[01] Which one of the following terms does not describe a common trait, structure or characteristic of one or more of the four fungal phyla (Chytridiomycota, Zygomycota, Ascomycota, and Basidiomycota)?

A. coenocytic B. mycorrhizae C. gametangia D. conidia
E. zooxanthellae F. hymenium G. dolipore
H. all describe a common trait, structure or characteristic

*All are used, with the exception of zooxanthellae (**E**).*

[02] Amongst the four fungal phyla (Chytridiomycota, Zygomycota, Ascomycota, and Basidiomycota), which of the following characteristics are unique to only one of the four phyla (choose the best answer)?

A. coenocytic
B. chytridiospore, zygospore, ascospore, and basidiospore are defining characteristics for the Chytridiomycota, Zygomycota, Ascomycota, and Basidiomycota, respectively
C. only Chytridiomycota has non-motile spores
D. only Chytridiomycota has motile zoospores
E. only Basidiomycota has a dikaryotic stage in its life cycle
F. only Ascomycota has a dikaryotic stage in its life cycle
G. A and D
H. none of the above

*There is no such thing as a chytridiospore. Coenocytes are common in Ascomycetes and Basidiomycetes, but only Chytridiomycota have motile zoospores (**D**).*

Match the following terms with the most appropriate definition (Choose the best answer)?
[03] septum *pl*. septa **[04]** haustorium *pl*. haustoria **[05]** gill

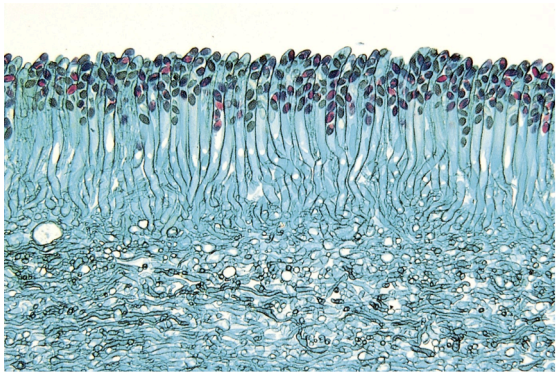
A. A small mass of vegetative tissue; an outgrowth of the thallus, for example in liverworts or certain fungi.
B. A cell or multicellular structure in which gametes are formed.
C. The strips of tissue on the underside of the cap of many hymenomycetes.
D. A single tubular filament of a fungus, oomycete, or chytrid.
E. A projection of a fungal hypha that functions as a penetrating and absorbing organ.
F. A tough, resistant, resistant, nitrogen-containing polysaccharide forming the cell walls of certain fungi.
G. An asexual fungal spore not contained within a sporangium; it may be produced singly or in chains; it is often multinucleate.
H. None of the above

*Verbatim definitions from your textbook. The answers are (**H**) (**E**) and (**C**), respectively.*

Match the following images with the most appropriate fungal group (Choose the best answer)

[06]

[07]



A. Ascomycete B. Chytridiomycete C. Hymenomycete D. Gasteromycete
E. Basidiomycete F. Zygomycete G. Lichens H. Teliomycete

*The images are from your textbook. [06] is a Chytridiomycete (**B**), [07] shows the characteristic ascii of Ascomycetes (**A**).*

[08] What are the most defining characteristic(s) of the Chytridiomycota (Choose the best answer)?

A. slender rhizoids B. unicellular C. chitin wall(s) D. aseptate
E. undulipodium F. ascospore G. A and C H. A and E

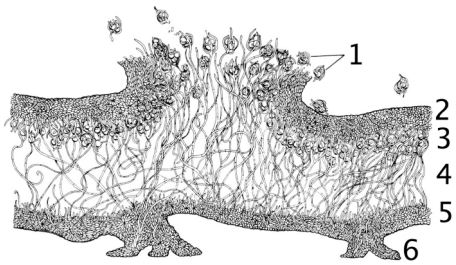
*Written by the students, the answer is (**H**).*

[09] Which one of the four major phyla of the fungal kingdom are characterized by clamp connections?

A. Chytridiomycete B. Zygomycota C. Ascomycete D. Basidiomycota

*Written by the students, the answer is (**D**)*

[10] Identify the most appropriate group on the basis of the vegetative and reproductive structures diagrammed in the figure (Choose the best answer)?



