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The Society is extremely grateful for the support of its Sustaining Members. These organizations are listed above in alphabetical order. Patronize them and let their representatives know of our appreciation whenever possible.

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Richard T. Hanlin, President
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Richard E. Koske, Councilor (1983-86)
Gareth Morgan-Jones, Councilor (1983-86)
Francis A. Uecker, Councilor (1982-85)
If this issue of the MSA Newsletter seems larger--with more pages--to you, your recollection of past issues is good. Several reasons account for this increase. First, it contains the abstracts from the annual meeting (see pages 16-48), and there are twenty more than last year! Second, the participation of foreign members and the number of items included from them has substantially increased. I presume this results from a change made in the timing of questionnaire distribution to foreign members and the longer response time now available to them. Third, this issue contains more advertising (see pages 13, 55, and 64) than previous editions.

Unless otherwise noted, all the creative fillers (art, poetry, jokes, etc.) included are heretofore unpublished. Michael G. Rinaldi prepared the cover figure of Microsporum canis Bodin. The cartoons were done by Ann Bell (page 9) and Rod Tulloss (page 49). Other illustrations (see pages 6 and 49) and some one-liners (pgs. 12 and 60) are reprinted with permission (via Dave Minter) from the April issue of the British Mycological Society Foray Programme. Jennifer Mueller Wettlaufer and Randy Currah authored the poetry on pages 7 and 47 respectively. For their filler contributions, I also wish to thank Susan Du Bois (pg. 15), Roland Seymour (pg. 50), and Dick Korf (pg. 59).

The Southern Illinois University-Carbondale Office of Research and Development Administration should be recognized for their indirect assistance in the form of student work (secretarial) support. Likewise, I wish to acknowledge the able assistance of Linda Newman--who has the uncanny ability to correctly decipher my scribbled writing and who typed most of this issue--and the "volunteer" labor provided at mailing time by the SIU-C Mycology students.
GENERAL ANNOUNCEMENTS

YOU ALL COME!

Brent Reeves wishes all who will attend this year's MSA Annual Meeting to know that the MSA Awards and Social (Tues. evening, August 7, 1984) is also a "supper." The Brauts and German Potato Salad will be supplemented with soft drinks and Coors beer. Coors' Brewery will furnish Herman Joseph, Killian's Red, and Coors' Light ("...for those of us that must watch our calories or want to remain trim, youthful, and appealing!"--B.R.). The Society applauds all the help offered by Coors Brewery!

ATTENTION BRITISH COLLEAGUES

British members of the MSA can now pay their dues (subscriptions) in sterling. Send the equivalent sterling amount to Dave Minter at C.M.I., Kew, Surrey, England, to arrive before January 20th each year. After that, Dave notes, "You will be too late." (Dave's effort on behalf of the Society and its British members is most appreciated.--ed.).

MSA MAIL MATTERS

Moving? Want your Mycologia, MSA Newsletter, and other MSA-related mail to arrive at your new address uninterrupted and on schedule? Want to help keep MSA operating costs--and thus your dues--down? Help achieve these goals by notifying the Secretary of your move (if possible) six to eight weeks in advance of your moving date. If you plan to be on a sabbatical or other temporary leave from your regular position, DO NOT report a change of address to the Society. Please attempt to make arrangements to have your MSA mail sent to you by someone at your permanent address.

FORAY REPORTS WANTED

Lists of fungi collected on MSA Forays in Indiana (1981), Pennsylvania (1982), and Iowa (1983) would be appreciated by Wm. Bridge Cooke. Some people in the Indiana and Pennsylvania Foray Portraits are presently unidentified. Bridge would like to hear from any brave soul who thinks he or she may be able to identify some or all of the presently nameless faces.

NEW FACILITIES

The Cryptogamic Herbarium, University of Toronto has moved from the Botany Department into expanded facilities in a separate building. Space is now available for visitors and the examination of collections. Monographers are especially encouraged to request the loan of material. Reprints in all areas of morphology, taxonomy, and phytogeography for both fungi and lichens would be appreciated for the Herbarium's reprint collection. For further information and specific arrangements contact the curator, John C. Krug.

TRAVELLING TO BRITAIN?

Dave Minter has assumed the position of Foray and Systematics Committee Secretary in the British Mycological Society. Please write to him if you're interested in attending any BMS forays. (see Calendar of Meetings, Forays, and Workshops for more)

SUGGEST MSA MEMBERSHIP TO A FRIEND OR STUDENT.
TROPICAL FIELD STUDIES

Mycologists interested in tropical field work should contact Amy Y. Rossman. Include a brief curriculum vitae and statement of research interests.

INDIVIDUALS INVITED TO JOIN NOMENCLATURE SUBCOMMITTEES

The Special Committee for Fungi & Lichens (R. P. Korf, Secretary) of the International Association for Plant Taxonomy invites all interested botanists to join one or more of their new working subcommittees on proposals for changes in the International Code of Botanical Nomenclature. Four subcommittees will begin work immediately, and exchange comments by mail. The work of the subcommittees will need to be completed by January 1986 if changes are to be enacted at the 1987 International Botanical Congress. Readers interested in serving on sub-committees should so advise the convener of the subcommittee(s):

SUBCOMMITTEE A: (Taxa that may be treated in different taxonomic groups now specified under Art. 13.1(d) when such groups have different sanctioning authors) Convener: Dr. Vincent Demoulin, Department de Botanique, Universite de Liege, Sart Tilman, B-4000 Liege, BELGIUM.

SUBCOMMITTEE B: (Citation and transfer of sanctioned names under Art. 13.1(d) and Rec. 50E.2) Convener: Dr. David L. Hawksworth, Commonwealth Mycological Institute, Ferry Lane, Kew, Richmond, Surrey TW9 3AF, ENGLAND.

SUBCOMMITTEE C: (Other problems with Art. 13 and the starting-point for nomenclature of fungi and lichens, and with Art. 59 on pleomorphic fungi) Convener: Dr. Walter Gams, Centraalbureau voor Schimmelcultures, P.O. Box 273, 3740 AG Baarn, THE NETHERLANDS.

SUBCOMMITTEE D: (Fossil Fungi) Convener: Dr. Don R. Reynolds, Natural History Museum, 900 Exposition Boulevard, Los Angeles, CA 90007, U.S.A.

REDUCED RATES FOR EXPERIMENTAL MYCOLOGY

Although the price advertised by Academic Press is $60.00 per year, MSA members and others can obtain EXPERIMENTAL MYCOLOGY at the personal subscription rate of $32.50 (confirmed May 1984--ed.). Orders must request personal subscription and must pay by personal check or money order. Write Academic Press, 111 Fifth Avenue, New York, NY 10003. Thanks to Henry Aldrich for providing these details.

DANIEL E. STUNTZ MEMORIAL FOUNDATION

A memorial foundation honoring the late Professor Daniel E. Stuntz has been established by members of the Puget Sound Mycological Society in cooperation with J. Ammirati and the Department of Botany, University of Washington. The foundation was formed mainly to aid and assist the systematic mycology students in the Pacific Northwest, particularly those at the University of Washington. The foundation also will help to maintain the D. E. Stuntz Mycology Library, publish and disperse mycological information, provide supplies and equipment for mycology research, grant monies for travel to meetings and forays, and support amateur and professional mycology programs in the Pacific Northwest.

Established under the Washington Nonprofit Corporation Act, the foundation is exclusively for educational, charitable, and scientific purposes. Contributions should be sent to J. Ammirati, Department of Botany, KB-15, University of Washington, Seattle, WA 98195. Make checks payable to the D. E. Stuntz Memorial Foundation.

CREATIVITY REQUIRED

W. J. Sundberg hereby requests submission of your unpublished mycological creations--be they art, cartoons or jokes, limericks, and poetry--for consideration for publication in the MSA Newsletter. All original materials can be returned to the artist or author. Help us.
CALENDAR OF MEETINGS, FORAYS, AND WORKSHOPS

For those traveling abroad, the calendar includes in brief form some miscellaneous European activities as well as a listing of the main British Mycological Society (BMS) forays, etc. For the BMS activities contact the local organizer (listed with each) or Dave Minter, C.M.I., Ferry Lane, Kew, Surrey TW9 3AF England.

August 1984

4-9 MSA Annual Foray and Meeting will be held in conjunction with the AIBS. (See Annual Meeting Program elsewhere in this issue for details.)

10-12 The FOURTH WILD MUSHROOM FAIR and foray to Tequila's Hill. For more details, contact Fco. Trujillo Flores, Facultad de Ciencias, Universidad de Guadalajara, Ap. postal 5-885 Guadalajara Jalisco 45000 Mexico.

11-12 The Society for Industrial Microbiology will offer a WORKSHOP on PLASMIDS IN BIOTECHNOLOGY; ISOLATION AND APPLICATIONS at Colorado State University in Fort Collins. Plasmid isolation, electrophoretic analysis, cloning with plasmid vectors, and nick translation and hybridization procedures will be covered. Organized by George A. Somkuti (Eastern Regional Research Center-USDA, Philadelphia, PA; telephone: 215/233-6474. Registration is limited to 80 participants. For additional information and registration forms, contact: Ann Kulback, SIM, c/o AIBS, 1401 Wilson Blvd., Arlington, VA 22209. Telephone: 703/256-0337.

11-12 The OHIO MUSHROOM SOCIETY SUMMER FORAY will be held at Mill Creek Park, Youngstown, OH. Get more data from Walt Sturgeon, 288 E. North Avenue, East Palestine, OH 44413.

12-17 SOCIETY FOR INDUSTRIAL MICROBIOLOGY annual meeting will be held at Colorado State University, Fort Collins. For more information contact Ann Kulback, SIM, c/o AIBS, 1401 Wilson Blvd., Arlington, VA 22209. Telephone: 703/256-0337.

13-18 The ARCTIC MYCOLOGICAL SYMPOSIUM 2, will be held in Engadin, East Switzerland. For more information contact Dr. Yosio Kobayasi, 5-33-1, Maruyama-cho, Funabashi City, Japan.

17-19 BMS TRUFFLE HUNT at Cotswolds. Jane Ingham, 21 Loughmill Road, Pershore, Worcestershire.

19 The Colorado Mycological Society's ANNUAL MUSHROOM FAIR will be held at the Denver Botanic Gardens and the chief identifier will be Harry D. Thiers.

23-26 The FOURTH ANNUAL TELLURIDE MUSHROOM CONFERENCE, designed for persons interested in the study and cultivation of wild mushrooms, will be held in Telluride, CO. Inquiries and reservations should be directed to Emanuel Salzman, Box 5503, Denver, CO 80217-5503.

16-19 The Glassboro State College, Glassboro, NJ (Elizabeth Moore, resident mycologist), will be the site of the 1984 NORTHEASTERN MYCOLOGICAL FORAY. Rolf Singer will be the Senior Mycologist. Cas Bas (Netherlands) and several other Mycologists will also be there. Glassboro is located only 10 miles from Newfield, NJ, the home for many years of Job Bicknell Ellis (1329-1905). Forays will probe as many local habitats as possible in an attempt to rediscover Ellis' species. For further information, contact Robert Peabody, R.D. #1, Box 250, Milford, NJ 08848. Phone: 201/995-9110 (after 5 p.m.)

PATRONIZE THE MSA SUSTAINING MEMBERS
### September 1984

**5-12** BMS AUTUMN FORAY at University of Essex, Colchester. T. R. G. Gray, Department of Biology, University of Essex, Colchester, Essex, CO4 3SQ.

**14-16** The 31st CHARLES HORTON PECK ANNUAL FORAY will be held at Alleghany State Park, Salamanca, NY, at the former Youth Conservation Camp in the Red House Area. Inquiries and reservations should be addressed to Douglas A. Wright, 94 Remington Place, Buffalo, NY 14210.

**15-16** A FLESHy FUNGI WORKSHOP will occur in Terra Alta, WV. Walt Sturgeon will be the instructor. For more information write Bill Beatty, Brooks Nature Center, Oglebay Park, Wheeling, WV 26003.

**20-23** The NORTH AMERICAN MYCOLOGICAL ASSOCIATION (NAMA) FORAY will be held near Dorset, Ontario. The general theme will be Forestry and Ecology in relation to Mycology. For further information contact Frans vanGerwen, 5 Cameron Street, Toronto M5T 2H1, Ontario, Canada.

**27-30** The ALEXANDER H. SMITH LAKE STATES FORAY for 1984 will be held at the Larado Taft Field Campus of Northern Illinois University in Oregon, IL. Attendance is limited and the cost is approximately $75.00. Contact Liz Farwell (co-ordinator) for more information.

**30-Oct. 19** The JAPAN MUSHROOM STUDY TOUR is a 20-day package for amateurs and professionals. Includes exchange seminars with Japanese mycologists and collecting on Hokkaido, on Mt. Fuji, and in the Kyoto area. Leaders will be Gary Lincoff, Emanuel Salzman, and Andrew Neil. Cost will be approximately $3,000.00. Contact Emanuel Salzman, c/o Fungophile, Box 5503, Denver, CO 80217-5503 for more information.

### October 1984

**6-7** The OHIO MUSHROOM SOCIETY FALL FORAY will be held at Lake Hope State Park in southeast Ohio. Contact Walt Sturgeon, 288 E. North Avenue, East Palestine, OH 44413.

**6-13** BMS UPLAND FORAY at Acharacle Argyll. Dave Minter (see address above).

**8-12** JOURNEES EUROPEENES DU CORTINAIRE will be held at Thonon-Les-Bains, France. Madame Jocelyne Frossard, Crytre, Margencel, 74200 Thonon-Les-Bains, France.

### November 1984

**17** BMS AUTUMN TAXONOMY MEETING: ASCOMYCETES IN DISARRAY at Jodrell Laboratories, Kew, Surrey. Dave Minter (see address above).

**29-Dec. 13** TRUFFLING THROUGH EUROPE. A 2-week tour of the truffle centers of Europe. Visits to truffle farms, processing plants, and markets in Italy and France with ample opportunities to sample both white and black truffles. Rome, Paris, Monte Carlo, and Copenhagen are also on the itinerary. Leaders will be Gary Lincoff, Gary Menser, and Andrew Neil. The cost is approximately $2,098.00. For more information contact Frank Pipal, Educational Tours, 5935 S. Pulaski, Chicago, IL 60629.

### January 1985

February 1985

?-? AMAZON-ANDES MUSHROOM FORAY. A 2-week study tour of the Amazon River and Peruvian Andes in late February and early March. Itinerary includes: First week on a research ship going down the Amazon and along some of its tributaries with daily excursions into the jungle to collect fungi. Second week in the Andes collecting at elevations between 8,000 and 12,000 feet (including Machu Picchu). Leaders will be Gary Lincoff and Gerry Miller. Cost is approximately $2,200.00. For more information contact Gary Lincoff, New York Botanical Garden, Bronx, NY 10458.

April 1985

?-? NEW ENGLAND MYCOLOGISTS meeting will be organized by John Haines. For the occasion the group will be renamed Northeastern Mycologists. Write John to get on a mailing list and to learn the details.

May 1985

?-? BMS PUFFER FORAY (The Puffer is a small steamship [with bar] being chartered to steam up Loch Fyne and the Isle of Bute) may be "a bit pricy." Dave Minter (see address above).

24-30 BMS SPRING FORAY at Pulborough, West Sussex. Rod Bevan, Westcott West Street, Billingshurst, West Sussex.

August 1985

5-9 John Pitt, Maren Klich, and Dick Hanlin will conduct a five day hands-on workshop on PENICILLIUM IDENTIFICATION at the University of Georgia, Athens, GA. The dates fall the week before the MSA meeting in Gainesville, FL. Further information and registration forms may be obtained from Maren Klich.

10-15 The MYCOLOGICAL SOCIETY OF AMERICA ANNUAL FORAY AND MEETING will occur in conjunction with the annual AIBS meeting in Gainesville, FL.

11-17 The FOURTH INTERNATIONAL MARINE MYCOLOGY SYMPOSIUM will be held in Portsmouth, England. Deadline for offered papers is July 20, 1984. Details from Professor E. B. Gareth Jones, Portsmouth Polytechnic, Department of Biological Sciences, King Henry I Street, Portsmouth, PO1 2DY, Hants, England.

September 1985

4-11 BMS AUTUMN FORAY at Chester College, Chester. Bruce Ing, Chester College, Cheyney Road, Chester CH1 4BJ.

The significance of fungi
No. 1

Fungi are important in Veterinary Sciences!
FORTHCOMING COURSES

INTRODUCTORY MYCOLOGY will be taught at Auburn University in the Fall of 1984. Contact Gareth Morgan-Jones.

FIELD MYCOLOGY, an upper division-graduate level course, will be offered at Southern Illinois University at Carbondale. Monthly, day-long continuing education workshops on southern Illinois mushrooms will also be offered August-November. Write Walter J. Sundberg to learn more.

WILD MUSHROOMS will be offered August 12-24, 1984 at Kirkland Lake, Ontario, by John C. Krug through the Junior School of Arts for Northern Ontario. For further information contact JSANO, Northern College of Applied Arts and Technology, 140 Government Road East, Kirkland Lake PN2 3L2, Ontario, Canada.

TO MR COSTISICK

Coprinus: The Suicide

Wild mushrooms picked the day before
Lay cool behind my icebox door.
With great delight, I thought their fate
Would be to cheer my dinner plate.

So as I lit my morning pipe
I savored thoughts of cap and stipe
Tucked neatly in a hot souffle
Or flavouring some rechauffe.

So neatly had they joined the bowl
(Amid chopped celery petiole
And radishes of firm delight)
Where I had put them for the night,

My instincts knew they'd be superb!
My mind alive with spice and herb,
My matchless genius as a chef
Was glowing as I searched the shelf

Within the fridge. But to my shock
A horror had usurped my stock
Of mushrooms picked the day before.
They'd killed themselves behind the door.

Such horror! I with ghastly groan
Wept soundly on the provolone.
At last, to soothe my ruffled state,
I polished off a truffle plate.

--Jennifer Mueller Wettlaufer
7930 Clinton Street
Elma, NY 14059
NEW MYCOLOGICAL RESEARCH

S. K. ABDULLAH: Coprophilous and Soil Ascomycetes of Iraq.
P. T. ARNOLD: On VA mycorrhizal interactions with sewage sludge and toxic metals; VA mycorrhizal response to fire and associative diazotrophs.
T. E. CHASE (with R. C. ULLRICH): Genetic regulation of intersterility and speciation in Heterobasidion annosum (Fomes annosus).
J. CLAUSZ: Molecular mechanism of chromatin assembly in Physarum polycephalum (in cooperation with Timothy Herman, Biochemistry Department of the Medical College of Wisconsin).
O. CONSTANTINESCU: Monograph of Plasmopara and a check-list of Peronospora.
B. DMITRIEFF: Nutrient media for cultivation of wild mushrooms; Boletus and Cantharellus.
J. EVANS (student of T. M. HAMMILL): Perithecial and bulbil development in Melanospora fallax.
L. GUZMAN-DAVALOS and F. J. TRUJILLO FLORES: Mushrooms, lichens, and myxomycetes from Jalisco, Mexico.
E. B. GARETH JONES: Spore attachment in marine, freshwater, and coprophilous fungi.
R. KOFFMAN: Investigations into Aspergillus clavatus and Cunninghamella echinulata.
L. J. LITTLEFIELD: Biocontrol of leafy spurge (Euphorbia esula, a northern rangeland weed) with pathogenic fungi.
A. S. METHVEN (with R. H. PETERSEN): The genus Clavariadelphus in North America north of Mexico.
G. MORGAN-JONES: Mode of action of opportunistic soil Hyphomycetes in biocontrol of phytonematodes, including the role of diffusible toxic metabolites.
M. MUELLER (student of W. J. SUNDBERG): Fungi associated with Mountain Pine Beetle in west central Colorado.
S. L. PEELE: Small scale (Mail order) "Wild Mushroom Farm" culture.
R. R. POHLAD: Cellulose decomposition fungi.
S. A. REHNER: Population genetics of Agaricus campestris and Agrocybe pediades.
A. Y. ROSSMAN: If funded, the Mycology Lab at Beltsville will undertake research on the identification of VA mycorrhizal fungi using advanced technology.
R. SEYMOUR: Zoosporic fungi of southern Mexico.
M. SHERWOOD-PIKE and J. GRAY: Paleoeocology and taxonomy of a Miocene mycoflora from Clarkia Lake, northern Idaho.
L. SHIH (student of J. AMMIRATI): Life history and cytology of Laccaria.
D. WEBER: Characterization of phytotoxin from Cryptosphaeria populina, causal agent for Aspen canker.
J. F. WHITE (with G. T. COLE): Fungal endophyte-host associations in the grasses (e.g. Lolium and Festuca).

W. YUN: Hypogeous fungi--taxonomy and mycorrhizae.

M. F. DOYLE: Some common marasmioid fungi of Illinois.

**FUNGI FOR DISTRIBUTION**

**ASCOMYCETES**

G. E. Templeton has specimens of Protomyces macrosporus on Torilis japonica.

**BASIDIOMYCETES**

R. Tulloss has specimens and color slides of Amanita species--particularly Section Lepidella and largely from the New Jersey Pine Barrens.

S. L. Peele has a large selection of mushroom cultures in Florida Mycology Research Center's catalog. Dung inhabitors are also available--dry or in preserving fluid.

**DEUTEROMYCETES**

G. Morgan-Jones has isolates of Paecilomyces lilacinus, Verticillium lamellicola, V. leptobactrum, and V. chlamydosporium implicated in cyst and root-knot nematode pathology.

**MISCELLANEOUS**

N. A. Weber informs us that the Weber Ant Fungus Collection (W. J. Robbins, 1969, Current Topics in Plant Science, pp. 71-73, Academic Press, NY) is maintained at the New York Botanical Garden, Bronx, NY 10458. These unique cultures are from various attine ant species.
FUNGI WANTED

MYXOMYCETES
K. L. Braun: Myxomycete specimens or tree bark (identified) from Mexico.
S. L. Stephenson: Myxomycetes, especially collections from western North America.

OOMYCETES
O. Constantinescu: Peronosporales, especially *Plasmopara*.
G. W. Moorman: *Pythium ultimum* isolated from floricultural crops, especially poinsettias.

ZYGOMYCETES
R. Koffman: *Cunninghamamella echinulata* and information related to cultivation.
W. J. Vail: Azygospores of *Gigaspora* spp. from soil.

ASCOMYCETES
K. K. Baker: *Valsa* and *Cytospora* cultures (for a Ph.D. study).
S. E. Carpenter: Specimens and cultures of *Bisporella*.
T. Iturriaga: Cultures and specimens of *Strossmayeria* (Helotiales).
E. B. Gareth Jones: Isolates of *Sordaria* species for spore attachment work.
D. W. Minter: Specimens of the ascomycete family *Rhytismataceae* (*Rhytisma*, *Coccomyces*, *Lophodermium*, *Hypoderma*, etc.).
O. Petrini: Fresh collections of *Rosellinia* spp.
L. J. Spielman: *Valsa* and *Leucostoma* from any host; *Septoria* from Salicaceae; cultures and specimens.
D. Weber: *Morchella* species.
C. S. Yang: Cultures or specimens of *Tricharina* spp.

BASIDIOMYCETES
J. Ammirati: *Dermocybe* collections with notes and color photos (Kodachrome), especially western material.
D. Bermudes: *Amanita* cultures. All welcomed, especially from amanitin-producing species.
D. E. Desjardins: Collections of collybioid and marasmioid fungi from the Pacific Northwest (*Collybiaceae* and *Marasmiaceae* sensu Singer).
B. Dmitrieff: Cultures of *Boletus edulis*. 
R. W. Kerrigan: Wild isolates, with vouchers, of *Agaricus bisporus/brunescens* and other similar species (no *A. bitotiquis*); notes essential, Kodachromes appreciated.

B. Liu: *Termella aurantia*, *T. mesenterica*, and *T. encephala*.

A. S. Methven: Collections of *Clavariadelphus* from North America with color notes and spore prints. Cultures of *Clavariadelphus* from North America along with a portion (dried) of the original collection.

S. A. Rehner: Basidiospore prints and somatic cultures of *Agrocybe pediades*, *Panaeolus foenisecii* and *Agaricus campestris*. Glad to reciprocate. Write for details, collection, and handling of isolates.

W. J. Sundberg: Specimens (with notes and/or photographs of *Lepiota* sensu lato).

R. Tulloss: Well documented collections of *Amanita* spp. with slides, if possible--please inquire first.

R. Vilgalys: Fresh cultures and/or spore prints of *Collybia dryophila* or *Pleurotus ostreatus* (with vouchers). Willing to reciprocate with cultures of other desired material from my area.

W. Yun: *Melanogaster*.

**DEUTEROMYCETES**

E. A. Felix: Isolates of pathogenic conidial fungi or yeasts from saline natural environments.

T. W. Gaither: Dermatophytic hyphomycetes of medical significance and similar members of the *Moniliaceae*.

R. V. Gessner: Cultures of *Dendryphiella arenaria* and *D. salina*.

T. Iturriaga: Cultures and specimens of *Pseudospiropes*.

R. Koffman: *Aspergillus clavatus*, and any related information on culture.

M. E. Palm: *Trichocladium* spp., cultures and specimens.

R. Roberts: Isolates of *Alternaria ricini*, *A. macrospora*, *A. raphani*, preferably fresh.

K. Seifert: Cultures or specimens of any synnematous hyphomycetes—particularly *Stilbella*.

G. E. Templeton: *Colletotrichum* species.

J. F. White: Cultures of Coelomycetes.

**MISCELLANEOUS**

J. A. Berry: Cultures of fungal pathogens of maize, soybean, alfalfa, sorghum, and wheat. Call 515-270-3309 for permits and address.

P. T. Arnold: Pure inoculum of various endogonaceous mycorrhizal fungi.

**LATE ADDITION**

H. M. Saylor: Dried specimens of hypogeous and secotoid representatives of the astrogastraceous series, with or without notes or photographs.
IDENTIFICATIONS

The following are willing to identify the taxa specified.

OOMYCETES
O. Constantinescu: Peronosporales.

ASCOMYCETES
S. E. Carpenter: Crocicreas, Bisporella, Pezizella, and Hymenoscyphus (Discomycetes).
T. Iturriaga: Strospomaryeria.
Y. Kobayasi: Cordycps and its allies.
A. Y. Rossman: Members of the Hypocreales including Nectria.
L. J. Spielman: Valsa, Leucostoma, and their anamorphs in Cytospora.

BASIDIOMYCETES
J. Ammirati: Cortinarius.
M. S. Gillium-Davies: Maramius.
K. Seifert: Dacrymycetales.
W. J. Sundberg: Lepiota sensu lato.
W. Yun: Melanogaster.

DEUTEROMYCETES
S. K. Abdullah: Aero-aquatic conidial fungi especially genera such as Helicodendron, Helicon, Spiroshaera, Pseudaegerra, Candelabrum, etc.
T. Iturriaga: Pseudospiropes.
G. Morgan-Jones: Deuteromycotina.
M. E. Palm: Trichocladium and similar genera.
J. F. White: Coelomycetes.

MISCELLANEOUS
R. Seymour: Zoosporic fungi, particularly water molds.

AMANITA PHALLOIDES--FOOD OF THE GODS! SO, DON'T EAT IT, UNLESS YOU'RE IMMORTAL!
NEW BOOKS BY MSA MEMBERS

The following announcements were received in response to the MSA Newsletter questionnaire:


Michael O. Garraway and Robert C. Evans. 1984. FUNGAL NUTRITION AND PHYSIOLOGY. John Wiley and Sons, New York. Based on a fungal physiology course taught at Ohio State since 1969, the book is designed to meet requirements of those needing to know about fungal physiology. Due out in June.


Geraldine C. Kaye. 1984. WILD AND EXOTIC MUSHROOM CULTIVATION IN NORTH AMERICA. Farlow Herbarium, Cambridge. 32 pages. $4.00. (See Publications Available for more details).

SHOW THE GROWTH OF MUSHROOMS IN YOUR CLASSROOM

Our Mushroom Mini Farms arrive mature and ready to produce their first of several crops of edible mushrooms. Reliable and guaranteed, each MiniFarm comes complete with simple instructions.

