UNIVERSITY OF ALBERTA MICROFUNGUS COLLECTION AND HERBARIUM (UAMH)

A Division of the Devonian Botanic Garden, Faculty of Agriculture, Forestry and Home Economics
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SUMMARY OF ACTIVITIES FOR 2007

Staff, Volunteers

Professor (Curator) - **L. Sigler**
.66 FTE Devonian Botanic Garden/UAMH, Fac. Agriculture, Forestry & Home Economics
.33 FTE Medical Microbiology & Immunology, Fac. of Medicine
Consultant in Mycology, PLNA/UAH Microbiology & Public Health
& Adj. Prof. Biol. Sci.
Assistant Curator (.5 FTE Non-academic, .5 FTE trust, NSERC) – **C. Gibas**
Technical or laboratory assistants (trust): - **A. Hashimoto** (to Aug), **B. Bahnmann** (part-time from June), **N. Fairbairn** (part-time from Dec.), **V. Jajczay** (casual)
Volunteers- **M. Packer, Sharon Midbo, Carole Pierce**

Affiliates
R. Currah, Professor, Biological Sciences, Faculty of Science
M. Berbee, Professor, University of British Columbia, Vancouver
G. Hausner, Assistant Professor, University of Manitoba, Winnipeg

Academic Teaching & Graduate Supervision

L. Sigler

- MMI 427 Fungi in the Human Environment (full responsibility)
- MLSCI 240 Pathogenic Bacteriology (4 lectures)
- BOT 306 Biology of the Fungi (1 lecture)
- Medical Microbiology & Immunology Residency Program, mycology elective (3.5 weeks, 1 student)

Graduate Supervisory Committees (Sigler)
M. Day, Biological Sciences, Supervisor, R. Currah
M. Davey, Biological Sciences, Supervisor, R. Currah
M. Plishka, Biological Sciences, Supervisor, R. Currah

Professional Training (Workshop)

May 17 Invited instructor, workshop on "Rapidly Changing Mycology: New Facts & Ideas," Toronto, ON. Sponsored by the US National Laboratory Training Program, this advanced workshop attracted 40 participants from Canada, the US, Bahamas, Germany and India.

Cultures Received, Distributed and Accessioned

Cultures received for identification, deposit or in exchange (**Table 1**) **136**

Cultures distributed on request or in exchange (**Table 2**).....**250**

Culture Collection and Herbarium Accessions

New accessions **110**

Total accessions.....**10876**

Information on Accessions available through print and on-line CATALOGUES

Catalogue of the University of Alberta Microfungus Collection and Herbarium. [PDF]
http://www.devonian.ualberta.ca/uamh/search

In-house and Collaborative Research

Refereed Journal Articles

1. Balajee SA*, Sigler L, Brandt ME. DNA and the classical way: Identification of medically important molds in the 21st century. Medical Mycology 2007; 45:475-90
*Mycotic Diseases Branch, Centers for Disease Control and Prevention, Atlanta, Georgia, USA.

Abstract The advent of the 21st century has seen significant advances in the methods and practices used for identification of medically important molds in the clinical microbiology laboratory. Historically, molds have been identified by using observations of colonial and microscopic morphology, along with tables, keys and textbook descriptions. This approach still has value for the identification of many fungal organisms, but requires expertise and can be problematic in determining a species identification that is timely and useful in the management of high-risk patients. For the increasing number of isolates that are uncommon, atypical, or unusual, DNA-based identification methods are being increasingly employed in many clinical laboratories. These methods include the commercially available GenProbe assay, methods based on the polymerase chain reaction such as single-step PCR, RAPD-PCR, rep-PCR, nested PCR, PCR-RFLP, PCR-EIA, and more recent microarray-based, Luminex technology-based, and real-time PCR-based methods. Great variation in assay complexity, targets, and detection methods can be found, and many of these methods have not been widely used or rigorously validated. The increasing availability of DNA sequencing chemistry has made comparative DNA sequence analysis an attractive alternative tool for fungal identification. DNA sequencing methodology can be purchased commercially or developed in-house; such methods display varying degrees of usefulness depending on the breadth and reliability of the databases used for comparison. The future success of sequencing-based approaches will depend on the choice of DNA target, the reliability of the result, and the availability of a validated sequence database for query and comparison. Future studies will be required to determine sequence homology breakpoints and to assess the accuracy of molecular-based species identification in various groups of medically important filamentous fungi. At this time, a polyphasic approach to identification that combines morphologic and molecular methods will ensure the greatest success in the management of patients with fungal infections.

2. Bowman MR*, Paré JA, Sigler L, Naeser JP, Sladky KK, Hanley CS, Helmer P, Phillips LA, Brower A, Porter R. Deep fungal dermatitis in three inland bearded dragons (*Pogona vitticeps*) caused by the *Chrysosporium* anamorph of *Nannizziopsis vriesii.* Medical Mycology 2007; 45:291-96.

*Dept Surgical Sci, Veterinary Medicine, Univ Wisconsin, Madison, WI

Abstract The *Chrysosporium* anamorph of *Nannizziopsis vriesii* (CANV), a keratinophilic fungus that naturally and experimentally causes severe and often fatal dermatitis in multiple reptile species, was isolated in pure culture from skin samples of three inland bearded dragons (*Pogona vitticeps*) with deep granulomatous dermatomycosis. The first animal presented with a focal maxillary swelling involving the skin and gingiva. This lizard died while undergoing itraconazole and topical miconazole therapy. The second presented with focally extensive discoloration and thickening of the skin of the ventrum and was euthanized after 10 weeks of itraconazole therapy. A third lizard presented with hyperkeratotic exudative dermatitis on a markedly swollen forelimb. Amputation and itraconazole therapy resulted in a clinical cure. Histopathology of tissue biopsies in all cases demonstrated granulomatous dermatitis with intralesional hyphae morphologically consistent with those produced by the CANV. The second lizard also had granulomatous hepatitis with intralesional hyphae. Evidence in this report suggests that the CANV is the etiologic agent of an emerging condition in captive bearded dragons that has been called 'yellow fungus disease'.

