BI 432/532 Introductory Mycology Fall 2019

Credits: 5

Prerequisites: BI 214, 253 or instructor's consent

Required textbook: 21st Century Guidebook to Fungi. 2nd Ed. by David Moore, Geoffrey D. Robson and Anthony P. J. Trinci. 2019. This book is open-access online:

http://www.davidmoore.org.uk/21st_century_guidebook_to_fungi_platinum/index.htm

Lab manual: Mushrooms Demystified, 2nd Ed. D. Arora. Ten Speed Press. 1986.
Optional lab book: Mushrooms of the Redwood Coast, N. Siegel and A. Schwartz, Ten Speed Press. 2016.

Additional learning resources will be provided.
Reference materials on reserve:

- 21st Century Guidebook to Fungi. 2nd Ed. (hard copy)
- Webster and Weber, Introduction to Fungi
- Arora, Mushrooms Demystified

Instructor: Jeff Stone
Office hours MF 11:30–12:30, 1600–1700 (Zoom), and by arrangement
jstone10@uoregon.edu
stonej@science.oregonstate.edu

GE: Tiffany Thornton
tthornto@uoregon.edu

Lectures: MWF 10:00 – 10:50 via Zoom
Labs MW 11-1:45 and 2:15-5:00; In person, KLA 5

Course description

An overview of the kingdom Fungi together with fungus-like organisms traditionally studied by mycologists. Students will learn the unique biological (life history, physiological, structural, ecological, reproductive) characteristics that distinguish Fungi (and fungus-like taxa) from other organisms. Ecological roles and interactions of fungi will be emphasized within the organizational framework of the most recent classification based on molecular phylogenetics. Students will learn the defining biological characteristics of the phyla of kingdom Fungi, and of several representative taxa (classes, orders, genera) within these. The unique aspects of each taxonomic group as agents of plant, animal, and human disease, as partners in symbioses with various organisms, and as mediators of ecological processes will be discussed in detail. In the laboratory portion of the class, students will learn to identify distinctive diagnostic structures of fungi, learn to differentiate various and fungal taxa, and use keys to identify genera and species of macro- and microfungi (including lichens). Students will learn how to isolate and purify fungi in culture from natural substrates and the use of selective media for isolation and cultivation of fungi. Working in groups, students will complete lab projects designed to illustrate fungal diversity and the unique aspects of fungal reproduction. In short, the objective is to learn as much about fungal biology as is possible in ten weeks.

Learning outcomes

Students completing this course will be able to:

- define characteristics of fungi that distinguish the group of organisms as a distinct evolutionary lineage
- differentiate the major groups (phyla, subphyla & several orders) of fungi and fungus-like organisms
- describe the life cycles and mating systems characteristic of major fungal groups
- describe the evolutionary history and phylogenetic relationships of fungi
- discuss ecological roles of fungi
- discuss importance of fungi as agents of plant and animal disease
- discuss the economic importance and biotechnological uses of fungi
- describe the roles of fungi as symbionts with other organisms
- identify common fungal taxa in the field
- use standard identification procedures to identify an unknown specimen
- employ standard isolation procedures to isolate an purify cultures of microfungi

Communication Policy

I welcome and encourage questions and discussion on any topic relevant to the class. Please use the Discussion forums in Canvas for questions and comments on class content, clarification or explanation of concepts, and general questions about class schedule, exam dates etc. I will schedule virtual office hours via Zoom for general discussion and questions. For questions and concerns that do not concern general class topics, please email me to schedule a meeting. I will also be available during lab times and can meet with students individually before or after lab periods, or at other times by arrangment.

Student Evaluation

BI 432 final grades will be based on two mid term exams (12% each), a final exam (20%), and lab projects as follows: culture collection and report (12%), specimen collection (12%), *Schizophyllum* mating experiment report (12%), *Sordaria* mating report (12%), class attendance and participation (4%).

Grades for BI 532 will be based on all of the above, and in addition a class project consisting of either a short (~5-10 p) paper, informational webpage, or class presentation pertaining to an aspect of fungal biology of interest to the student. This will count as 5% of the final grade, with relative percentages of exams adjusted proportionally. The topic and format for the project must be approved by Dr. Stone.