These “kits” provide a fascinating demonstration of reproduction in the higher basidiomycetes. By using several MiniFarms simultaneously, it is also possible to illustrate phototropism, geotropism, atmospheric control of basidiocarp morphology, mass sporulation, and many other phenomena (including the culinary abilities of the instructor!)

The following varieties are presently available: Shiitake (Lentinus edodes), Tree-Oyster (Pleurotus ostreatus).

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FAR WEST FUNGI

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Your support of this business aids and abets a graduate student in mycology.
Yosio Kobayasi has the following available for sale: HISTORICAL AND ETHNOLOGICAL MYCOLOGY (1983), 25,000 yen + 1,500 yen (for surface mail). Approx. $113.00 U.S. ICONOGRAPHY OF VEGETABLE WASPS AND PLANT WORMS (CORDYCEPS) 30,000 yen. From Kobayasi, 15,000 yen + 1,500 yen (for surface mail). Approx. $71.00 U.S.

Prakash Chandra Jain has TRANSACTIONS OF THE MYCOLOGICAL SOCIETY OF JAPAN, Volume 20 (1979) for sale.

C. Volbracht has a long list of duplicata, from Fries' ICONES SELECTAE HYMENOMYCETUM to small field guides for sale and exchange.

A. Weintraub has for sale MD Magazines (collector's items), consists of Movies, Art Medicine, etc., 50¢ per copy for all back issues. No late issues or recent ones. Have a good collection. Postage extra.

GUIDELINES FOR LAB AUTOMATION is available from Jill S. Shipman at ECO Instruments, One Bridge Street, Newton, MA 02158.

Stephen L. Peele has LEUCOGARICUS GINERASCENS, a serialized manuscript on a new psychoactive toxin (HPLC shows no psilocybin). With spore sample for microscopy, $5.00.


Ross W. Davidson has numerous reprints of papers on forest tree diseases and wood defects to give away.

Robert E. Machol wishes to sell Boudier, text and 324 plates, (Includes almost all Volume I--Agarics and other Basidiomycetes). $1,500.00. He also has other old and rare books on mushrooms--send for a list.

Michael R. Talley offers the following books for sale: Couche's THE GENUS SEPTOBASIDIUM (1983); Zinsser & Bayne-Jones' A TEXTBOOK OF BACTERIOLOGY (1939); Smith, Conant & Overman's MICROBIOLOGY, 13th ed. (1964); Lennette, Spaulding & Truant's MANUAL OF CLINICAL MICROBIOLOGY, 2nd ed. (1974); Kirk, Peel, James & Kershaw's BASIC MEDICAL LABORATORY TECHNOLOGY (1975); AMERICAN JOURNAL OF BOTANY: 1976-1980 (missing Vol. 66 No. 8; Vol. 67 No. 1); CANCER: Vol. 39 (1977), Nos. 4, 6; Vol. 40 (1977), Nos. 4, 5; Vol. 41 (1978), Nos. 1, 2, 3, 4; Vol. 42 (1978), No. 5. Each book or journal set (all issues) is for sale at best offer.

INDEX OF PLANT DISEASES (USDA Handbook 165) is available from Dr. Terry Kirkpatrick; Southwest Research and Extension Center; Rte. 3, Box 258; Hope, AR 71801.

Amy Y. Rossman has a reprint list available. If reprint requests were not answered, write again. Some requests were received without names.

J. Cramer reports that although Mycologia Memoir No. 6 (L. E. Wehmeyer. 1975. THE PYRENUMYCETOUS FUNGI) is out of print, No. 7 (M. E. Barr. 1978. THE DIAPORTHALES IN NORTH AMERICA WITH EMPHASIS ON GNOMONIA AND ITS SEGREGATES) and No. 8 (R. E. Halling. 1983. THE GENUS COLLYBIA [AGARICALES] IN THE NORTHEASTERN UNITED STATES AND ADJACENT CANADA) are still available from him at the special individual MSA member prices of $20.00 and $15.00 respectively. Parts 1-5, also available at special MSA individual member discounts, can be obtained from the New York Botanical Garden.

Geraldine C. Kaye's WILD AND EXOTIC MUSHROOM CULTIVATION IN NORTH AMERICA (1984) is a directory and bibliography of up-to-date information on literature, equipment, spawn, commercial growers, and marketers in the United States and Canada. It features over 20 species of edible mushrooms currently grown or offered for sale in the market place. Send $4.00 plus 50¢ postage/handling (Checks made payable to Farlow Herbarium) to Farlow Reference Library, Harvard University, 20 Divinity Avenue, Cambridge, MA 02138, USA.

Publication of a new catalogue of the University of Alberta Mold Herbarium and Culture Collection is planned for late 1984. Price yet to be determined. To get your name on the mailing list, write to Lynn Sigler, Curator.


Rod Tulloss has the BIBLIOGRAPHY AND INDEX TO NORTH AMERICAN LITERATURE ON AMANITA (for cost of mailing and reproduction)--over 200 cited references; indexed for over 170 taxa.


John McPartland is (still) willing to part with Vols. 72 & 73 of PHYTOPATHOLOGY; Vols. 1, 2, 3 of PHYSIOLOGICAL PLANT PATHOLOGY; and Vol. 67 of AMERICAN JOURNAL OF BOTANY; all for $5.00 per volume.

The Center for Forest Mycology Research has limited quantities of reprints of pre-1971 publications for distribution. Some authors include H. H. McKay, R. W. Davidson, O. K. Miller, J. G. Palmer, and others who have been associated with the CFMR. Send a self-addressed, stamped envelope to Harold H. Burdsall for the list.

Naohide Hiratsuka has the following available: (1) Jubilee Publication on the Seventieth Birthday of Dr. Naohide Hiratsuka, 808 pp., 1973. $70.00, and (2) Commemorative Number on the Seventy-seventh Birthday of Dr. Naohide Hiratsuka, 296 pp., 1980. Rept. Tottori Mycol. Inst. (Japan) No. 18. $35.00.

A summarized history of THE UNIVERSITY OF ALBERTA MOLD HERBARIUM AND CULTURE COLLECTION and a detailed description of the facility and its objectives has been prepared by and is available from the curator, Lynne Sigler. (This enlightening two-page overview should be very useful to all interested in mycological history, culture collections, and/or the Fungi Imperfecti.—ed.).

For those teaching Forest Pathology, Alex L. Shigo notes that the USDA Forest Service, Northeastern Forest Experiment Station, Forestry Sciences Laboratory has some publications that might be of use.

SAID THE FARM-BOY UPON HIS RETURN FROM NEW YORK CITY, "I HAVE COENOCYTE WITH PEOPLE THAT ACRASIA THAN US STAYING AT THE WALDORF HAUSTORIA."
MYCOLOGICAL SOCIETY OF AMERICA
1984 ANNUAL MEETING PROGRAM
Colorado State University, Fort Collins, Colorado

Saturday, August 4
All Day: Foray to Cameron Pass, near Fort Collins, Larimer Co., Colorado

Sunday, August 5
All Day: Meeting of the MSA Council

Monday, August 6
Session 2. Symposium. Eumycetozoon Phylogeny: Theoretical and Applied Considerations
Session 3. Posters. Biochemistry, Physiology, Taxonomy, and Ultrastructure
Afternoon: Session 3. Posters (con't)
Session 5. Contributed Papers. Ecology
Evening: Plenary Session

Tuesday, August 7
Session 8. Symposium. Recent Advances in Cytology and Genetics of Higher Fungi
Afternoon: Annual Lecture. Clifford W. Heseltine. Fungi, People, and Soybeans
Session 10. Contributed Papers. Physiology
Session 11. Contributed Papers. Morphology, Taxonomy, and Genetics
Evening: Awards Presentation and Social

Wednesday, August 8
Morning: MSA Breakfast and Business Meeting
Presidential Address. Richard T. Hanlin. The Pedagogical Ascomycete
Afternoon: Session 12. Morphology and Taxonomy

Thursday, August 9
Morning: Session 15. Contributed Papers. Ultrastructure
Session 18. Contributed Papers. Morphology and Taxonomy

ABSTRACTS

Abstracts of the papers scheduled for presentation at the 1984 MSA Annual Meeting are included alphabetically by author on the following pages.
First, evidence is presented that mycorrhizae have a questionable relationship in the past. The authenticity of the two species was demonstrated by comparative studies. The mating systems of G. lucidum and G. tsugae were confirmed and identified as heterothallic tetrapolar. Interfertility tests between homokaryons of each species were negative. Comparative temperature studies between several isolates of each species from various regions of North America indicated distinct optimal ranges for each species. G. lucidum isolates had an optimal range from 30-34°C while those of G. tsugae had an optimal range from 20-25°C. Morphological comparisons between each species were also conducted using brightfield, Hoffman modulation, and scanning electron microscopy. These comparisons indicated differences in the basidiospore sizes, spore wall structure, and cultural characteristics.

E. B. ALLEN and M. F. ALLEN. Department of Range Science and Ecology Center UMC 52, and Department of Biology and Ecology Center UMC 45, Utah State University, Logan, UT 84322. The Physiological ecology of mycorrhizae: implications for succession.

Three hypotheses are tested to demonstrate that the abundance of mycorrhizae regulates the rate of succession. First, evidence is presented that mycorrhizal inoculum density increased with time after a disturbance. Second, plants of later seral stages have greater physiological response to mycorrhizae than those of early stages. Experiments in Wyoming sagebrush-grassland showed that the pioneer species are predominately nonmycotrophic. Species of later stages are facultatively mycotrophic, but have greater conductance, CO2 exchange rates, and dry mass increases with mycorrhizae if they are from late than from middle seral stages.

The third hypothesis is that field inoculations with mycorrhizae will increase late seral species. Inoculated grasses in the genus Agropyron had increased conductance at water potentials -3.8 MPa and had slowed phenological development compared to the uninoculated plants. These measurements were taken during a relatively wet growing season, and no differences in plant cover or density were noted due to mycorrhizae. Thus further observation is needed to test the third hypothesis. If mycorrhizae do increase dominance of late seral species, then mycorrhizal abundance may be said to regulate the rate of succession.

M. F. ALLEN. Biology Department and Ecology Center, Utah State University UMC 45, Logan, UT 84322. Prospects for mycological contribution to mycorrhizology: A promising mutualism.

Observations and experiments on the fungal symbiont of mycorrhizae have been continuous for over 100 years. Mycorrhizae were originally described in a project funded to grow truffles. Despite this long heritage, the need for research on mycorrhizal fungi is extensive and not adequately being met. The number of papers on mycorrhizae listed in Biological Abstracts has increased 3-fold since 1976. However, there has been no measurable increase in the rate of mycological contributions through that time. There have been no increases in new mycorrhiza projects reported in the MSA newsletter, no increase in number of mycorrhizal papers published in Mycologia, and no change in "fungal-oriented" mycorrhizal papers listed in Biological Abstracts.

Several promising directions have opened (or re-opened) recently which demonstrate the need for mycological input: e.g., differential effects on plants by different endophytes (both at the species and ecotype level) and animal-mycorrhizal fungus interactions. Agronomic interest has expanded tremendously with little expansion of mycorrhizal information presented in basic coursework in Agriculture or Biology. These observations indicate an opportunity and a challenge for mycologists to remain active in the pursuit of research and technology on one of the two mycorrhizal symbionts, the fungus.


The ability of mycorrhizal fungi to migrate onto a disturbed site might be a major factor affecting the rate of succession of that site. Migration rate may depend, in part, upon the microenvironmental site characteristics from where the spores are produced and disseminated. We contrasted microhabitats of 2 species of mycorrhizal fungi, Glomus fasciculatum and Russula emetica, from 3 sites, a shrub steppe, a spruce-fir forest, and a Douglas fir forest. Maximum sporulation of G. fasciculatum in the shrub-steppe occurred in drier sites (where plants have previously utilized soil moisture). Sporulation sites also had lowered light intensity, higher P, N and C. In the shrub-steppe, Wind-speeds of 10-15 m/s with 5-7 m/s under the shrubs are common during the growing season. Sporocarp formation of R. emetica occurred only on sites with notably high moisture, N, and C concentrations. During sunny periods, the sporocarp was always located in a site with reduced light intensity (29%). A 2-2.5 m/s wind at ground level was necessary to move spores from under the musroom, but the maximum gust measured was 1.5 m/s. These results suggested that in an arid site such as Kemmerer, WY, adequate wind speeds and dry soils facilitate transport of VAM fungal propagules. However, in the higher elevation mesic sites, sporulation conditions for promoting wind transport of fungal propagules are minimal.
Plant pathologists

Once the toxicity of heavily contaminated barley, Aspergillus nidulans in England, with few v-c groups represented in a single birch log. Plant pathologists have used v-c as a tool for comparing isolates of plant pathogenic fungi from the same and from different hosts. Fungal ecologists and population geneticists could benefit from similar studies.

J.B. ANDERSON, Department of Botany, Erindale College, University of Toronto, Mississauga, Ontario, L5L 1C6. Mating type, ploidy, and parasexual recombination in Armillaria mellea.

Armillaria mellea is an important pathogen attacking the roots of many different plants. The taxonomic species consists of several morphologically similar but reproductively isolated groups or "biological species." The genetic basis for intersterility within A. mellea is as yet unknown. Mating among haploid strains within biological species is determined by bifactorial heterothallism, but compatible matings produce diploid rather than dikaryotic cells. In the field, vegetative cells are also diploid. Because the fungus does not fruit readily in the laboratory, I recently investigated the possibility of parasexual analysis as an alternative to meiotic crossing. Of several agents tested, benomyl was effective in causing somatic segregation in diploid cells with two to four heterozygous marker loci. Segregants homo- or hemizygous for one or more of the marker loci were recovered from diploids synthesized in the laboratory and isolated from the field. Numerous recombinants were found for most pairs of loci.

Measurements of nuclear DNA content by fluorometry of mithramycin stained cells showed that as expected diploid nuclei contained twice as much DNA as haploid nuclei. Most segregants had haploid or near-haploid DNA contents strongly suggesting abnormal segregation of whole chromosomes in the presence of benomyl. I will discuss the problems in A. mellea to which parasexual genetic analysis may be applied and the potential of this fungus in future mycological studies.

Anderson, J. B., see Hintz, W. E., et. al.
Anderson, J., see Meyer, R. J., et. al.
Anderson, J., see Mohan, M., et. al.
Andrews, D. R., see Silver, J. C., et. al.
Andrews, J. H., see Kinkel, L. L.
Ansel, J., see Thibaut, M.

R. K. ANTIBUS. Department of Botany, University of Montana, Missoula, MT 59812. Enzymatic studies: what might be learned about mycorrhizal ecology.

The activities of soil-bound (abiotic) and root-surface enzymes have drawn the attention of researchers for several decades. These investigations suggest that enzymes originating from microorganisms, plants and animals play an important role in soil biogeochemical transformations and may be useful in examining functional changes associated with ecological phenomena. For example, changes in abiotic enzyme activities have been associated with successional changes in plant communities and in response to various types of environmental perturbation. Other studies have shown that root-surface enzyme activities allow discrimination of plant ecotypes adapted to specific soil conditions. Recent studies have demonstrated the presence of phosphatases associated with mycorrhizae; however, their potential contributions to mineral nutrition remain speculative. An assessment will be made of our current level of knowledge concerning enzymes and mycorrhizal mineral nutrition. Potential areas of future research will be discussed, emphasizing how such research could contribute to our understanding of mycorrhizal ecology.

R. APTA, B. FLANNIGAN and G.B. McFARLANE. Department of Brewing and Biological Sciences, Heriot-Watt University, Edinburgh, EH1 3HX, United Kingdom. Studies on Aspergillus clavatus and the malting of barley.

Although not a common contaminant of barley, Aspergillus clavatus is associated with malting of barley and is the causal agent of maltworker's lung, an extrinsic allergic alveolitis. Once present in a maltings, it is extremely difficult to control and barley stored for malting may become contaminated by spores originating in other parts of the maltings. Laboratory malting of contaminated barley from commercial maltings shows that there may be a 2500-fold increase in viable counts during production of green malt. Damaged and pregerminated kernels and elevated malting temperatures contribute to establishment of the organism. Up to 25% of the viable inoculum in green malt may survive as spores after kilning to produce finished (dry) malt, and 5-7% may survive in rootlets and other residues screened off for substitution into cattle feed. Strains of A. clavatus also produce a number of mycotoxins including ascladiol, cytochalasin E, patulin and two tremorgens. The toxicity of heavily contaminated finished malts and residues has been examined using brine-shrimp and tissue-culture tests. Possible effects of toxins on fermentation by Saccharomyces cerevisiae have also been examined.

P. T. ARNOLD and L. A. KAPUSTKA. Botany Department, Miami University, Oxford, OH 45056. Sludge application and toxic metals: effects on endogonaceous fungi and their hosts.

The effects of long-term sewage sludge application on VA mycorrhizal fungi was studied at Miami University's Ecological Research Center in Oxford, Ohio. The commercially produced sludge Milorganite (6-2-0;NPK) has been applied to plots on a monthly basis during growing seasons since 1978. An equivalent nutrient input of commercial urea phosphate fertilizer has been applied on different plots.
Other plots had no nutrient amendment (control). On the 5-yr old field which was employed for application, the effect of Milorganite on soil microbial populations, VA mycorrhizal fungal populations and mycorrhizal biomass was examined. Nutrient (C,N,P) and toxic metal (Cd,Cu,Zn) concentrations were also determined in Milorganite amended vs. fertilizer amended vs. control soil and plant tissue. Clearing and staining of Cirsium arvense, Festuca elatior, Zea mays and Geranium sp. roots shows a significant reduction in VA mycorrhizal infectivity in the fertilizer-amended plots when compared with both the control and sludge-amended plots. Distinct differences also occurred in the plant species composition of each treatment. Experimentation involving varying concentrations of Cd, Cu, and Zn on mycorrhizal and nonmycorrhizal Festuca was also performed.

Arnot, J. H., see Whitney, K. D.


Amanita phalloides was reported for the first time in México in a location of the State of Guererro (Villegas, et al., 1982). Later, an intense herbarium and field research allow broadening both its distribution and the knowledge about the morphological, microscopic, chemotaxonomic and toxic features that supporting its identification and reaffirm the presence of such species in Mexico.

Even so, its precise localization in the forest it inhabits, made easier the realization of an integral analysis including important data such as habitat, habit, mycoflora, vegetation, soil, altitude, climate and ethnobotany. The information obtained suggests this species is native rather than an introduced one, however, the historical aspects of the vegetation that has been introduced in those zones are being continuously studied.

Arnon, J. M., see Hufnagel, H. E., et. al.

Arnon, J. M., see Mullins, J. T., et. al.

J. ASTIER. 65 Blvd. de la Liberation. 13001 Marseille, France. New or rare species of Ascomycetes and Basidiomycetes. (No abstract)

G. W. BACON. Toxicology & Biological Constituents Res. Unit, USDA-ARS-Russell Research Center, P. O. Box 5677, Athens, GA 30615. The nature of ammonia inhibition in conidia of Aspergillus ochraceus.

Conidia of Aspergillus ochraceus are dormant in the absence of exogenously supplied nutrients. However, in the presence of certain soil types these conidia do not germinate even though nutrients are supplied. It was determined that ammonia was one soil factor responsible for the inability of conidia to germinate, produce a germ tube. The effects of ammonia were concentration dependent. High concentrations of ammonia (9.0 to 20.0 μg ammonia/ml of air) were toxic to conidia. Concentrations between 8.0 to 0.5 μg ammonia/ml of air inhibited spore germination, but these spores germinated when the ammonia was removed. The nature of conidial inhibition was examined using 14C-labeled amino acids and sugars. Ammonia-inhibited spores incorporated exogenously supplied amino acids and sugars into several cellular fractions at the same rate as did noninhibited spores. Ammonia-inhibited spores did not initiate protein synthesis and it was concluded that low concentrations of ammonia directly or indirectly inhibited this process which is apparently necessary for germ tube development.

Baker, R., see Elad, Y., et. al.

B. J. Ballard, J. C. Cavender and I. A. Ungar. Botany Department, Ohio University, Athens, OH 45701. The occurrence of vesicular arbuscular mycorrhizae in some midwestern halophytes.

The roots of dominant vegetation in a saline flat with three salinity zones were stained for VAM. The three zones were a highly saline Atriplex zone (salinity of soil water 0.4-0.9%), a moderately saline Hordeum zone (0.1-0.4%) and a nonsaline meadow zone. Atriplex triangularis was not mycorrhizal. Hordeum jubatum was mycorrhizal. Incidence peaked in midsummer at 90% root segments colonized. This high colonization level was much greater than those found in meadow vegetation (average 62%). Transplants were made of Atriplex and Hordeum individuals into the three zones. No VAM was seen in Atriplex after two months indicating that the annual Atriplex resists colonization even at low salinity. High salinity decreased Hordeum colonization and height. Increased colonization was strongly correlated with increased Hordeum height in both transplant and pot experiments. VAM appears to augment Hordeum growth at moderate salinities but does not aid in adaptation to high salinities. Mycorrhizal inoculum potential studies of the Hordeum zone yielded very high values of 90-93% root segments colonized. These results indicate that VAM colonization and inoculum exist at high levels in this saline environment and that VAM appears to play a significant role in the growth of at least one dominant halophyte, H. jubatum.

T. J. BARONT. Department of Biological Sciences, State University of New York at Cortland, P. O. Box 2000, Cortland, NY 13045. The effect of humidity on basidiospore size in Clitopilus hobsonii.

Investigators have noted that basidiospore (spore) size may vary in a statistically significant manner during spore production by basidiomata. This variation in spore size may be detected in different species population or even in a single specimen (Tange and Hillhouse, 1974; Parmasto and Parmasto, 1982). Parmasto and Parmasto (1982) believe that some of the important factors which may produce differences in spore size are caused by environmental conditions,
e.g. "weather conditions" and/or diurnal influences. One environmental condition which might influence spore size is relative humidity (RH). Gilliam (1975) has shown that in Marasmius rotula spores are not even produced until the RH approaches 100%. A basidiome producing culture of Clitopilus hoblinii (Berk. & Br.) Orton (#4227 TJB, ex Beltsville 445-22) was used to determine if differences in RH could significantly change spore size in this species. Basidiomata were produced under five different RH. At spore onset deposits were collected twice a day for three consecutive days or until sporulation ceased. An analysis of the variability in spore size due to differences in RH and due to the developmental stage of the individual specimens will be presented.

D. J. S. BARR. Biogeomatics Res. Inst., Central Experimental Farm, Ottawa, Ontario, Canada K1A 0C6. Endochytrium multiguttulatum in pure culture.

A chytrid closely resembling E. multiguttulatum Dognon grows well in axenic culture on PDM agar (0.1% peptoneized milk, 0.1% tryptone, 0.5% dextrose, 1% agar). Following germination, the germ tube enlarges into a new sporangium and the zoospore cyst remains persistent. The mature thallus consists of a subglobose to irregular sporangium with one to several rhizoidal axes which are walled off at neck level, and one or occasionally 2-4 broad discharge tubes. There is a small quantity of gelatinous material at the ends of the discharge tube which, on zoospore release, fuses momentarily with the zoospores forming an evanescent vesicle. There is a very conspicuous operculum. In the TEM the zoospores are similar to those of Nowakowksiella and Cladochytrium.

M. E. BARR BEIGLOW. Department of Botany, University of Massachusetts, Amherat, MA 01003. Notes on the Calosphaeriales.

The limits and diagnostic features of the order are outlined. The unique centrum, comprising clumps of ascii each with one or two long tapering paraphyses that form a peripheral layer, and the ascospores that are typically allantoid, are the most conspicuous features that unite members of the order. Variations in several character states -- development and type of stroma, arrangement of ascomata, length of beaks, number of ascospores per ascus, and septation of ascospores -- have been utilized as generic characters in the past. These are re-evaluated and a synopsis of accepted genera is presented.


Endogone pisiformis Lk., type species of the Endogonaceae (Zygomyctina), has previously been isolated and grown in pure culture. In inoculation experiments, it colonized leek on water agar and scots pine in growth pouch. Dead leek roots were invaded by vesicular and finely-branched hyphae. Hyphae were only superficial on scots pine roots but in both cases the fungus formed clustered, lipid-filled vesicular structures. Sporulation was not observed. Recently, typical zygosporae and sporocarps of E. pisiformis developed in association with 2 month old lodge pole pine in glass culture tubes containing vermiculite:peat 9:1, glucose and minerals. Procedures are underway to determine the nature of the association between E. pisiformis and various plants and precisely define the conditions that will predictably bring about sporulation. This information verifies the previously suspected identity of the cultures originally obtained from E. pisiformis sporocarps and may provide a valuable method for elucidation of zygosporae and zygosporocarp developmental sequence and requirements.

Bertke, C. C., see Huiziar, H. E., et al.
Bertke, C. C., see Mullins, J. T., et al.

M. BLACKWELL AND R. L. GILBERTON. Department of Botany, Louisiana State University, Baton Rouge, LA 70803 and Department of Plant Pathology, University of Arizona, Tucson, AZ 85721. Distribution and sporulation phenology of Myxomycetes in the Sonoran Desert of Arizona.

All pith samples from 68 dead saguaro cacti in 3 plots and 11 dead isolated plants in Saguaro National Monument, Arizona, produced at least one myxomycete upon incubation at 20 or 30 C. Three species, Badhamia gracilis, Physarum straminipes, and Didymium eremophilum, developed at high frequencies on the substrates in moist chamber culture. Perichaena corticalis and Protophysarum phloiogenum were also present. Although previous literature reports indicate that Myxomycetes grow and sporulate best at low pH, these species all tolerated substrates of pH 8.7-10.4. Didymium eremophilum and P. phloiogenum had peaks in sporulation within 6 days; other species were slower. There was no difference in time of sporulation of sporangia of B. gracilis or D. eremophilum at 20 and 30 C; however, sporulation of P. straminipes was significantly later at 30 C. Reduced spore germination of P. straminipes at 30 C may be a factor. Frequency of P. straminipes in plants at higher elevations was significantly greater, and may be related to temperature; frequency of D. eremophilum at higher elevations was lower than at elevations with higher substrate density.

M. BLACKWELL and WALTER ROSSI. Department of Botany, Louisiana State University, Baton Rouge, LA 70803 and via P. Trigo 28, I-00136 Rome, Italy. Biogeography of Fungal Obligate Parasites of Termites.

At least 20 species of fungi in 9 genera are obligate parasites of termites and some of their termophiles. One additional species is found on a wider range of hosts. New collections of fungus-infected termites have greatly extended the host and geographical ranges of several fungal species. Species of Ambrosiopsis were previously known from North America, Europe, Madagascar, and New Guinea. Our report extends the range to South America, Africa, and Asia. Laboulbeniopsis territarius, which was known only from the United States and Italy, is now known from Africa and Asia. The range of Termitaria coronata has been extended from the New World, Australia, and the Philippines to the African and Asian continents; these new records indicate that T. coronata may be more commonly associated with termite hosts. Species of the families Termitidae and Rhinotermitidae are the most common hosts of all species; however, these families contain...
a large number of species, many of which have wide distributions. They also are more commonly examined for fungal pathogens than other termites. We have found no cases of strict host specificity or related host specificity where we have adequate collections.

JEAN BOISE  Botany Department
University of Massachusetts, MA 01003
Host plant relationships in a popular genus of Loculoascomycetes

The name Trematosphaeria has largely been applied to species found on woody substrates. Yet, a smattering of species found on monocotyledonous or herbaceous dicotyledonous plants have been assigned to Trematosphaeria because of their morphology. Reappraisal of the morphological characteristics by which Trematosphaeria is delimited supports the view that Trematosphaeria species grow on wood or bark, and discordant elements are referable to other genera. Two species that grow on palms or bamboo share the characteristics of Astrosphaeriella species. A species described from collections on cactus spines appears to belong to Stuartella. The inhabitant of Iris rhizomes is transferred to Phaseospheria. A species found on Artemisia has been designated type of Massariosphaeria. Furthermore, a second species that has been named as a Trematosphaeria and grows on Artemisia species supports the concept that Syncarpella species grow on host plants from the Asteraceae.

J. A. BOURRET Department of Biology, California State University, Long Beach, CA 90840. Sugar transport in germinating Pilobolus longipes spores.

