

NAME _____

SS# _____

EXAM 1
February 8, 2001
BIO 329

Directions: All explanations, definitions, and descriptions should be presented in good English. This means complete sentences should be used except when lists or fill-in-the-blanks are required. Spelling of mycological terms should be accurate. Slight misspellings may be overlooked, but major misspellings will result in wrong answers.

1. Multiple choice (30 pts @ 2 each); circle the number of the correct choice.
 - a. A definition of a fungus should not include that they
 1. are eucaryotic
 2. produce spores
 3. grow by budding
 4. grow by hyphal apical extension
 5. reproduce sexually
 6. obtain food by phagocytosis
 - b. According to your professor, medical mycology should be given more emphasis by medical microbiologists and public health administrators because
 1. more and more species of fungi are being implicated in human disease
 2. more and more cases of life-threatening mycoses are being diagnosed each year
 3. the population on average is aging making it more prone to fungal disease
 4. earlier intervention would greatly decrease costs because serious mycosis mostly must be managed in hospital settings
 5. more and more of the population is becoming medically compromised, usually by other diseases, but also by trauma such as burns, making them very prone to mycosis
 6. all and more of the above
 - c. Few fungi of medical importance
 1. are obligate pathogens of humans
 2. are hyphal organisms
 3. grow in the yeast morphology
 4. are dimorphic
 5. are found as free living saprophytes in nature
 6. are members of the Ascomycota

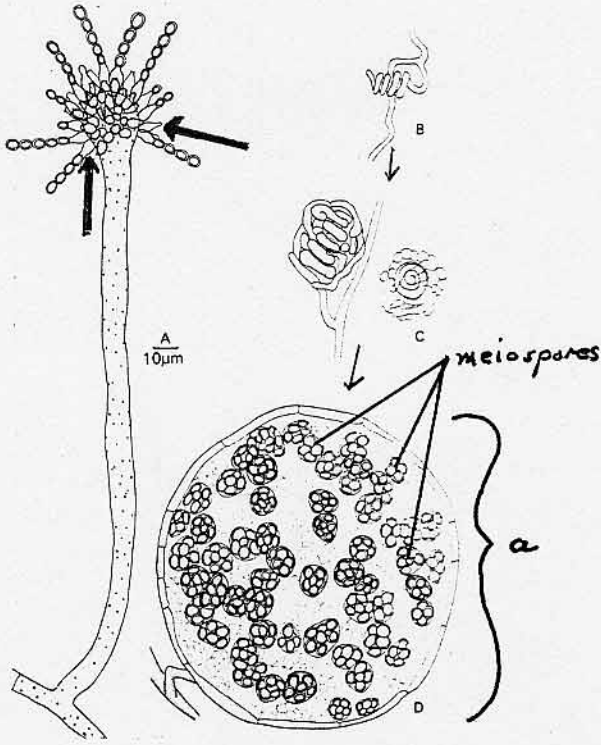
- d. Fungal classification has been revised significantly during the last 25 years resulting in the elimination of numerous taxa of fungal-like organisms. Among the phyla/divisions eliminated, mycologists and phylogenists include the
- Oomycota (the “water molds”)
 - Hyphochytridiomycota (the “hyphochytrids”)
 - Myxomycota (the “slime molds”)
 - Plasmodiophoromycota (the “endoparasitic slime molds”)
 - all of the above
 - none of the above (a through d)
- e. Cells of some fungi in which karyogamy and meiosis occur, and in which spores are produced that enclose the meiotic nuclei, are
- conidia
 - zygospores
 - asci
 - sporangia
 - basidia
 - none of the above
- f. Heterothallic means
- the alteration of haploid (N) and diploid (2N) generations by some fungi
 - the production of a conidium by differentiation of a pre-existing hypha
 - the fungus is sexually self-sterile
 - a fungus must be included in the Fungi Imperfecti
 - a fungus is a member of the form-class Hyphomycetes
 - a fungus reproduces only by fragmentation
 - none of the above
- g. Hyphal apical extension and yeast bud formation are said to involve plasma membrane and cell wall expansion as mediated by
- Woronin bodies
 - endonucleases
 - cytokinesis
 - vesicles
 - mitosis
 - endocytosis
- h. Zoospores having one whip-lash, posterior flagellum are characteristic of the fungi included in the phylum
- Chytridiomycota
 - Oomycota
 - Plasmodiophoromycota
 - Hyphochytridiomycota
 - all of the above
 - none of the above
- i. Zygomycota do not produce
- zoospores
 - mitospores
 - zygospores
 - sporangia
 - hyphae
 - sporangiospores

