 Phylogenetic Classification

- The following system of classification is based upon a comprehensive survey of fungal phylogenetic data:
- System is restricted solely to organisms in the Kingdom Fungi, but not the oomycetes and slime molds.

Hibbet et al. Scheme

- Includes only monophyletic groups
- Uses seven ranks
  - Kingdom
  - Subkingdom
  - Phylum (suffix –mycota; except Microsporidia)
  - Subphylum (suffix –mycotina)
  - Order (suffix –ales)
  - Subclass (suffix –mycetidae)
  - Class (suffix –mycetes)

Hibbet et al. Scheme (cont.)

- Some taxa are considered incertae sedis, that is, their specific position in the classification hierarchy is uncertain
- Scheme includes:
  - One kingdom
  - One subkingdom
  - Seven phyla
  - 10 subphyla
  - 35 classes, 12 subclasses, 129 orders

Hibbet et al. Scheme (cont.)

- Significant changes to traditional schemes include the following:
  - Chytridiomycota
    - Blastocladiales is now a phylum unto itself
  - Neocallimastigales is now a phylum unto itself
  - Zygomycota is not accepted as a phylum at present pending further study
  - Microsporidia is now a phylum

Phylogeny of the Fungi: Basal Fungi and Dikarya (Hibbet et al., 2006)
Hibbet et al. Scheme (cont.)

- **Kingdom Fungi**
  - **Phylum Chytridiomycota**
    - Thallus monocentric, polycentric, or filamentous; asexual reproduction by zoospores with a single posteriorly-directed flagellum; sexual reproduction with zygotic meiosis where known; Golgi apparatus with stacked cisternae; nuclear envelope fenestrated at poles during mitosis.

- **Phylum Neocalimastigomycota**
  - Thallus monocentric or polycentric; anaerobic, found in digestive system of larger herbivorous mammals; lacks mitochondria but contains hydrogenosomes; zoospores posteriorly unflagellate or polyflagellate; nuclear envelope remains intact throughout mitosis.

- **Phylum Blastocladiomycota**
  - This phylum reflects phylogenetic information from a number of molecular studies
  - Very similar in many respects to the Chytridiomycota and Neocalimastigomycota
  - Typified by *Allomyces*

- **Phylum Microsporidia**
  - The nomenclatural status of Microsporidia is ambiguous
  - Currently a Phylum by the zoological Code
  - It will be necessary to decide whether the nomenclature should be governed by the zoological or the botanical Code

Hibbet et al. Scheme (cont.)

- **Phylum Glomeromycota**
  - Subphylum Mucoromycotina
  - Subphylum Entomophthoromycotina
  - Subphylum Zoopagomycotina
  - Subphylum Kickxellomycotina

Phylogeny of the Ascomycota (Hibbet et al., 2006)
Hibbet et al. Scheme (cont.)

- Subkingdom Dikarya
  - Phylum Ascomycota
    - Subphylum Taphrinomycotina
      - Pneumocystis
      - Schizosaccharomyces
    - Subphylum Saccharomycotina
      - Budding yeasts, sometimes form hyphae
    - Subphylum Pezizomycotina
      - Primarily molds forming various ascocarps

- Subkingdom Dikarya (cont.)
  - Phylum Basidiomycota
    - Subphylum Pucciniomycotina
      - Contains the rust fungi
    - Subphylum Ustilaginomycotina
      - Contains the smuts and ‘jelly’ fungi
    - Subphylum Agaricomycotina
      - Contains typical mushrooms, toadstools, etc.