Pilobolus longipes sporangiospores germinate in response to a heat treatment and glucose. The early stages of germination, however, do not require glucose metabolism, as non-metabolizable forms of glucose (3-O-methyl-D-glucose or 6-deoxy-D-glucose) proved equally effective in activating spores. Essentially no glucose was transported at 25°C (the optimum temperature for mycelial growth), but at 38°C uptake was immediately detectable. Moreover, the rate of uptake increased rapidly with time. I have determined the initial uptake velocities over a range of glucose concentrations for dormant and recently activated spores. The uptake data are consistent with carrier mediated transport but the Km values for the two populations differ by a factor of about six (2.3 mM for dormant spores vs. 0.4 mM for activated spores). The mechanism of transport is most likely facilitated diffusion. The most direct explanation of the shift in Km upon activation is an allosteric change in a constitutive transport system, but the existence of a second high affinity (low Km) system that becomes functional upon activation is not ruled out.

S. M. BOYETCHKO and J. P. TEWARI. Department of Plant Science, University of Alberta, Edmonton, Alberta, Canada, T6G 2P5. Vesicular-arbuscular mycorrhizae associated with barley under monoculture in Alberta.

Three types of chlamydospores, belonging to the genus Glomus, were isolated by wet-sieving and decanting of soil from a field under barley monoculture in Alberta. In one type, the chlamydospores were present in loose sporocarps, while, in the remaining two types, they were formed singly. The two non-sporocarpic chlamydospore types, isolated after about 2-month storage of the soil at 4°C, revealed evidence of extensive hyperparasitism in the form of perforations and reaction zones. The sporocarpic chlamydospores did not reveal any evidence of hyperparasitism, indicating that they may be resistant to the hyperparasites affecting the non-sporocarpic types.

J. P. BRASELTON. Department of Botany, Ohio University, Athens, OH 45701

Synaptomenal complexes and karyology of the Plasmodiophoromycetes

Nuclei of the Plasmodiophoromycetes are too small for accurate observations of chromosome numbers and structure by light microscopy. Synaptomenal complexes (SCs), however, occur in nuclei of transitional, cystogenous (sporogenic) plasmodia. The haploid chromosome numbers of several members of the Plasmodiophoromycetes have been determined by counting the number of SCs per nucleus by reconstructing models of nuclei based on serial thin sections. Nuclear volumes, total length of SCs per nucleus, distribution of SC ends at the nuclear envelope, and structure of SC's also are determined through serial section reconstructions. SCs of Plasmodiophora brassicae do not have distinct central elements like the SCs of Polymyxa, Sorosphaeria, and Membranosorus. Also, central regions of SCs in P. brassicae are narrower than those in the other three genera. Pachytene nuclei of all members analyzed through serial section reconstructions have two poles, each defined by an end-to-end pair of centrioles; SCs end at the nuclear envelope near the poles.

Brooks, J. L., see Longcore, J. G., et. al.
Brown, J. K., see Wain, R. P., et. al.

T.D. BRUNS, D.S. SHUMARD, AND M.E.S. HUDSPETH. Division of Biological Sciences, University of Michigan, Ann Arbor, Mich. 48109. A restriction/gene map for the mitochondrial genome of Suillus viscidus.

We have constructed a restriction/gene map of the mitochondrial genome of the bolete Suillus viscidus (=S. aeruginascens) Restriction enzyme analysis was used to determine that the genome is a closed circular molecule of 110 + 10 kilobases. Our map is based upon 32 Sites of 8 restriction enzymes. Gene probes derived from petite mutants of Saccharomyces were used in DNA transfer-hybridization experiments to locate homologous gene sequences for five mitochondrial genes. The order of these gene sequences in S. viscidus is: ATPase subunit 9, S-rRNA, cytochrome oxidase subunit III, ATPase subunit 6, L-rRNA. The relative position of these sequences is unique among previously published mitochondrial gene maps. We also have preliminary map data for the mt-genomes of a second isolate of S. viscidus and 3 other Suillus species. The poten-
Factors related to the distribution of four rusts on Juniperus osteosperma

The distribution of Gymnosporangium inconspicuum, Gymnosporangium neoloni, G. kernianum Bethel, and Gymnosporangium speciosum was determined on 17 pinyon-juniper sites throughout Utah. Transects were established and 96 randomly selected trees (on each site) were assessed for symptoms and/or signs of rust diseases. A number of environmental parameters were correlated with frequency and severity of the various types of rusts. Levels of G. kernianum infection were favored by moderate rather than high temperatures and greater than average summer precipitation. Conditions contributing to successful initiation of G. neoloni infection were more dependent on high levels of precipitation than were conditions for G. inconspicuum or G. kernianum. All Gymnosporangium rust species were less frequent in sites with higher summer temperatures. Both G. kernianum and G. inconspicuum were more frequent in sites with lower winter temperatures. (Gymnosporangium inconspicuum, G. kernianum, and G. neoloni infections correlated positively to the number of stems of J. osteosperma on sites with the highest total precipitation (r = .10).) Gymnosporangium kernianum seemed to have the greatest impact on host vigor although each species negatively affected the health of J. osteosperma. The correlation of soil nutrients with Gymnosporangium species was also noted. These correlations do not permit postulating cause and effect between host, pathogen and environment but have suggested hypotheses.

Carmichael, J. W., see Currah, R.

S.E. Carpenter. Department of Forest Science, Oregon State University, Corvallis, Oregon. 97331.

The Mt. St. Helens Eruptions: Mycological Phenomena

Phoenicoid Ascomycetes and Basidiomycetes, normally found on burned forest soils, were primary colonizers of tephra. Large areas of tephra were colonized by anamorphic and teleomorphic states of Anthracobia melamoma within 20 days of the May 18, 1980 eruption. The presence of fungal colonies enabled growth of bryophyte and algal colonies on nutrient poor tephra. Fungal succession on tephra is proceeding relatively slow compared to that in periodically burned forests. The thickness of tephra overlying forest soil, its low nutrient status, and the paucity of organic matter in many areas have slowed fungal colonization and will likely influence colonization of tephra by fungi competitive with phoenicoid fungi. Colonization of herbaceous debris from emergent vegetation is primarily by inoperculate Discomycetes. Secondary colonization on tephra is by a number of phoenicoid Basidiomycetes, including Myxomphalia maura and Pholiot a fulvozonata.

G. C. Carroll. Department of Biology, University of Oregon, Eugene, Oregon 97403. The dominant needle endophyte in Douglas fir is a mutualistic symbiont.

Endophytic fungi have been described from the leaves of a number of evergreen plants over the last 15 years. The dominant needle endophyte in Douglas fir needles is an undescribed representative of the Hemiphaeidaceae whose anamorph occurs on galls of three closely related Cecidomyiid flies, Contarinia pseudosugae, C. cucicular, and C. constricta. It has been suspected that leaf endophytes may function as mutualistic symbionts. That suspicion has now been confirmed for the Douglas fir endophyte: in every sample of mite-infected needles examined larval mortality proved significantly higher in endophyte-infected galls than in uninfected needles. The fungus does not directly parasitize larvae; the basis for larval mortality in galls infected with the endophyte is unknown. Conidia produced on galls during the wet fall and winter seasons serve to initiate symptomless infections in healthy Douglas fir needles. Contarinia galls are produced only on young, first-year foliage. They appear to become infected with the endophyte during the dry summer months prior to the onset of the rainy season with spores from an as yet undiscovered source.

Castellano, M. A., see Berch, S. M.

Castellano, M. A., see Li, C. Y., et. al.

Castillo, J., see Wieczek, S., et. al.

J. C. CAVENDER AND T. N. LAUGHANPAI. Department of Botany, Ohio University, Athens, OH 45701 and BioSciences, Himachal Pradesh University, Simla 171005, India. Cellular slime molds of the Western Himalayas and selected tropical forests of India.

Dictyostelid slime molds were isolated from 190 soil samples collected from 30 sites distributed among 5 climatic zones of India: subalpine, upper and lower temperate, subtropical, and tropical. 6353 clones of 14 species were isolated. Based on data of percent frequency, density, and presence, Polysphondyillum pallidum was the most important species country-side, followed closely by P. violaceum. Dictyostelium mucoroides was the most abundant csm in the subalpine forest but occurred throughout India, although less abundantly than in Europe. D. minutum was associated with soils high (>10%) in organic matter. It was most common in the temperate oak forest and did not occur outside of this zone. D. auro-stipes, the third most prominent species, was most abundant in the lower temperate forest and was the most characteristic species of Himalayan forest soils occurring from the tropical base at 400 meters to the oak-pine forest at 2200. D. giganteum was the dominant species of the subtropical zone where soils are much disturbed, eroded, and low in organic matter. D. purpureum was the most prominent csm in tropical moist forest but was very rare outside the tropical zone. D. sphaerocephalum was a good competitor in soils subject to extreme dry, hot conditions as thorn forest soils. Acytostelium sp. and D. polycyphalum were occasional, the latter occurring chiefly in warmer soils. D. tenue and D. vinaceo-fuscatum were confined to the tropics. D. discoides was not found.
The Species Concept in the Cystostereum pini-canadense Complex.

Cystostereum pini-canadense (Schw.) Parm. is a resupinate, loculo-feculent basidiomycete with a corticel-like to hydnaceous basidioma, and comprises a morphological species complex. The species involved are Radulum pini-canadense Schw., Odontia subahbrauta Bourd. and Galz. and Peniophora picina Overh.; all of which occur in North America. They differ primarily on the configuration of the hemicole and the thickness of the basidioma as well as an apparent allotropy in North America. Interfertility tests using monokarvons from all three morpho-species indicate that they have the potential to interbreed, although D. subahbrauta may be geographically isolated from R. pini-canadense and P. picina at the present time. Microscopically the basidiomata and cultures agree with interfertility tests that the three morpho-species comprise a biological species.

Cheung, P. J., see Gaskins, J. E.
Cifuentes, J., see Aroche, R. Ma.
Clark, J., see Hu, F.-S.

Keith Clayton, Department of Botany, Louisiana State University, Baton Rouge, LA 70803. Positive intertensions between grasses and fungi.

The Balansiae (Ascomycetes, Clavicipitaceae) are a group of five genera parasitic on graminoids. All are systemic and typically sterilize their hosts. Many important forage and pasture grasses serve as hosts as does the grain crop rice. All Balansiae that have been investigated produce a variety of ergot-type alkaloids resulting in a variety of cattle diseases such as seco foot and ryegrass staggers. In addition, infected ryegrass has been shown to be more resistant to insect herbivory compared to uninfected ryegrass. From the perspective of the host plant, infection appears to be advantageous by reducing herbivory and increasing vigor. Experiments in my lab have confirmed differential herbivory by the fall army worm on infected and uninfected ryegrass as well as on a number of other grass species. Experiments conducted with the native grass Danthonia scapata infected by Atkinsonella hypoxylon have demonstrated significantly higher survival, flowering, and growth rates compared to uninfected species in a variety of field conditions. Competition experiments between Danthonia and a co-occurring grass also showed infected plants performed significantly better. Currently a number of analogous experiments with different grasses and other Balansiae species are underway. Surveys of populations of many hosts have revealed very high levels of infection, especially in older populations. These data suggest the relationship between grasses and the Balansiae is mutualistic rather than parasitic.

K. W. Cochran, Department of Epidemiology and of Pharmacology, Univ. of Michigan, Ann Arbor, MI 48109, and NAMA Toxicology Committee, Experience with a Mushroom Poisoning Case Registry.

Reports of mushroom poisoning were requested from regional poison centers and mycological groups. In the first half-year the Registry has received 113 reports of 99 incidents involving 151 individuals and at least 63 species of mushrooms. Reported ingestions 77% were for food, 15% accidental and 8% for non-nutritional recreation. While the most reported species was Amanita phalloides (16), 14 of the cases involved a single incident. Other frequently reported species were Amanita pantherina (8), Coprinus atramentarius and Gyromitra esculenta (6 ea.); Cantharellus cibarius, Chlorophyllum molybdites and Panellus tenuisectil (5 ea.); and Morchella esculenta (4). The presence of two generally acknowledged edible and choice species can be attributed only in part to concurrent alcohol. The only reported death was from Lepiota (jossenii). As might be expected the most frequently reported effects were gastrointestinal; nausea, 54%; vomiting, 50%; intestinal cramps, 41%; diarrhea, 34%. Since most species are represented by only 1 or 2 cases and given the prevalence of idiosyncrasy, any judgments are quite tentative. Many cases telephoned into poison centers are summarily resolved by the administration of ipecac. More extensive reporting of cases, where professional or amateur mycologists are involved, is needed.

O. R. Collins, Department of Botany, University of California, Berkeley, CA 94720. Myxomycetes: Reproductive systems, speciation and phylogenetics.

Divergence of Myxomycetes from other eukaryotes probably occurred following introduction of syngamy and meiosis into the life cycle of ancestral amoeboflagellates. Most eukaryotes have lost the amoeboflagellate stage, but it is retained in Myxomycetes. A multiple asexual mating system would have been ideal for isogamous amoeboflagellate ancestors, so its existence in extant Myxomycetes is easy to explain. This sexual system is now combined with efficient asexual (apomictic) and vegetative reproductive modes. Selection for genes which permitted sympamy and meiosis to be bypassed, without prevention of plasmodium and spor production, marked a new level of reproductive sophistication. The same genes under different selection pressures probably also control reversion from an apomorphic to a sexual reproductive mode. Such a mechanism enhances chances of survival and opportunities for speciation through reproductive isolation. Reversible shifts between apomictics and sexuals in Didymium iridum (Physarales) and Stemonitis flavo-gena (Stemonitales) are known and their operation in seven additional Physaralean species in three genera is implied by apomorphic isolates in each of the seven species. Further, genetical and isozymal data for D. iridum show each apomict tends to be divergent from others as well as from sexuals. Conversely, interbreeding sexuals tend to show little divergence from one another. Inasmuch as biological diversification originates with divergences between members of the same species, I shall discuss our findings in the context of speciation and phylogenetics.
Cooper, J. O., see Ellzey, J. T.
Cotter, D. A., see Glaves, M. L.
Cotter, D. A., see Seshadri, J., et. al.
Currah, R. S., see Sigler, L., et. al.


Using correlations between ascospore sculpturing, degradative capacity, and mechanism of anamorph dehiscence, four families can be defined within the order Onygenales: Arthrodermataceae, Gymnoascaceae Onygenaceae and Myxotrichaceae. Most taxa with the ability to degrade keratin, formerly distributed between the Gymnoascaceae and Onygenaceae, have a distinct pitting pattern on the ascospore wall in addition to rhexolytically dehiscing conidia. These taxa comprise the Onygenaceae. Keratinolytic species with smooth ascospores and a tendency to form phragmocinidia are placed in the Arthrodermataceae. Cellulolytic species with smooth, or undulate-walled ascospores which often have polar and/or equatorial thickenings. Some are mildly cellulolytic but most do not have marked substrate preferences and anamorphs are rare.

Dimond, R. L., see Seshadri, J., et. al.
Dove, M. B., see Powell, M. J., et. al.

S. E. DUBOIS and R. W. SCHEETZ. Dept. of Biological Sciences, Univ. Southern Mississippi, Hattiesburg, MS 30506-5018. Localization of actin in spores and swarm cells of myxomycetes.

Spores possessed intense fluorescent foci when stained with nitro- benzoxadiazole-phallacidin (NBD-Ph). Fluorescent foci migrated to the spore periphery as germination proceeded. Germinated spores lost the discrete foci and showed no fluorescence once protoplast emerged. Fluorescence was lacking in unstained controls or controls extracted with KI. Actin may be involved in spore germination by moving enzymatic vesicles to the spore periphery during the germination process. The posterior region of the flagellate stage of Myxomycetes fluoresced when treated with NBD-Ph. The anterior region, encompassing the basal bodies and nucleus, showed little or no fluorescence. Presence of actin was confirmed using a KI extractant control. Disrupted negatively stained preparations viewed in the transmission electron microscope revealed a dense filamentous network that bound heavy meromyosin producing typical arrowhead-decorated filaments.

M. T. Dunn. Mycogen Corp., 5451 Oberlin Dr., San Diego CA 92121. Mycology in industry, applied research.

In the past industrial mycology has been somewhat in disfavor with many students of mycology because of its pedestrian aura. In fact deep tank fermentation of fungi for the production of antibiotics or industrial acids does indeed fit this conception. But today we find ourselves in the middle of a boom in biotechnology. Genetic engineering has brought advances made in basic research to the applied arena. Although much of this work has been with bacteria, yeast and filamentous fungi are gaining prominence in many situations. Advances in agricultural science has brought biological control of pests to the forefront in recent years. Companies are beginning to arise with the task of producing these biocontrol agents on a large scale. The production of these fungi is often not amenable to existing fermentation technology and therefore the future should provide an interesting platform from which new and diverse processes will be launched.

P. H. DUNN and D. R. REYNOLDS. Pacific Southwest Forest and Range Experiment Station, US Forest Service, 4955 Canyon Crest Drive, Riverside, CA 92507 and Natural History Museum, 900 Exposition Blvd., Los Angeles, CA 90007. Characterization of saprobic fungi which exist as obligate epiphytes.

Fourteen pure culture isolates of sooty molds from Florida, Louisiana, and California are studied. Individual and combined physiology and morphology data sets are compared as three-dimensional cluster patterns. The deuterocapnodiaceous genera Chaetasbolisia, Leptoxyphium, and Polychaeton represent the clustered isolates.

Dupler, M., see Elad, Y., et. al.
Duran, R., see Fuentes-Davila, G.

M. J. DYKSTRA. Anatomy and Radiology, University of Georgia, Athens, GA 30602. A structural comparison of gloeoplerous hyphae and gloeocystidia in Hericium and Clavicorona.

Cystidia are frequently utilized in taxonomy of the Holobasidiomycetes. They have had various functional roles ascribed to them over the last 200 years. Unfortunately, most of our understanding of cystidial structures is based on very few studies. This paper presents the genesis of an ongoing study of the structural characteristics of cystidia of various types. Future attempts will be made to relate the function of cystidia to their structure. Clavicorona and Hericium were examined in this study because DONK noted that their taxonomic placement in different families is based on positive vs negative geotropism more than on any cytological or developmental features. Hericium has a well-developed gloeocystidial population arising from gloeoplerous hyphae while Clavicorona has extensive gloeoplerous hyphae with far fewer cystidia. They both have an apparent transformation of lipid bodies in these elements into granular and then crystalline materials during the approach of cellular senescence. In Hericium most of the mature cystidia have fractured walls, lending some credence to the argument
that these are "excretory" structures as proposed by such authors as CLEMENSON. Wall structures in the two genera differ.

Y. ELAD, R. LIPSCHITZ, M. DUPLER and R. BAKK. Botany Department, Colorado State University, Fort Collins 80523. Scanning electron and light microscopy of interaction between Pythium nunn and several soil fungi.

Hyphal interactions between the recently described mycoparasite Pythium nunn and three species of Pythium, two species of Phytophthora, Rhizoctonia solani and Sclerotium rolfsii were observed by phase contrast and scanning electron microscopy. P. nunn produced thin, slender side branches that were appressed against the surface of host hyphae during the initial stages of parasitism. In later stages, two different types of interaction were observed. In one type, massive coiling around host hyphae and immediate disappearance of its cytoplasma was noted with Pythium ultimum and P. vexans; whereas, as with P. aphanidermatum and both Phytophthora cinnamomi, P. parasitica, S. rolfsii and young mycelium of R. solani, the mycoparasite partially encompassed host hyphae and either globular appressoria or infection pegs were formed. The mycoparasite occasionally penetrated host hyphae and partial degradation of cell wall material was observed in SEM micrographs. In vitro tests suggested that P. nunn was not parasitic to 10 species of fungi in eight genera which are members of the class Deuteromycetes.

J. J. ELLIS. Northern Regional Research Center, ARS, USDA, Peoria, IL 61604. Species and varieties in the Rhizopus arrhizus-R. oryzae group as indicated by their DNA.

DNA renaturation experiments suggest that many species in the Rhizopus arrhizus-R. oryzae group have been too narrowly defined on morphological or physiological characteristics. The extent of DNA relatedness among 11 authenticated strains and varieties of R. arrhizus, R. oryzae, R. delemar, and Amylomyces rouxii shows that all could well fit within the same species. A. rouxii is proposed as a variety on morphological characteristics even though DNA reassociation with R. arrhizus and R. oryzae showed a high degree of relatedness. R. delemar and its varieties minus and multiplicissporus as well as R. arrhizus var. delemar, R. chunkuensis var. isoferramentarius, and R. javanicus var. kawasakiensis all showed a very high DNA relatedness with one another but somewhat less with R. arrhizus. It is proposed that this latter group of names be referred to as variety delemar for the species based on morphological characteristics supported by extent of DNA relatedness. R. microsporus showed low DNA relatedness with the preceding species that clearly indicates it as a distinct species. It is concluded that the above species and varieties, exclusive of R. microsporus, can be accommodated in the following three taxa: R. arrhizus var. arrhizus Fischer, R. arrhizus var. rouxii (Kunt et Ceerl.) Ellis, and R. arrhizus var. delemar (Wehmer et Hanz.) Ellis.

J. T. ELLZEY and M. O. COOPER. Biological Sciences, University of Texas at El Paso, El Paso, TX 79968. "Viruslike particles" within hypovirulent and convert strains of Endothia parasitica.

Thin sections of freeze-substituted Endothia parasitica, Ep 67, Italian virulent strain; Ep 113, French hypovirulent strain; Ep 67F, a convert resulting from the cross between Ep 67 and Ep 113; and Ep 155F, a convert resulting from Ep 155 x Ep 113 were examined using transmission electron microscopy. Aggregates of "viruslike particles (VLPs)" were observed in the hypovirulent and the convert strains, but not in the virulent strains. The "VLPs" measured 31-80 nm in diam. Utilizing a polyethylene glycol extraction procedure followed by negative staining with 0.5% uranyl acetate, two subpopulations of spherical particles (21-42 nm in diam) and (52-92 nm in diam) were obtained from both the hypovirulent and convert strains. No such particles were isolated from the virulent strains.

Evans, R. C., see Stempen, H.
Fallon, R. D., see Newell, S. Y.
Federici, B. A., see Lucarotti, C. J.
Flannigan, B., see Apta, R.


Teliospores formed in profusion at room temperature when mycelium of Tilletia indica was isolated from artificially infected wheat kernels and grown on potato sucrose agar. Moreover, the sporogenous mycelium formed teliospores indefinitely, despite repeated subculturing. Early development stages of the fungus stained with BGL-Giemsa showed that the sporogenous mycelium was dikaryotic and had some cells which resembled clamp connections. Probasidia were terminal and intercalary and contained two nuclei presumed to be conjugately associated. Teliospores, however, contained one nucleus which suggested that nuclei in probasidia were haploid and fused during sporogenesis. Promycella contained hundreds of postmeiotic nuclei. One nucleus entered each primary sporidium but, after one or two mitoses, up to four nuclei separated by septa were seen in mature sporidia. In primary and secondary sporidia, and in sporogenous and somatic mycelia, three pairs of chromosome-like bodies were seen which suggested that n=3. Primary sporidia dissociated in culture, formed secondary, mononucleate, falcate sporidia or germated directly; secondary sporidia germinated by repetition or directly. Despite their multinucleate condition, the heterothallic nature of monosporidal lines was confirmed when tests showed that only paired lines of opposite mating type were pathogenic.
The phenylamides, namely metalaxyl or ridomil, were introduced in the late 1970's and are used systematically to control diseases caused by fungi in the order Peronosporales. Ridomil and SAN 371F are compared in vitro as to their influence on the growth and reproduction of Phytophthora palmivora, namely on sporangium release, spore behavior, encystment, germination, and hyphal growth. Until now the phenylamide fungicides were thought to be specific for members of the Peronosporales. Data will be presented to show that zoosporic fungi in vitro. Sensitivity may be correlated with capacity to synthesize sterols. The relationship of these studies to the mechanism of action of phenylamides will be discussed.

S. A. FULTZ, Dept. of Biological Sciences, Stanford University, Stanford, CA 94305.

A cold adaptation mechanism in Flammulina velutipes.

Patterns of soluble carbohydrate compounds are compared in four geographical isolates of F. velutipes grown at 25, 15, and 5°C. All isolates show increased concentrations of sugar alcohols at decreasing growth temperatures. In addition, there are compositional differences between the strains at 25°C that appear to correlate with site of origin; more northern strains have more polyols.


Exophiala pisciphilus McGinnis and Ajello was isolated from the brain lesion of the smooth dogfish, Mustelus canis (Mitchell), which was born in the shark exhibit at the New York Aquarium. This isolate grew best on Potato Dextrose Agar in complete darkness at 24-28°C. Retarded growth was observed in media with high salinities (i.e. 55 o/oo and above). Benomyl, a plant fungicide, inhibited hyphal development at 0.01 ppm and above; while conidia germination was not prevented, except at concentrations of 500 ppm and above. The normal developmental stages were studied by light and scanning electron microscopy over a 6-day period. Conidia germinated within 24-36 hr post-inoculation. By day-3, mycelium formation had started. Melanization began on day-4, which was followed by an initiation of aerial hyphae on day-5. After 5 days of development, the mycelium continued to grow in diameter and produced long aerial hyphae, which gave the colony a raised, blackish muzzy grey appearance.

Gilbertson, R. L., see Adaskaveg, J. E.
Gilbertson, R. L., see Blackwell, M.
Gilbertson, R. L., see Morse, J. C.
Gisi, U., see Fuller, M. S.

M. L. GLAVES and D. A. COTTER. University of Windsor, Ontario, Canada NSB 3P4. Isolation and partial identification of the autoactivator released during spore germination of Dictyostelium discoideum.

It has previously been shown that mutant or aged wild type spores of Dictyostelium discoideum are capable of spontaneously germinating. This phenomenon is called autoactivation and is accompanied by the release of stimulatory factors during spore swelling. The stimulatory factors have the ability to cause rapid and synchronous germination in subsequent spore populations. Simple bioassays were devised for the routine detection of these factors in post germination supernatants. The bioassays were also used to monitor concentrations of the factors during isolation and purification procedures. These factors, referred to as autoactivators, separate into two major peaks of activity when fractionated on Sephadex LH-20 columns (1.5 x 40 cm). Based on gel filtration studies with Sephadex LH-20, a stimulatory compound in the second major peak appears to have a molecular weight of slightly less than 1000 daltons. Exposure of either crude or partially purified autoactivator to gold or alkaline phosphatase for 60 minutes at 37°C results in a 50% to 70% decrease in stimulatory activity. This decrease in activity suggests that the autoactivator contains at least one exposed phosphate group which appears to be required for maximal stimulatory activity. Preliminary separation of the autoactivator from contaminating molecules using anion exchange HPLC, coupled with assay of the eluting fractions, indicates that the autoactivator is a derivative of adenine.

D. A. GLAWE. Department of Plant Pathology, University of Illinois, Urbana, IL 61801. Valsaria insitiva, in artificial culture.

Stromata of an Illinois collection of Valsaria insitiva (Tode: Fr.) Ces. & de Not. were soaked in water 3 h and allowed to forcibly discharge ascospores onto Difco potato-dextrose agar (PDA). Single and mass ascospore isolates were cultured on PDA and subjected to 10 h fluorescent light at 20°C followed by 14 h of darkness at 15°C per day. Ascospores germinated by producing yeast-like budding cells through irregular fissures in the cell walls; ascospores on host bark germinated similarly. In culture, the yeast-like cells continued to bud indefinitely, but eventually some produced germ tubes, resulting in mycelial colonies in which hyphae formed conidia from lateral, percurrently proliferating loci in a manner reminiscent of Exophiala Carm. Hyphal cells sometimes disarticulated to form arthropore-like cells. After approximately 2 wk colonies formed multicellular pyconidia which contained periclinally thickened phialides which often proliferated percurrently in an annellide-like fashion. Phialides sometimes underwent large proliferations in which the cell lengths were approximately doubled. The pycnidial state produced small, hyaline, oval conidia and resembled Cytosporaella Sacc. Implications of these findings will be discussed.

S. E. Gochenaur. Biology Department, Adelphi University, Garden City, New York 11530. Factors regulating the density of ascospores in soil.