3. Day MJ*, Gibas CFC, Fujimura KE, Egger KN, Currah RS. *Monodictys arctica,* a new hyphomycete from the roots of *Saxifraga oppositifolia* collected in the Canadian High Arctic. Mycotaxon 2006; 98:261-72.
*Biol Sci, U of Alberta

Absract *Monodictys arctica* sp. nov. is described on the basis of nine isolates obtained from the roots of eight separate collections of *Saxifraga oppositifolia* from Ellesmere Island, Nunavut, Canada. Conidia are multicelled, smooth, darkly pigmented, and globose, oblong, ellipsoidal, or pyriform to irregularly shaped or dichotomously branched, consisting of a blastically produced basal cell and a distal proliferation of up to 24 cells arising from meristematic growth. Analyses of SSU and ITS sequences indicate the species is unique but has an affinity to the loculoascomycete taxon *Leptosphaeria dryadophila*.

4. Greif MD*, Gibas CFC, Tsuneda A, Currah RS. Ascoma development and phylogeny of an apothecioid dothideomycete, *Catinella olivacea*. American Journal of Botany 2007; 94:1890-99.
*Biol Sci, U of Alberta

Absract *Catinella olivacea* is a discomycetous fungus often found fruiting within cavities in rotting logs. Because this habitat would lack the air currents upon which discomycete species normally rely for the dispersal of their forcibly ejected ascospores, we suspected an alternative disseminative strategy might be employed by this species. An examination of the development of the discomycetous ascomata in pure culture, on wood blocks, and on agar showed that the epithecium was gelatinous at maturity and entrapped released ascospores in a slimy mass. We interpreted this as an adaptation for ascospore disperal by arthropods. Developmental data also showed that *C. olivacea* was unusual among other discomycetes in the Helotiales (Leotiomycetes). For example, the ascoma developed from a stromatic mass of meristematically dividing cells and involved the formation of a uniloculate cavity within a structure better considered an ascostroma than an incipient apothecium. Furthermore, the ascus had a prominent ocular chamber and released its ascospores through a broad, bivalvate slit. These features, along with phylogenetic analyses of large subunit and small subunit rDNA, indicated that this unusual apothecial fungus is, surprisingly, more closely affiliated with the Dothideomycetes than the Leotiomycetes.

5. Iwen PC*, Sigler L, Freifeld AG. *Mucor circinelloides* was identified by molecular methods as a cause of primary cutaneous zygomycosis. Journal of Clinical Microbiology 2007; 45:636-40.
*Univ Nebraska Medical Center, Omaha, NB

Absract A case of primary cutaneous zygomycosis caused by *Mucor circinelloides* is described. Histopathology showed typical hyphae along with chlamydospores. The isolate was identified by molecular and phenotypic methods. The utility of sequence analysis of the internal transcribed spacer region is highlighted; however, further studies are needed to assess species genetic heterogeneity.

6. Kumar D*, Sigler L, Gibas CFC, Mohan S, Schuh A, Medeiros BC, Peckham K, Humar A. *Graphium basitruncatum* fungemia in a patient with acute leukemia. Journal of Clinical Microbiology 2007; 45:1644-47.
   *Division of Infectious Diseases, Univ Toronto, ON

Abstract We report the first case of infection caused by *Graphium basitruncatum* in a man with acute leukemia who developed persistent fungemia and skin lesions. *G. basitruncatum,* a member of the Microascaceae, is phylogenetically and morphologically distinct from *Graphium penicillioides* and the opportunistic pathogens *Scedosporium apiospermum* (*Pseudallescheria boydii*) and *Scedosporium prolificans*.

Refereed Articles In Press

7. Tan DHS, Sigler L, Gibas CFC, Fong IW. Disseminated fungal infection in a renal transplant recipient involving *Macrophomina phaseolina* and *Scytalidium dimidiatum*: case report and review of taxonomic changes among medically important members of the Botryosphaeriaceae. Medical Mycology (accepted Oct 22, 2007)
8. Wang W, Tsuneda A, Gibas CFC, Currah RS. *Cryptosporiopsis* species isolated from the roots of aspen in central Alberta: identification, morphology and interaction with the host in vitro. Canadian Journal of Botany. (accepted)

Oral Presentations (♦Invited speaker)

9. Sigler L, Peterson SW. Relationships within the vertebrate-associated *Ajellomyces* clade: new taxa within the genus *Emmonsia*, close relative of *Blastomyces*. International Conference on Culture Collections, Goslar, Germany, A0187, 2007; Oct. 9.
10. ♦Sigler L. Overview on Canadian Culture Collections, workshop on "Canada's microbial culture situation: creating future stability" sponsored by CRTI (federal Chemical, Biological, Radiological, and Nuclear [CBRN] Research and Technology Initiative), Ottawa, 2007; Feb 13.

Abstracts - Posters

11. Gibas CFC, Sigler L. Recent developments in the systematics of *Arachnomyces* and its *Onychocola* anamorphs, having a predilection for human nail and skin. International Conference on Culture Collections (ICCC) A0180, 2007; Oct 7-10.
12. Sigler L, Gibas CFC. 2007. The University of Alberta Microfungus Collection and Herbarium – a Microbial resource centre conserving Canadian fungal diversity. ICCC A0188, 2007; Oct 7-10.
13. Sigler L, Peterson SW. 2007. Molecular genetic diversity among *Emmonsia* and *Blastomyces* isolates (*Ajellomycetaceae*) supports recognition of new species pathogenic to vertebrates. American Society for Microbiology, Toronto F-050, 2007; May 22.
14. Imperial MR, Romney M, Javer A, Sigler L. *Spiniger meineckellus* as a possible novel etiologic agent of allergic fungal rhinosinusitis. Assoc Medical Microbiol & Infectious Disease Canada (AMMI). Serial No. 0073; SP 20, 2007; Mar 14-18.