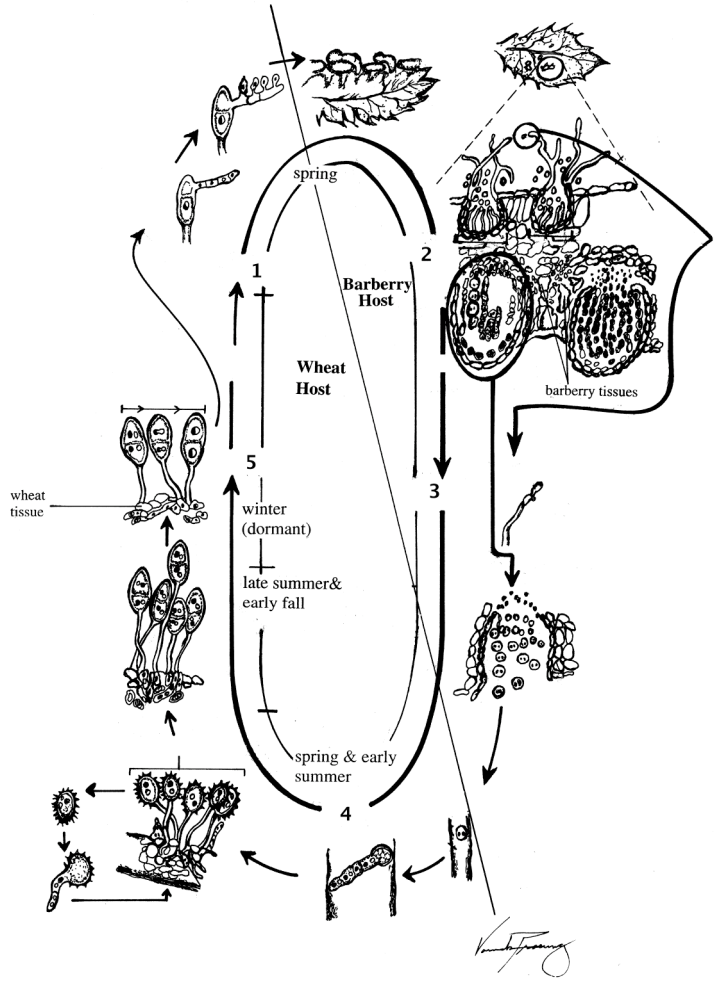
A. Basidiomycete B. Zygomycete C. Lichens
D. Teliomycete E. Chytridiomycete F. Hymenomycete
G. Ascomycete H. Gasteromycete

*From you textbook, it is a lichen (**C**).*

[11] Which of the labeled regions identifies the location of the photobiont in the vegetative structure (Choose the best answer)?

A. 1 B. 2 C. 3 D. 4 E. 5 F. 6 G. 2 and 4 H. 2 and 5

*As indicated in your textbook, the photobiont forms a layer marked as 3 (**C**).*



Identify the numbered stages in the wheat rust ((*Puccinia graminis* var *tritici*) with the following genetics events.

[12] meiosis

A. 1 B. 2 C. 3 D. 4 E. 5

[13] plasmogamy

A. 1 B. 2 C. 3 D. 4 E. 5

[14] karyogamy

A. 1 B. 2 C. 3 D. 4 E. 5

*The various stages can be deduced from host and season, if not from the sporulating structures, the answers are (**A**), (**C**), and (**E**), respectively.*

[15] Which of the following stages contribute the most to the ability of the rust fungus to optimize pathogenicity (Choose the best answer)?

A. basidiospores and urediniospores
B. basidiospores and aeciospores
C. basidiospores and teliospores
D. urediniospores and aeciospores
E. urediniospores and teliospores
F. teliospores and aeciospores
G. all spores exhibit genetic and/or selective pressures to evolve enhanced pathogenicity

*As explained in lecture, genetic variability is maintained by aeciospores (arising from fusion of haploids on barberry) and selective pressure for successful infection by urediniospores on wheat (**D**).*

[16] Which of the following is/are propagules of lichens —containing both the mycobiont and algal or cyanobacterial photobiont— that serve to disseminate this unusual example of a symbiotic organism (Choose the best answer)?

A. calyptra B. ascospore C. gemma D. operculum
E. isidia F. peristome G. A and E H. D and F

*The two 'spore' forms (propagules) of lichens are soredia and the answer, isidia (**E**).*

[17] Which of the following characteristics are key adaptive component(s) of the successful invasion of land by plants (Choose the best answer)?

1. stomata
2. chlorophylls a and b
3. vascular tissue
4. embryophyta
5. determinate growth of the gametophyte
6. indeterminate growth of the gametophyte
7. heterospory

A. 1, 2, 3 and 4 B. 1, 3, 4 and 7
C. 2, 3, 4 and 5 D. 2, 3, 4 and 6
E. 1, 3, 4 and 6 F. 1, 2, 4 and 7
G. 1, 3, 5 and 6 H. 3, 4, 6 and 7

*Stomata, vascular tissue, embryophyta, and indeterminate growth of the gametophytes are all adaptive (**E**).*

Match the following divisions of the 'lower' land plants with the characteristic that uniquely distinguishes it from the other 'lower' plant groups. Choose the best answer.

[18] Anthocerophyta (Hornworts)
[19] Hepatophyta (Liverworts)
[20] Bryophyta (Mosses)

A. protonemata B. stomates
C. sporangia D. antheridial head
E. motile sperm F. archegonial head
G. rhizoids H. none of the above

*The crucial term is uniquely distinguishes. None of the traits are unique to only one group, so the answer is (**H**) for all three.*

[21] What is/are the characteristic(s) that distinguish liverworts from hornworts?