Ascospores of an indigenous soil fungus (Coniochaeta nepalica) and an alien species (the coprophile, Sordaria fimicola) were placed on polyvinyl chloride...
The membranes were buried in the A horizon of an oak-birch forest for up to 210 da during the fall, winter and spring of 1982-83. The membranes were recovered at various intervals and per cent germination of the ascospores and rate of loss from the membranes determined. Even though the spores of both species showed no decrease in viability during burial, their life span in soil is very short than to grazing by soil animals. In addition, shifting of sand grains during freeze-thaw cycles ruptured approximately 15% of Sordaria's ascospores. The smaller spores of Coniochaeta were not affected.

Gochnaur, S. E., see Wiencek, S., et al.

L. P. GRAND. Dept. Plant Pathology, North Carolina State University, Box 7616, Raleigh, NC 27695-7616. Mycology in Plant Pathology.

Mycology is the foundation of Plant Pathology; indeed, Plant Pathology was once considered "Applied Mycology". Most Plant Pathology departments still require of students a sound background in Mycology. There is a growing trend toward the elimination of Mycology at many Universities. Positions are being filled by those with backgrounds in cell biology, genetic engineering, etc. This trend greatly concerns many Plant Pathologists, because if it continues the future of Mycology may rest almost entirely in Plant Pathology. Must Plant Pathologists provide the Mycology necessary for their students? Where will other students obtain their Mycology? Have we come full circle from de Bary? Plant Pathology as a final haven for Mycology provide security for our science (discipline). A slanted emphasis on plant pathogenic fungi however, is not the most desirable alternative. On the other hand, we might expect fewer name changes! If this trend continues, is Plant Pathology equal to the challenge?

Guarro, J., see Sigler, L., et al.

Richard T. Hanlin, Dept. of Plant Pathology, University of Georgia, Athens, GA 30602. The pedagogical ascomycete

The ascomycetes comprise a large and diverse group of fungi that can be used in the classroom to demonstrate a wide variety of biological principles and phenomena. Although the majority of ascomycetes do not produce ascocarps readily in culture, there are a number of species that do so reliably, and these can be incorporated into any biology curriculum, from high school to graduate courses. For those taxonomic groups that do not sporulate in culture, material freshly collected in the field can be used to supplement cultures. Emphasis is placed on working with living materials in the belief that students find them more interesting and more rewarding than dried specimens. cultured materials can also be manipulated to demonstrate phenomena of particular interest when desirable. Following a discussion of some of the mechanics of assembling and maintaining a selection of species suitable for classroom use, I will present some examples of what we can learn from these interesting fungi.

Harrison, J. A., see Jaworski, A. J.

E.F. HASKINS, A.A. HINCHENES* and M.D. MCGUINNESS. Department of Botany, University of Washington, Seattle, WA 98195. *Department of Pathology, St. Louis University Medical Center, St. Louis, MO 63104

The Amoebal and Protoplasmodial Cyst Phase of the Myxomycete Echinostelium minutum de Bary

Light microscopical, TEM, and SEM studies were performed on the encystment cycle of myxamoebae and protoplasts of Echinostelium minutum de Bary. The time course of encystment was documented using LM. The TEM and SEM studies indicated that amoebal and protoplasts share a number of characteristics: the cyst walls consist of a single, densely fibrous layer (TL); the cyst walls are convoluted into numerous folds (SEM); neither the amoebal nor protoplasts possess a preformed germ pore; the cyst walls of both phases undergo dissolution during excystment.

I.B. HEATH, K. RETHOFET and L.J. McKERRACHER. Biology Department, York University, 4700 Keele St., Toronto, Ontario M3J 1P3, Canada. Structure and functions of fungal cytoskeletons.

We have prepared fungal hyphae by conventional fixation, freeze substitution, freeze etching and critical point drying of polyethylene glycol embedded sections in attempts to fully identify the fungal nuclear and cytoplasmic skeletons. We have looked at migrating organelles, mitotic nuclei and tip growth. The comparative results of these observations will be discussed with respect to intracellular force generating systems and the relative adequacy of the respective preparation techniques.

M. C. HEATH. Botany Department, University of Toronto, Toronto, Ontario M5S 1A1, Canada. Some features of the development and composition of the haustorial neckband of Uromyces phaseoli var. vignae.

In sporulating colonies of the cowpea rust fungus, haustorial neckbands usually consist of two adjacent, electron opaque, rings encircling the neck of the haustorium. Energy dispersive X-ray (EDX) analysis of glutaraldehyde-fixed, unstained material revealed that the ring closest to the haustorial body usually is rich in iron, phosphorus, and chlorine while that closest to the haustorial mother cell lacks iron and is rich in chlorine and silicon. Calcium may be present in either ring. Only one, iron- and chlorine-rich, ring is present in the neckbands.
of young haustoria. Osmium post-fixation removes all detectable elements except iron from the neckbands of young haustoria.

D. E. HEMMES and T. E. STASZ. Biology Discipline and College of Agriculture, University of Hawaii at Hilo, 1400 Kapiolani Street, Hilo, HI 96720. Ultrastructure of fully-expanded and germinating sporangia of *Pythium ultimum*.

Fully-expanded sporangia of *Pythium ultimum* contain a protoplasm rich in functional organelles including nuclei, mitochondria, dictyosomes, rough endoplasmic reticulum and numerous unattached ribosomes. The cytoplasm also contains lipid bodies and dense-body vacuoles. However, the cytoplasm does not contain any preformed organelles or structures involved in zoosporogenesis such as peripheral vesicles, cleavage vesicles, or flagella. The sporangial wall of *P. ultimum* is thin, approximately 200 nm thick, and has numerous dense plaques in the outer third portion of the wall. In direct germination the inner, electron-transparent portion of the sporangial wall extends as the germ tube wall, and ruptures the outer dense portion of the wall. Relationships between sporangia of *P. ultimum*, converted oospores of *P. ultimum* and sporangia of other Pythiaceae fungi will be discussed.

R. P. HERMAN and Celi A. HERMAN. Water Resources Research Institute and Department of Biology, New Mexico State University, Las Cruces, NM 88003. Morphological changes induced in *Achlya caroliniana* by prostaglandin synthesis inhibitors.

We have previously demonstrated that aspirin and indomethacin, which block cyclooxygenase, the first enzyme in prostaglandin synthesis, cause growth inhibition, abnormal colony morphology, and suppressed reproduction in oomycetes. In this report we show that the abnormal ball shaped *Achlya* colonies result from an altered branching pattern established early in development. Control colonies grown in glucose, yeast extract, neopeptone medium (PYG) produce a loose mass of mycelium with relatively long intervals between branches. The colonies grown in PYG with 0.1 mM indomethacin are small and star shaped, with short intervals between branches. These branches in turn bear branches with a short inter-branch interval. The effect of indomethacin on colony morphology appears to be insensitive to the source of nitrogen or carbon. Three organic nitrogen sources and five carbon sources produce the characteristic colony in the presence of inhibitor. The suppression of reproduction by indomethacin is dependent on the timing of exposure to the drug. In general, colonies derived from propagules germinated in medium with indomethacin present showed no reproduction regardless of subsequent treatment. In contrast, cultures started in the absence of inhibitor can be induced to produce normal oogonia, antheridia and oospores by appropriate manipulation even in the presence of indomethacin.

C. W. HESSELTINE. Northern Regional Research Center, ARS, USDA, Peoria, IL 61604. Fungi, People, and Soybeans.

The use of soybeans in Asia goes back before the written historical record. The more important soybean fermented foods made with the use of fungi are shouyu, miso, tempeh, and sufu. The lecture will describe the research that has been conducted in the U.S. on these mold-fermented products. The interaction of scientific research between the U.S. and Asia has resulted in mutual benefits and understanding between the peoples of both regions.

TERRY W. HILL and R. G. WAGGENER. Department of Biology, Southwestern At Memphis, 2000 North Parkway, Memphis, TN 38112. Cellulase secretion by *Trichoderma reesei* is inhibited by anticalmodulin drugs.

*Trichoderma reesei* secretes an inducible complex of cellulolytic enzymes into its medium. *Myceilla* of *T. reesei* were induced to begin secretion in a medium containing 1 mM lactose, and the medium was assayed over time for the activity of endocellulase using a viscometric assay and carboxymethyl cellulose as a substrate. Secretion is blocked by introduction of the calmodulin antagonists trifluoperazine, color-pronazine, or W-5. Substituted analogs of these molecules are less effective in blocking secretion. The relative effectiveness of these drugs, when compared to their effects in other systems known to involve the function of calmodulin, indicates that calmodulin may function as a regulatory agent in some critical step in secretion of endocellulase by this fungus.

Hinchee, A. A., see Haskins, E. F., et. al.

WILLIAM E. HINTZ, JAMES B. ANDERSON, and PAUL A. HORGAN. Department of Botany, Mushroom Research Group, University of Toronto, Mississauga, Ontario, Canada, L5C 1C6. Partial characterization of mitochondrial DNAs from *Agaricus brunneascens* and *Agaricus bitorquis*.

Mitochondrial DNAs were isolated from three cultivated strains of the commercial two-spored mushroom *Agaricus brunneascens* (bisporus) and from eleven isolates of the four spored mushroom *Agaricus bitorquis*. Digestion of the fungal mitochondrial DNA with restriction endonucleases yielded numerous fragments. Summation of the fragment sizes gave a mitochondrial genome size of 89,000 base pairs (58 x 10^6 daltons) for *A. brunneascens* and 164,000 base pairs (108 x 10^6 daltons) for *A. bitorquis*. The restriction patterns, using a variety of endonucleases, were identical for all three isolates of *A. brunneascens*. The eleven isolates of *A. bitorquis* demonstrated heterogeneity in their restriction patterns and have been tentatively assigned into five groups. A partial restriction map of *A. brunneascens* mtDNA has been constructed and the gene arrangement of the ribosomal RNAs and cytchrome b are currently being determined using cloned probes from *Neurospora crassa*. Furthermore, the extreme difference between the genome size of the *A. brunneascens* and *A. bitorquis* is being analyzed by DNA-DNA hybridization.
Hips, L. E., see Allen, M. F.

H. C. HOCH and R. C. STAPLES. Department of Plant Pathology, New York State Agricultural Experiment Station, Cornell University, Geneva, NY 14456 and Boyce Thompson Institute, Ithaca, NY 14853. The microtubule-microfilament (F-actin) network of uredospore germings of Uromyces phaseoli.

Initiation of cell differentiation (apressorium formation) and mitosis in uredospore germings of U. phaseoli can be induced by either topographical or chemical signals. Recent evidence that microtubules and microfilaments might be involved in mediation of these signals has prompted us to develop protocols for studying this network. F-actin, visualized using rhodamine-conjugated phalloidin, occurred as: (i) filaments, located throughout the germ tube, especially in the more basipetal region; and (ii) peripheral plaques, positioned near the periphery of the cell's cytoplasm; and (iii) nuclear inclusions, located within the nucleoplasm subjacent to the spindle pole body (SPB). Electron microscopy of freeze-substituted hyphae revealed similar profiles of F-actin-like filaments. Treatments with KI, phalloidin, and cytochalasin E substantiated that the fluorescently labelled sites were F-actin. Microtubules (Mt's) were observed by indirect immunofluorescence microscopy using a yeast antitubulin. The Mt cytoskeleton was visualized throughout the cytoplasm, oriented parallel to the longitudinal axis of the cell. Repolymerization of Mt's following depolymerizing treatments (e.g., cold, nocodazole, demecolcine) showed that the microtubule organizing center in Uromyces hyphae in G1 are in the hyphal tip and not at the SPB's of the nuclei.

Hoch, H. C., see Ton-That, T. C.
Hocking, A. D., see Pitt, J. I.
Homola, R. L., see Longcore, J. G., et al.
Horgen, P. A., see Horton, J. S.
Horgen, P. A., see Meyer, R. J., et al.
Horgen, P. A., see Mohan, M., et al.

B. W. HORN. Northern Regional Research Center, ARS, USDA, Peoria, IL 61604. Association of Candida guilliermondii with amylolytic filamentous fungi on preharvest corn.

In sampling corn at harvest in Georgia, Candida guilliermondii var. guilliermondii was found to be the dominant yeast, comprising 47-47.0% of total fungi based on dilution plating. Populations of C. guilliermondii were confined primarily to visibly moldy kernels infected with filamentous fungi, of which Fusarium moniliforme and Aspergillus flavus were prevalent. When grown in liquid shake culture, C. guilliermondii was unable to utilize starch. Growth of the yeast increased considerably when associated with amylolytic F. moniliforme and A. flavus. Utilization of starch hydrolyzates by C. guilliermondii in mixed cultures was reflected by both a decrease in reducing sugars and a reduction in growth of F. moniliforme and A. flavus. The lowering of culture pH by F. moniliforme and A. flavus did not stimulate yeast growth. The association between C. guilliermondii and amylolytic filamentous fungi on preharvest corn may be considered commensalsitic. Insect vectors may be important in maintaining this association.

J. S. HORTON, P. A. HORGEN. Department of Botany, University of Toronto, Erindale Campus, Mississauga, Ontario, L5L 1C6

Demonstration of a pheromonally-induced polypeptide during sexual morphogenesis in Achiya ambisexualis E87

Sexual reproduction in Achiya ambisexualis, a member of the Oomycetes, is mediated by a group of at least two steroid pheromones. In the present study antheridiol, a pheromone constitutively secreted by female strains, has been shown to induce the qualitative synthesis of a 64,000 dalton polypeptide in 3 male strains of Achiya. Two-dimensional gel electrophoresis and autoradiography have demonstrated that this induced polypeptide is basic in nature, with a pI of at least 8. Experiments using the RNA synthetic inhibitor actinomycin D suggest that the polypeptide is transcriptionally regulated. The synthesis of the induced polypeptide occurs throughout male sexual morphogenesis (as induced by female A. ambisexualis strain 734) and the lack of synthesis during induced vegetative branching suggests a role for the polypeptide specific to the male sexual cycle in Achiya. Immunological and in vitro translation studies are now in progress in an attempt to gain a better understanding of the regulation of this polypeptide.


Freeze-substitution is a fixation method for electron microscopy. The method is easy and ideally suited for application to fungi grown either as a monolayer or in suspension. Fixation is achieved by rapid freezing followed by reaction of chemicals with the frozen specimen. Sections reveal structures that do not exist after standard glutaraldehyde/OsO4 fixation as well as structures that appear different from what we are accustomed to seeing. Freeze-substitution allows one to analyze "better artifacts". However, not all of the artifacts are representative of living cell structure. An alternative to these methods is to eliminate fixation, and cell death, all together. Video-enhanced contrast, differential interference contrast microscopy (Allen, et al. Cell Motil. 1:291, 1981) is a valuable tool for studying living cells. Taking advantage of the difference in the way the eye and the video camera "perceive" contrast, this system permits observation of objects that are smaller than the theoretical limit of resolution of the light microscope. Fast intraphyal vesicle transport, intercellular movement of particles through dolipore septa and the rapid production of vesicles by Golgi body-like cisternae can be seen and recorded on videotape for further study.
In both species, the growth rates in axenic peptone-yeast extract agar supplemented with heat-killed bacteria.

Plasmodia and myxamoebae of the slime molds Stemonitis flavogena and Didymium iris have been grown axenically on PY agar (1g peptone, 2.5g yeast extract, 2.5ml of 0.4 M MgSO4.7H2O, 0.5ml of 0.5 M CaCl2, 20ml of pH 6.5 phosphate buffer and 965 ml of distilled water) supplemented with heat-killed (80C for 10 minutes) Escherichia coli. Although Didymium iris has not yet been sporulated in axenic culture, Stemonitis flavogena can be grown from spore to spore on PY medium without supplementation with heat-killed bacteria. In both species, the growth rates for myxamoebae are equal to that observed in live bacterial cultures while the rates for plasmodia are significantly lower. However, plasmodial growth can be enhanced by the addition of liver extract (1%) and hematin (6ml of 0.25% in 1% NaOH) to the PY medium. On the other hand, while the addition of 1% glucose or sucrose to PY agar produces dense myxamoebal populations, it is highly inhibitory to plasmodial formation and growth.

Recent senescence in axenic cultures of Physarum polycephalum.

Physarum polycephalum grown as microplasmodia in axenic shake culture has generally been considered to lack a specific lifespan. Yet transfers of microplasmodia to axenic and non-axenic (bacterial associate added) surface cultures have been reported to undergo senescence in a regular manner indicative of a determinate lifespan. When subcultures of our aux2 and aux4 isolates of P. polycephalum, which have been grown for over four years in axenic shake culture, were transferred to non-axenic surface culture they displayed progressively shorter lifespans (older axenic cultures yield shorter lived non-axenic cultures). Similar subcultures transferred to axenic medium also underwent senescent-like events. These subcultures, after a period of vigorous growth, displayed a slower growth rate, reduced plasmodial streaming, less yellow pigment and eventually fragmented into a number of small spherical structures with the concomitant lysis of most of the plasmodium. In non-axenic culture these spheres quickly degenerate and disappear from culture, however, in axenic surface culture they revive and after several days produce new vigorous plasmoidia. Following this period of vigorous growth the plasmodium will again undergo senescent-like events. This cycle of senescence and growth has been repeated many times in several cultures over a period of months. We have also been able to isolate a subline from the aux2 culture which no longer undergoes this senescent phase and is apparently truly immortal.

Cottonseeds apparently infected with Aspergillus flavus were harvested from field-grown plants in Arizona. A. flavus contamination was confirmed by plating surface-sterilized seed portions on potato dextrose agar. The remaining seed portions were processed for transmission electron microscopy (TEM). Ultrathin sections of cottonseeds were observed and hyphae were localized in the following areas: associated with cotton fibers, in most of the layers comprising the seed coat, and in the embryo. As controls, laboratory-grown cultures of A. flavus and apparently uninfected cottonseeds were observed by TEM. Light microscopy studies to locate A. flavus in cottonseed are in progress.

Zoospores of Blastocladia emersonii contain mRNA which must be translated during germination before a tube will develop. Zoospore mRNA is synthesized during growth phase and late sporulation. Sporangia treated with 2 ug actinomycin-D at 210 min into sporulation (T210) will release zoospores but these cells will not produce germ tubes when induced to germinate.

Actinomycin-D given to sporangia at T210 causes a 50% decrease in the incorporation of 35S-methionine or 3[H]-leucine into proteins synthesized between 20 and 40 min into germination. However, the level of incorporation is identical compared to control cells when actinomycin-D is given during germination. Analysis of these proteins on 2-dimensional SDS-PAGE gels revealed similar patterns for cells from sporangia treated with actinomycin-D compared to cells treated with actinomycin-D during germination or untreated control cells. The most obvious difference in the patterns was the increased intensity of some spots in the autoradiograms from cells released from sporangia treated with actinomycin-D. These results indicate the zoospore mRNA synthesized during growth and late sporulation are both translated during early germination but it is the late sporulation mRNA that is responsible for germ tube formation. Supported by NSF grant PCM-8309775.
if any differences exist among the species. The patterns of cressor development are essentially similar, although there are slight differences. Some of the species have a trach, providing a possible diagnostic tool at the species level. Another difference so far determined among the species is the ascus tip structure. The details of meiosis and spore formation seem essentially the same throughout the tribe.

Kapusta, L. A., see Arnold, P. T.

Harold W. Keller. Department of Biology, The University of Texas at Arlington, Arlington, TX 76019

Taxonomy of the Myxomycete Arcyria nigella.

Arcyria nigella was first described by Y. Emoto in 1928 from two field collections made from dead trunks of Rhamnella franguloides in the Botanical Garden of the University of Tokyo. These specimens were obtained recently through a loan from the National Science Museum, Ibaraki, Japan. These collections were compared with Emoto's description and with nine additional collections from Ohio that all developed on bark from living Juniperus virginiana and Taxodium distichum placed in moist chambers. The following species description is based on the Ohio collections. Sporangia gregarious in groups of 2-20, stipitate, broadly ovate to short-cylindrical, 0.28-0.68 mm in diameter, 0.7-1.1 mm in total height, olivaceous to dull green or dull gray; stalk short, 0.15-0.3 mm in height, light-colored often weakly developed and interlaced with fiber-like strands or filled with spore-like cells; calyptra extending 1/3 to 1/2 the total height of the sporangium proper, bowl or vase-shaped above, tapering into a stalk below, the outer surface smooth and pleated, the inner surface marked with conspicuous r ticulations bearing prominent papillae; capillitium strongly adhering to the margin and center of the calyptra, scarcely elastic, the threads 3-6 um in diameter marked with reticulations and spinous processes; spores dark olivaceous to dull green in mass, almost hyaline by transmitted light, minutely roughened, 9-10 um in diameter. This species is separated from all other members of the genus Arcyria by its usually dark olivaceous color and its deep calyptra.

Harold W. Keller and Jean D. Schonreck. Department of Biology, The University of Texas at Arlington, Arlington, TX 76019 and Department of Life Sciences, Indiana State University, Terre Haute, IN 47805.

Licea fimbriata: a coprophilous myxomycete species with uncertain taxonomic affinity.

Licea fimbriata was collected in 1929 on horse dung in laboratory culture by Dearness and Bisby and described in the "Fungi of Manitoba." This species was for many years confused with and gathered at Winnipeg, Manitoba. It is now known from Oklahoma and Colorado in the U.S., as well as Kenya and Mongolia. It is apparently restricted to the dung of herbivorous animals. Moist chamber cultures of cow dung collected from the Pawnee National Grassland in Colorado have yielded abundant plasmodia and fruticules. Plasmodia were transferred to water agar and observed until sporulation. The pale orange-yellow phaneroplasmata has then a fan-shaped, three-dimensional, advancing feeding edge, and trailing reticulate veins in which the proplasm undergoes rhythmic, reversible streaming. Sporulation gener-

ally produces clusters of 20 to 30 fusiform sporangia. Microscopic examination of sporangia revealed short capillitial threads attached to the inner sporangial wall. Energy dispersive spectroscopy detected relatively high amounts of calcium in the peridium of L. fimbriata. The genus Licea is based largely on the absence of a capillitium and to a lesser degree the presence of a protoplasmodium. The presence of a capillitium, a phaneroplasmata, and detectable amounts of calcium would argue for removal of Licea fimbriata from the Liceales and recognition of a new genus in either the Physarales or the Trichiales.

L. L. Kinkel and J. H. Andrews, Plant Pathology Department, University of Wisconsin-Madison, Madison, WI 53706. Fungal Colonization of Leaf Surfaces.

From emergence until abscission, leaves are insular habitat patches for colonization by fungi. Habitat area and "quality" change as leaves grow. Fungal population sizes and species number at any time reflect a dynamic balance among the competing processes of immigration, emigration, reproduction, and death. Population density appears to be bimodal over time, peaking first as buds swell, and again about 5 months later, on mature leaves. In practice, it is difficult to distinguish immigrants (species which have arrived, but are perhaps in a dormant form or are transient) from colonists (inhabitants which grow and may reproduce). There is some evidence for a successional pattern, but this is disrupted by repeated, unpredictable disturbances such as storms. Species immigration rates of fungi to leaf surfaces are initially high and progressively decline, as determined by exposing surface-sterilized leaves or sterile apple seedlings to the orchard air spora. A fluctuating species equilibrium appears to be reached within 2-4 weeks after exposure. Sampling constraints complicate the description and analysis of phylloplane microbial communities.

M. A. Klich. U. S. Department of Agriculture Southern Regional Research Center, P. O. Box 19687 New Orleans, LA 70179. Ecological studies on the entry of Aspergillus flavus into developing cotton plants.

An understanding of the mode of entry of Aspergillus flavus into cotton plants and seeds may lead to practical field control measures for this highly toxigenic fungus. Field and greenhouse studies have shown that entry may take place through newly exposed cotyledonary leaf scars and involucral nectaries. The fungus may then move upward through the plant into the seeds. This process of entry and movement of A. flavus is strongly influenced by the developmental and physiological state of the plant. Drought stress greatly increases the probability of seed contamination. Bolls from flowers blooming during the early and middle parts of the peak flowering period are more likely to contain A. flavus in their seed than the seed of bolls from flowers blooming at other times.

Robert D. Koehn. Department of Biology, Southwest Texas State University, San Marcos, Texas 78666. Amphibious hyphomycetes of the Guadalupe River.

A one year study of the Guadalupe River in South Central Texas has revealed that it supports the growth and sporulation of 23 species of amphibious
Water and leaf samples were taken each month from 4 sites along the river. At each site the greatest species richness occurred when the water temperatures were lowest. In this area of Texas, the greatest organic input also occurs during the coldest time of year when leaf abscission from riparian vegetation is greatest. When the results of this survey are compared with previous results for the constant temperature San Marcos River, similar seasonality of many of the species is evident. Therefore, seasonal fluctuations of these fungi is more dependent on substrate availability than on the physical conditions of the river water. Lunnulosa curvula Ingold is present throughout the year and is most common. Tetracladium marchal H. DeWild is also abundant during the fall and winter. Lemonniera aqautica DeWild was present at each site but seemed more prevalent in the spring and summer months. Presence of 10 other species occurred sporadically throughout the year. Submerged, decaying leaves from 8 species of trees were collected during the study, but none of the fungal species appeared to prefer a specific substrate.

K. H. LAVOIE. Biology Department, University of Michigan-Flint, Flint, MI, 48503.

Competitive interactions among fungi and invertebrates: A manipulative study of dung decomposition.

Early fungal species can compete with invertebrates for the use of dung by the physical interference of their hyphae and/or by exploitatively tying up resources in an unavailable microbial pool. The presence of fungal hyphae was able to reduce dung use by flies and/or beetles as indicated by lowered reproductive output. The interference effect was most severe when the hyphal mat was the densest and declined as the hyphae senesced or were manually removed. Dung form was altered without affecting the total amount of dung material. The form of the dung influenced development of the hyphal mat and affected the number of times an invertebrate had to deal with the hyphae to gain access to X amount of dung resource. Dung form also influenced dung use by the fungi, with a higher surface area to volume ratio allowing more fungal growth and a greater depletion of resources in the dung available to invertebrates.

DONALD F. LEWIS and JOHN H. ADLER. Department of Biological Sciences, Drexel University, Philadelphia, PA., 19104.

Sterol Composition of the Fungus Cultivated by the Leaf-Cutting Ant Atta cephalotes isthmicola.

The essential sterols required by insects are acquired either through their diet or from symbionts, and in the case of this leaf-cutting ant are presumably supplied by the fungus. The dominant sterols in the bodies and nervous system of this ant are \( \Delta^5,7,24(28) \)-methylcholostriatrienol, 22-dihydroergosterol and ergosterol in a 65:23:10 ratio. Since this ratio is atypical of the sterol composition found in most higher fungi, the fungus was isolated from a 10 year old ant-maintained laboratory fungus-garden cultivated on several media. In all cases the dominant sterol was ergosterol (24 \( \Delta \)-methylcholesta-5,7,22 trans-trien-3 \( \Delta \)-ol). This was confirmed by GLC, analytical HPLC, mass and \( ^1H \) NMR spectroscopy.

C. Y. Li, M. A. Castellano, and J. M. Trappe. Forestry Sciences Laboratory, Pacific Northwest Forest and Range Experiment Station, Corvallis, OR 97331

Acetylene-reducing nitrogen-fixing bacteria isolated from sporocarps of two ectomycorrhizal Basidiomycotina.

Two different dinitrogen-fixing bacteria were isolated in nitrogen-free pure culture from the interior of surface-sterilized Sullus ponderosus and Hygmo-gaster parksi sporocarps. Both bacteria were aerobic chemoheterotrophic Gram-negative rods. Under microaerophilic conditions (15% nitrogen, 99% oxygen) in nitrogen-free media with a water extract of H. parksi sporocarp, both bacteria grew well and reduced acetylene and thus presumably can fix molecular nitrogen. No growth occurred for either bacterium without the sporocarp extract. Also, acetylene reduction occurred only in the presence of the sporocarp extract under microaerophilic conditions. H. parksi sporocarp extract stimulated growth of the bacterium isolated from S. ponderosus more than that isolated from H. parksi.

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Lifehitz, R., see Clad, Y., et al.

Lingle, W. L., see Porter, D.

LoBuglio, K. J., see Wang, C. J. K., et al.