Identification, Advisory and Depository Services

Cultures are received from medical laboratories, industry or other agencies for identification, verification or deposit. We provide advice on fungus biology or significance of mold growth, and assistance with problems of fungal contamination or deterioration. In 2007, these agencies referred isolates (see **Table 1**): Bodycote Testing Laboratory, Calgary, AB; Keystone Labs, Edmonton, AB; Mycology Laboratory Services, Ontario Ministry of Health; Loyola University Medical Center, Maywood, IL; Toronto Zoo, Scarborough, ON;; Columbus Zoo, Powell, OH; St. Louis Zoo, St. Louis, MO; College of Veterinary Medicine, N. Carolina State Univ., Raleigh, NC. We continue to provide consulting service to the National Reference Centre (NRC), Microbiology & Public Health, Univ. of Alberta Hospitals, Dr. R. Rennie, Director. Ten isolates were received for identification in 2007.

Environmental

Various public and private agencies and members of the public contact us concerning assessment, significance and control of molds in the indoor environment. In addition to providing advice by telephone, we examine bulk and tape samples for presence and types of molds, and provide advice on the potential health hazards of exposure. In 2007, about 14 reports were prepared on samples submitted from homes, commercial or public buildings in the western provinces.

Visits, Meetings

Feb 13-14	LS participated in a CRTI sponsored workshop entitled **"Canada's microbial culture situation: creating future stability**" in Ottawa, Feb. 13-14.
May 18-24	LS attended the American Society for Microbiology Annual General Meetings, Toronto, ON and presented a poster.
May 20	LS visited Dr. Jean Paré, veterinarian at Toronto Zoo, to discuss collaborative work.
Aug 10	Dr. V. Vujanovic, Dept of Food and Bioproduct Sciences, University of Saskatchewan, Saskatoon, SK visited to discuss preservation methods and research.
Oct 7-11	LS and CG attended the International Conference on Culture Collections, Goslar, Germany.

Other Activities

Editorial work (LS): Journal of Clinical Microbiology (6); Mycological Research (1), Canadian Journal of Microbiology (1); grant reviews (2).

Culture Collections (LS): I continue to work on a national strategy to ensure the future of Canadian culture collections. In 2006, the federal Chemical, Biological, Radiological, and Nuclear [CBRN] Research and Technology Initiative [CRTI]) posted a contract for a consultant to do a feasbility study on the creation of a new federal Canadian culture collection program. I worked with the successful bidder, Sporometrics, Inc. (Toronto), to 1) provide background information and documentation on culture collections in Canada, 2) organize a 1 day meeting for the Sporometrics working group at the Garden in January, 3) participate in a national level workshop of 44 key stakeholders held in Ottawa in February, and 4) contribute to the final report entitled **National Centres for Secure Biological Resources**. At the February workshop, I was speaker and one of four group leaders.

Committees (LS):

- Appointed to a newly established National Mycology Network reporting to the National

Microbiology Laboratory and the Canadian Public Health Laboratory Network. Objectives are to develop national leadership in fungal disease surveillance and outbreak investigation, training programs, quality assurance programs, molecular fungal identification and serology.

- Mycological Society of America Committee on Culture Collections.

External Funding (Grants/Fees for Services)

NSERC. Major Facilities Access (continuing). The University of Alberta Microfungus Collection and Herbarium (UAMH). (2005-2008) Application for renewal pending (Major Resources Support program)	52,767
NSERC Discovery (continuing). Systematics of Fungi in the Human Environment Sigler, L. 2006 to 2011	31,878
NSERC Research Tools & Instruments. Thermal cycler and basic equipment for molecular characterization of fungi. Sigler, L. 2006 - 2007	28,000
U of A Small Faculties Fund. Equipment **(new)**. PCR Workstation and peripherals for molecular laboratory	4,980
Income from all services cultures, services, identifications, assessments and consultation	20,000
Consultation to UAH National Reference Centre (Microbiology & Public Health)	4,500

Publications Citing UAMH Cultures or Assistance

1. Alamouti SM, Kim JJ, Humble LM, Uzunovic A, Breuil C. Ophiostomatoid fungi associated with the northern spruce engraver, *Ips perturbatus*, in western Canada. Antonie van Leeuwenhoek 2007; 91:19–34.

   Abstract A number of ophiostomatoid fungi were isolated from the spruce-infesting bark beetle, *Ips perturbatus* and its galleries collected from felled spruce trees and logs in northern BC and the Yukon Territory. Isolates were identified to species using morphological characteristics, nuclear ribosomal DNA and partial b-tubulin gene sequences. Thirteen morphological and phylogenetic species were identified among the isolates. *Leptographium fruticetum, Leptographium abietinum, Ophiostoma bicolor, Ophiostoma manitobense, O. piceaperdum*, and eight undescribed species of the genus *Ophiostoma* and the anamorph genera *Leptographium, Hyalorhinocladiella, Ambrosiella* and *Graphium*. A number of these species, i.e. *L. fruticetum, Hyalorhinocladiella sp.* 2, *O. bicolor* and *O. manitobense*, were isolated repeatedly from *I. perturbatus*, while others, i.e. *Graphium* sp. 1 and *O. piceaperdum*, seemed to be sporadic associates. Among all the isolates, *L. fruticetum* had the highest relative dominance in this survey. A high frequency of occurrence of this species with the beetle may indicate a specific relationship between the two partners.

2. Antal Z, Kredics L, Pakarinen J, Doczi I, Andersson M, Salonen M, Manczinger L, Szekeres A, Hatvani L, Vágvölgyi C, Nagy E. Comparative study of potential virulence factors in human pathogenic and saprophytic *Trichoderma longibrachiatum* strains. Acta Microbiologica Immunologica Hungarica 2005; 52:341–50.

   Abstract Potential virulence factors of 9 saprophytic and 12 clinical *Trichoderma longibrachiatum* strains were examined in the present study, in order to compare their capacity to cause infection in humans. All of the strains were able to grow at temperatures up to 40 °C and at pH values ranging from 2.0 to 9.0. Carbon and nitrogen source utilization experiments

revealed that all of the strains were able to utilize a series of basic amino acids both as sole carbon and nitrogen sources. The MIC values of the tested antifungal drugs were found to be 0.016-8 μg/ml for amphotericin B, 64-256 μg/ml for fluconazole, 0.5-32 μg/ml for itraconazole and 0.008-1 μg/ml for ketoconazole in the case of the examinedis olates. Metabolites of the strains inhibited the growth of different bacteria furthermore, compounds produced by three clinical isolates reduced the motility of boar spermatozoa, indicating their toxicity to mammalian cells as well. On the whole, there were no significant differences in the examined features between strains derived from clinical or soil samples. The question, however, whether all environmental *Trichoderma longibrachiatum* strains have the capacity to cause infections or not, remains still unanswered.