Final grades will be based on the cumulative percentages at the end of the term. Final grades will be assigned as follows: A, 90-100%; B, 80-89%; C, 70-79%, D, 60-69%; F, <60%.

Incompletes — A grade of "I" (incomplete) will be given only when there is a strong and compelling case for doing so. An incomplete can not be given unless the student has completed more than 70% of the course requirements, e.g. midterm exams 1 and 2, and at least 2 of 4 lab assignments. If an incomplete is requested, the student must make arrangements to remove the incomplete by the end of the next regular term following the term in which the incomplete was given.

As the university community adjusts to teaching and learning remotely in the context of the COVID-19 pandemic, course requirements, deadlines, and grading percentages are subject to change. I am aware of the effects COVID restrictions will have on students' ability to meet course requirements and I will make adjustments as appropriate. I will be mindful of the many impacts the unfolding events related to COVID-19 may be having on you. Though attendance and

participation account for 4% of the final grade, I will be flexible and reasonable in providing opportunities for make-up work. During this unusual time, I encourage you to talk with me about what you are experiencing so we can work together to help you succeed in this course. Given the difficulties and uncertanty caused by the ongoing COVID-19 outbreak, late work and make-up work will be accepted for any reasonable cause. Please alert me to ongoing issues that may affect your ability to meet scheduled due dates and make arrangements for scheduling make-up work as soon as is practical. All make-up work must be completed before the final exam due date, otherwise a grade of "I" will be entered.

Field Trips

Due to COVID-19 precautions I am not able to schedule or require field trips as in past years. If university policy permits I will make plans to schedule socially distanced local campus trips either on weekends or during non class weekday times during the term. I will also make arrangements for optional trips to more distant locations for students who can provide their own transportation for a few weekends during the term.

Extra credit

No papers, projects or other supplementary student work, other than the exams and assignments, will be accepted for extra credit. Extra credit questions will be built into the mid term and final exams. Students who attend class regularly and participate actively and thoughtfully will be given favorable consideration for increasing a borderline grade to the next higher letter grade.

Class schedule, reading assignments, lecture topics, and exams				
Week	**Date**	**Lecture Topic**	**Lab Topic**	**Reading**
1	M Sep 28	No Class		
1	W Sep 30	Course overview, objectives Importance of fungi.	Overview of lab, objectives Microscopes Fungal structures, spores, hyphae, sporocarps	**21st Century Guidebook:** chapters 1.1, 1.9, 2.4-2.8, 3.1, 3.9-3.10, 4.1-4.3, 5.1-5.4, 6.1-6.9 , 8.5 Loron et al 2019. Early fungi from the Proterozoic era in Arctic Canada. Nature 570:235. Redecker 2000. Glomalean Fungi from the Ordovician. Science 289:1920
1	F Oct 2	Overview of fungi higher fungi, cellular structures, hyphal organization,	sporocarp diversity	

		evolution and phylogeny, fossil record, diversity	start Schizophyllum mating **Assignment 1 due**	Blackwell 2000. Terresrial Life--Fungal from the Start? Science 289: 1884 State of the World's Fungi 2018. Kew Garden.
2	M Oct 5	Basidiomycota life cycle, monokaryons/dikaryons, ballistospores, phylogeny of basidiomycota, mating compatibility, mating systems		
2	W Oct 7	Basidiomycota ecology, ectomycorrhizae, mycoheterotrophic plants	Agarics, polypores,	**21st Century Guidebook:** Chapters 3.8, 7.1-7.6, 10.1-10.7, 13.1-17, 14.4 Pringle et al. 2005. The Captured Launch of a Ballistospore. Mycologia 97: 866. Fischer et al. 2010. How far and how fast can mushroom spores fly? Fungal Biology 114: 669. Eastwood et. al. 2011. Plant cell wall decomposing machinery. Science 333:762. van der Heijden and Horton. 2009. Socialism in the soil. J. Ecology. 97: 1139. van der Heijden et al. 2015. Mycorrhizal Ecology and Evolution. New Phytologist 205: 1406. van der Heijden. 2016. Underground networking. Science 352:290. Klein et al. 2016. Belowground carbon trade among tall trees. Science 352: 342. Radiolab, Mycorrhizal Networks Jusino et al. 2016. Experimental evidence of a symbiosis between red-cockaded woodpeckers and fungi. Proc. R. Soc. B 283: 20160106. Hittinger. 2012. Endless rots most beautiful. Science 336:1649. Floudas et al. 2012. The Paleozoic Origin of Enzymatic Lignin Decomposition. Science 336: 1715.
2	F Oct 9	Basidiomycota ecology wood decay		
3	M Oct 12	Wood decay fungi in forest communties, decay pathogens Polyporoid clade Hymenochaetoid clade	Basidiomycota-Hymenomycetes, Aphyllophorales, Ectomycorrhizae **Start Culture projects, collections**	
Field trip tentatively scheduled for Sat. Oct 10, 9:00-4:00; Destination TBA				
3	W Oct 14	Basidiomycota – "Gasteromycetes" Gomphoid-Phalloid clade	gasteromycetes	**21st Century Guidebook:** chapters 11.7, 15.1-15.3,