- j. A septum with a central septal pore and associated Woronin bodies is
1. characteristic of a basidiomycetous fungus
 2. called a dolipore septum
 3. found in a clamp connection
 4. suggestive of a euascomycetous fungus
 5. a rare type of septum found only in certain members of the form-class Blastomycetes
- k. Multihyphal aggregates that completely surround the prototunicate asci of some fungi, but which have no preformed exit port for ascospore release, are called
1. cleistothecia
 2. perithecia
 3. apothecia
 4. pycnidia
 5. acervuli
 6. basidiocarps
 7. none of the above
- l. The Fungi Imperfecti encompass fungi that
1. are phylogenetically related
 2. are always logically classified based on the best scientific reasoning
 3. are all probably cleistothecial ascomycetes
 4. are given binomial names with little regard, until very recently, to characteristics other than conidial morphology and conidiation methods
 5. are all teleomorphic
 6. will, in all probability, never be classified properly
- m. Conidia that are produced in a manner that leaves a ring on their conidiogenous cell for each conidium produced are said to be
1. holoarthric conidia
 2. thalloconidia
 3. enteroarthric conidia
 4. annelloconidia
 5. poroconidia
 6. phialoconidia
 7. botryoblastoconidia
- n. It appears that the majority of fungal pathogens of humans are members of the Ascomycota as determined by observations of sexual structures, ultrastructural features and DNA sequence data. Among the ascomycetous sexual structures and ultrastructural features, mycologists do not include
1. dolipore septa
 2. cleistothecia
 3. apothecia
 4. Woronin bodies
 5. any of the above

- o. Medically important fungi
1. are so unique that they should be considered outside the realm of general mycological concepts
 2. do not generally grow as soil saprophytes
 3. are never restricted to endemic regions
 4. are generally yeasts in tissue and thus never produce spores similar to those of other fungi
 5. are usually saprophytic soil fungi that have elevated temperature tolerances
2. Fill in the blanks (20 pts at 2 pts each).
- a. A fungal taxon ending in the suffix mycetes is indicative of the taxonomic rank of _____.
 - b. The meiosporangium of a member of the Basidiomycota is the _____.
 - c. Holobasidiomycotina species which form a septa in their meiosporangia after each meiotic nuclear division are included in the class _____.
 - d. A very new class has been erected for members of the Schizosaccharomycetales (fission yeasts) Pneumocystidiales (which includes the agent of PCP) and the Taphrinales. This new class is the _____.
 - e. Spores that are dikaryotic and directly produce basidia and basidiospores upon germination are characteristic of fungi classified in the classes _____ and _____.
 - f. Members of the Fungi Imperfecti that produce conidia in a multihyphal aggregate, tissue-like structure termed a pycnidium are included in the form-class _____.
 - g. The dark spot seen in the apices (tips) of actively growing hyphae of some Ascomycota and Basidiomycota is called a _____ and in fact represents a cluster of microvesicles surrounded by macrovesicles.
 - h. An unique hyphal branch structure that develops on the hyphae of some Basidiomycota and perpetuates the dikaryotic condition is called a _____ (one or two words are acceptable).
 - i. Many vegetative cells or hyphae of fungi are in actual fact very large multinucleate cells that are increasing in size without very much, if any, cytokinesis (e.g. growth and nuclear division without cell division). Such large multinucleate cells whether hyphal or not are called _____.

3. Diagram interpretations (20 @ 1 pt each).

a.



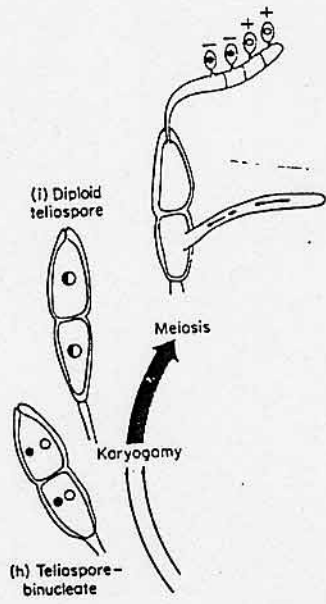
1. structure (as indicated by bracket)

2. class _____

3. phylum _____

4. structures as indicated by bold arrows

b.



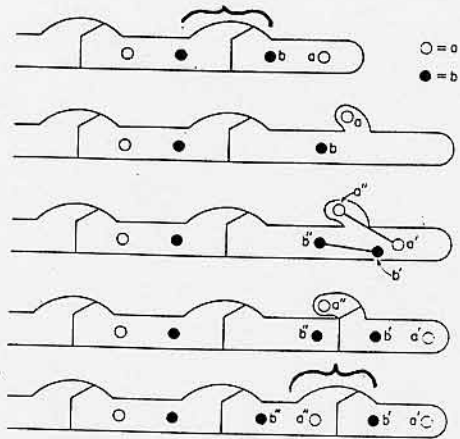
5. structures (as indicated by pluses and minuses)

6. ploidy (e.g., 1N, 2N, N+N)

7. phylum _____

8. subphylum _____

c.