3. Antal Z, Varga J, Kredics L, Szekeres A, Hatvani L, Manczinger L, Vágvölgyi C, Nagy E. Intraspecific mitochondrial DNA polymorphism within the emerging filamentous fungal pathogen *Trichoderma longibrachiatum*. Medical Microbiology 2006; 55:31-5.

   Abstract The genetic diversity of the emerging fungal pathogen *Trichoderma longibrachiatum* was examined at the level of mitochondrial DNA. The 17 investigated strains, comprising nine clinical and eight non-clinical isolates, exhibited seven and ten different mitochondrial DNA profiles by using the restriction enzymes *Bsu*RI and *Hin*6I, respectively. The sizes of mitochondrial DNAs varied from 34·9 to 39·5 kb. The discriminatory power of the method was higher than that of internal transcribed spacer sequence analysis and therefore should be more suitable for identification and epidemiological investigations. However, clinical and non-clinical isolates did not form separate clusters on the resulting dendrogram and thus there was no indication of a correlation between genetic structure and pathogenicity of the isolates.

4. Campbell CK, Borman AM, Linton CJ, Bridge PD, Johnson EM. *Arthroderma olidum*, sp. nov. A new addition to the *Trichophyton terrestre* complex. Medical Mycology 2006; 44:451-9

   Abstract In 1981, four fungal isolates from hair of the European badger (*Meles meles*) were examined by Dr Phyllis Stockdale at the Commonwealth Mycological Institute, Kew, and deposited in the UK National Collection of Pathogenic Fungi as an undescribed member of the *Trichophyton terrestre* complex. The present paper formalizes the complete description of a new ascomycete taxon, *Arthroderma olidum* following successful recent attempts to re-isolate the same fungus from the soil of Badger holes in South West England. Furthermore, using ribosomal RNA gene sequencing, we show that the asexual form of *A. olidum* is conspecific with the recently described *Trichophyton eboreum* 1 isolated from a human skin specimen in Germany.

5. Davey ML, Currah RS. A new species of *Cladophialophora* (hyphomycetes) from boreal and montane bryophytes. Mycological Research 2006 111: 106-16.

   Abstract During a survey of bryophilous fungi from boreal and montane habitats in central Alberta, a hitherto undescribed species of *Cladophialophora* was recovered from *Polytrichum juniperinum*, *Aulacomnium palustre*, and *Sphagnum fuscum*. On potato dextrose agar (PDA) colonies grew slowly, attaining a diameter of 25 mm after 30 d, were dark grey, velvety, radially sulcate, and convolute and cracked at the centre. Micronematous conidiophores gave rise to branched chains of small (1–2 _ 8–22 mm), cylindrical to fusiform conidia with truncate, swollen scars at each end. Phylogenies built on the ITS and ribosomal SSU regions indicate the isolates form a monophyletic clade within the family Herpotrichiellaceae (Chaetothyriales) that is composed of two geographically based groups, each with 99 % within-group sequence similarity and 97–98 % between-group sequence similarity. A teleomorph has not been found but would likely be similar to species of *Capronia*. In vitro inoculation of the isolates onto axenically grown

P. juniperinum produced no discernible host symptoms, and host penetration could not be detected using light microscopy. The production of polyphenol oxidases by the fungus and the role of other *Cladophialophora* species as latent endophytes and saprobes suggest that a potential role for the fungus is the degradation of the polyphenol-rich cell walls of mosses. A dichotomous key to species of the genus *Cladophialophora* is provided.

6. Davis CM, Noroski LM, Dishop MK, Sutton DA, Braverman RM, Paul ME, Rosenblatt HM. Basidiomycetous fungal *Inonotus tropicalis* sacral osteomyelitis in X-linked chronic granulomatous disease. Pediatric Infectious Disease Journal 2007; 26:655-6.

   Abstract Osteomyelitis is a common clinical manifestation of chronic granulomatous disease, a disorder of phagocytic function. Fungal organisms account for a significant proportion of these infections. We describe the clinical presentation and subsequent destructive sacral osteomyelitis with a basidiomycetous mold, *Inonotus tropicalis*, in a patient with an X-linked chronic granulomatous disease.

7. Day MJ, Gibas CFC, Fujimura KE, Egger KN, Currah RS. *Monodictys arctica,* a new hyphomycete from the roots of *Saxifraga oppositifolia* collected in the Canadian High Arctic. Mycotaxon 2006; 98:261-72.

   Abstract *Monodictys arctica* sp. nov. is described on the basis of nine isolates obtained from the roots of eight separate collections of *Saxifraga oppositifolia* from Ellesmere Island, Nunavut, Canada. Conidia are multicelled, smooth, darkly pigmented, and globose, oblong, ellipsoidal, or pyriform to irregularly shaped or dichotomously branched, consisting of a blastically produced basal cell and a distal proliferation of up to 24 cells arising from meristematic growth. Analyses of SSU and ITS sequences indicate the species is unique but has an affinity to the loculoascomycete taxon *Leptosphaeria dryadophila*.

8. De la Cruz TE, Wagner S, Schulz B. Physiological responses of marine *Dendryphiella* species from different geographical locations. Mycological Progress 2006; 5:108-19.

   Abstract The saprobic, cosmopolitan, marine fungi *Dendryphiella arenaria* and *Dendryphiella salina*, isolated from various plant and algal substrates from different geographical locations and climatic zones, were studied for their adaptations to the abiotic and biotic parameters commonly found in their natural marine habitats. All the tested strains of *D. arenaria* and *D. salina* grew optimally on culture media with added marine salts, at pH values between 6.5 and 8.0 and at an incubation temperature of 25°C. The *D. arenaria* strains had faster mean colony extension rates under all conditions of culture. All strains exhibited an increased salt optimum with increasing incubation temperature. The TLC profiles of strains of the two species were similar. The culture extracts were antimicrobial, though production of the biologically active metabolites was strain-specific. There were no significant correlations between source of origin and responses to the investigated parameters. These results demonstrate phenotypic plasticity and the ability of each isolate to adapt to diverse biotopes.