		Agaricoid gasteromycetes; jelly fungi		Malloy, O. C. 1997. Blister rust in North America. Ann. Rev. Phytopathology 35:87. Arneson, P.A. 2000. Coffee rust. The Plant Health Instructor. DOI: 10.1094/PHI-I-2000-0718-02 Currie, C. et al. 2001. Ants fungi bacteria. Ann. Rev. Microbiology 55:357. Currie, C. et al. 2003 Attine symbiosis. Science 299:386. Youngsteadt, M. 2008. Fungus gardens. Science 320:1006. Mueller, U. et al. 1998. Evoution of agriculture in ants. Science 281:2034. Poulson, M. 2015. Consequences of fungus domestication. Environmental Microbiology 17: 2562.
3	F Oct 16	Rusts, Pucciniomycotina		
4	M Oct 19	Basidiomycete-insect interactions		
4	W Oct 21	Smuts, Ustilaginomycotina "Heterobasidiomycetes" rusts and smuts, jelly fungi Rhizoctonia		**21st Century Guidebook:** chapters 3.7, 9.3, 9.6 Pataky, J. K., and K. M. Snetselaar. 2006. Common smut of corn. The Plant Health Instructor. DOI:10.1094/PHI-I-2006-0927-01
4	F Oct 23	Basidiomycota review		
4	S Oct 25	**Mid term 1**		
5	M Oct 26	Ascomycota overview, mating systems, reproductive structures; Ascomycota phylogeny and classification		
5	W Oct 28	lichens and lichenized fungi	Lichens	**21st Century Guidebook:** Chapters 13.18, 16.8-16.13, 18.1-18.3 Spribille, T. et al. 2016. Basidiomycete yeasts. Science 353:488. Geiser, L. and P. Neitlich. Air pollution and climate gradients indicated by epiphytic macrolichens. Environmental Pollution 145: 203. Seymour et al. 2005. Sex in the extremes: lichen forming fungi. Mycologist 19: 51. Bennet, J. and M. Klich 2003. Mycotoxins. Clinical Microbiology Reviews 16: 497.
5	F Oct 30	mycotoxins		
6	M Nov 2	Ascomycete human and animal pathogens, medical mycology		

