops, conventions, symposia, and forays in the Calendar should submit material formatted as shown below and include complete postal/electronic addresses.

2001 (May 15-June 30), Online Symposium on Instructional Technology.
DETAILS: Inoculum 51(4)
Dr Terry Stewart (Massey University), Webmaster
http://www.ispp-itsymposium.org.nz/

Christchurch, NEW ZEALAND
www.cropr.cri.nz/whats_on/mushroom/conf

2001 (July 7-12), 8th International Marine & Freshwater Mycology Symposium.
Hurghada, EGYPT
Youssuf Gherawwy, University of Agricultural Sciences
Institute of Applied Microbiology
Muthgasse 18/haue B
A-1190 Vienna, Austria
yhassan@mailcity.com

2001 (July 8-13), 3rd International Congress on Mycorrhizae (ICOM 3).
Adelaide, AUSTRALIA
Prof. Sally Smith, Dept. Soil & Water
Waite Campus, University of Adelaide
PMB 1, Glen Osmond, South Australia 5064
sally.smith@adelaide.edu.au
http://www.waite.adelaide.edu.au/
Soil_Science/3icom.html

2001 (August 19-23). Third Brazilian Mycological Congress.
Agus de Linoia, MEXICO
Adauto I. Milanez
Member of the Organizing Committee
www.eventus.com.br/micologia

2001 (September 2-8), Fungi on Lichens Workshop.
DETAILS: Inoculum 52(2): 17.
Steuben, Maine
Humboldt Field Research Institute
Northeastern Naturalist

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Inoculum
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Mycological Society of America

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