9. Drees M, Wickes BL, Gupta M, Hadley S. *Leythophora mutabilis* prosthetic valve endocarditis in a diabetic patient. Medical Mycololgy 2007; 45:463-7.

   Abstract While dematiaceous (dark-walled) fungi are ubiquitous in the environment, their involvement in invasive human infections has rarely been reported. However, these organisms have been identified as potential emerging pathogens, particularly among immunocompromised hosts. We describe a diabetic patient with *Lecythophora mutabilis* prosthetic valve endocarditis who was treated surgically, as well as with amphotericin B lipid complex and voriconazole, which were subsequently followed by prolonged voriconazole suppressive therapy. To the best of our

knowledge, our patient is the first reported survivor of *L. mutabilis* prosthetic valve endocarditis.

10. Ewaze JO, Summerbell RC, Scott JA. Physiological studies of the warehouse staining fungus, *Baudoinia compniacensis*. Mycological Research 2007; 111:1422-30.

Abstract *Baudoinia compniacensis*, the fungus responsible for highly conspicuous black growth on walls and other surfaces in the vicinity of distillery warehouses and commercial bakeries, has been little studied, in part because its isolation and cultivation have long been considered difficult. In the present study, basic details regarding the physiology of this organism are elucidated for the first time. It is able to utilize ethanol as a carbon source, but not other simple alcohols; glucose is also well utilized, as is the ethanol breakdown product acetate. Inorganic and many organic nitrogen sources support growth well, but urea does not. Though strongly inhibited by salt concentrations over 2 m, *B. compniacensis* can survive considerably higher concentrations. The fungus does not ordinarily survive temperatures of 52 °C or higher when moisture is present, but can be pre-adapted to survive this temperature by prior heat or ethanol exposure. Sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) analysis of cellular proteins reveals that heat and ethanol pre-adaptation appear to induce formation of putative heat shock proteins.

11. Greif MD, Currah RS. Development and dehiscence of the cephalothecoid peridium in *Aporothielavia leptoderma* shows it is a species of *Chaetomidium*. Mycological Research 2007; 111:70-7.

Abstract The development of the cephalothecoid peridium of *Aporothielavia leptoderma* was examined using light and electron microscopy. Early stages in ascoma initiation were consistent with previous reports for other species in the *Chaetomiaceae*. However, as young cleistothecia increased in size, clusters of peridial cells in the outer *textura angularis* elongated in a radial pattern around a central cell or cell cluster to form rosettes of relatively thick-walled segments that marked the central areas of incipient cephalothecoid plates. The external flank along median portions of the radial cells became thin walled and swelled outwards so that each plate became concave and was separated from adjacent plates by a more or less circular to polygonal ridge of knuckle-shaped swellings. When dry, mature peridia split apart along some of the ridges demarcating individual plates but an internal mechanism for liberating ascospores from the confines of the ascoma was not observed. Physical disturbance of mature cleistothecia by beetles, when enclosed together in a Petri dish, shattered the peridia, liberating the ascospores. Smaller insects were unable to cause disarticulation of the cephalothecoid plates. Because of the presence of an apical germ pore in the ascospores and morphological similarity to *Chaetomidium arxii*, the new combination *Chaetomidium leptoderma* (syn. *Thielavia leptoderma*) comb. nov. is proposed.

12. Greif MD, Currah RS. Patterns in the occurrence of saprobic fungi carried by arthropods caught in traps baited with rotting wood and dung. Mycologia 2007; 99:7-19.

Abstract Fungi from approximately 1700 individual arthropods that had been captured in traps set in aspen-dominated woodland in western Canada and baited with coyote dung, moose dung, white-rotted wood, brown-rotted wood and fiberglass were isolated in pure culture and identified. These data were analysed with principal components analysis (PCA) to determine whether different types of substrate attracted specific arthropods and whether these animals carried unique assemblages of fungi with known proclivities for the new habitat. Mycobiotic agar was used to restrict the numbers of fungi isolated and resulted in the recovery of 1687 isolates representing 65 species across 12 orders. Isolates of cosmopolitan fungal taxa such as species

of *Cladosporium*, *Penicillium*, and *Beauveria* were the most numerous. Taxa with predilections for specific substrates, such as *Myxotrichum* and *Cryptendoxyla* that are known inhabitants of cellulose-rich materials (i.e. rotted wood), and various representatives of the keratinophilic Onygenales were recovered from arthropods attracted respectively to baits rich in cellulose and keratin. When traps were analysed according to the identity and numbers of arthropods captured, there was considerable overlap among clusters representing specific bait types, with traps baited with coyote dung being the most divergent partly because they captured significantly more arthropods than those baited with moose dung or rotted wood. When bait type was examined according to the identity and numbers of fungi on trapped arthropods the degree of overlap was also high although a few trends could be discerned. In particular traps baited with brown-rotted wood and coyote dung diverged slightly indicating that arthropods visiting these bait types were carrying somewhat different suites of fungi.

13. Koziak ATE, Cheng KC, Thorn RG. Phylogenetic analyses of *Nematoctonus* and *Hohenbuehelia* (Pleurotaceae) Canadian Journal of Botany 2007; 85:762-73.