				Lee, M.R. 2009. History of ergot of rye. I & II. J. R. Coll. Phys. Edinb. 39: 179. Richard, J.L. 2007. Mycotoxins and mycotoxicoses. Int. J. Food Microbiology 119:3. Blehert, D. S. 2012. Bat white-nose syndrome. PLOS pathogens 8: e1002779 Johnson, L. 2003. Dermatophytes. Mycologist 17:147. Wakefield, A.E. 2002. Pneumocystis. Mycologist 16:138. Miceli, M.H. et al. 2011. Emerging opportunistic yeast infections. Lancet Inf. Disease 11:142. Fisher et al. 2012. Emerging fungal threats. Nature 484:186 Brown, G. D. et al. 2012. Hidden killers. Science Translational Medicine 4:1.
6	W Nov 4	Fungi and pharmaceuticals, forensic mycology	**Start Sordaria mating project**	**21st Century Guidebook:** chapters 11, 14.7, 17.13-17-25 Sicard, D. and J. Legras. 2012. Saccharomyces domestication. Comptes Rendus Biologies 334:229. Moore, D. 2001. Fungi and Medicine. Chapter 5 in Slayers, saviors, servants and sex: an expose of kingdom fungi. Springer-Verlag, New York. Henderson, J. W. 1997. The yellow brick road to penicillin: a story of serendipity. Mayo Clinic Proc. 72:683. Wiebe, M. B. 2004. Quorn mycoprotein--overview of a successful fungal product. Mycologist 18:17. Tribe, H. t. 1998. The discovery and development of cyclosporin. Mycologist 12:20. Aly et al. 2011. 50 years of drug discovery from fungi. Fungal
6	F Nov 6	Fungi and fermentation, food fungi		
7	M Nov 9	Ascomycete-insect interactions		

				Diversity 50:3. Nielsen, R. I. and K. Oxenboll. 1998. Enzymes from fungi: their technology and uses. Mycologist 12:69. Winkler, D. 2008. Yartsa Gunbu. Economic Botany 62:291.
Sat Nov 8 Field Trip 5 TBA				
7	W Nov 11	Ascomycete plant pathogens 1		**21st Century Guidebook:** chapters 14.1-14.3, 14.9-14.17; 3.5
7	F Nov 13	Ascomycota review		
7	S Nov 15	**Mid Term 2**		
8	M Nov 16	"Zygomycetes" overview, Mucoromycota Zygomycete-insect symbioses, Zoopagales, Entomophthorales	**Schizopyllum mating reports due**	**21st Century Guidebook:** chapters 3.2-3.4, 3.6 Klironomos, J. N. 2003. Variaion in plant response to native and exotic arbuscular mycorrhizal fungi. Ecology 84:2292. Smith and Smith 2014. How harmonious are AM symbioses? New Phytol. 205:1381. Field K. J. and S. Pressel. 2018. Unity in diversity: structural and functional insights into the ancient partnerships between plants and fungi. New Phytologist 220:996. Greenberg, D.A. and W. Palen 2019. A deadly amphibian disease goes global. Science 363: 1386 Scheele et al. 2019. Amphibian fungal panzootic causes catastrophic and ongoing loss of biodiversity. Science 363:1459.
8	W Nov 18	Glomeromycotina, AM fungi	AM mycorrhizae	
8	F Nov 20	Chytridiomycota, Blastocladiomycota; rumen fungi, plant pathogens, Physoderma, Synchytrium Neocallimastix	**Sordaria mating reports due**	
9	M Nov 23	Oomycota, overview, pheromones, water molds, Hyphochytridiomycetes, Labyrinthulids		**21st Century Guidebook:** chapters 3.10 Frye, W.E. and N. Grunwald 2010. Introduction to Oomycetes. The Plant Health Instructor. DOI:10.1094/PHI-I-2010-1207-01
9	W Nov 25	Fungi in extreme environments		
9	F Nov 27	**no class**		
10	M Nov 30	Oomycete plant and animal pathogens	**Collections due Isolations due**	Stowell et al. 2005. Rapid blight: a new plant disease. APSnet Features.

10	W Dec 2	Oomycetes Again		doi:10.1094/APSnetFeature/2005-0705 Hardham, A. 2005. Phytophthora cinnamomi. Mol. Plant Pathol 6:589 Weste, G. and G. C. Marks. 1987. The biology of Phytophthora cinnamomi in Australasian forests. Ann. REv. Phytopathology 25: 207. Podger, F. D. 1972. Phytophthora cinnamomi, a cause of lethal disease in indigenous plant communities in western Australia. Phytopathology 62:972. Rizzo, D. M., M. Garbelotto, and E. M. Hansen. Phytophthora ramorum: Integrative research and management. Ann Rev. Phytopathology 43:309. Grunwald, N. J., J. LeBoldus, and R. C. Hamelin. 2019. Ecology and evolution of the sudden oak death pathogen, Phytophthora ramorum. Ann. Rev. Phytopathology 57: 14. Hansen, E. M., P. W. Reeser, W. Sutton. 2017. Ecology and pathology of Phytophthora ITS clade 3 species in forests in western Oregon, USA. Mycologia 109:100. Hansen, E. M. 2015. Phytophthora species as emerging pathogens of forest trees. Current Forestry Reports 1:16. Hansen, E. M., D. J. Goheen, E. S. Jules, B. Ullian. 2000. Managing Port-Orford cedar and the introduced pathogen, Phytophthora lateralis. Plant Disease 84:4. Brasier. C., A. M. Vettraino, T. T. Chang, A. Vannini. 2010. Phytophthora lateralis discovered in an old-growth Chamaecyparis forest in Taiwan. Plant Pathology 59:595.
10	F Dec 4	Catch up and review. We made it!		
10		**FINAL EXAM REVIEW TBA**		
11	**Dec 8**	**Final Exam**		