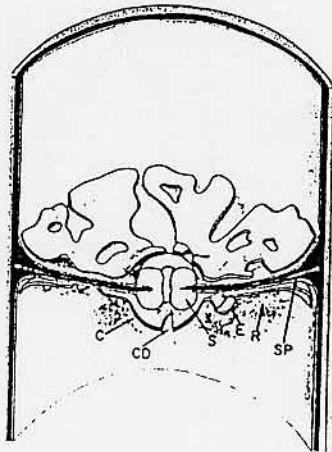
9. structure (as indicated by brackets)

10. function _____

11. subkingdom _____

12. phylum _____

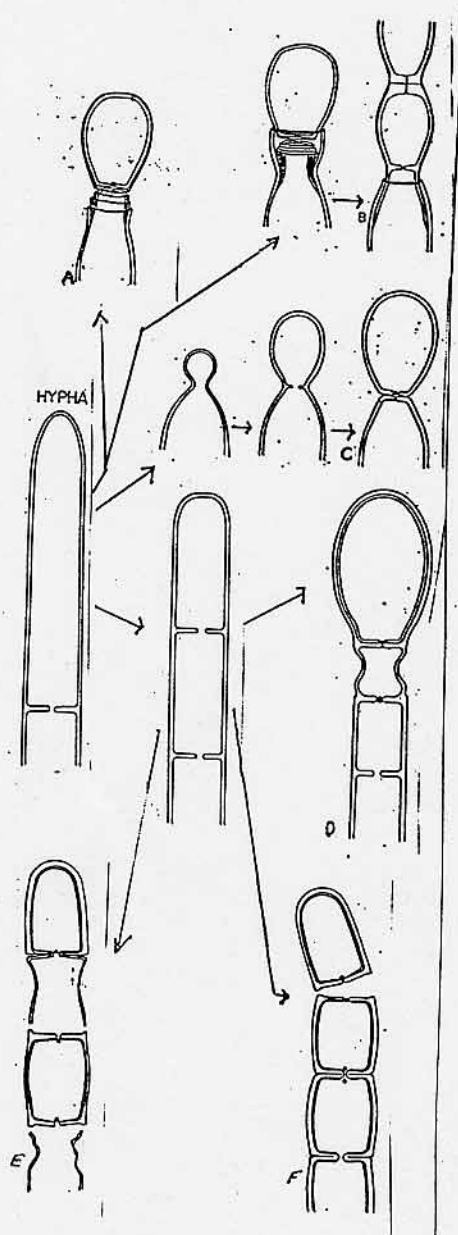
d.



13. structure _____

14. phylum _____

- e. The identification of Hyphomycetes to form-genus is often most efficiently made by observations of conidium ontogeny (the morphological mechanism used by the fungus to produce its conidia). In the blanks provided, identify the ontogenetic method or conidium type indicated by each diagram and identified by the letters A through F.



15. (A) _____

16. (B) _____

17. (C) _____

18. (D) _____

19. (E) _____

20. (F) _____

d. The relevance of modern medicine (post-World War II and the discovery of antibiotics) to medical mycology.

e. The relevance of HIV infections to medical mycology.

5. Essay (15 pts). You are working in a microbiology laboratory of a hospital and continually isolate the same type of unusual "mold" from biopsy material of the same patient. Although the physician has initiated antifungal therapy and the patient seems to be getting better, your curiosity and the physician's interest in maybe publishing a paper related to this unusual mycosis prompts him/her to encourage you to try and figure out at least a little about the organism before submission of a manuscript. Unfortunately the "mold" in your hands seems to be a *Mycelia Sterilia* member. Nevertheless he/she tells you to use the light and electron microscopic equipment at your disposal and with which you are an expert user for your evaluation. In a clear and concise essay of no more than two or three paragraphs (about 1 page of small writing or two pages of large writing) describe what characteristics of this "mold" you might try to observe and what differences you might see which might help you to determine its general taxonomic affinity at the Subkingdom, Phylum and possibly even the Subphylum level.

Bonus questions (10 points): answer one only in as much detail as you can based on my lectures and your reading.

- A. Numerous putative virulence factors have been identified among the medically important fungi, which are often divided into two groups termed primary virulence factors and secondary virulence factors. In no more than a page, if you write small, or two, if you write big, discuss with examples these two categories of virulence factors and how they might contribute to some fungi being pathogens of humans, whereas others are not.

OR

- B. In a well organized essay, explain how molecular biology has contributed greatly in clarifying which organisms should be included among the fungi, and also how it is currently helping to clarify the classification of fungi, and particularly members of the Fungi Imperfecti.

Note: the coverage for this Exam ended with information through spores.