D. J. LODGE Center for Energy and Environment Research, G.P.O. Box 3682, San Juan, P.R. 00936.

Possible competition among VA-endomycorrhizal and ectomycorrhizal fungi for Populus deltoides roots.

Fine roots (<2mm) of Populus deltoides Bartr. (eastern cottonwood) were sampled in North Carolina, Iowa, and Illinois (120 trees) and percentages of no-

mycorrhizal, VA-endomycorrhizal, ectomycorrhizal, and dually-infected root lengths were calculated from 200 grid intersect points (1m total root length) each. Terminal and non-terminal roots were tailed separately. In addition, cuttings of a cottonwood clone were field-infected, transplanted and grown under similar soil nutrient and moisture conditions and then sampled. Field samples were screened for the presence of six ectomycorrhizal morpho-types; each morpho-type was categorized as to apparent interference (+/-) with endomycorrhizal infection. Four major findings  

Lakhanpal, T. N., see Cavender, J. C.
suggest competition among some ecto- and endomycorrhizal fungi for terminal roots. 1. Dual infections were significantly lower in trees with interfering morpho-types than in trees with only non-interfering morpho-types. Reductions of dual infections from expected (based on random assortment) were intermediate in trees with mixed + - interference types. 2. Percentages of ecto- and endomycorrhizal root length were negatively correlated, except where infections were sparse. 3. Ectomycorrhizal fungi were predominantly on terminal roots, and high levels of endomycorrhizal infection were related to depression of endomycorrhizal infection in terminal as compared to non-terminal roots within the same tree. 4. Percentages of endo- and endomycorrhizal root length were negatively correlated in cottonwood cuttings grown under similar soil conditions.

JOYCE C. LONGCORE, RICHARD L. HOMOLA and JOAN L. BROOKS. Botany Department, University of Maine, Orono, ME 04469. Fungal Flora of a Sphagnum Peat Wastewater Treatment System.

We are attempting to identify the fungi in a sphagnum peat, on-site wastewater treatment system in Maine. Peat samples are removed monthly at 3 depths from 3 locations of the experimental filter field, which has functioned effectively for 5 years since construction. Fungi are recovered by plating on various media and by baiting techniques. Imperfects, yeasts, actinomycetes, chytrids and oomycetes have been isolated during the first months of this NSF-funded study. Illustrated, with emphasis on zoosporic fungi.

Lorea, F., see Arroche, R. Ma.

C. J. LUCAROTTI and B. A. FEDERICI. Department of Entomology, University of California, Riverside, CA 92521.

The ultrastructure of the meiospore of Coelomomyces dodgii Couch (Blastocladiaceae, Chytridiomycetes).

The ultrastructure of the meiospore of Coelomomyces dodgii is typical of the Blastocladiaceae. The nucleus is centrally located and conical in shape, and at the base there is a spur that curves back towards the large plate-like mitochondrion. At the flattened anterior of the nucleus there is a double membrane bound cap of ribosomes. Approximately nine lipid globules are partially embedded in the mitochondrion and are covered by a fenestrated microbody. The kinetosome is at the base of the nucleus and is connected to a single, posterior, whiplash flagellum. A non-kinetosomal centrole and terminal plate are absent. A paracrystalline body is present in the peripheral cytoplasm.

E. S. LUTTRELL. Department of Plant Pathology, University of Georgia, Athens, GA 30602.

Intercellular and intracellular mycelium in galls of some smut fungi on cereals.

The mycelium is entirely intercellular in Tilletia caries, cause of bunt of wheat; inter- and intracellular in Tilletia nuda, cause of loose smut of barley; largely intracellular in Tolyposporium penicillarii, cause of kernel smut of pearl millet; and entirely intracellular in Ustilago maydis, cause of common smut of corn. Intra- cellular hyphae penetrate directly through host cell walls without constriction. The host plasmalemma on the entry side is pushed back until it fuses with the plasmalemma on the exit side. An encasement resembling host cell wall material which is laid down in the interfacial zone around the hypha forms a tube extending from wall to wall of the traversed cell. There are no haustoria. Prior to teliospore formation hyphae mass in cavities in the galls. The cavities may arise primarily from disintegration of galled host cells or primarily from differential growth of infected host tissues. The term intercellular is hardly appropriate for the mycelial masses in these cavities. Interlaminar might be a better term.

R. W. MARTIN and C. E. MILLER. Department of Botany, Ohio University, Athens, OH 45701. Sexuality and resting body development in Olpidiopsis varia (Lagenidiales, Olpidiopsidaceae).

Sexual thalli of O. varia were observed by electron microscopy using conventional methods. The antheridium and oogonium developed as spherical thalli inside their host. An ornamented outer wall surrounded both antheridium and oogonium as development proceeded. Large lipid bodies, many vacuoles and osmophilic bodies contributed to most of the volume of the oogonium. The antheridium possessed few lipid bodies and several nuclei in the cytoplasm. Prior to sexual fusion the nuclei of the antheridium and oogonium underwent simultaneous, synchronous nuclear divisions. About 14 per cent of the nuclei in the antheridium and 29 per cent of the nuclei in the oogonium were eliminated. In early division stages nuclei possess axial filaments similar to those usually found in prophase I of meiosis. During the latter stages of division, peripheral vacuoles in the antheridium expanded and cytoplasmic vacuoles of the oogonium enlarged. The antheridial cell produced a penetration tube which punctured the oogonial wall and eventually disintegrated. The peripheral vacuoles of the antheridial cell continued to expand while the cytoplasmic contents entered the oogonium. A plug of wall material was present at the site of cytoplasmic entry after sexual fusion. The influence of temperature and host nutrition on resting body development was also examined.

W. Wallace Martin. Department of Biology, Randolph-Macon College, Ashland, VA 23005. Dynamics of aquatic fungi parasitic in midge eggs.

Recent publications have described Catenaria spinosa, Catenaria ramosa, Catenaria unicinata, Aphanomyces sexualis, Atkinsiella entomophaga, Couchia circumplexa and a Plasmodiophora-like organism as parasites in the eggs of midges (Chironomidae). These fungi as well as undescribed species of Couchia and unidentified water molds are important in the natural control of midge populations in Virginia and neighboring states. During a two-year study of collections of midge egg masses from over 400 Virginia lakes, rivers and streams, 10.8-18.2% of midge eggs were killed by various categories of fungi and unknown factors. In a three-year study of the dynamics of aquatic fungal parasitic in a lotic community of Chironomus attenuatus mortality rates in the eggs ranged from 28.8% to 41.4%. A year-long study was carried out at a small pond in which egg masses of Glyptotendipes lobiferus and Endochironomus nigricans predomi-
The rate of mortality varied from 29.9% in eggs of G. lobiferus to 7.2% in eggs of E. nigricans and 17.5% in eggs of all other midge species combined. In the two latter studies Catenaria and Couchia were responsible for the greatest amount of infection during each year and appeared and disappeared in response to changing water temperatures. In the stream study combined rainfall amounts over the three-year period showed significant negative correlations with numbers of egg masses and prevalence of disease.

Mattox, K. R., see Stewart, K. D.
May, G., see Taylor, J. W., et. al.
McFarlane, G. B., see Apta, R.
McGuinness, M. D., see Haskins, E. F., et. al.
McKerracher, L. J., see Heath, I. B., et. al.

K. B. McNVIGHT, Department of Botany, University of Michigan, Ann Arbor, MI 48109
The adaptive morphology of Flammulina velutipes (Agaricales) with respect to relative humidity.

Twelve isolates of Flammulina velutipes (Curt. ex Fr.) Singer obtained from widely separated populations on three continents were compared in a genotype X treatment experimental design. Relative humidity during sporocarp maturation and spore production was the treatment factor. Significant differences were observed between genotypes and between treatments for number and size of spores, number, size, and weight of sporocarps, phenology of sporocarps and various micromorphological characters. The possible adaptive value of the observed variation will be discussed.

McLaughlin, D. J., see O'Donnell, K. L.
McLaughlin, D. J., see Yoon, K. S.
Meyer, R., see Mohan, M., et. al.

R.J. MEYER, M. MOHAN, J. ANDERSON, and P.A. HORGEN, Department of Botany, University of Toronto, Erindale Campus, Mississauga, Ontario, L5L 1C6.

Molecular cloning of plasmid-like DNAs of Agaricus bitorquis

Mitochondria of strain Ag4 of Agaricus bitorquis contain plasmid-like DNAs that are of two sizes: 4.0 kb (pMPJ) and 7.5 kb (pEM). The results of restriction analysis suggested that pEM consists of two different plasmid-like DNAs with the same molecular weight (pEM1 and pEM2). Entire copies of pEM and pMPJ are being cloned into bacterial plasmids pBR322 and pDPL13. Blunt-ended inserts were ligated into the SmaI site of pDPL13. Inserts with added PSTI linkers were ligated into the PSTI site of pBR322. The results will conclusively demonstrate whether pEM consists of two different plasmid-like DNAs. Cloning these plasmid-like DNAs is the first step in exploring the possibility of using pEM and/or pMPJ as transformation vectors in the commercially important Agaricus.

J. DAVID MILLER. Chemistry and Biology Research Institute, Agriculture Canada, Ottawa, Ontario, K1A OC6

Fusarium graminearum toxins in wheat and corn.

Various authors have stated that Fusarium head blight occurs in moist weather with either warm or cool temperatures, or that warm dry weather is required. Different cultivars of wheat may be susceptible at different stages of plant development. No satisfactory conclusions can be reached from such conflicting information, perhaps because few researchers have considered the effect of differential virulence of the Fusarium strains in the field and their ability to produce 'mycotoxins'.

Recent experiments have attempted to quantify the formation of deoxynivalenol and other Fusarium toxins in experimental infections of wheat and corn. The data indicate that plant enzymes affect the chemical structure and concentrations of trichothecene mycotoxins expressed by the invading fungus. Resistant wheat cultivars have numerically high fungal biomass to deoxynivalenol ratios and the converse is true for susceptible cultivars. These results complicate Wicklow-Janzen theories of the ecology of mycotoxins specifically relating to Fusarium graminearum toxins.

S. L. Miller and O. K. Miller, Jr. Dept. of Biology, Virginia Polytechnic University and State University, Blacksburg, Va, 24061. Reproductive biology of some hypogeous fungi.

Most hypogeous fungi which form sporocarps at or below the ground surface are confirmed or putative mycorrhizal formers. In addition, many hypogeous fungi contribute much to small mammal dietary intake. Spores from these fungi are thus concentrated in fecal pellets and disseminated. The biology of propagule production, dissemination, viability, and germination has not been fully examined. Sporocarps of Cauteria, Rhizopogon Leucogaster, Hymenogaster, Zelleromyces, and Tuber spp. were collected fresh and portions of the tissue fixed. Spore viability was tested using vital staining techniques. Treatments such as mycophagy, freezing, dessication, rainwater application, and nutrient supplementation were used to determine the effect of natural phenomena on spore viability. Germinability was tested using a variety of media, and physical and biochemical stimulants. Fixed tissue was embedded in plastic and examined with light and electron microscopy. Nuclear staining of spores and tissue was accomplished using multialum hematoxylin. Our results indicate that many hypogeous fungal spores are multi-celled or multinucleate, and possibly homothallic. Asexual propagules are much more common than previously believed. Viability and germination of propagules is not affected by passage through small mammals, but is induced by natural phenomena. The reproductive biology of hypogeous fungi is discussed in relation to seasonal environmental and ecological processes, and the mycorrhizal habit.

Miller, C. D., see Martin, R. W.
Miller, O. K., see Miller, S. L.
Mims, C. W., see Sherman, J. D.
C.W. MIMS. Dept. of Biology, S.F. Austin State Univ., Nacogdoches, TX 75962. The future of mycology in academia.

In my opinion mycology can have a bright future in academia although such a future is certainly not guaranteed. At this time, in fact, I believe that mycology is actually losing ground in many institutions. Most of us are aware of declining enrollments in mycology and have observed instances in which a mycology position has been phased out when the "resident mycologist" either moves, retires, dies or assumes full time administrative duties. If the department is allowed to fill the position often the person hired is not a mycologist and the departmental mycology course dies. This is, of course, not a desirable sequence of events as far as mycology and mycologists are concerned. To reverse this decline in mycology and insure a sound future for the science in academia, I believe that mycologists need to do two things. First we must work to convince nonmycologists of the benefits resulting from the presence of one or more mycologists in their department. Secondly we must update our courses to include new and pertinent information that will capture the interest and imagination of undergraduates. Outstanding students must be identified early and guided into graduate programs that will train them not only as mycologists, but also give them other "state of the art" skills that so many academic departments are looking for. Thus equipped the new mycologist will be more competitive in the current job market.

J.K. MISRA, Kavak Shadh Ekai(Mycological Research Unit), Department of Botany, Sri Jai Narain Degree College, Lucknow 226001 India.

Fungi from the plant detritus under alkaline water and their ecology.

Collection and isolation of fungi from the decomposing plant parts under alkaline aquatic habitat have been made using various techniques. A total of fifty five species belonging to twenty nine genera were obtained. Of these 36 genera belonged to geofungi while the rest three to aquatic fungi. The result indicated substrate relationship/preference among the fungal forms recovered, besides having relationship with other factors of water.

Many of the fungal forms also showed their active growth on the decomposing material when collected. Nutrient source and the nature of the available substrate besides the physico-chemical factor of the water appear to play decisive role on the ecology, nature and activity of fungi in the habitat studied.

Mohan, M., see Meyer, R. J., et. al.

M. MORAN, R. MEYER, J. ANDERSON, and P.A. HORGEN, Department of Botany, Mushroom Research Group, University of Toronto, Erindale Campus, Mississauga, Ontario, L5L 1C6

Evidence for three distinct plasmid-like DNA components in the mitochondria of Agaricus

In the examination of over twenty-five isolates of both Agaricus brunnescens (bisporus) and A. bitorquis for polymorphism in the mitochondrial genomes, we observed an extreme divergence in the comparative restriction maps of one A. bitorquis isolate. Upon closer examination, it became apparent that two unique linear plasmid-like DNA components were localized in the isolated mitochondria of A. bitorquis (strain Ag4): pEM (7.5 kilobases) and pHPJ (4.0 kilobases). Restriction endonuclease digests indicated that pEM consisted of two distinct components, both 7.5 kilobases in size, but with uniquely different restriction sites and copy number within the mitochondria. Denaturation and partial renaturation of pEM, and pEMg mixtures followed by electron microscopy indicated regions of inverted repeated sequences on the pEM genomes. Replacement labeling of the pEM plasmid-like DNA provided a probe for hybridization studies. No homology was detected between the pEM plasmid like DNAs, and the Ag4 nuclear or the Ag4 mitochondrial genomes. Furthermore, no hybridization was detected between the pEM components and pHPJ. These data suggest independent replication of all three plasmid-like DNA components. The potential utilization of pEM and pHPJ as transformation vectors for the cultivated mushroom will be discussed.


Specific mycorrhizae range from very specialized to generalized plant-fungus associations in nature. Some fungi will form mycorrhizae with only a specific plant species or genus (specialists) while others can associate with a wide array of plant species (generalists). Similarly, a plant species may associate with only a limited number of specific fungus species while others can literally associate with thousands of fungus species. Because trees and associated vegetation need mycorrhizae for establishment in natural forest systems, the degree to which they depend on specific mycorrhizal fungi and the presence of those fungi in disturbed forest sites can be important in determining the initial composition of the forest community. Plant succession may likewise be influenced by the specialized nature of the mycorrhizal associations and presence of fungus species in developing communities. Different tree species or trees and shrubs can also share mycorrhizal mycelium; recent studies demonstrate the movement of carbohydrates and water between plants via a shared mycorrhizal fungus. Overstory/understory composition and its change through time may thus be significantly affected by mycorrhizal interconnections. Background mycorrhizal considerations are thus essential to full understanding of community dynamics.
A number of opportunistic soil Hyphomycetes have been found to be capable of colonizing cysts and eggs of phytonematodes by soil Hyphomycetes. When dry leaves are wetted, CO₂ release rates (in darkness, usually <5 μg CO₂-C g⁻¹ dry g⁻¹ h⁻¹) when relative humidity is low (<75%) during neap tides (when immersion may not occur daily). Whenever leaves are wetted or damp (3% water >30% of fresh weight: rain, tidal immersion, fog, relative humidity >90% for long periods), release rates are much higher (at temperatures between 20-30°C, for culms, ~100 μg CO₂-C g⁻¹ dry g⁻¹ h⁻¹; for leaves, ~175 μg CO₂-C g⁻¹ dry g⁻¹ h⁻¹). When dry leaves are wetted, CO₂ release begins immediately, at very high rates (>2X normal) which decrease to the above level for wet leaves after about 1 h. Virtually none of the CO₂ release is attributable to abiotic processes. Bacterial contribution to dead-leaf respiration is less than 0.1% of the total, based on our estimates of bacterial productivity (3H-thymidine incorporation into macromolecules) and minimum production efficiency (10%). Algal respiration in the dark is < that of bacteria, based on our values for light-stimulated fixation of 14CO₂ in air. Direct observational estimates of fungal, bacterial, and algal biovolumes indicate that fungal biovolume is much greater (>10) than that of bacteria or algae. Therefore, most of the microbial respiration of standing-dead marsh plants originates from a fungal assemblage which is very well adapted to the desiccation stress of the standing-dead marsh-plant habitat.
Five Samples were collected of Minnesota, St. The life cycle of Tilletiaria reinvestigated. produces sterigmate, ballistosporic KERRY L. O'DONNELL and DAVID J. MCLAUGHLIN. Department of Botany, University of Minnesota, St. Paul, MN 55108. Unusual member of the Ustilaginales a transversely septate metabasidium. Dikaryotization was reported to occur by means of Ustilago-like fusion bridges. Karyogamy was not observed but was thought to take place in the teliospore which develops next to the fusion bridge. We have examined karyological aspects of the life cycle by serial-section electron microscopy to assess the taxonomic position and phylogenetic relationship of this fungus. Metabasidium development, meiosis, postmeiotic mitosis, basidiospore formation, dikaryotization, and karyogamy were included in this study.

KERRY L. O'DONNELL and DAVID J. MCLAUGHLIN. Department of Botany, University of Minnesota, St. Paul, MN 55108. The life cycle of Tilletiaria reinvestigated. The classification of any biological system requires the taxonomist to group together clusters of similar organisms, and then to choose features which can be used as primary distinguishing characters. Unless the taxa under consideration are biologically isolated, it is to be expected that some individuals making up similar populations will be borderline, and difficult to classify. Taxonomic decisions are then required to decide which distinguishing features will be given priority, in order to place the borderline cases in the most appropriate genus or species. In organisms such as asexually reproducing fungi, such decisions are necessarily subjective. The taxonomist ultimately may be forced to separate taxa, even at the generic level, on one or two microscopic morphological characters. In this paper, the relationship between Aspergillus and Penicillium is looked at in this light, and their interfaces with related genera are examined. In particular, features used to distinguish Paecilomyces, Geosmithia, Raperia, Merimbla and Elassidina will be discussed. Some interesting new borderlines species which lie along the interfaces among these genera will be described.

S. K. PARKER and R. W. SCHEETZ. Dept. of Biological Sciences, Univ. Southern Mississippi, Hattiesburg, MS 39406-5018. X-ray diffraction analysis of calcareous deposits in Physaraceous Myxomycetes. Powder x-ray diffraction using a wide-angle Gandolfi camera was utilized to investigate calcareous deposits in Myxomycetes of the order Physorales. Investigations of 35 species from diverse collections have shown several members of the family Physaraceae to contain a crystalline structure. Species of Physarum, Fuligo, Craterium, Badhamia, and Diachea showed indications of calcite in four species, possibly calcium formate in five species and vaterite in three species as a secondary compound. Five species produced insufficient diffraction lines for compound identification but the presence of two additional crystalline compounds was indicated. Species of the family Didymiaceae with the exception of Didyma sp. consistently showed calcite as the sole crystalline compound. These results are inconsistent with the general hypothesis that members of the family Physaraceae contain amorphous calcium deposits. The CaCO₃ is not exclusively in the form of calcite and additional crystalline calcium compounds may be present. Further studies are underway to determine how environmental conditions affect calcium deposition.

RONALD H. PETERSEN. University of Tennessee, Knoxville, TN 37916. The clavarioid fungi of New Zealand. Based on three seasons in the field, and subsequent observation of preserved specimens from appropriate herbaria, a flora of the clavarioid Aphyllorhales has been written for New Zealand. The following conclusions have been drawn from this exercise: 1) the flora includes a large number of taxa hitherto undescribed and/or unreported: 2) certain genera (i.e. Ramaria) fruit less commonly than expected: 3) certain other groups (i.e. Clavaria subr. Holocybe, Ramariopsis) are far more abundant than expected: 4) distribution patterns of many fungi can more accurately be drawn because of systematic examination of type specimens. Pekkala, D., see Silver, J. C., et. al.

J. L. PITI and A. D. HOCKING. CSIRO Division of Food Research, P.O. Box 52, North Ryde, N.S.W. 2113 Australia. Interfaces among genera related to Aspergillus and Penicillium.

The classification of any biological system requires the taxonomist to group together clusters of similar organisms, and then to choose features which can be used as primary distinguishing characters. Unless the taxa under consideration are biologically isolated, it is to be expected that some individuals making up similar populations will be borderline, and difficult to classify. Taxonomic decisions are then required to decide which distinguishing features will be given priority, in order to place the borderline cases in the most appropriate genus or species. In organisms such as asexually reproducing fungi, such decisions are necessarily subjective. The taxonomist ultimately may be forced to separate taxa, even at the generic level, on one or two microscopic morphological characters. In this paper, the relationship between Aspergillus and Penicillium is looked at in this light, and their interfaces with related genera are examined. In particular, features used to distinguish Paecilomyces, Geosmithia, Raperia, Merimbla and Elassidina will be discussed. Some interesting new borderlines species which lie along the interfaces among these genera will be described.

R. P. MICHENER. Biology Dept., Ferrum College, Ferrum, VA 24088. Fungi isolated during a study of biodeterioration of cellulose products. This study was designed to provide information dealing with the biodeterioration of cellulose materials used in wet environments. The study involved isolation and identification of fungi which are capable of unique to this habitat. Samples were collected from a variety of sources and subjected to direct observation and isolation. Isolation involved plating of surface sterilized samples, buffered salt washed samples and homogenized samples onto standard agar media. Fungi isolated included representatives of the Zygomyctina, Ascomycotina, and Deuteromycotina. Some of the more common isolates included species of Mucor, Chaetomium, Sordaria, Alternaria, Aspergillus, Trichoderma, Nigrospora, and Phoma.

R. P. MICHENER. Department of Biology and the Institute of Developmental Biology, Texas A&M University, College Station, TX 77843. Cell surface recognition between gametes of Allomyces macrognus.

Gamete mating in the Chytridiomycete Allomyces macrognus requires gamete recognition for mating. The ability to recognize female from male gamete cell surface is important because, due to the secretion of the sex attractant, asex, 10 or more male gametes may become clustered over the posterior surface of the female gamete. The purpose of this study was to investigate the nature of gamete recognition. Preincubation of the gametes with the lectins wheat germ agglutinin (WGA) or Concanavalin A (CONA) blocked gamete mating but no conjugation. Specificity of gamete fusion was prevented only when the male gametes bound WGA or the female gametes bound CONA to the cell surface. Fluorescence microscopy indicated that FITC-conjugated WGA or CONA was localized only in the region adjacent to the flagellar insertion point. Addition of the appropriate sugars blocked mating as did preincubation in glucosidases or N-acetylglucosaminidases. The glycoprotein nature of the female cell surface was indicated by the incubation of the female gametes in tunicamycin, an inhibitor of N-
linked protein glycosylation. These results show that gamete recognition requires an interaction between carbohydrate-binding protein and sugar residues on appropriate gamete cell surfaces. From this data and other recently published results (J. Cell Sci. 53: 193, 1982), a model is proposed for gamete recognition that consists of reciprocal lectin-like mediated interactions with specific glycoproteins and calcium ions.

J. POMMERVILLE. Department of Biology and the Institute of Developmental Biology, Texas A&M University, College Station, TX 77843. Protein and RNA synthesis during zoospore germination in the Chytridiomycetes. Only members of the order Blastocladiales have been shown to contain sequestered messenger RNA (mRNA) within the nuclear caps of the zoospores. The objective of this study was to determine if other members of the Chytridiomycetes contain sequestered mRNA that can be used to initiate rapid zoospore germination without the need for transcription. Zoospores from Allozymes macrogynes, Blastocladiella emersoni, Chytridium komare, Entophlyctis confusa, Giromycetes luteus, Karlingia azomantis, and karlingia (Rhizophyllum roseus) were examined. Zoospores were incubated in germination medium containing the protein synthesis inhibitor cycloheximide (CHX) or anisomycin (ANISO), or in the RNA synthesis inhibitor actinomycin D (ActD). Zoospores were germinated in medium without inhibitor as controls for the timing of germination and early development. The results of these experiments indicated that all zoospores tested have the ability to initiate germination (produce a rhizoidal germ tube) in the presence of ActD. However no germination was observed in the zoospores incubated with either CHX or ANISO. From these results it can be concluded that for the Chytridiomycetes tested in this study, sequestered mRNA is present even though several groups do not contain nuclear caps or clustered ribosomes. Such results are interesting with regards to the phylogenetic relationships and biosystematics of these unflagellated fungi.

D. PORTER. Botany Department, University of Georgia Athens, GA 30602. Macrofungi inhabiting the coastal foredunes of Sapelo Island, Georgia. The harsh environment of the sand dunes adjacent to the high energy Atlantic beaches of a coastal barrier island seems an unlikely habitat for terrestrial macrofungi. The foredunes of Sapelo Island, GA, are composed of a substratum of shifting sands with sparse amounts of organic material and are subjected to periodic high winds and salt spray. Yet a few apparently adapted species of fungi have been repeatedly collected in this habitat in large numbers primarily in the fall and winter months. From periodic observations for nearly two years, the dominant macrofungi are Psathyrella ampullophila (Dur. & Lev.,) Orton, Peziza amphorophila Dur. & Mont., and an undescribed species of Melanoleuca. It is highly unlikely that these sand dune fungi are mycorrhizal. There appears to be no constant association of any of the fungal species with particular species of dune grasses or other vascular plants. In fact, fruiting bodies of these fungi may even be found on the sea side of forming foredunes where no vascular plant colonization has occurred. In addition, axenic cultures of both Psathyrella ampullophila and Melanoleuca sp. have been readily obtained from basidio-carp tissue. It is hypothesized that the hyphae of these fungi play a role in the stabilization of the forming embryo dunes by colonization of tide washed plant litter and aggregation of sand grains.

D. PORTER AND W. L. LINGLE. Botany Department, University of Georgia, Athens, GA 30602. Endolithic marine fungi and algae from planted shell fragments. In order to determine the biological nature of shell-bearing marine microorganisms, panels with small fragments (ca. 0.5 cm²) of clean, uninvaded calcium carbonate shells of various bivalve molluscs were planted in marine locations from 10 to 90 m deep off the coasts of Maine, Georgia and Jamaica. Half of the panels were covered by stainless steel shades to inhibit the growth of algae and select for heterotrophic fungal growth. Shell fragments retrieved after 6 months displayed extensive invasion by endolithic fungi, algae and cyanobacteria. Detailed spatial relationships and cytological observations have been made on these organisms using a resin cast technique in which shell fragments are fixed and embedded, then decalcified for SEM observations. This is followed by reembedding and sectioning for TEM observations.

MARTHA J. POWELL, M. B. DOVE, AND M. M. JOHNSON. Botany Department, Miami University, Oxford, OH 45056. Comparative mitosis in the aquatic fungi, Chytridiomycetes hyalinus and Nowakowskia elegans. The genera, Chytridiomycetes and Nowakowskia, in Sparrow's classification of Chytridiomycetes are in different families because of differences in thallus complexity. Similarities found in the fine structure of zoospores, including a type 1B MLC, however, have suggested that these two genera are closely related. The mitotic apparatus in Chytridiomycetes hyalinus and Nowakowskia elegans was studied with light and electron microscopy to search for additional structural characters which might correlate with similarities in zoospore fine structure. In both species, the mitotic apparatus was centric and intranuclear. The original nuclear envelope was used in the reformation of daughter nuclei during telophase, leaving a remnant midbody. Thus, similarities in structure of the mitotic apparatus correlate with similarities in zoospore structure and support the close relationship of these two organisms, although C. hyalinus produces a monocentric thallus and N. elegans produces a polycentric thallus. In this study the correlations between fine structural characters considered to be conservative among protista, indicate that thallus complexity is not necessarily a reliable character on which to base families within the order Chytridiomycetes.