Abstract *Hohenbuehelia* (Agaricales, Pleurotaceae) and *Nematoctonus* (Hyphomycetes) are the names for the sexual and asexual stages of a genus of nematode-destroying fungi (Basidiomycota). We obtained partial sequences of nuclear ribosomal DNA, including the internal transcribed spacer region and the 5′ end of the large subunit, of 37 isolates of *Hohenbuehelia* and *Nematoctonus* representing 13 of the 16 described species in *Nematoctonus*. Phylogenetic analyses support *Hohenbuehelia–Nematoctonus* as a monophyletic clade of the Pleurotaceae, within which the species were placed in five main subclades. Exclusively predatory species (*Nematoctonus brevisporus* Thorn & G.L. Barron, *Nematoctonus campylosporus* Drechsler, *Nematoctonus robustus* F.R. Jones, and *Nematoctonus* sp. UAMH 5317) appear to be basal. In these species, adhesive knobs to capture prey are produced on their hyphae but not on their conidia. A single mycelial individual may feed on many nematodes. From these have arisen both exclusively parasitoid species (*Nematoctonus cylindrosporus* Thorn & G.L. Barron, *Nematoctonus leiosporus* Drechsler, *Nematoctonus leptosporus* Drechsler, *Nematoctonus pachysporus* Drechsler, *Nematoctonus tylosporus* Drechsler), and species that we call intermediate predators (*Nematoctonus angustatus* Thorn & G.L. Barron, *Nematoctonus concurrens* Drechsler, *Nematoctonus geogenius* Thorn & GL. Barron, *Nematoctonus hamatus* Thorn & G.L. Barron, and *Nematoctonus subreniformis* Thorn & G.L. Barron). Exclusively parasitoid species have conidia that germinate to form sticky knobs that attach to passing nematodes but lack adhesive knobs on the hyphae. Each mycelial individual feeds on only one nematode. Intermediate predators have adhesive knobs both on hyphae and on germinated conidia and can act in both predatory and parasitoid modes. Most morphospecies are resolved as monophyletic, but sequences of additional gene regions are required to clarify species limits within the *N. angustatus* – *N. geogenius* group.

14. Li De-Wei. *Stachybotrys eucylindrospora*, sp. nov. resulting from a re-examination of *Stachybotrys cylindrospora*. Mycologia 2007; 99:332–39

Abstract The holotype of *Stachybotrys cylindrospora* was examined and the morphological characters were found to fit the description of *Stachybotrys chartarum*. Thus *Stachybotrys cylindrospora* is a synonym of *S. chartarum*. However a number of isolates and specimens subsequently described and studied by several mycologists have typical cylindrical conidia with longitudinal striations. The conidia are much longer than those of *S. chartarum*. These conidial characters showed that those isolates and specimens are notably different from *S. chartarum* and of the holotype of *S. cylindrospora*. Therefore a new name, *Stachybotrys eucylindrospora* sp. nov., is proposed to accommodate these isolates and specimens.

15. Mao X, Buchanan ID, Stanley SJ. Phenol removal from aqueous solution by fungal peroxidases. Journal of Environmental Engineering and Science 2006; 5(S1): S103–9.

    Abstract Aromatic compounds may be removed from aqueous solution by extra-cellular peroxidase enzymes that target specific classes of aromatic compounds. Phenol removal by commercially available extra-cellular enzyme, *Arthromyces ramosus* peroxidase (ARP), was studied at several temperatures and pH values. The optimal pH for phenol removal was found to lie within the range of pH 7 to 8, and was not affected by temperature. At neutral pH, phenol removal increased with decreasing temperature within the range of 0 °C to 30 °C. *Coprinus cinereus* peroxidase (CIP) was produced by *Coprinus cinereus* UAMH 4103 in a stirred fermentor; the fermentor broth was filtered, and used in phenol removal tests at room temperature. The impurities remaining in the crude enzyme solutions following filtration produced a beneficial effect on phenol removal from the buffered aqueous solution. However, greater phenol removal was observed in un-buffered solutions compared to removals achieved in solutions that contained phosphate buffer.

16. Narisawa K, Hambleton S, Currah RS. *Heteroconium chaetospira,* a dark septate root endophyte allied to the Herpotrichiellaceae (Chaetothyriales) obtained from some forest soil samples using bait plants. Mycoscience 2007; 48:274-81.

    Abstract During an extended search in Western Canada for fungal root endophytes useful as biocontrol agents against soil-borne pathogens, we isolated *Heteroconium chaetospira*, as well as *Phialocephala fortinii* or similar taxa, from seven samples of forest soil using herbaceous seedlings of four different species (i.e., barley, Chinese cabbage, eggplant, and melon) as bait plants. Our results support a previous observation that eggplant is a particularly effective species for baiting *H. chaetospira* from soil and confirm the ability of this fungus to grow as an endophyte in the roots of axenically reared host plants. Cultural characters show that this species is similar to *P. fortinii* and other melanized fungi in the dark septate endophyte (DSE) group (e.g., *Leptodontidium orchidicola*, *P. sphaeroides*, and *Cadophora finlandica*) in that it produces darkly pigmented colonies on agar media. *Heteroconium chaetospira* differs from *P. fortinii* and other melanized members of the Leotiomycetes in the DSE group in that its conidia are fusiform and develop in blastic acropetal chains. *Heteroconium chaetospira* is phylogenetically distant from most DSE taxa because DNA sequences for the nuclear small subunit (SSU) ribosomal RNA gene (rDNA) indicate that the taxon is affiliated with the Herpotrichiellaceae of the Chaetothyriales rather than with the Leotiomycetes.

17. Saito K, Kuga-Uetake Y, Saito M, Peterson RL. Vacuolar localization of phosphorus in hyphae of *Phialocephala fortinii*, a dark septate fungal root endophyte. Canadian Journal of Microbiology 2006; 52:643-50.

    Abstract *Phialocephala fortinii* is a dark septate fungal endophyte that colonizes roots of many host species. Its effect on plant growth varies from being pathogenic to beneficial. The basic biology of this species has received little research, and thus the main objectives of this study were to determine cytological features of hyphae, including the nature of the vacuolar system, and whether polyphosphate was present in vacuoles. Both living hyphae and hyphae that had been rapidly frozen and freeze substituted before embedding were studied. A complex system of vacuoles, including a motile tubular vacuolar system, elongated vacuoles, and spherical vacuoles, was demonstrated in living hyphae by the fluorescent probe Oregon Green 488 carboxylic acid diacetate, using laser scanning confocal microscopy. The motile tubular vacuolar system was more prevalent at the hyphal tip than in more distal regions, whereas elongated vacuoles and spherical vacuoles were more abundant distal to the tip. All vacuoles contained polyphosphate as shown by labelling embedded samples with recombinant polyphosphate binding

domain of *Escherichia coli* exopolyphosphatase, containing Xpress tag at the N-terminal end, followed by anti-Xpress antibody and a secondary antibody conjugated either to a fluorescent probe for laser scanning confocal microscopy or colloidal gold for transmission electron microscopy. The polyphosphate was dispersed in vacuoles. This was confirmed by staining embedded samples with 4',6-diamidino-2-phenylindole and viewing with UV light using epifluorescence microscopy. These cytological methods showed that the tubular vacuolar system had lower concentrations of polyphosphate than the spherical vacuoles. Lipid bodies were present around vacuoles.