A. none of the below B. silica walls in the liverworts
C. eustelar anatomy in the hornworts D. eustelar anatomy in the liverworts
E. stomates in the liverworts F. stomates in the hornworts
G. B and D H. C and E

*Written by the students, the answer is (**F**).*

[22] Which of the following best distinguishes leptosporangial from eusporangial ferns (Choose the best answer)?

A. A single apical cell is the progenitor of the multi-cellular sporangia in leptosporangial ferns; multiple superficial initials are the progenitor of the multi-cellular sporangia in eusporangial ferns.
B. A single apical cell is the progenitor of the multi-cellular sporangia in eusporangial ferns; multiple superficial initials are the progenitor of the multi-cellular sporangia in leptosporangial ferns.
C. Eusporangial development culminates in the formation of a tapetum surrounding the spores.
D. Leptosporangial development culminates in the formation of a tapetum surrounding the spores.
E. A and C F. A and D G. B and C H. B and D

*The apical and multiple initials are distinguishing, as is the tapetum in eusporangial ferns (**E**).*

[23] Which of the following groups of seedless vascular plants has a eustele-like siphonostele (Choose the best answer)?

A. Lycopodiaceae B. Selaginellaceae C. Sphenophyta (horsetails) D. Psilotum
E. Cycadophyta F. Ginkgophyta G. Coniferophyta H. None of the above

*Horsetails exhibit a vasculature that bridges eustele and siphonostele (**C**).*

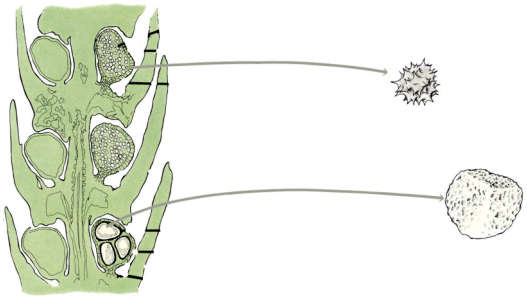
[24] Which of the following groups of seedless vascular plants has elators as part of the spore dispersal mechanism (Choose the best answer)?

A. Lycopodiaceae B. Selaginellaceae C. Sphenophyta (horsetails) D. Psilotum
E. Cycadophyta F. Ginkgophyta G. Coniferophyta H. None of the above

*Horsetails elators to disperse the spores (**C**).*

[25] Identify the most appropriate group matching the diagram of the reproductive structure (Choose the best answer)?

A. Lycopodiaceae B. Selaginellaceae
C. Sphenophyta (horsetails) D. Psilotum
E. Cycadophyta F. Lycophyta
G. Bryophyta H. None of the above



*The diagram is from your textbook, the presence of micro- and megaspors points to Selaginallaceae (**B**).*

[26] Which of the following extant ('still in existence, surviving') group(s) of seeded vascular plants retain the 'archaic' trait of motile sperm?

A. Coniferophyta B. Gnetophyta C. Cycadophyta D. Araucariaceae
E. B and C F. C and D G. A and C H. None of the above

*Cycadophyta retains this 'archaic' trait (**C**).*

[27] Which of the following are potential mechanisms by which a vascular plant can transport water over long distances (and against the opposing force of gravity)?

A. Capillary action pulls the water up the narrow xylem conduit ('pipe') because of the surface tension of water.
B. The water is pushed up the xylem conduit by osmotic pressures generated in the roots by lowering the osmolarity of the root cell sap, causing water to flow into the root and up the stem.
C. The water is pushed up the xylem conduit by osmotic pressures generated in the roots by increasing the osmolarity of the root cell sap, causing water to flow into the root and up the stem.
D. The water is pulled up the xylem conduit by evapo-transpiration from the leaves, creating a negative pressure that 'sucks' the water up the stem from the roots (and soil).
E. A and B
F. B and D
G. C and D
H. None of the above

*As explained in lecture, both root pressure (for short heights, created by the higher osmolarity within the root) and evapotranspiration (for tall heights) are well-established mechanisms for water transport (**G**).*

[28] Which of these typify the special nature of seeded vascular plants *compared to* other vascular and non-vascular land plants (Choose the best answer)?

A. The common presence of regions of *secondary* cellular divisions (meristems) that allow the development of a more complex final form of the mature plant, especially the vasculature.
B. The presence of heterospory (micro- and mega-spores)
C. The complete dependence of the haploid (gametophyte) stage on the parental sporophyte (diploid).
D. The complete dependence of the haploid (gametophyte) stage *and* sporophyte (diploid) offspring (at least initially) on the parental sporophytes (diploid).
E. A and B
F. A, B and D
G. A and D
H. B and C

*Unlike heterospory, which occurs in non-seeded plants, secondary meristems (usually the cambium) and the seed typify the seeded vascular plants (**G**).*