F. B. REEVES. Botany Department, Colorado State University, Fort Collins, Colorado. 80523. Secondary succession, plant strategies, resource competition, and mycorrhizal dependency. On heavily disturbed big sagebrush communities secondary succession begins with ruderal species and appears to proceed to competitor species and then to stress-tolerant species, sensu Grime 1977. Severe disturbance reduces the number of viable vesicular-arbuscular (VA) mycorrhizal propagules (Moorman and Reeves 1979). The sequence of succession may reflect the relative mycorrhizal dependency of the dominant plants constituting each sere. The pioneer stage is non-mycorrhizal.
Thus there is a selection pressure for mycotrophs and increased mycorrhizal dependency. The protracted stage of ruderal species (M-) is a result of competitor species (Mc) replacing M- species because Mc species better compete for limited P and N. When two resources are limited, growth isoclines (Tilman 1982) may explain why Mc species are dependent on mycorrhizal colonization. Declining P and N levels and success of obligately mycorrhizal species are resolved in the climax community.

Reeves, R. B., see Reid, R. A.


Photosynthesis, ultimately, is the key physiological process directly related to the competitive ability of plants. Although it is well established that the formation of mycorrhizae can enhance nutrient uptake of some nutrients in soil, little is known as to how photosynthesis responds to mycorrhizae development. Evidence suggests that photosynthesis may be affected by mycorrhizae in a manner that is neither a simple nor a direct response to nutrient uptake. Hormonal balances, source-sink relationships and nutrient interactions must all be considered in explaining plant responses to mycorrhizae establishment. Observations on photosynthetic stimulation by mycorrhizae are consistent with source-sink explanations but are likely more complex, involving nutrient interactions in both root and shoot. Interactions between nitrogen, phosphorus tissue contents as modified by mycorrhizal development appear to be particularly important in explaining photosynthesis and growth responses. Efforts to explain such a complex interactive system can be greatly aided by mechanistic simulation models.

Iain D. Reid. National Research Council of Canada, Plant Biotechnology Institute, Saskatoon, Sask., Canada S7N OW9.

Nutrient nitrogen inhibits lignin degradation by Merulius tremellosus.

Merulius tremellosus is a white-rot fungus which removes lignin faster than carbohydrate from wood, and may be useful for biological delignification. In six weeks, the fungus removed 41% of the lignin, but only 9% of the total dry weight, from aspen wood (0.12% N). Supplements of ammonium chloride, ammonium acetate, urea, glutamate, casein hydrolysate, albumen, peptone, and yeast extract, supplying 0.5% N, all inhibited lignin degradation in albumen, peptone, and yeast extract stimulated total weight loss. In synthetic media, nutrient nitrogen also inhibited degradation of 14C-synthetic lignin (DHP) to 14CO2 by M. tremellosus. Maximal DHP degradation occurred in low N medium (2 mM glutamate). Added glutamate (10 mM and 25 mM) and albumen (10 mM N) decreased DHP metabolism. Ammonium chloride and yeast extract (each 10 mM N) increased the early rate, but decreased the ultimate extent of DHP degradation. In low N cultures, the conversion of DHP to 14CO2 accelerated when glucose was exhausted from the medium.

R. A. Reid and F. B. Reeves. Botany Department, Colorado State University, Fort Collins, Colorado. 80523. Mathematical models of VA mycorrhizal colonization in corn (Zea mays).

Microbial growth within a limit, here applied to colonization of roots by VAM fungi, usually is defined by a Logistic equation. When analyzing a soil for Mycorrhiza Inoculum Potential (MIP), a short (2-4 week) bioassay is used. During this period of time there is little possibility for the reproduction of spores of the fungi. The fungal population is finite, and the bioassay reflects the relative number of viable VAM propagules present in the soil. Colonization (infection) data from non-diluted and diluted soils provide sigmoidal progress curves that approximate the Logistic equation but are best described by the Gompertz equation. These results are consistent with other pathosystems that have asymmetrical disease progress curves (Berger, 1981).

Reithoret, K., see Heath, I. B., et al.

Reynolds, D. R., see Dunn, P. H.

R. G. Roberts, J. A. Robertson. USDA, ARS, Richard B. Russell Agricultural Research Center, P. O. Box 5677, Athens, GA 30613, and R. T. Hanlin, Dept. of Plant Pathology, University of Georgia, Athens, GA 30603. A new record for Ascostrochila xylina

An uncommon ascomycete, Ascostrochila xylina L. Aliz, was isolated from a surface sterilized sunflower (Helianthus annuus L.) seed during a mycological survey of heat damaged commercial samples of oilseed-type sunflower seed. This is the first record of A. xylina both from sunflower seed and the American continent. A previously unrecognized isotype collection and an apparently misplaced fragment of the holotype were found among the 7 specimens of A. xylina received from major herbaria. Measurements of ascospores and perithecial hairs indicate that a greater range of variation exists for these characters than was described by Ames. The perithecial hairs are produced by the sympodial proliferation of certain cells of the perithecial walls, with the portions distal to the points of proliferation becoming the short, hyaline, clavate branches which are typical of the genus. Centrum tissues are similar to those reported by Whiteside for A. gunnesea L. Ames, with broad, white paraphyses originating from a basal hymenium and interspersed among asci. Asci are thin-walled and evanescent with a non-amyloid apex.
The enzyme reaches a peak 75962. In addition, polyclonal and monoclonal antibodies raised against purified enzymes have an acidic pH optimum and a secreted from the cells in preparation for the aggrega-

tion stage of development. The enzyme which is se-
creted prior to aggregation appears to possess pro-
erties common to lysosomal enzymes; i.e., the enzyme
has an acidic pH optimum and a vesicular location in
the cell. In addition, polyclonal and monoclonal
antibodies raised against purified

precipitate the enzyme. Aminidase activity has been detected in several develop-
mental stages of the cellular slime mold,

Dictyostelium discoides. The enzyme reaches a peak of activity during vegetative growth and then is se-
creted from the cells in preparation for the aggrega-
tion and the form of the enzyme se-
cretion; i.e., isozone 1 is the form of the enzyme present extracellu-
larly. At cycloheximide concentration sufficient to inhibit protein synthe-
sis, the release of the enzyme is affected. In the presence of respiratory poisons such as sodium azide and sodium cyanide, secretion is inhibited. In con-
trast to the above, the presence of the natural sub-
strate, trehalose, and also mannitol are stimulatory to the release of the enzyme. Electrophoreograms of both the intracellular enzyme and the secreted enzyme reveal that no major processing is occurring during secretion; i.e., isozone 1 is the form of the enzyme present intracellularly and the form of the enzyme se-
creted. On the basis of these findings, we conclude that trehalase is a lysosomal enzyme which may be lo-
ocalized in vesicles distinct from those already known.

ROLAND SEYMOUR. Department of Botany. The Ohio State University, Columbus, OH. 43210. Tropical Watermolds: A New Family of Oomycetes.

The morphological and developmental character-
istics of a new family of tropical watermolds are described and illustrated. Currently represented by four species isolated on hempseed from soil in the Amazon basin, West Indies, and West Africa, the family is distinguished by formation of a tubular, unbranched thallus bearing lateral thin-walled sporangia and densely ornamented oogonia containing a single ooospore. Antheridia are solitary, monoclinous in origin with an undifferentiated antheridial cell delimited midway along the tubular filament and attached apically to the oogonial wall. The fungi are of rare occurrence having been found in less than 1 percent of the soil samples examined and only appear after 14 weeks inoculation.

J.D. SHERMAN and C.W. MIMS. Dept. of Botany, S.F. Austin State University, Nacogdoches, TX 75962. Ultrastructural evidence for meiosis in a supposed apomictic isolate of the myxomycete Didymium iridis. In this study TEM was used to examine developing spores of the Mo-1 isolate of D. iridis in an at-
tempt to determine whether or not meiosis occurs. This isolate is nonheterothallic and on the basis of Feulgen nuclear DNA measurements has been reported to exhibit a 2N-2N life cycle.

The results of this study suggest that meiosis or at least an attempt at meiosis occurs in maturing spores of the Mo-1 isolate. Synaptonemal complexes were found in the nuclei of 10-12 hour old spores and metaphase, anaphase and telophase division figures were observed in 15-19 hour old spores. These ob-
ervations raise some interesting questions re-
grading apomixis in myxomycetes and underscore the need for similar studies on other supposed apomictic isolates.

R.V. SHUKLA and P.C. JAIN. Mycology Laboratory, Department of Botany, Sagar University, Sagar, M.P., India, 470 003. Thermophilic Fungi: On Thielavia and Some Similar Genera from Soils of India. Present report is a part of an extensive survey of thermophilic fungi from soils of India. During the survey 10 species belonging to 4 genera Auremonium, Corynascus, Mycellothora and Thielavia, i.e., A. alabamense anamorph of T. terrestris, C. seadonium, M. thermophila conidal state of T. heterothallica, T. fragilis, T. octospora, T. terricola, T. variospora, Thielavia so. 1 (from grassland soil), Thielavia sp. 2 (from decomposing cloth) and Thielavia sp. 3 (from road side soil) were recorded from different habitats. Except A. alabamense all the fungi grew well at temperatures 45-50 C. A. alabamense, T. octospora and T. variospora are being reported here for the first time from soils of India. Three isolates which could not be identified upto species are new additions to the genus Thielavia as they differ from all other reported species of this taxon.
Shumard, D. S., see Bruns, T. D.


Oncocladium flavum is a fungus characterized by striking verticillately branched hyphae borne in aggregations which resemble the ascocarps of some Onygenaceae. Although the fungus has been observed on a number of occasions occurring on keratinous materials, no report has yet been made of the development of the verticillate hyphae in culture. Thus the connection of these appendages with the fungus named by Sigler and Carmichael in 1976 as Malbranchea flava has not been proven. In 1983, independent discoveries of Oncocladium flavum in Alberta and in Spain led to the reexamination of this fungus. We succeeded in demonstrating the link between Malbranchea flava and Oncocladium flavum.

J. C. SILVER, D. R. ANDREWS and D. PEKKALA. Department of Microbiology, University of Toronto, West Hill, Canada, M1C 1A4. Induction of stress-proteins by heat shock or arsenite in Achlya.

Rapid elevation of temperature leads to specific changes in both the synthesis and phosphorylation of nuclear and cytoplasmic proteins in the oomycete Achlya (Silver, et al., 1983, C.J.Biochem. 61). In Achlya this treatment results in the induction of a very characteristic set of "heat-shock" or "stress" proteins. Some of these proteins appear unique to the cytoplasm while others appear unique to the nucleus. A remarkably similar set of proteins is seen in a wide range of higher and lower eukaryotes, suggesting that these proteins are part of a ubiquitous response to cell stress. We have investigated whether these stress proteins can be induced in Achlya by agents other than elevated temperature. Arsenic compounds can be found in both terrestrial and aquatic environments. In vertebrates arsenic can be sequestered with oftentimes disastrous effects. The same is not necessarily true for aquatic plants (e.g. marine algae) which although they accumulate arsenic appear able to detoxify it. In the present study we show that in Achlya, arsenite causes the induction of many of the same proteins as does heat-shock. However, within 190 minutes after arsenite treatment, the pattern of protein synthesis begins to return to the control pattern. (Supported by grants from N.S.E.R.C. Canada to J.C.S.)

K. T. Smith. Department of Botany and Plant Pathology, University of New Hampshire, Durham, NH 03824.

Relationship of in vitro decay activity of Haematostereum sanguinolentum to electrical characteristics of Abies balsamea.

Decay resistance of A. balsamea (L.) Mill (balsam fir) to activity by H. sanguinolentum (Alb. & Schw. :Fr.) Pouz. is related to the degree of ionization of the substratum as well as to other characteristics indicative of the progressive decay process. Decay was measured as percent loss of oven-dried weight (ODW) of wood samples in agar-block bioassays. Categorization of wood alteration due to the decay process was based upon visible characteristics of the samples and electrical resistance (ER) measurements of aqueous extracts. Differences of ER of extracts are due to differences in the ionization of the wood prior to sampling. With a 12 wk incubation period, wood located interior to sapwood, free of discoloration, ER >250 kilohms (kΩ) decayed least with 3 - 5% loss of ODW. Wood visibly identical, ER <100 kΩ lost 10 - 14% ODW. Similar losses of 14 - 16% ODW were found with visibly discolored wood, ER <100 kΩ. The greatest amount of decay was of previously decayed samples, ER <100 kΩ, which lost 25 - 27% ODW. Similar results were obtained using wood samples drawn at random from various sites and from samples excised from an individual tree.

Smolich, B. D., see Taylor, J. W., et. al.

F.W. SPIEGEL. Department of Botany and Microbiology SE 401, University of Arkansas, Fayetteville, AR. 72701. Phylogenetic hypotheses can help solve developmental problems in dictyostelids.

The dictyostelid cellular slime molds Dicystogetum discoideum and Polysphondyllum spp. are popular "model biological systems". Unfortunately, most researchers who work with them are unaware of the phylogenetic milieu of these interesting organisms. As a result they often try to explain various developmental phenomena using models based upon very distantly related organisms. I will attempt to demonstrate that hypotheses generated from a knowledge of phylogenetic relatedness can be quite useful in solving some classical developmental problems of the dictyostelids. A major problem for biologists working with D. discoideum has been to determine how migrating slugs maintain a pattern of prestalk and prespore tissue. Comparison of D. discoideum with its probable sister species shows that its slug stage differs from theirs by not producing stalk during migration. In stalk producing species, prestalk cells are lost to the stalk and are replaced by recruits from the prespore region. The hypothesis was developed that the prestalk cells in slugs of D. discoideum behave the same way during migration as those of stalk producing species except that they are not incorporated into a stalk and are thus available to be rerecruited into the prestalk region. Light microscopic observations of living and fixed slugs confirm the hypothesis. The results also help to explain how slugs are able to move. Additional testable phylogenetic hypothesis will be presented to explain the evolution of the dictyostelid slug.

P. D. STAHL. Division of Plant Science, University of Wyoming, Laramie, WY 82071. VAM fungi from high elevation sites in Wyoming and Colorado.

Soil and roots from alpine and subalpine sites were examined for the presence of VAM fungi. Roots of most herbaceous plants and many shrubs from these habitats are infected by endomycorrhizal fungi; infection frequencies for herbaceous plants range from 0-3% and for shrubs, 0-67%. Soils contained from 62 to 437 spores per 100 g dry soil and three to seven species of VAM fungi. Members of the genus Glomus are the most abundant endophytes but representatives of Gigaspora and Acaulospora were also
Spores of high elevation sites are compared to those found at lower elevations in the same region.

Staples, R. C., see Hoch, H. C.

JACK S. STAPLES. Department of Biological Science, Northern Arizona University, Flagstaff, Az 86011. Ecology of hypogeous fungi— their patterns of sporocarp production and host association in some Arizona coniferous forests.

An abundant and diverse community of hypogeous fungi is associated with ponderosa pine and pinyon pine stands in Arizona. Five ascomycete genera with 8 species and 10 basidiomycete genera with 27 species were collected during a four year study. Sporocarps of the zygomycous fungi, Endogone lactiflua and E. remansii, were of minor importance. Estimates of relative abundance and frequency. Species of Rhizopus, Hysterangium, Gautieria, Scleroaster, Geopora, and Hymenogaster were found in all months of the year and accounted for the greatest biomass in yearly productivity. Estimates of total sporocarp productivity ranged from 0.6 kg dry weight/ha in pinyon pine stands to 24.6 kg dry weight/ha in ponderosa pine stands. Rober Lemings, Gautieria crispa, Hysterangium separabile, and Scleroaster xerophyllum were collected in all stages of development beneath the winter snowpack. Relationships between sporocarp production and site factors of moisture, temperature, elevation, plant association and age class of plant associate were determined. The highly positive correlation between sporocarp production and age class of ponderosa pine (correlation coefficient = 0.95) is discussed with emphasis on the implied significance for small mammal mycophagy.

Stasz, T. C., see Hemmes, D. C.

HENRY STENPEN and ROBERT C. EVANS. Biology Department, Rutgers University, Camden, NJ 08102. Localization of antigenic material in hyphal sheaths of Bipolaris maydis race T using ferritin labeled antibody.

Germ tubes of Bipolaris maydis race T possess a granular, fibrillar, sheath-like extension of the cell wall. This sheath can be visualized using negative staining and light microscopy, scanning and transmission electron microscopy, and an indirect immunofluorescence technique. Using this latter procedure it was determined that both the sheath and the wall of the germ tube fluoresced, but the conidial wall did not. An electron microscopic procedure using ferritin-labeled antibody was used in an attempt to determine where in the sheath the antigenic material was localized. The ferritin label occurred in an approximately continuous layer on the outer surface of the germ tube wall. The label also appeared in the sheath itself and was localized in discrete patches in the granular region with little label attached to the fibrillar portion.

K. D. STEWART and K. R. MATTOX. Dept. of Botany, Miami University, Oxford, Ohio 45056. Comparative cell structure and development of eukaryotic microorganisms: Possible evolutionary relationships among protist groups.

The flagellar apparatus (flagella + cytoskeleton), the details of mitosis, and the form of mitochondrial cristae are the only morphological features of sufficiently general occurrence among protist groups to be consistently useful in comparisons. Plastids and associated features, although not as widely present, exhibit significant correlations with some of the other characters to a degree that aids in the interpretation of structure in groups that lack them. The form of the mitochondrial cristae (tubular, lamellar or vesiculate) is consistent within groups and appears to be a conservative character. It is an intriguing fact and unlikely to be a coincidence that the bacteria judged to be most similar to mitochondria biochemically and most likely to be related to the ancestors of bacteria also possess the same range of variation in the structure of their internal membranes; that is, they are tubular, lamellar or vesiculate. These are the purple non-sulfur bacteria, and they exhibit biochemical differences that correlate with the morphological variations. Polyphyletic origin of mitochondria is indicated, and their correlations with other characteristics lead to some rather surprising clues as to the relative primitiveness of protist groups and the possible center of evolutionary radiation.

JEFFREY K. STONE. Department of Biology, University of Oregon, Eugene, OR 97403. Foliar endophytes of Douglas fir.

Two species of fungal endophytes are commonly isolated from surface-sterilized Douglas fir foliage: Phyllosticta sp. 1, which also infects Abies spp., and Psm-1, an undescribed hyphomycete taxon isolated only from Douglas fir. Phyllosticta sp. 1 hyphae penetrate the needle between periclinal walls of epidermal cells, growing intercellularly into the mesophyll and may penetrate mesophyll cells. Psm-1 infections arise from direct penetration of epidermal and hypodermal cells, producing single, apparently dormant intracellular hyphae in those cells. Infec-

J. W. TAYLOR, B. D. SMOLICH, and G. MAY. Department of Botany, University of California, Berkeley, CA 94720. Mitochondrial DNA, Evolution and Neurospora.

This report discusses the general application of nucleic acid-molecular biological techniques to fungal evolutionary biology and specific results of a current study of heterothallic Neurospora species. These species were chosen because of their potentially interesting origins (e.g., hybridization, developmental mutation, very recent divergence), and because they are delimited by mating studies (Per-
Electron probe analysis reveals in Aspergillus versicolor the presence of calcium, potassium, magnesium, phosphorus, silicon, chlorine and sulphur. With this technique no other elements appeared. No attempts were made to obtain quantitative estimates of the absolute concentrations of the element present. This approach permits the detection of all the elements of MENDELEEV's classification between beryllium and uranium.

There can be little doubt that X-Ray microprobe analytical method will become generally used in Mycology as technical problems are solved and the limitation and applicability of this approach become better defined. Hence X-Ray microanalysis permits to obtain fundamental information on the presence of ions and elements in fungi.

H. D. THEIERS. Department of Biological Sciences, San Francisco State University, San Francisco, CA 94132. The genus Arcangeliella in western North America.

Arcangeliella is a secotioid taxon closely related to and apparently derived from the genus Lactarius of the gilled fungi. Species of Arcangeliella appear to be more common and occur in greater variety on the western coast of North America than elsewhere, although species have been reported from Australia, Europe, Malaysia and South America. Both hypogeous and epigeous taxa are present in North America. The hypogeous species are presently known to be restricted to the montane regions but epigeous taxa occupy both coastal and montane habitats. Demidioecarps are usually found associated with conifers, most commonly with Abies spp. in the higher elevations. Arcangeliella crassa, a montane species is the most abundant and widespread species. Other species include A. variigeta known only from the coastal regions and three new species: A. desjardinii, A. saylorii and A. parva from the mountains.

H. D. THEIERS. Department of Biological Sciences, San Francisco State University, San Francisco, CA 94132. Some observations on the fleshy fungus flora of Australia.

Several different aspects of the fleshy fungus flora of Australia will be considered. Among these considerations will be the following: 1. A brief analysis of the bolete flora of Australia and a comparison with the known rough and smooth-spored boletes found in the eastern and western portions of North America. 2. A comparison of some of the apparent ectomycorrhizal associates (gilled fungi and boletes) of plantings of Monterey pines (Pinus radiata) in Australia with those occurring in native stands in California. 3. A look at some of the unusual epigeous and hypogeous secotioid fungi of Australia, particularly those found in West Australia.

M. THIBAUT and M. ANSEL. Laboratoire de Parasitologie, 75, rue de l'Ecole de Médecine, 75270 Paris Cedex 06, France. Research on a fungal pathogen by means of X-Ray electron probe analysis.

Electron probe X-Ray analysis has been little applied to the study of fungal pathogens. In an effort to obtain more detailed information about these fungi, studies have been carried out with Aspergillus versicolor (Vuill.) Tiraboschi.

Small pieces of fungal tissues were dissected. After washing, drying and coating, analyses were conducted on an X-Ray microprobe. When a sample is bombarded with electrons, X-Rays are emitted. Each element in the spectrum emits its own X-Ray spectrum and the spectral lines emitted by each element are characteristic of the element.

DENNIS TODD. Department of Biology, University of Oregon, Eugene, Oregon 97403. Distribution patterns of foliar endophytes in Douglas firs.

Many plants harbor symptomless fungal infections in their leaves. Some hosts, such as Douglas fir (Pseudotsuga menziesii), show infection rates that approach 100% in older leaves. The apparent
The endophyte may confer disease resistance to the host or decrease the damage caused by herbivorous insects. A statistical study of Douglas firs of known seed parentage reveals that the host genotype has a highly significant effect on the distribution of endophytes, parasites, and insect damage. The endophyte infection rate is positively correlated with the growth rate of the host. The relationships among endophyte infection rates, site factors, insect damage rates, and rates of infection by pathogenic fungi are discussed.

T. C. TON-THAT and H. C. HOCH. Department of Plant Biology, Geneva University, Switzerland and Department of Plant Pathology, New York State Agricultural Experiment Station, Cornell University, Geneva, NY 14456. Morphological responses of Mucor globosus to cytochalasin E modulated by N\textsuperscript{6},O\textsuperscript{2}-dibutyryl adenosine 3':5'-cyclic monophosphate.

The cytochalasins are a group of fungal metabolites that inhibit a variety of cellular functions. It has been reported that cytochalasin E (CE) inhibits spore germination and mycelial growth and causes swollen spores and hyphal tips in a variety of fungi. We investigated the effect of CE on growing hyphal tips of Mucor globosus pretreated with N\textsuperscript{6},O\textsuperscript{2}-dibutyryl adenosine 3':5'-cyclic monophosphate (Bt2cAMP) because cAMP is indirectly involved with microtubule integrity. After 10 min on potato dextrose agar at 10-3M, CE inhibited fungal growth and produced swollen tips and abnormal hyphal branching. These phenomena were reversible. Pretreatment with 10-2M Bt2cAMP for 30 min reduced the frequency of CE-induced swollen tips and formation of branching. When growing hyphae were cultivated on polycarbonate nucloere membranes, a longer pretreatment of Bt2cAMP and exposure to CE was required. These data suggest that microtubules may be necessary for maintenance of a normal orientation of the actin microfilament system. Usually microfilaments are displaced or disrupted by CE leading to the loss of structures associated with the apical polarity of the cell. The ultrastructure was studied in treated cells by the technique of freeze-substitution to ascertain the position and organization of microtubules and microfilaments.

Trappe, J. M., see Li, C. Y., et al.

Trappe, J. M., see Molina, R.

DOROTHY L. TUTHILL. Department of Botany, University of Wyoming, Laramie, WY 82071. Ancient fungi from deep-lying loess deposits.

Loess samples collected in Iowa and Nebraska from depths of 1 to 2 meters were examined for molds belonging to the Aspergillus flavus group. A. toxicarius was found in the 2 deepest samples, and an array of unusual Aspergillus, Penicillium, and other fungal species were found in all of the samples. The presence of the fungi cannot be accounted for by movement down from the surface, as they are different from those at the surface. Therefore, it is suggested that these molds were deposited with the loess, some 14,000 to 20,000 years ago. The majority of fungi isolated from depths of 2 m or more produce sclerotia. Perhaps their ability to survive for so long is attributable to their formation of resistant structures, and their ability to grow and reproduce when there is an occasional input of organic matter via percolation. The species assemblage is a reflection of the climate at the time of deposition, and can be used to hypothesize what the climate and vegetation may have been before the Wisconsin glaciation.

Ungar, I. A., see Ballard, B. J.

J. M. UPADHYAY. Loyola University, New Orleans, LA 70118. A new variety of a thermophilic mold, Thermoascus aurantiacus var. levisporus.

We report a member of the new thermophilic taxon, Thermoascus aurantiacus var. levisporus. Since the first description of T. aurantiacus by Miehe in 1907, a detailed study of this mold was made by Apinis in 1967. In comparing our data with those of Apinis, our isolate displays many of the characteristics similar to those of T. aurantiacus, with a few significant differences. Growth patterns on various media are similar to those of T. aurantiacus and brown ascomata are produced in both. The anamorph in both consists of terminal and thick-walled conidia. On the other hand, in our culture the cleistothecial wall is composed of several rows of more or less uniform layers of relatively large pseudoparenchymatous cells, whereas T. aurantiacus possesses an inner layer of small cells and outer layer of large cells. In our mold the ascospores are smooth and thick-walled rather than rough and thin-walled as found in T. aurantiacus. The central part of the ascocarp in our mold was found to be plectenchymatous. Its optimum temperature for growth is 49-50°C and it grows best at pH 3.5-4.0.

Wain, R.P., Brown, J. K., Yangco, B.G. and Diane Te Strake, Biology Department and Department of Internal Medicine, Division of Infectious and Tropical Diseases, University of South Florida, Tampa, FL 33628. Electrophoretic studies of selected enzymes of isolates of Basidiobolus.

Techniques of gel electrophoresis were employed to estimate levels of genetic variation and genetic differentiation within and among various isolates, of the fungus Basidiobolus, including ATCC cultures. Members of this taxon are distributed worldwide. In tropical and subtropical areas some isolates can cause the disease entomophthoromycosis basidiobolae. Preliminary results of isozyme comparisons will be discussed in terms of distribution and systematic relationships, population structure and evolutionary potential.

L. L. WALLACE. Department of Botany and Microbiology University of Oklahoma, Norman, OK 73019. Ungulates and Mycorrhizae: Actions, Interactions and Reactions.

Although percent infectivity varies, it is now commonly accepted that most grasses are mycorrhizal.
In addition to whatever carbon losses these plants have to their fungal symbionts, most grasses are grazed. Faced with this double loss of carbon, what possible benefits might grasses accrue by being mycorrhizal? Mycorrhizal fungi may improve nutrient uptake since even though grasslands typically have fertile soils, their aridity may greatly reduce nutrient availability. In addition, hormonal production of mycorrhizal roots affects aboveground morphology. This may enhance plant tolerance of grazing. Many plants show a stimulation of productivity and photosynthesis following moderate grazing. This could actually increase carbon flow to roots and stimulate further mycorrhizal infection. This interacting trio of grazing ungulates, forage grasses and mycorrhizal fungi may be far more important in grassland ecology than previously thought.