18. Scott JA, Untereiner WQ, Ewaze JO, Wong B, Doyle D. *Baudoinia*, a new genus to accommodate *Torula compniacensis*. Mycologia 2007; 99:592-01.
Abstract *Baudoinia* gen. nov. is described to accommodate *Torula compniacensis*. Reported originally from the walls of buildings near brandy maturation warehouses in Cognac, France, species of *Baudoinia* are cosmopolitan colonists of exposed surfaces subjected to large diurnal temperature shifts, episodic high relative humidity and wetting, and ambient airborne ethanol. Morphologically *B. compniacensis* resembles some anamorphic Mycosphaerellaceae in possessing dark brown, nonseptate or uniseptate conidia with coarsely roughened walls that are borne acropetally in unbranched chains and released by schizolytic dehiscence. Analysis of partial nuclear rDNA SSU sequences positions *B. compniacensis* in the order Capnodiales and reveals that it is most closely related to the microcolonial genus *Friedmanniomyces*. Heat resistance is induced by brief sublethal temperature exposure.

19. Szekeres A, Laday M, Kredics L, Varga J, Antal Z, Hatvani L, Manczinger L, Vágvölgyi C, Nagy E. Identification of *Trichoderma longibrachiatum* by cellulose-acetate electrophoresis-mediated isoenzyme analysis. Clinical Microbiology and Infection 2006; 12:369-75.

Abstract Cellulose-acetate electrophoresis was used to investigate isoenzyme polymorphism among ten clinical and 11 non-clinical isolates of *Trichoderma*. Initial testing of 13 enzyme systems for activity and resolution of bands showed that seven were appropriate for identifying the different species. Each of the enzyme systems investigated (glucose-6-phosphate dehydrogenase, glucose-6-phosphate isomerase, 6-phosphogluconate dehydrogenase, peptidases A, B and D, and phosphoglucomutase) was diagnostic for at least one species. On the basis of the results of isoenzyme analysis, several isolates identified originally as *Trichoderma pseudokoningii*, *T. koningii* or *T. citrinoviride* were re-identified as *T. longibrachiatum*, in agreement with sequence analysis data for the internal transcribed spacer region of the isolates. The availability of a quick, inexpensive and reliable diagnostic tool for the identification of *T. longibrachiatum* isolates is important, as most clinical *Trichoderma* isolates belong to *T. longibrachiatum*. Furthermore, as many different enzyme systems are available, the method may also be suitable for the identification of other clinically relevant fungal species.

20. Weinberger M, Mahrshak I, Keller N, Goldscmied RA, Amariglio N, Kramer M, Tobar A, Samra Z, Pitlik SD, Rinaldi MG, Thompson E, Sutton D. Isolated endogenous endophthalmitis due to a sporodochial-forming *Phialemonium curvatum* acquired through intracavernous autoinjections. Medical Mycology 2006; 44:253-9.

Abstract We report a case of endogenous endophthalmitis due to a sporodochial-forming species of *Phialemonium curvatum*. The infection led to the enucleation of the affected eye, but there was no evidence of systemic dissemination. The isolated *P. curvatum* produced aggregates of phialides, many occurring on coils or in verticils, which eventually develop into sporodochia. The initial and post-enucleation isolates revealed they were identical to strains of *P. curvatum* from Israel causing disseminated disease in patients practicing intracavernous autoinjections for the treatment of erectile dysfunction. The reported case had unusual clinical and microbiological features. Despite the route of acquisition and the lack of systemic antifungal

therapy, the infection did not spread beyond the eye. The morphology of the phialide aggregates was also unique, and the distinction between *Volutella* and *Acremonium* is discussed. This case expands the spectrum of infections due to *Phialemonium* species, and reveals a novel way of developing fungal endophthalmitis.

21. Yang WQ, Tien M, Goulart BL. Characterization of extracellular proteases produced by four ericoid mycorrhizal fungi in pure culture and in symbiotic states. Acta Horticulturae 2006; 715:403-10.

Abstract Extracellular proteases produced by four mycorrhizal fungi growing in pure culture were compared to those produced by their symbionts (mycorrhizal blueberry plant roots). The profiles of the extracellular proteases produced by these isolates in pure culture were different from those produced by the symbionts. This conclusion was further supported by the results from isoelectric focusing study of the protease produced by Sterile White II (*H. ericae*, **UAMH** 9264) and its symbiont. No protease band was observed in nonmycorrhizal control plants. Different extracellular proteases were also produced by two different highbush blueberry cultivars infected with the same native isolate, *Oidiodendron maius* (**UAMH** 9263). The pH optima for protease activity were different between pure cultured mycorrhizal fungi and their symbionts. These results suggest that extracellular protease production by the symbiont is at least partially host controlled. The results are discussed in relation to ecological aspects of mycorrhizal symbiosis.

