Topics covered between midterm and final in PBIO 4723/5723 – Spring 2014
Final exam date: 5/7/14 at 8:00 a.m.; final version! posted 5/1/14

Note that the final exam will be comprehensive;
use the first review sheet to study for lectures 1-18

Lecture 19 (3/25)
- Background reading on genomics
  - What is a genome?
  - In general, what is the goal of a genomics study?
  - Why are genome sequences useful for creating phylogenetic trees?
  - Besides learning about evolutionary history, what are some practical applications of research on fungal genomics?
- Student presentation (genomics)
  - This presentation didn’t happen, but we did discuss the Nature paper showing how genomics helped elucidate the evolutionary relationships among the groups of fungi
  - Why did the researchers sequence six genes that are core to cell function instead of sequencing the whole genomes of the many fungi they studied?
  - Were the results of this study consistent with the fungal phylogeny presented at the start of the semester?
  - Why don’t the nodes in the fungal phylogeny presented in class have labels showing morphological features, as a similar tree for the vertebrates does?

Lecture 20 (3/27)
- Guest speaker: Dr. Brad Stevenson, OU Microbiology
  - What is the relationship between Dr. Stevenson’s work and Dr. Cichewicz’s work?
  - Secondary metabolites are chemically diverse, but the fungi producing them share a few biosynthetic pathways. The genes encoding the enzymes that produce the secondary metabolites are clustered and modular so they can be “mixed and matched.” But the genes aren’t always expressed so we can’t always make them make what we want, when we want it.
  - What were the overall objectives and research strategy described in the Tolypocladium paper that Dr. Stevenson talked about?

Lecture 21 (4/1)
- Background reading on fungus-beetle interactions
  - What are the ecological interactions between bark beetles, trees, and fungi? How do these interactions affect forest health? What about in the “urban forest” (e.g. Dutch elm disease)?
  - Summarize the central controversy explored in the Six and Wingfield paper
- Student presentation (fungus-beetle interactions; Maggie)
  - Be able to explain the question that was being asked, the methods the researchers used to answer the question, and the main findings
  - What is the relationship between a fungal anamorph and a teleomorph?
Lecture 22 (4/3)
- Guest speaker: Dr. Ken Hobson, OU Biology
  - How do bark beetles select which tree to infect? How do they overcome the tree’s defenses? How could forest managers put this information to practical use?
  - What is the role of human activities in the huge areas of forest currently being killed by bark beetles?

Lecture 23 (4/8)
- Background reading on fungal plant pathogens
  - In general, which phyla of fungi contain the most fungal plant pathogens? How do fungi infect plants? How do growers control fungal plant pathogens?
  - Compare and contrast the complexity and stages of the life cycles of *Puccinia* (yellow rust of wheat) and *Magnaporthe* (rice blast)
- Student presentations (fungal plant pathogens; Anthony and Jessica)
  - For each presentation, be able to explain the question that was being asked, the methods the researchers used to answer the question, and the main findings
  - What is the disease triangle, and how is it useful?
  - What is integrated pest management?

Lecture 24 (4/10)
- Guest speaker: Jen Olson, Plant Disease and Insect Diagnostic Laboratory, Oklahoma State University, Stillwater
  - What does Jen do on a day to day basis, and why is her job important?
  - What tools does she use?

Lecture 25 (4/15)
- Work on projects in class (nothing to test on)

Lecture 26 (4/17)
- Background reading on human fungal pathogens
  - What are mycotoxins?
  - Who is typically most susceptible to fungal infections?
- Student presentations (human fungal pathogens; Sam and Bonnie)
  - For each presentation, be able to explain the question that was being asked, the methods the researchers used to answer the question, and the main findings
  - What are the three main “branches” of medical mycology, and how do the two papers relate to those three branches?
  - How are humans typically exposed to mycotoxins? What are the treatment options if someone is exposed?
  - What are dimorphic fungi?
  - What are some possible ways to classify infectious fungi?
  - What are the prevention and treatment options for someone infected with a fungus?

Lecture 27 (4/22)
- Writing circle #2. I will not test you on material from this day.
Lecture 28 (4/24)
• Work on projects in class (nothing to test on)

Lecture 29 (4/29)
• Guest speaker: Brian Doherty, IMMY, Norman, OK
  o What kinds of products does IMMY make?
  o What are the main fungal pathogens that IMMY currently works with?
  o What are the main challenges IMMY faces?

Lecture 30 (5/1) – last day of class
• Background reading on wood decomposition
  o What molecules do wood decay fungi consume? How do these molecules relate to the terms “brown rot” and “white rot”?
• Student presentation (wood decomposition; Chris)
  o Be able to explain the question that was being asked, the methods the researchers used to answer the question, and the main findings
  o Much of our class discussion focused on why the findings were unexpected and how this study system differs from a “real” ecosystem
• I showed excerpts from two David Attenborough videos
  o One explained two symbiotic relationships involving fungi (mycorrhizae and lichens) – what are mycorrhizae and lichens, why are they important in ecosystems, and what does each partner gain from the symbiosis?
  o The other video showed Cordyceps fungi infecting ants and other insects. What makes these fungi unique, and what is their role in ecosystems?
• I also handed out a “word sort” activity for you to use at home (if you didn’t get it, let me know and I’ll send it to you). The idea is to use scissors to cut out the terms, then sort them into categories, define the categories, and articulate the relationships among the categories.