Waggner, R. G., see Hill, T. W.

C. J. K. WANG, H. E. WILCOX, C.-S. YANG and K. F. LaBUGLIO. Department of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210. New ectendomycorrhizal and pseudomycorrhizal fungi, and the influence of pH on the mycorrhizal associations in *Pinus resinosa*.

A new species of *Phialophora* forming ectendomycorrhizal association, and a new species of *Phialocephala* forming pseudomycorrhizal association, both with red pine seedlings, are described. The influences of pH on mycorrhizal syntheses with 12 fungi on red pine were studied using monoxenic cultures with a vermiculate-peat moss substrate. Each fungus-red pine association responded differently to the varying pH. In general at pH 5, all root and shoot systems were much larger and healthier than those at pH 3. At pH 3 root and shoot systems were severely reduced in the controls and in mycorrhizal seedlings inoculated by *Cenococcum* and *Chloridium* species. However, the mycorrhizal seedlings inoculated with the new species of *Phialophora* and *Phialocephala* were strikingly less affected.

Weber, D. J., see Bunderson, E. D.

Wilcox, H. E., see Wang, C. J. K., et. al.

K.D. WHITNEY. Department of Biology, University of Texas at Arlington, Arlington, Texas 76019

Protostelids: Relationships, Affinities, and Phylogeny.

The protostelids are a group of amoeboid protists that form minute, one to few-spored aerial fruiting bodies. This group has been considered a monophyletic assemblage, and this is reflected in the current classification system which, for the most part, uses presence or absence of flagellate cells in the life cycle and other details of the trophic phase to circumscribe taxa. The protostelids, though, exhibit a number of characteristics on which to base a classification system. Consequently, delimiting taxa and understanding the phylogeny of these organisms is particularly difficult. Recent ultrastructural studies of the flagellate cells, mitosis, sporocarp development, and feeding behavior in a number of different protostelids suggest that some currently recognized protostelid taxa are in need of revision. These studies appear to indicate that the protostelids are possibly a polyphyletic group derived from free-living amoeboid protozoans. Although a monophyletic origin for parts of some protostelid taxa is likely, the subclass Protostelia may encompass a number of amoeboid protists which have independently evolved the ability to form sporocarps. Possible lines of protostelid evolution including some probable monophyletic lines in the Protostelia are discussed, along with their affinities to non-fruiting amoebid protists.

K.D. WHITNEY and H.J. ARNOTT. Department of Biology, University of Texas at Arlington, Arlington, Texas 76019

Ultrastructure of calcium oxalate deposits in *Gilbertella persicaria* (Zygomycetes).

Calcium oxalate crystals often form conspicuous structures on aerial portions of zygomycetes. *Gilbertella persicaria*, a mucoralean parasite of peaches and other fruit, has several distinct types of calcium oxalate crystals associated with its sporangia and sporangiophores. The sporangial wall is studded with capitate-conical projections composed of calcium oxalate, while a number of crystal morphologies are seen on the sporangiophore. Crystals at the apex of the sporangiophore are rounded and non-capitate, abruptly merging at the base of the sporangium with the capitate crystals on the sporangium proper. Small crystals, often occurring in pairs, are scattered over lower portions of the sporangiophore, and these crystals are associated with flat rectangular bodies embedded in the sporangiophore wall. Additionally, large rhomboidal crystals occur in prominent oval patches scattered along the sporangiophore. Light, scanning and transmission electron micrographs of these crystals will be presented, and aspects of their development will be discussed.

D. T. WICKLOW. Northern Regional Research Center, ARS, USDA, 1815 N. University, Peoria, IL 61604.

Mycoxigenic fungi in cereals.

Fungi that infest and contaminate cereals with their toxic metabolites present an interesting challenge to agricultural scientists. Many of these fungi are effective saprophytes in nature and can become established in wounded kernel tissues where mechanisms of host resistance to fungal infection have little relevance. The design of agronomic strategies to prevent toxin contamination of preharvest cereals has been limited because not enough is known about the natural history of these fungi nor the conditions that promote kernel infection and toxin production. *Ecology provides needed perspective as to the significance of toxin biosynthesis in the survival of seed-infecting fungi.*

M. WICKLOW-HOWARD. Department of Biology, Boise State University, Boise, ID 83725.

The occurrence of vesicular-arbuscular mycorrhizae in disturbed and undisturbed ecosystems of the semi-arid deserts of Idaho.

Studies have been initiated on the occurrence of vesicular-arbuscular mycorrhiza (VAM) in sage com-
munities of surface disturbed and undisturbed areas of the semi-arid desert of Idaho. The majority of plants in the undisturbed environment were mycorrhizal (VAM). A road cut made through this community was revegetated with plants which were mostly non-mycorrhizal. The occurrence of mycorrhizal positive plants increased during the spring and summer months, and markedly decreased during the winter months. The major mycorrhizal positive plant species encountered are Artemesia tridentata, Purshia tridentata, and Chrysothamnus nauseosus.

S. WIENCEK, J. CASTILLO and S. E. COCHENDURK.
Biology Department, Adelphi University, Garden City, New York 11530. A comparison of reproductive output of the telemorph and anamorph of Coniochaeta nepalica.

Coniochaeta nepalica is the most abundant sphaeriaceous fungus in the A horizon of an oak-birch forest, is able to complete its life cycle in this habitat, and shows a seasonal peak in density during the fall. The reproductive output of its telemorph and anamorph provided with known amounts of a carbon-energy source was measured following growth of the holomorph in liquid culture on a polyvinyl chloride membrane. Analysis consisted of homogenizing the culture and then using the homogenate to test for residual glucose (Nelson Test), to prepare agar films for determination of biomass and conidial numbers, and for sonification prior to assaying amounts of soluble protein (Comassie Blue Technique) and ascospore numbers. The results of this study will be described and related to the growth of this fungus in nature.

M. C. WILLIAMS and H. G. NAGEL, Department of Biology, Kearney State College, Kearney, NE 68849.
Coprinus density increase on a burned prairie.

A portion of the Cather Prairie, a mixed grass unplowed native prairie, located in Webster Co. (southcentral) Nebraska, U.S.A. was control burned on May 8, 1983. Twelve days later a number of Coprinus sp. were observed in the burned area. Nine one hundred yard long transects were designated along the fire break and obvious macrofungi were counted. Four prairie conditions were sampled; unburned-unmowed, unburned-burned, mowed-unburned, and mowed-burned. Duncan's new multiple range test was used to test for differences between the 4 treatment means.

The burning treatment did significantly increase Coprinus sp. density at the P = 0.05 level. There was no significant difference between mowed-unburned and unmowed-unburned.

Yang, C.-S., see Wang, C. J. K., et. al.
Yangco, B. G., see Wain, R. P., et. al.

K.S. YOON and D. J. McLaughlin. Kangwon University, Korea 200 and University of Minnesota, St. Paul, MN 55108, USA. Meiosis and meiosis during basidiosporogenesis in Boletus rhinellum.

Meiosis occurred at the apex of the basidium. During prophase I, two types of spindle pole body were observed: a sausage-shaped form at pachytene and a bilobular form probably at diplotene. At metaphase I, the nuclear membrane was fenestrated and often showed large discontinuities. Occasional cytoplasmic organelles were seen within the nuclear membrane. During anaphase I, the chromosomes surrounded a cylinder-shaped bundle of continuous microtubules and the separation of the chromatids appeared to be asynchronous. At ana-phase I, the interpolar region was narrowed, and the spindle pole body was slightly extruded from the sibling nuclei. Ultrastructural features of meiosis II observed at ana-phase II seemed to be similar to meiosis I; however, the spindle appeared to be shorter and to contain fewer microtubules than at meiosis I. The two spindles of meiosis II were parallel and the division synchronous. The interphase II nucleus after migration to the middle region of the basidium bore a bilobular spindle pole body. A post-miotic mitosis occurred in the basidiospore. The division plane was often oblique to the longitudinal axis of the spore. The nuclear membrane was fenestrated and the membrane around the spindle pole body was frequently absent. Astral microtubules were common.

ZANG M. WUM. Kunning Institute of Botany, Academia Sinica, Kunming, Yunnan, China. The vertical distribution of Cordyceps from E. Himalaya, China.

E. Himalaya is the resources of Cordyceps. There are about 9 species scattered the different vertical distribution areas.
1. Below (800-1000-1500 m). This zone corresponds to the monsoon forest. There are 3 sp. of Cordyceps are known, e.g. C. nutans Pat. (on adult of Pentatomidae), C. polyvartica Moller (on larvae of Lepidoptera) and C. \( \text{G} \).
arbuscula Teng (on larvae of Scarabaeidae).

2. From 1500-2600 m. This is a subtropical zone of evergreen broad leaves forest, where—under flourish about 3 species of Cryptomene with C. trig centri Yasuda (on adults of Vespidae etc.), C. oxycephala Penz. et Sacc. (on adults of Vespidae), C. sobolifera (Hill) serk (on pupae of Cicada), C. stylophora serk et Sr. (on larvae of Coleoptera buried in rotten logs.)

3. From 2600-4200 m. This represents the zone of deciduous broad-leaved forest and subalpine coniferous forests, with a host of 2 sp., e.g. C. liangshanensis Zang, Liu et Hu (on larvae of Lepidoptera), C. militaris (L.) Link (on pupae of Lepidoptera).

4. From 4200-5000 m. This represents the cold temperate alpine shrub-meadow zone, with only the hardy species of the C. sinensis (Berk.) Sacc. is parasitic on the larvae of Napius armoricanus Ober. It is a facultative saprobe from April to June.

Ode to Bill Carmichael
(On His Retirement)

'Twas on the eve of December 31st
When from their folders the fungi burst
To have a meeting about the morrow,
...their boss was leaving and it was time for sorrow.

First Geo Trichum (a candid fellow) said
"For he who loves mycelium
and gets the biggest thrillium
from messing with Chrysosporium
I think I feel very sorry forium."

Poetic Penny Sillium to Arthur Derma said,
"Oh forlorn dermatophyte
Bemoan the loss of your acolyte
He's taking his fanny to the bay
And with molds will no longer play."

"And what for?" asked Al Eurospore.
"To build a burning pile," replied Mycelium Sterile.
"That sounds like such a chore", announced Ann Ellophore.
"There really must be something more."

At this point a positive mating strain,
Waved his club-shaped antheridium saying,
"Hold on now, I have the right report,
He's building us a big resort."

Squeals of joy rang through the lab,
Even old Nan Izzia joined the confab.
As dreams of immunocompromised scalps and groins,
Danced vividly in their woronin body broins.

"For those who like hair, there'll be cattle and goats
Trichophyton can ramble all over their coats
If its feathers you crave, there will be chickens too
And if you don't like feathers you can grow in their doo.
Old leaves and books and a timber too
There's so many choices which first will you chew?"

"And if its skin you desire
Well listen to me
There's lots of this stuff
In the province of B.C."
(T. rubrum suppressed a squeal of glee).

The molds now burrowed deep in the drawers
To get ready to leave in a few short hours
All of them eagerly looking forward
to enjoying, at last, their big reward.

--R. Currah
COMMENTS FROM NEW CORRESPONDING MEMBERS

Not long ago (1982), the Society elected four new Corresponding Members—R. W. G. Dennis, R. Kuhner, E. Muller, and C. V. Subramanian. Formal letters of notification were sent to each by then Secretary-Treasurer Goos. Excerpts from their replies pertaining to their election are reproduced below.

"It was with mingled pleasure and astonishment that I read your letter of 19th November, received yesterday. Astonished because I had no idea I had any friends left in the United States. Thirty, even twenty, years ago of course there were plenty, but with the passing years they died off, went on before as you might say, or just lapsed when I retired seven years ago. It is therefore with enhanced appreciation that I thank the members of the Mycological Society of America for the honour they have done me in electing me a Corresponding Member of the Society.

As an outsider, unfamiliar with issues and personalities involved, I would not presume to vote on Society business, but I shall certainly look forward eagerly to reading Mycologia, probably well before the library copy gets here ......... at Kew.

Please accept my best wishes ...... in regard to the continuing prosperity of the Society."

Yours Sincerely,

R. W. G. Dennis

"Mon élection en qualité de Membre correspondant de la Société mycologique américaine m'a vivement surpris. Veuillez dire à vos Collègues combien je suis sensible à ce témoignage de haute estime.

C'est un grand honneur qui m'est fait, en même temps qu'a ceux qui sont devenus mes collaborateurs; sans ces chercheurs, qui ont été mes élèves, je n'aurais pu diversifier mon activité mycologique comme je l'ai fait.

Je serai naturellement fort heureux de recevoir désormais Mycologia. En vous remerciant vivement, ......... je vous prie, de croire à l'assurance de mes sentiments les plus cordiaux."

R. Kuhner

"Many thanks for your kind letter ......... about my election as a Corresponding Member of the Mycological Society of America. I feel much honoured about that surprising and unexpected nomination, and I which to thank for that the Society."

Sincerely yours,

Emil Muller

"I am overwhelmed by the kindness and courtesy the members of the Mycological Society of America have shown me, and I am most grateful. Knowing as I do the distinguished membership of the Society and its remarkable record of service to our science during the past fifty years and more, I feel too small indeed to deserve an honour so great. And yet, I cherish it as something most precious and memorable and it is with justifiable pride that I accept it. I also consider it as a sign of the enormous goodwill and friendliness between our two countries.

I thank you and the Society most sincerely for the honour bestowed on me."

Yours sincerely,

C. V. Subramanian
Robert E. Machol recently described a numerical taxonomy technique for assigning lower-level taxa (such as genera) to higher-level taxa (such as families), and applied it to four controversial questions in Agaricales taxonomy (See Nova Hedwiga 21: 753-787, 1972). A FORTRAN program is available to MSA members.

Does anyone have personally developed programs they would share with other MSA members?

A free brochure describing BioSuperfile, a user friendly microcomputer software package, is available from BIOSIS. BioSuperfile is a piece of "filing system" software and allows users to create, maintain and update a file of bibliographic references. It also builds a dictionary of any terms designated as "index terms" in the references, and provides information retrieval capabilities. Menu-driven. CP/M or MS-DOS.

BioSuperfile was designed to provide information retrieval capabilities for the BIOSIS Information Transfer System (B-I-T-S), their newest, individually-tailored current awareness service. Available only to B-I-T-S subscribers at the special price of $100.00. Write: BioSciences Information Service, 2100 Arch Street, Philadelphia, PA 19103-1399.

OTHER MYCOLOGICAL ITEMS AVAILABLE--FOR GIVE-AWAY, SALE, OR EXCHANGE

Michael R. Talley has for sale used American Optical hemacytometers (improved Neubauer) for $10.00 each plus $1.00 postage. Limited supply.

Abraham Weintraub offers a Spinette electric centrifuge (4-tube table unit) for $50.00. Postage extra. He also has an experimental new liquid microscope slide mounting medium in a one ounce bottle for $3.00. Shipping extra on both. Sterile Experimental culture media (extractives) also still available.

Florida Mycology Research Center offers the World's largest mushroom spore selection. FMRC also carries an assortment of mushroom growing supplies, and a free catalog is available upon request from Stephen L. Peele.

The significance of fungi No. 2

The Fly Agaric used to drive Ancient Vikings
BERSERK!!!
PUBLICATIONS WANTED

P. C. Jain needs books and papers on plastic and rubber degrading bacteria and fungi.

C. Volbracht wishes to buy or exchange old mushroom books.

T. D. Murray is in need of a copy of DISEASES OF CEREALS AND GRASSES OF NORTH AMERICA by R. Sprague.


N. Amano is looking for TAXONOMY OF FUNGI IMPERFECTI by B. Kendrick (ed.) University of Toronto Press, 1971.

R. W. Kerrigan wants anything "old" on commercial mushroom culture, particularly spawn-related information.

J. S. Shipman is in need of any information on scientific computer programs developed by people in the society.

M. R. Talley would like copies of MYCOLOGIA before 1974.


O. Constantinescu wants publications on Peronosporales (old and new).

Y. Renaud would like reprints with detailed descriptions of Myxomycetes.

L. L. Norvel wishes any publications dealing with Higher Fungi and Myxomycetes of the Pacific Northwest (see Notes and Comments for more).

W. R. Burk wants reprints on the Gasteromycetes.

S. L. Stephenson needs reprints on Myxomycetes.

S. K. Abdullah wants any papers on Aero-aquatic conidial fungi and coprophilous and soil ascomycetes.

T. E. Chase is in need of GENETICS OF SEXUALITY IN HIGHER FUNGI by J. R. Raper.

R. Tulloss needs a copy of AGARICACEAE OF MICHIGAN by C. H. Kauffman.

J. Ammirati needs METHUEN HANDBOOK OF COLOUR by A. Kornerup and J. H. Wanscher. (Second or more recent addition is preferred).

H. M. Saylor would like copies of European and Australian publications on hypogeous and secotioid fungi.

CAUTION TO AQUATIC MYCOLOGISTS: HEMPESEEDS THAT ARE OVER-BOILED USUALLY GO TO POT.
POSITIONS WANTED

EDWARD A. FELIX is seeking a post-doctoral or permanent faculty-staff position (teaching/research), beginning September 1984. Ph.D., University of Texas, Austin. Major professor: Gary T. Cole. Research interest: broad, pathogenic mycology to physiological ecology of fungi.

JON POLISHOOK wishes a master's level research position. Jon studied with C. J. K. Wang at SUNY, and has 1½ years lab experience with mycotoxins, taxonomy of imperfect fungi, and decay of preservative treated wood.

STEVEN E. CARPENTER desires employment in teaching and research in a university environment. Research interests include taxonomy of the Discomycetes, fungal colonization of heat disturbance sites such as Mt. St. Helens, and Discomycetes as mycorrhizal fungi. Available for employment any time.

ERIC A. JOHNSON is seeking an assistant professorship in fungal and bacterial physiology.

HANANYA J. KRONENBERG is seeking a position in a company involved in fermentations, fermented foods, culture maintenance and inoculum development, research in applied mycology, single cell protein, antibiotic production, or related areas. Available immediately and will relocate. Research interests and publications in Oriental fermented foods. Also interested in Oriental mushrooms and waste utilization.

STEPHEN J. BECK is searching for a teaching assistantship/research fellowship in a pre-doctoral program. Since receiving his M.A. in December 1980, he has been teaching General Biology at the college level. His main research experience has been with the study of fungal parasitism of eukaryotic algae (see general announcements); however, he is interested in many aspects of microbiological research.

MARGUERITE A. PERSI would like a post-doctoral or assistant professor level position as soon as possible. Ph.D.: Medical College of Ohio, Toledo. Major professor: Jeffrey C. Burnham. Her research interests center around pathogenic mechanisms especially related to mycology (e.g., Candida or other yeasts).

POSTDOCTORAL POSITIONS AVAILABLE

New York State Agriculture Experiment Station: Post-doctoral fellowship (perhaps two) in CELL BIOLOGY. Fellow(s) will participate in ongoing research concerned with signal reception and transmission for cell differentiation and mitosis in Uromyces phaseoli. Research involves calcium and calmodulin interactions with the microtubule-microfilament cytoskeleton through the course of signal reception. Experience in cell biology and light and/or transmission electron microscopy preferred. Stipend: Approx. $17,000. Available immediately. Contact Harvey C. Hoch.

Purdue University: Post-doctoral research associate position available August 1, 1984, for research on the DEVELOPMENTAL BIOCHEMISTRY of Blastocladiella. Write James S. Lovett for more information.

University of Arkansas: A two year post-doctoral research associate position to study fungi of weeds that might be employed for biocontrol of the weed species. Write or telephone George E. Templeton to learn more.
Monterey Mushrooms, is a Santa Cruz, CA firm specializing in production and sale of high quality, edible mushrooms (Agaricus bisporus) and has a new research facility near Watsonville, CA (ready for occupancy in July, 1984). They are seeking to fill two entry-level Ph.D. positions in MUSHROOM GROWTH RESEARCH. Successful applicants will work as part of an interdisciplinary research team on new and innovative projects related to yield and quality.

One position requires a demonstrated ability in investigating biochemical aspects of physiological, genetic, or pathological problems in fungal systems (organismal orientation). This scientist will be responsible for research in mushroom growth, reproduction, and quality.

The second position requires a background in fermentation, soil biochemistry, poultry nutrition, or plant physiology. Prior experience with complex nutritional substrates helpful. This individual will be expected to have a leading role in the development of nutritional supplements and composting technology.

The company offers growth potential, competitive salaries, and a full benefit package including relocation expense reimbursement. Send resume or curriculum vitae with three references to Dodie Rogers, Monterey Mushrooms, P. O. Box 1990, Santa Cruz, CA 95061.

Applications will soon be taken for two MYCOLOGICAL TECHNICIAN positions at the Center For Forest Mycology Research, Madison, WI. Employment begins October 1, 1984. If interested, send a resume to Harold H. Burdsall who will send particulars when they become finalized.

The Department of Botany, University of California, Berkeley, is seeking to fill the position of MANAGER OF THE MICROGARDEN. The position includes curatorial, preparatory, and administrative duties relating to living fungal and algal collections in the Microgarden (a support facility to the Department's teaching and research programs). Extensive public service (distribution of cultures, etc.) is also involved.

Applicants should be able to work independently, supervise assistants, and conduct independent research on preservation and presentation of the Microgarden organisms. Experience with preservation of microorganisms by desiccation, lyophilization, and cryogenics desirable. Minimum educational requirement is a bachelors degree in biology. Salary will be commensurate with experience, but should be in the range of $22,000 to $27,000 per year. Available Fall, 1984. (pending receipt of funding).

For more information contact Mr. Derek Maskell, Department of Botany, University of California, Berkeley, CA 94720. Phone (415) 642-9109.

The USDA-ARS-NCR, Northern Regional Research Center (Peoria, IL 61604) has announced the three positions summarized below. For further details contact R. W. Detroy, at the address above.

RESEARCH CHEMIST. Incumbent serves as a microbial biochemist exploring the biochemical aspects of trichothecene biosynthesis. The overall objective will be to establish the sequence of biochemical steps and metabolic intermediate flux required to initiate the production of these mycotoxins. Incumbent will utilize radioisotope tracer techniques, protein isolation, enzymology techniques, in vitro protein analysis, and trichothecene to determine how formation can be controlled.

MICROBIOLOGIST. Incumbent serves as a microbial physiologist conducting research on the control of trichothecene mycotoxins by Fusarium species associated with cereal grains. Specifically, the incumbent: (1) determines the physiological parameters which influence the overproduction of trichothecenes; (2) investigates metabolic regulation patterns existing for mycotoxin production; and (3) establishes nutritional requirements of these toxigenic fungi to reduce toxin formation.

RESEARCH GENETICIST. Incumbent serves as a molecular biologist/geneticist conducting research in the application of microbial genetics for the control/regulation of trichothecene production by Fusarium species. Specifically, the incumbent conducts experiments in the following area of genetics: (1) microbial genetics; (2) mutational analysis; (3) classical Fusarium genetic analysis; (4) RNA/DNA isolation and characterization; and (5) plasmid/organellar isolation.
ASSISTANTSHIPS AND FELLOWSHIPS AVAILABLE

Frostburg State College: Teaching Assistantship leading to a M.S. in BIOLOGY. Contact W. J. Vail, Department of Biology, Frostburg State College, Frostburg, MD 21532

Ohio State University: Graduate Teaching Assistantships (with tuition waiver) in BOTANY are available. Write to Roland Seymour or Gary Floyd, Department of Botany, Ohio State University, 1973 Neil Avenue, Columbus, OH 43210.

Yoder Brothers, Inc.: Assistantship available for work with BACTERIAL DISEASES OF ORNAMENTAL PLANTS. Contact Boligala C. Raju, Chief Plant Pathologist, Yoder Brothers, Inc., P. O. Box 68, Alva, FL 33920. Phone (813) 728-2535.

State University of New York at Buffalo: Assistantships available. Contact Dr. Charles Jeffrey, Department of Biological Sciences, 109 Cooke Hall, State University of New York at Buffalo, Buffalo, NY 14260.

University of Texas: Graduate Student Assistantships available in APPLIED MYCOLOGY. Send inquiry to Gary T. Cole, Department of Botany, Univ. of Texas, Austin, TX 78712.

University of Vermont: Fellowships to study CLASSICAL, POPULATION, OR MOLECULAR GENETICS OF BASIDIOMYCETES. Contact Dr. Robert C. Ulrich, Department of Botany, Marsh Life Science Building, University of Vermont, Burlington, VT 05405.

Brigham Young University: Teaching Assistantships in MYCOLOGY. Write to Darrell Weber, 285 Widtsoe, Brigham Young University, Provo, UT 84602.

Auburn University: Graduate Research Assistantships and Postdoctoral Research Fellowships are available for study of the ROLE OF NON-PREDATORY HYPHOMYCETES IN BIOCONTROL OF PHYTONEMATODES. Contact Gareth Morgan-Jones, Department of Botany and Microbiology, Auburn University, Auburn AL 36830.

University of North Carolina, Institute of Marine Sciences: One Assistantship, starting September 1, 1984, for 2 years. Contact Jan Kohlmeyer, Institute of Marine Sciences, University of North Carolina, Morehead City, NC 28557.

Northern Arizona University: Graduate Research Assistantship, 2-year appointment for M.S. program in MYCOLOGY. Research involves work with ECTOMYCORRHIZAE OF PINE. For more information, get in touch with Jack States, Box 5640, Northern Arizona University, Flagstaff, AZ 86011.

University of Arkansas: Research Assistantship for an M.S. or Ph.D. aspirant to study BIOLOGICAL CONTROL OF WEEDS USING FUNGAL PATHOGENS. Bachelor’s or Master’s degree in Plant Pathology, Microbiology, or Mycology required. Salary $13,500.00 - $14,800.00. Write G. J. Weidemann, Department of Plant Pathology, 217 Plant Science, University of Arkansas, Fayetteville, AR 72701. Phone (501) 575-2445.

Southern Illinois University: Doctoral Fellowship, for 1985-1986, with $8,500 stipend plus tuition waiver for each of 3 years (University-wide competition, 5 available). Also Teaching Assistantship (available on Departmental competitive basis) for M.A. or Ph.D. aspirant in SYSTEMATIC MYCOLOGY. Duties in Gen. Biology, Gen. Botany and/or Forest Pathology. Write W. J. Sundberg, Dept. of Botany, SIU, Carbondale, IL 62901.

DON PFISTER HAS COPIES OF D. P. ROGERS' "A BRIEF HISTORY OF MYCOLOGY IN NORTH AMERICA"
ROBERT L. WICK, formerly an assistant professor in the Department of Plant Pathology, Physiology, and Weed Science at Virginia Polytechnic Institute and State University, Blacksburg, VA, will be joining the faculty at the University of Massachusetts, Suburban Experiment Station, Waltham, MA, May 1, 1984.

JANE TROLINGER recently accepted the position of research plant pathologist with Yoder Brothers, Inc. to work on diseases of ornamental plants.

MARY E. PALM has accepted a position as Mycologist with USDA/Animal and Plant Health Inspection Service and will be affiliated with the Mycology Laboratory in Beltsville, MD.

NORIHIDE AMANO has moved to the Laboratory of Applied Microbiology, Research Center, Suntory Ltd., Osaka, Japan.

ERIC A. JOHNSON has accepted a position with the Department of Microbiology and Molecular Genetics, Harvard Medical School, Boston, MA.

ROBERT A. HILL formerly at the Coastal Plain Experiment Station, Tifton, Georgia, is now at the Department of Biology, Tulane University and Southern Regional Research Center, New Orleans, LA.

JAMES S. LIEBMAN began a graduate program in Plant Pathology at the University of California, Berkeley, in the fall of 1983. His studies on disease caused by soil fungi are supported by a Graduate Fellowship from the National Science Foundation.

CAROL E. WINDELS will be employed as an Assistant Professor of Plant Pathology at the Northwest Experiment Station, University of Minnesota, Crookston, MN as of June 1, 1984. She was previously employed as Scientist at the University of Minnesota, Department of Plant Pathology, St. Paul, MN 55108.

RICHARD W. KERRIGAN, as of September 1984, will be with the Department of Biological Sciences, University of California, Santa Barbara, CA 93106.