Statement concerning students with learning disabilities

The University of Oregon is working to create inclusive learning environments. Please notify us if there are aspects of the instruction or design of this course that result in barriers to your participation. You may also wish to contact the Accessible Education Center in 164 Oregon Hall at 346-1155 or uoaec@uoregon.edu

Campus resources to support your learning

Tutoring and Learning Center (TLC) Drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. Located in the 4th Floor Knight Library (541) 346-3226, tlc@uoregon.edu

Counseling Center Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2nd Floor of the Health Center(541)346-3227

Accessible Education Center The University of Oregon is working to create inclusive learning environments. The instructor believes strongly in creating inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify us as soon as possible. You are also encouraged to contact the Accessible Education Center. If you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit during office hours so that we can strategize how you can get the most out of this course. Located on the 1st Floor of Oregon Hall (541) 346-1155, uoaec@uoregon.edu

Center for Multicultural Academic Excellence (CMAE) mission is to promote student retention and persistence for historically underrepresented and underserved populations. We develop and implement programs and services that support retention, academic excellence, and success at the UO and beyond. We reaffirm our commitment to all students, including undocumented and tuition equity students. Located on the 1st Floor of Oregon Hall (541) 346-3479, cmae@uoregon.edu

The *UO Access Shuttle* is an on-campus ride service provided at no cost to students with conditions that limit mobility. More information and a sign-up form can be found on the parking & transportation department website: https://parking.uoregon.edu/content/access-shuttle.

Class Courtesy

Please arrive in class on time. Late arrivals distract the instructor and the other students. Please turn off cell phones during the class meeting times. Use your laptop only for class activities. Do not leave class early unless you have cleared it with the instructor in advance. Ask questions if you did not hear or understand something.

Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the quarter (or before) so that I may address you properly.

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities. Classroom courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Our classroom is a learning environment, and as such should be a safe, inclusive and respectful place. Being respectful also includes using preferred pronouns for your classmates. Disrespecting fellow students as well as combative approaches, tones and/or actions are not acceptable. Please make me aware if there are classroom dynamics that impede your (or someone else's) full engagement.

Academic integrity

All students will be expected to adhere to the University's guidelines on academic integrity as outlined in the Student Conduct Code: https://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code. As detailed in the policy, academic misconduct means the violation of university policy involving academic integrity. This includes cheating ("any act of deception by which a student misrepresents or misleadingly demonstrates that the student has mastered information on an academic exercise that the student has not mastered"), and plagiarism ("using the ideas or writings of another as one's own.") The instructor has a zero tolerance policy for academic dishonesty. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures.

The University Student Conduct Code defines academic misconduct, which includes unauthorized help on assignments and examinations and the use of sources without acknowledgment. Academic misconduct is prohibited at UO. I will report misconduct to the Office of Student Conduct and Community Standards—consequences can include failure of the course. In our remote class, I will ask you to certify that your exams/papers are your own work. Exams are timed but students will have ample time to complete. I will adjust times to support students with accommodations through the Accessible Education Center. If a technological glitch disrupts your exam, don't panic. Take a photo to document the error message you're receiving and then email or call me.