Table 1. Cultures Received in 2007

	Person or industry or culture collection and address	Purpose	Total
1.	Berbee, M., Dept. of Botany, Univ British Columbia, Vancouver, BC	D	4
2.	Bodycote Testing Group (formerly Northwest Labs) (Jaafar, Z.), Calgary, AB	ID	4
3.	Bunn, U. (Witkowska, M.), Ontario Ministry of Health, Mycology Lab Services, Etobicoke, ON	ID	3
4.	Canadian Collection of Fungus Cultures (Babcock, C.), Agriculture Canada, Ottawa, ON	EX	1
5.	Centraalbureau voor Schimmelcultures (Merkx, T.), Utrecht, The Netherlands	EX	11
6.	Currah, R. (Wang, W., Skinner, S.), Dept. of Biological Sciences, Univ Alberta, Edmonton, AB	D	19
7.	Dhanani, N., Environmental Health and Saftey, Univ Alberta, Edmonton, AB	ID	2
8.	Duncan, M., St. Louis Zoo, Forest Park, St. Louis, MO	ID	1
9.	Dykstra, M.J., College of Veterinary Medicine, North Carolina State Univ. Raleigh, NC	ID	1
10.	Gruenig, C., Swiss Fed. Institute of Technology Forest Pathology and Dendrology, Zurich, Switzerland	D	12
11.	Kammeyer, P., Laboratory Medicine, Loyola University Medical Center, Maywood, IL	ID	1
12.	Keystone Labs (McDonald, J.), Edmonton AB	ID	1
13.	Klephaki, E. (King, M.J.), Columbus Zoo, Powell, OH.	ID	1
14.	Koster, B. (Wong, B.), Gage Occupational Environmental Health Unit, University of Toronto, Toronto, ON	D	17
15.	Paré, J. (Evans, M), Toronto Zoo, Scarborough, ON	ID	2
16.	Parks-Dely, J., Dept. of Biol. Sci., Univ Alberta, Edmonton, AB	D	1
17.	Reid, J., Microbiology, Univ of Manitoba, Winnipeg, MB	D	5
18.	Rennie, R., National Center for Mycotic Diseases, Univ Alberta Hospital, Edmonton, AB	ID	10
19.	Rice, A., Northern Forestry Centre, Edmonton, AB	D	1
20.	Sporometrics Inc. (Scott, J.), Toronto, ON	D	10
21.	St.-Germain, G., Laboratoire de Santé publique du Québec, Québec, PQ	D	1
22.	Stewart, L., Environmental Horticulture Dept., Univ Florida, Gainsville, FL	D	19
23.	Sutton, D., Fungal Testing Lab, Health Science Center, Univ Texas at San Antonio, San Antonio, TX	D	3
24.	Untereiner, W., Dept. of Botany, Brandon University, Brandon, MB	D	5
25.	Vederas, J. (Li, J., Markham, S.), Dept of Chemistry, Univ of Alberta, Edmonton, AB	SD/PS	1

Cultures received from:

1. Internal (Univ Alberta/UA Hospitals)	**33**
2. External (North America, International)	**103**

Total cultures received **136**

Codes: **D**= Deposit; **EX**= Exchange; **ID**= Identification; **SD**= Safe Deposit

PS = Preservation Service.

Table 2. Cultures Distributed in 2007

Person or industry or culture collection and address	Purpose	Total
1. BaseClear (Reichert, B.), Leiden, The Netherlands	MS	27
2. BD Diagnostics (White, V.), Sparks, MD	RD	112
3. Bio-Chem Consulting Services Ltd. (Sheppard, M.), Calgary, AB	IAQ	6
4. Brezden, S., Dept. of Agric, Food & Nutr Science, Univ Alberta, Edmonton, AB	PP	1
5. Centraalbureau voor Schimmelcultures (Merkx, T., Robert, V., Stalpers, J., Walther, G.), Utrecht, The Netherlands	EX/CR	12
6. Clean Air Laboratories, Research & Development, (Sobek, E.), Oakridge, TN	IAQ	4
7. Currah R. (Day, M., Plishka, M., Wang, W.), Dept. of Biological Sciences, Univ Alberta, Edmonton, AB	T	4
8. Foos, K.M., Dept. of Biology, Indiana University East, Richmond, IN	T	1
9. GAP EnvironMicrobial Services Ltd. (Shaw. J.), London, ON	QC	1
10. Gruenig, C., Swiss Fed. Institute of Technology Forest Pathology and Dendrology, Zurich, Switzerland	EX	10
11. Hambleton, S., Agriculture and Agrifood Canada, Ottawa, ON	CR	7
12. Kharbanda, P., Alberta Research Council, Vegreville, AB	ST	3
13. Khasa, D. (Quereshi, A.), Center for Forest Research, Université Laval, PQ	MR	21
14. Markham, J., Molecular and Cellular Biology, Univ of Guelph, Guelph, ON	MR	1
15. Mithani, S., BC Centre for Disease Control, Vancouver, BC	ST	6
16. Nirenburg, H.I., Institute fur Mikrobiologie, Berlin-Brandenburgische Akademie, Berlin, Germany	T	1
17. Novozymes Inc. (Teter, S.), Davis, CA	EZ	1
18. Peterson, L., Molecular & Cellular Biology, Univ Guelph, Guelph, ON	MR	2
19. Peterson, S., USDA-ARS National Center for Agric Utilization Res, Peoria, IL	CR	3
20. Raymond, P., Raymond's Enterprises of Canada, Laval, PQ	FM	2
21. Rennie, R. (Sand, C.), National Centre for Mycotic Diseases, Univ Alberta Hospital, Edmonton, AB	ST	1
22. Rossman, A., National Fungus Collections, USDA-Agric Res Service, Beltsville, MD	T	2
23. Scott, J.A. (Saleh, M.), Gage Occupational Environmental Health Unit, Univ Toronto, Toronto, ON	T	1
24. Sporometrics Inc. (Malloch, B., Scott J.A.), Toronto, ON	PT/MS	8
25. Technology Resource Inc. (Hung, C.), Vancouver, BC	RD	1
26. Toyo Institute of Food Technology (Hoshiko, E.), Kawanishi-shi, Japan	E	1
27. Vederas, J. (Clay, M., Li, J., Marcus, S.), Chemistry, Univ Alberta, Edmonton, AB	M/PS	4
28. Wingfield, M., Forestry Agricultural Biotechnology Institute (FABI), Pretoria South Africa	MS	5
29. Zettler, L. (Stice, A.), Dept of Biology, Illinois College, IL	MR	2

Cultures distributed to:

1. Internal (Univ Alberta/UA Hospitals)	**10**
2. North America	**184**
3. International	**56**

Total cultures distributed **250**

Codes: **CR** – Collaborative Research; **EX** – Exchange; **E** – Edible; **EZ** – Enzyme; **FM** – Food Mycology; **IAQ** - Indoor Air Quality; **M** – Metabolites; **MR** – Mycorrhizae; **MS** - Molecular Systematics; **PP** – Plant Pathology; **PS-** Preservation Service; **PT** – Proficiency Testing; **QC**- Quality Control; **RD** – Reference Diagnostics; **ST** - Susceptibility Testing; **T** – Taxonomy