CHIN S. YANG has accepted a one-year appointment as the Anna E. Jenkins Postdoctoral Associate in Mycology at the Department of Plant Pathology at Cornell University effective July 1, 1984. He will work with Richard Korf on the genera Tricharina (Discomycetes).

JOHN F. LESLIE has recently moved to Manhattan, KS, from Terre Haute, IN, and is now an Assistant Professor in the Plant Pathology Department at Kansas State University.

CHRIS LUCAROTTI will soon be leaving his post-doctoral position at the University of California-Riverside, where he has been working on Coelomomyces with Brian Federici. Effective August 1, 1984, Chris will serve as Assistant Professor in the Biology Department of Mount Saint Vincent University, Halifax, Nova Scotia, Canada B3M 2J6.

MARGUERITE A. PERSI is currently a Periodontic Trainee at the Center for Oral Health Research, School of Dental Medicine, Department of Microbiology, University of Pennsylvania, Philadelphia, PA 19104.

PATRICIA E. BOYD is now a production editor with Academic Press in Orlando, FL.

JOHN B. SUTHERLAND has accepted a new position in the BioSource Institute and Institute of Wood Research, Michigan Technological University, Houghton, MI.

MARTINA S. GILLIAM-DAVIES is back from five years in Saudi Arabia and is hoping to resume study of Marasmius.
DELORES RYKARD (student of E. S. Luttrell) completed her Ph.D. at the University of Georgia in March 1983 and has accepted a permanent position at Coker College, Biology Department, Hartsville, SC.

KENT P. DUMONT is no longer on the staff of the New York Botanical Garden. Mycologists who are studying collections obtained by Dumont in South America should send determinations to Clark T. Rogerson, New York Botanical Garden. If loans were involved in the arrangements for examining the specimens, the materials should be returned to Dr. Patricia K. Holmgren, Director of the Herbarium (NY), New York Botanical Garden, Bronx, NY 10458.

R. CURRAH, whose thesis was entitled "The taxonomy of the Onygenales: Arthrodermataceae, Gymnoascaceae and Myxotrichaceae", completed his Ph.D. in Medical Sciences (Medical Microbiology) at the University of Alberta and returns full-time to his position as Research associate at the U. of A. Devonian Botanic Garden.

MICHAEL R. TALLEY, who was formerly employed by METPATH INC., is now a mycological consultant of PATHLAB LTD., Council Bluffs, IA.

CHESTER R. BENJAMIN has been reassigned, via office reorganization, to the position of Senior Assistant to the Assistant Administrator for International Affairs and Planning, Office of International Cooperation and Development, USDA.

GEOFFREY PUGH has left Aston University to become Head of Department, Department of Biological Sciences at Portsmouth Polytechnic, Portsmouth, England.
DAVID W. MINTER visited India last September with Paul Cannon, also of C. M. I., to make further collections of microfungi in Himachal Pradesh State.

E. B. GARETH JONES spent the month of February, 1984, at Kuwait University and will attend the International Biodeterioration Symposium in Washington, DC in August 1984. He then plans to visit Dr. Perkins (VIMS), Paul W. Kirk (Old Dominion University, Norfolk), Jan Kohlmeyer (University of North Carolina, Morehead City), and J. Fell (Miami).

ROLAND SEYMOUR spent 10 weeks at the Centro de Investigacion de Paludismo in Tapachula, Mexico working on a newly funded National Academy of Science project involving the isolation of microbial pathogens of mosquito larvae.

ANDREW S. METHVEN visited the University of Michigan in February to examine collections of Clavariadelphus in the University Herbarium.

DAWN JOHNS, microbiologist, Jamaican Bureau of Standards, Kingston, has completed a 10-month study program with Donald T. Wicklow at the ARS Culture Collection, USDA, Peoria, IL. Her focus has been on the identification of toxigenic fungi in agricultural produce.

DENNIS E. DESJARDINS spent the month of January in Japan. He visited the Tottori Mycological Institute in Tottori-shi and the Forestry and Forest Products Research Institute in Tsuchiura City.

SHANNON M. BERCH spent three weeks in March in Richard Benjamin's laboratory at Rancho Santa Ana Botanic Garden studying Zygomycetes.

H. PETER MOLITORIS (Regensburg, Germany) is spending his sabbatical leave working with Jan Kohlmeyer on physiological problems in marine fungi. SCOTT SCHATZ is working for two months with Drs. Molitoris and Kohlmeyer on enzymatic questions in marine fungi and studies on the ontogeny of Ascomycetes.

GERALDINE C. KAYE visited David Malloch's Mycology Laboratory at the University of Toronto on April 23.

GARETH MORGAN-JONES visited the International Potato Center (CIP), Lima, Peru and conducted field surveys in Huanuco, Arequipa, and Cuzco, Peru during April. Dr. Parviz Jatala, CIP, Lima, Peru reciprocated by coming to Auburn University in March to collaborate on research on nematode biocontrol by fungi.

Harry D. Thiers' list of visitors to the Herbarium at San Francisco State University includes MASON HALE, MARY E. PALM, and HARRIET BURGE.

IRA F. SALKIN and J. KANE, Laboratory Services Branch, Ontario Ministry of Health, Toronto, visited the University of Alberta Mold Herbarium and Culture Collection in February, 1984, to give a course with Lynne Sigler in medical mycology. Visitors to UAMH during 1983 included M. RINALDI, T. Y. ZHANG, A. TSUNEDA, and G. T. COLE.

LARRY J. LITTLEFIELD spent one month (May 20-June 20) collecting diseased material and rust urediniospores from leafy spurge and cypress spurge in Greece, Yugoslavia, Romania, Hungary, and Italy.

WANG YUN, from the Institute of Forestry and Soil Science, Academia Sinica in Shenyang, China, is just entering the second year of a two year position as Visiting Mycologist at the USDA Forestry Sciences Laboratory in Corvallis, OR. Dr. Yun's major interests are in mycorrhizae and the taxonomy of hypogeous fungi. He has met some American mycologists, wants to make more American friends, and wishes to exchange ideas and specimens.
PAPERS, SEMINARS, SYMPOSIA, AND WORKSHOPS

G. B. CALLEJA was a rapporteur at the Dahlem Konferenzen workshop on "Microbial adhesion and aggregation" January 15-20, 1984, in Berlin.

R. S. UPADHYAY presented a research paper on Fusarium udum in the 4th International Congress of Plant Pathology held at Melbourne, Australia, from August 17-24, 1983.

ROLAND SEYMOUR offered a laboratory/discussion session on "Mycoses of invertebrate vectors of human disease" during a short course on New Developments in Vector Control at the International Center for Public Health Research, Univ. of South Carolina, McClellanville, SC.

ANDREW S. METHVEN lectured on "The genus Lactarius in northern California" to the San Francisco Mycological Society in December, 1983.

PAUL T. ARNOLD presented "Comparisons of VA mycorrhizal spore populations and infectivity in response to sewage sludge vs. urea-phosphate fertilizer amendment" at the 6th Annual Graduate Ecology Symposium, Ohio State University, Columbus, OH on April 7, 1984 and "Effects of sludge application on VA mycorrhizal fungi" to the Ohio Academy of Science, Case Western University on April 28, 1984.

BOB. R. POHLAD presented "Luttrellian concept of ascomycete systematics" to the Department of Plant Pathology, Physiology and Weed Science, Virginia Polytechnic Institute and State University on February 20, 1984.

DENNIS E. DESJARDINS gave a presentation on "Undescribed species of marasmioid fungi from California" at the California Botanical Society Graduate Student Meetings held at Chico State University, April 7-8, 1984.

GARETH MORGAN-JONES lectured on the "Diaporthe/Phomopsis complex of soybeans; morphology and ecology" at the USDA sponsored conference on the Diaporthe/Phomopsis disease complex of soybean, Fort Walton Beach, FL March 27, 1984 and "Fungal parasites of nematode eggs in soybean" at the Southern Soybean Disease Workers Meeting at the same location, March 28, 1984. He presented three talks entitled "Endoparasitic fungi", "Soil Hyphomycetes as cyst and egg pathogens", and "Mode of action and ultrastructural studies" at the First International Workshop on Biological Control of Nematodes held at Lima, Peru, April 9-13 and chaired the final session on methodology and development of biocontrol agents.

LUNG-CHI WU presented "Composting Technology", which dealt with substrate for mushroom production by commercial operations in North America, at the British Mycological Society's Second General Meeting symposium on "Resource relations of agarics" held at the University of Manchester on April 10-13, 1984.

JAMES J. FERGUSON reports that a workshop on Applications of Mycorrhizal Fungi in Crop production was held at the University of Florida, Gainesville, FL on February 22-23. Sponsored by the Fruit Crops Department, Institute of Food and Agricultural Sciences (IFAS), it was attended by scientists, extension agents, and industry representatives from 11 states and 3 foreign countries. The meeting included talks on applications in crop production, inoculum production, viability and storage, spore germination and axenic culture, culture collections, crop production in fumigated and non-fumigated soils, applications in greenhouse, fruit, vegetable and forest tree crops, and reclamation of strip mined and phosphate mined lands. P. WALLACE, F. A. WOOD, J. GRAHAM, C. JOHNSON, B. HETRICK, D. SYLVIA, L. RHODES, J. MENGE, P. KORMANIK, S. NEMEC, R. BEST, J. FERGUSON, N. SCHENCK, and H. BRYAN were speakers. Proceedings of the workshop are being prepared and will be available from James Ferguson.

ROY WATLING and ORSON K. MILLER presented talks on fungal ecology at the April, 1984 meeting of the Mycological Society of San Francisco.
JEFF EVANS (undergraduate student of T. M. Hammill) received an award of $1,100.00 from the SUNY-Oswego Alumni Association to continue his study on *Melanospora fallax* (See *New Mycological Research* for more).

WANG YUN, a visiting mycologist (from China) at the USDA Forestry Sciences Laboratory in Corvallis, Oregon (see Notes And Comments for more), was honored by membership in the Society of the Sigma Xi on May 8, 1984.

GARETH MORGAN-JONES has been elected to a three-year term on the Faculty Senate at Auburn University.

GUSTAVO A. ESCOBAR has been elected Chairman of the Departamento de Biologia of the Universidad de El Salvador and Vice President of the Colegio de Biologos de El Salvador for the next biennial.

C. W. HESSELTINE was decorated with the Third Class Order of the Rising Sun in Japan on November 28, 1983. Dr. Hesseltine was recognized for his distinguished services in development of Japan's soy sauce fermentation industry, improvement of Japan's research on fermented soybean foods, and promotion and active participation in technical cooperation between the United States and Japan. He is the first foreign scientist to receive this honor which is bestowed on behalf of the Emperor.

EDWARD A. FELIX was the 1984 award recipient of the Robert A. Welch Pre-doctoral Fellowship.

R. S. UPADHYAY was awarded the Research Associateship of the University Grants Commission, New Delhi to work on "Biology and control of Gibberella indica."

RYTAS VILGALYS was awarded the Gertrude Burlingham Fellowship from the New York Botanical Garden last summer.

EVERETT S. BENEKE received the Rhoda Bennham ward for meritorious contributions in medical mycology from the Medical Mycology Society of the Americas in St. Louis, Missouri, on March 3, 1984.

JOHN CLAUSZ was promoted to Associate Professor in 1983.

GARY T. COLE was appointed Erskine Visiting Professor in the Department of Botany, University of Canterbury, Christchurch, New Zealand, from June 1 through August 15, 1984.

CHESTER R. BENJAMIN was one of a ten-member group (International Organization Affairs Task Force) which received an "OICD International Honor Award" this Spring for outstanding performance in coordinating and providing leadership to USDA participation in world agricultural affairs.

TERRENCE M. HAMMILL was honored at the Spring Honors Convocation at SUNY-Oswego with the 1984 SUNY-Oswego President's Award for Creative and Scholarly Activity and Research.

JILL S. SHIPMAN received a Small Business Innovative Research Grant of $50,000 for a rotating ring-disk electrode and presented the research at the Energy Technology Conference 1984 in Washington, DC in April.

RODNEY G. ROBERTS received a Certificate of Merit and a $1,000 cash award from the USDA for "Dedication and excellence of performance as a plant pathologist in the isolation and identification of fungi invading sunflower seed."

LYNN SIGLER replaced Bill Carmichael on the International Commission on the Taxonomy of Fungi, a commission of the IUMS.
CLARK T. ROGERSON was given the Distinguished Service Award by the Corporation of The New
York Botanical Garden on May 11, 1984, in recognition of his outstanding service to the
Garden and to his profession.

HARRY D. THIERS was awarded an Exceptional Meritorious Award by California State University
System for service to the university. The award included a check for $1,500.

LAFAYETTE FREDERICK was the recipient of the "Lamplighter Award" for Distinguished Service in
teaching from Beta Kappa Chi National Scientific Society at the annual meeting in Atlanta,
GA March 28-30. This spring, he was also elected President-elect of the Association
of Southeastern Biologists.

WILLIAM LOUIS CULBERSON, who joined the faculty of the Department of Botany of Duke University
in 1955, has just been named Hugo L. Blomquist Professor, the first recipient of this
newly created chair.

DENNIS E. DESJARDINS was given an award at the California Botanical Society Graduate Student
Meetings in April for presentation of the best paper on a thesis in progress. (Paper
title: "Undescribed species of marasmioid fungi from California").

WALTER J. SUNDBERG was elected to a three-year term as Chairman of the Botany Section of the
Illinois State Academy of Science.

DICK KORF advises us that he, like many another MSA member interested
in improving his vocabulary and that of his children, uses one of these
"new word each day" calendars displayed at the breakfast table. Though
many of the words are old crackers, some are indeed new (to him). He,
and he supposes other mycologists, was surprised on September 5th to see
an entry for a word he had never seen before, viz.,

fungible

adj. Law. something exchange-
able for another of like kind.

They have a simple economy, based on ex-
change of such fungible goods as grain and
vegetables.

On the occasion of a recent mid-term test in his Introductory Mycology
course, Dick requested a series of definitions, among them numbering this
one (for which he mercifully offered extra credit). None of the students
knew the legal meaning, but there were some exciting answers. Four of
the students took the easy way out, and merely defined fungible as edible.
Two chose variations on a theme: capable of being attacked by a fungus,
and an environment especially suited to the growth of fungi, such as an
old pair of rotten boots. Knowing of Dick's interest in taxonomy, one came
up with able to be classified as a fungus. Top award, in Dick's opinion,
was for believable in a mycological sense.
PERSONAL NEWS

MARTHA SHERWOOD married LAWRENCE PIKE on January 15, 1983.

On April 29, 1984, JILL S. SHIPMAN was married to Sheldon Kaplan, a Senior Systems Analyst with Binary Systems in Newton, MA.

RICHARD W. (Rick) KERRIGAN wed Hope Willis on May 12, 1984.

NATALIE ELIZABETH PALM, daughter of Mary and Steve Palm, was born on June 28, 1983.

ROSS W. DAVIDSON wishes to announce that he is now fully retired after 35 years in the U. S. Division of Forest Pathology, then 20 years with the Colorado State University Wood Research Laboratory working on wood defects and tree diseases, and finally 6 weeks in Taiwan studying forest tree diseases.

J. W. (Bill) CARMICHAEL retired on December 31, 1983 from his position as Professor and Director of the University of Alberta Mold Herbarium and Culture Collection. In establishing UAMH as a combined herbarium and culture collection of microfungi, Bill developed innovative techniques for the preparation of dried specimens, for filing herbarium material, and for preservation of living cultures. During his tenure, the UAMH became well established as a collection of international repute. Bill was frequently consulted for advice on the identification and taxonomy of Hyphomycetes and his expertise will be greatly missed.

Bill has moved to Fanny Bay, British Columbia where he has resided on a part-time basis during the past 10 years. A major duty there will be to clear the land in preparation for building a permanent home. A poem written by Randy Currah in honor of Bill's retirement is published in this issue.

YVES RENAUD retired on April 30, 1984 after 36½ years with the French Railways SNCF. (Hopefully he will continue his work with the Société Lorreine de Mycologie and his mycological illustration activities.--ed.)

ROBERT BERMAN, long-time Microgarden Manager at the University of California at Berkeley, is retiring at the end of this year.

We regret to report the following deaths:

NORMAN F. CONANT, on April 23, 1984. Dr. Conant, an emeritus MSA member, was James B. Duke professor emeritus and former Chairman of Microbiology at Duke Medical Center where he taught for 39 years. Educated at Bates College (Lewiston, ME) and Harvard University, he concentrated on categorizing fungi and the diseases they cause. His Manual of Clinical Mycology, written during World War II at the request of the U. S. Surgeon General, described many unusual tropical diseases unfamiliar at the time to armed forces physicians. He also published a second book, five textbook chapters, and over 60 articles. For those wishing to communicate with wife Sylvia, her address is 5622 Garrett Road, Durham, NC 27707.

THOMAS CLIFFORD VANTERPOOL, on January 15, 1984. Also an emeritus MSA member, Dr. Vanterpool received his training at McGill University, the University of Manitoba, and the University of Saskatchewan. His tenure as an instructor-researcher spanned a total of 39 years—for a short period at McGill University and subsequently at the University of Saskatchewan. He authored over 50 technical papers on plant disease and mycology. Among his notable contributions was the demonstration that a virus disease in plants could be caused by a double virus and the discovery that browning root rot of wheat was induced by Pythium and could be controlled by phosphate fertilizers.
NOTES AND COMMENTS

A NEW MYCOLOGICAL JOURNAL

The association of Swiss Mycological Societies recently decided to devote their SCHWEIZERISCHE ZEITSCHRIFT FÜR PILZKUNDE (SZP) to "popular articles", and initiate a new journal--MYCOLOGIA HELVETICA--for strictly scientific works. Each volume of MYCOLOGIA HELVETICA consists of 10 parts issued within 5-6 years. It contains original papers in English, French, German, or Italian on "ecology, experimental mycology, genetics, medical mycology and mycotoxins, partial and full monographs, morphology, cytology, plectology, classical and computer assisted taxonomy, systematics and nomenclature. Priority is given to...papers dealing with higher fungi. Contributions to industrial mycology are excluded." The Editors welcome submission of articles by MSA members. Subscription rate is 14 Swiss Fr. per year.

Editor: H. Gopfert, Alpenblickstrasse 53, CH-8630 Ruti, Switzerland.
For subscriptions contact: Mrs. J. Delamadeline, Rue des Combes 12, CH-2034 Peseuz, Switzerland.

NEW UNDERGRADUATE SCHOLARSHIP IN MYCOLOGY

A "Katherina Bollenbacher Memorial Scholarship" has been established at the University of Arkansas, Fayetteville, by the University's Board of Trustees in recognition of Miss Bollenbacher's contributions to cotton disease research while a USDA cooperating agent in the Department of Plant Pathology during the period 1955-1971. Among her more notable achievements was the discovery of tentoxin (with N. D. Fulton and B. J. Moore) during research on cotton seedling disease--particularly the etiology of variegated cotton seedling chlorosis caused by Alternaria alternata.

The scholarship, to be awarded annually, will provide an upper-level undergraduate student the opportunity to participate in mycological research in the Department of Plant Pathology. For contribution or further information contact D. A. Slack, Head, Department of Plant Pathology, PS 217, University of Arkansas, Fayetteville, AR 72701.

INDUSTRIAL MYCOLOGY

From M. J. Thirumalacher we learn that a Phyton-27, a water soluble fungicide-bactericide developed by the Jeersannidi Anderson Institute, is a unique copper compound which is non-phytotoxic and is systemic in plants. Its action is chemotherapeutic at first and later remains as protectant. It has been used for controlling Dutch elm and oak wilt diseases as tree injection, and elms with up to 30% DED have recovered after treatment. It has EPA registration and is being marketed by Source Technology Biologicals, a Minnesota based corporation.

The Institute has also obtained two U. S. patents--one for a process for producing an enzyme, which effectively cleans up oil tankers from a strain of Actinomucor elegans, and another for a new species of marine Geotrichum that degrades crude oil in ocean oil spills.

SUMMARY--MID-ATLANTIC STATES MYCOLOGY CONFERENCE

The 1984 Mid-Atlantic States Mycology Conference was held April 28-29, at Virginia Polytechnic Institute and State University at Blacksburg, VA, and was hosted by Orson K. Miller. Ronald Peterson, who was the special guest speaker, lectured on "Kiwi Klavarias; Kross-Roads of the Koral Fungi." An additional 12 papers were presented at the Saturday conference. Highlight of the week-end was a foray into the Blue Ridge Mountains for the elusive Morchella. Plans for the 1985 meeting are now underway, and all mycologists are invited to participate. Contact Jerry Motta for information.

SUGGEST MSA NEWSLETTER ADVERTISING TO FRIENDS IN MYCOLOGICALLY RELATED BUSINESSES.
HELP WANTED

Gary A. Fine is a sociologist who is studying the social ecology of mycologists. He writes to enlist the thoughts and help of other MSA members on the following subjects:

1.) The relationship between the "amateurs" and the "professionals." What is the relationship? How the two groups interact with each other? Gary is particularly interested in this general topic and welcomes any and all comments.

2.) The way that mycologists see the environment. Unlike many naturalists, with whom mushroomers share much in common, mycologists (amateur, in particular) go into the fields and forests with the intention of disturbing (picking) their subject matter. How is this perspective reconciled with the sincere love of nature that these individuals have?

3.) The social side of mycology and mushrooming. Do you know of any writings on this subject?

Lorelei L. Norvell is compiling a Master Index of Higher Fungi and Myxomycetes in the Pacific Northwest. Anyone having well-documented geographical distributions of species in British Columbia, Idaho, Oregon, or Washington, please notify her. (The list encompasses Agaricales, Non-Gilled Basidiomycetes, Ascomycetes—with fruiting bodies visible to the naked eye—and Myxomycetes.) Any publications containing pertinent information would be welcome.

Jack Rogers' home rather than office phone number was included in the new 1984 MSA Directory. Jack writes"....my wife has been put in the role of receptionist and general counselor to those parties seeking me. She is patient, but I have detected a bit of surli-ness lately when the phone matter comes up." For correction, his office telephone number is: 509/335-3732.

EMERITUS NOTE

Malcom A. McKenzie reports that he is "still healthy at age 81, after 11 years of retirement at the University of Massachusetts, Amhurst, as professor emeritus and former director of the state tree laboratories." He still serves as Secretary, New England Chapter, International Society of Arboriculture.

BEAUTY IS IN THE EYE OF THE BEHOLDER

Terry M. Hamill informs us that a SIEMENS ELMISKOP 1A transmission electron microscope has been installed in his laboratory. It was donated to SUNY-Oswego by JEOLCO who had taken it in trade from the Oak Ridge National Laboratory. The instrument is in excellent condition, an "oldie but goodie," and he no longer has to drive to Syracuse to use a TEM.

ALL IN PUN*

During the days when Pat McInally, pro-football player for the Cincinnati Bengals, was a high-school student, his biology instructor asked the class, "Why do toadstools grow in clumps?"

No one knew the answer, so McInally looked up sheepishly and replied, "Because there isn't mush room." When the laughter subsided, McInally added, "I can't help it. I'm a fun gi."

There was more laughter from the class, and then McInally completed his verbal hat trick. Looking apologetically at the teacher, he said, "I'm sorry. I know it was in spore taste."

--Bucky Albers

*Reprinted with the permission of Reader's Digest and the Journal Herald of Dayton, Ohio.
CHANGES OF ADDRESS FOR RESPONSEENCE

The following individuals have moved or changed address since the printing of the 1984 MSA Directory and are requesting response to an announcement with this issue of the MSA Newsletter. Please make these changes in your Directory as they will not appear in future Newsletter issues.

Dr. Norihide Amano
Lab. of Applied Microbiology
Research Ltd., Suntory Ltd.
1-1 Wakayamadai, Shimamoto-cho
Mishima-gun
Osaka 618, Japan

Richard W. Kerrigan
Dept. of Biological Sciences
University of California
Santa Barbara, CA 93106
(as of Sept. 1984)

Mary E. Palm
Mycology Lab., Bldg. 011A
BARC-West
Beltville, MD 20705

John M. McPartland
4800 S. Lake Park #1701A
Chicago, IL 60615

Jon Polishook
Box 532, Rt. #2
Bloomsbury, NJ 08804

Stephen A. Rehner
Dept. of Botany, KB-15
Univ. of Washington
Seattle, WA 98195

Neal A. Weber
1805 Aaron Drive
Tallahassee, FL 32303

Chin S. Yang
Dept. of Plant Pathology
Cornell University
Ithaca, NY 14853

ASSOCIATIONS AND CLUBS

These enthusiastic groups form grassroots types of mycological organizations which provide education, enjoyment, edification, and edibles for many. A number of these groups are affiliated with the MSA (see page 65); this involves joining the Society on the same terms as a Personal Member, i.e., dues of $25.00, and receipt of MYCOLOGIA and the semiannual MSA NEWSLETTER.

If public interest in mycology is a factor, the future of mycology is bright. The January issue of the Mycophile, the newsletter of the NORTH AMERICAN MYCOLOGICAL ASSOCIATION, lists a total of 64 mycological clubs and associations around the country. And, this number continues to grow yearly. For the names and addresses of these groups (or those near you), write to Mrs. Ann Hart, NAMA Membership Secretary, 336 Lenox Ave., Oakland, CA 94610 or to W. J. Sundberg.

Several of these clubs, some with organized toxicology committees or study groups, have provided identification assistance, chemical testing (in some cases), other knowledge, and advice to the medical community and the public in cases of suspected mushroom poisoning. Two recent examples include poisonings by Amanita pantherina (OREGON MYCOLOGICAL SOCIETY, Portland, OR) and Amanita phalloides (SAN FRANCISCO MYCOLOGICAL SOCIETY, San Francisco, CA; an MSA Affiliated Society).

Like many other clubs, the MONTSHIRE MYCOLOGICAL SOCIETY (see MSA Newsletter 34[1]:52) has initiated "specialists" groups to enhance their depth of knowledge and understanding with individuals emphasizing the study of a single genus in the local flora.

The MYCOLOGICAL ASSOCIATION OF WASHINGTON (D.C.) will host the 1985 NAMA foray at Canaan Valley Resort State Park, near Elkins, West Virginia on August 1-4. In addition to good food and mushrooms, the site offers numerous amenities for the less mycologically inclined (pool, tennis, golf, horseshoes, etc.) [I intend to bring my skates and squeeze in some time to try their outdoor roller skating rink.--ed.] For more information, contact Jimmy Schreiber, MAW President, 1924 Lawrence St. NE, Washington, DC 20018. Phone: (202) 526-5652.
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AFFILIATED SOCIETIES

The Boston Mycological Club, c/o E. H. Halliwell, 855 Commonwealth Avenue, Newton, MA 02159

Colorado Mycological Society, Joan L. Betz, Secretary, 501 Clermont Parkway, Denver, CO 80220

The Mycological Society of San Francisco, Steve Cochrane, President, P. O. Box 11321, San Francisco, CA 94101

The North American Mycological Association, Gary Lincoff, President, New York Botanical Garden, Bronx, NY 10458

The Ohio Mushroom Society, 288 E. North Avenue, East Palestine, OH 44413

Societe Mycologique de France, 36 Rue Geoffroy-Ste. Hilaire, Paris V, France

THE MYCOLOGICAL SOCIETY OF AMERICA

Application for Membership

NAME: ________________________________     AREA OF INTEREST (check one)

MAILING ADDRESS:

________________________________________

ZIP CODE: ___________     TELEPHONE (include area code): _____________________________

Date on which you wish your membership to begin: January 1, 19__

Signature of member endorsing your application: ________________________________

DUES INFORMATION (check one)

___ Regular Member ....... $25.00
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___ Student Member ....... $12.00
  (Maximum eligibility — 5 years)

___ Associate Member .... $5.00
  (Newsletter only)

___ Emeritus Member with
  MYCOLOGIA ......... $12.00

___ Affiliated Society .... $25.00

Completed form and dues are to be sent to Dr. Amy Rossman, Treasurer, National Fungus Collections, Room 313, Bldg. 011A, BARC-West, Beltsville, MD 20705. PHONE: (301) 344-3366.

In the U.K. send payment to Dr. David Minter, CMI, Ferry Lane, Kew, Richmond, Surrey. TW9 3AF.