Discrimination and Harassment

Prohibited Discrimination and Harassment
Any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment may seek resources and help at safe.uoregon.edu. To get help by phone, a student can also call either the UO's 24-hour hotline at 541-346-7244 [SAFE], or the non-confidential Title IX Coordinator at 541-346-8136. From the SAFE website, students may also connect to Callisto, a confidential, third-party reporting site that is not a part of the university.

Students experiencing any other form of prohibited discrimination or harassment can find information at respect.uoregon.edu or aaeo.uoregon.edu or contact the non-confidential AAEO office at 541-346-3123 or the Dean of Students Office at 541-346-3216 for help. As UO policy has different reporting requirements based on the nature of the reported harassment or discrimination, additional information about reporting requirements for discrimination or harassment unrelated to sexual assault, relationship violence, sex or gender based bullying, stalking, and/or sexual harassment is available at Discrimination & Harassment.

Reporting
The instructor of this class is a Student-Directed Employee. As such, **if you disclose to me, I will respond to you with respect and kindness. I will listen to you, and will be sensitive to your needs and desires. I will not judge you. I will support you.** As part of that support, I will direct students who disclose sexual harassment or sexual violence to resources that can help. **I will only report the information shared to the university administration when you as the student requests that the information be reported** (unless someone is in imminent risk of serious harm or is a minor). Please note the difference between 'privacy' and 'confidentiality.' As a Student-Directed Employee I can offer privacy because I am not required to report certain information to the university. However, I cannot be bound by confidentiality in the same way that a counselor or attorney is. Confidential resources such as these means that information shared is protected by federal and state laws. Any information that I as a student-directed employee receive may still be accessed by university or court proceedings. This means, for example, that I could still be called as a witness or required to turn over any related documents or notes that I keep.

Please note also that I am required to report all other forms of prohibited discrimination or harassment to the university administration. Specific details about confidentiality of information and reporting obligations of employees can be found at titleix.uoregon.edu.

Mandatory Reporting of Child Abuse
UO employees, including faculty, staff, and GEs, are mandatory reporters of child abuse. Child abuse pertains to individuals who are under the age of 18. This statement is to advise you that your disclosure of information about child abuse to the instructor may trigger my duty to report that information to the designated authorities. Please refer to the following links for detailed information about mandatory reporting: Mandatory Reporting of Child Abuse and Neglect.

Safe Ride
541-346-7433 ext 2
pages.uoregon.edu/saferide

Safe Ride is an **assault prevention shuttle** that works to provide free, inclusive, and accessible alternatives to traveling alone at night for **UO students, faculty, and staff**.

We are a schedule-ahead service and riders can (1) call once we open to schedule a ride with a dispatcher or (2) leave a voicemail on the day of their ride request. We do not call riders ahead of time to confirm due to capacity constraints, but riders are always welcome to call us to double-check that their ride was scheduled. We are a feminist, 'for-the-students/by-the-students' organization and operate out of the Women's Center in EMU 12F.

Operating hours:
Spring term Sunday - Thursday | 7p - midnight
Friday + Saturday | 7p - 2a
Summer term Sunday - Thursday | 9p - midnight
Friday + Saturday | 9p - 2a
Fall/Winter term Sunday - Thursday | 6p - midnight
Friday + Saturday | 6p - 2a

Policy and rules:
1. We are a **schedule-ahead service**, we **do not call ahead**, and we can only wait for riders for 5 minutes at their pick-up time and location.
2. We only give rides to groups of **3 or fewer** to prioritize groups that are at higher risk.
3. We are a **free service** and do not accept tips.

Bi 432/532 Fall 2012 Introductory Mycology Lab syllabus

In addition to examination of specimens illustrating characteristics of the fungal groups covered each week, laboratory periods will be spent completing the five projects listed below.

1. Culture collection, isolation from natural substrate. Weeks 2-8, cultures and report due Nov 30, 2020

A. A collection of at least five fungi, identified to genus, and to species if possible, isolated in axenic culture from a natural substrate. Students will choose one natural substrate or ecological guild of fungi for isolations. Natural substrates include: soil, dung, living leaves, forest litter, aquatic substrates (submerged leaves etc), wood, rotting fungi, lichens and mosses, rotting vegetables, food, marine substrates, interior building environments, and others. Techniques for isolating from various substrates will be discussed in class. Discuss isolation procedures with Dr. Stone before selecting the substrate.

B. Write a brief (ca 2-3 page) report on the general group of fungi you were attempting to isolate, the methods employed, and discuss in detail one of the fungi you isolated. This may include information on its taxonomic/nomenclatural history, aspects of its phylogenetic relationships, aspects of ecology, unusual or important metabolites such as mycotoxins, pathogenicity to animals or plants, or other interesting, noteworthy characteristics. Include illustrations of your own (drawings or photographs) or from other sources, but provide attribution for illustrations not your own.

2. *Schizophyllum* mating weeks 1–6, Report due November 16, 2020

Obtain 8 – 10 single basidiospore isolates of *Schizophyllum commune* by suspending basidiocarps above agar surface and carefully excising isolated basidiospores onto agar medium in petri dishes. Allow isolates to grow for 1 week. These preliminary steps have been completed by Dr. Stone and the class GE.

When sufficient primary mycelium has developed, mate each isolates in all combinations by placing a small block of agar from two isolates on opposite sides of a 60 mm petri dish. On the basis of mating reactions (see class materials), characterize the mating type alleles for each isolate. Write a brief (ca 2-3 page) report on the experiment. The report should briefly and concisely explain the bifactorial/tetrapolar mating systems of Basidiomycota, describe the hypothesis being tested, describe the methods and results (including quantitative data and any statistical tests used), and include an interpretation of the results in relation to mating types of the strains used in the experiment.

3. Field collection weeks 1–9, due Nov 30, 2020

A collection of field collected specimens to include at least:

10 lichens*, representing a minimum of five families
10 basidiomycetes*, representing a minimum of five families
10 ascomycetes* or conidial anamorphs, representing a minimum of five orders

All specimens must be identified to species, but exceptions may be allowed for unusual or atypical specimens. Only one specimen per genus is allowed (unless explicitly permitted by Dr. Stone). Each specimen must be placed in a specimen packet (paper bag etc) labeled for curation with collection date, collection location, habitat, substrate (e.g. tree species, soil, carpet etc), collector, identifier, and reference used for identification. Students may share/trade material but the original collector must be reported. Collections must be accompanied by a printed list giving collection details and most current (i.e. mycobank.org) classification information for each specimen. Points will be deducted for out of date names; consult www.mycobank.org for all specimen names.

Example:

taxon	**fungal group**	**location and date**	**habitat**	**collector**	**identifier**	**Reference**
Peltigera neopolydactyla (Gyelnik) Gyelnik	lichen; Lecanoromycetes, Peltigerales, Peltigeraceae	Fall Creek, Lane Co., OR; 7 Nov. 2016	Old-growth Pseudotsuga/Tsuga forest. Growing on soil with moss.	H. J. Simpson	L. M. Simpson	McCune and Geiser, 2010, p 214.
Boletus zelleri (Murr.) Murrill	basidiomycete; Agaricomycetes, Agaricales, Boletaceae	Hardesty Mt Trail, Lane Co., OR; 14 Nov. 2016	Old-growth Pseudotsuga/Tsuga forest. On soil.	Ada Shroom	I. Guessed	Bessette et al. 2000, p. 171
Lophodermella morbida Staley & Bynum	ascomycete; Leotiomycetes Rhytismatales, Rhytismataceae	Peavy Arboretum, Corvallis, Benton Co., OR 14 July 2016	On foliage of *Pinus ponderosa*	Woody de Caye	I. C. Spores	Funk 1985, p. 66

4. Sordaria mating experiment weeks 6–8, Report due Nov 20, 2020

This is a demonstration of the uses of filamentous fungi as model organisms in classical genetics. Students will use tetrad analysis (the arrangement of ascospores in asci) to infer genotypes, genetic linkage, and recombination (crossing over) frequency from contolled matings of strains of *Sordaria fimicola*. Pooled class data will be used to calculate crossing over frequency, genetic distance etc. for two genes involved in spore pigmentation. A short, ca 2-3 page, report summarizing the methods, results, analysis and interpretation is required. Matings of Sordaria strains will be started in week 6, data collected the following week and a report due by the end of week 8.