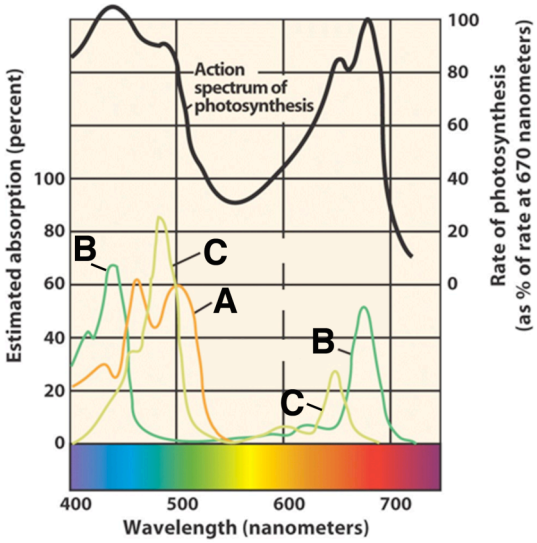
SC/BIOL 2010.040 Plant Biology First Term Test 30 January 2012

NAME:_____KEY_____

[01] Which one of the following is the best description/name for the absorbing pigment A in the graph (from your textbook)?



A. A linear tetrapyrrolle
B. A cyclic tetrapyrrolle
C. chlorophyll
D. xanthophyll
E. phycoerythrin
F. carotene
G. bilin
H. None of the above

Two of thepigments (B and C) have twp peaks, indicating that they are chlorophylls. Pigment A absorbs only in the blue-green, and is carotene: ***F***.

[02] What is an action spectrum of photosynthesis?

A. It is the wavelengths of fluorescence: the light emitted when an excited electron returns to the ground state
B. It is the wavelengths of absorbance: when light is absorbed to cause the electron to 'jump' to the excited state
C. It is the absorbance spectrum of the reaction center chlorophyll that undergoes photochemistry ($Chl^* \longrightarrow Chl^+ + e^-$)
D. It is the absorbance spectrum of the light-harvesting chlorophylls (and other pigments), responsible for transferring the exciton to the reaction center (resonance energy transfer)
E. It is the wavelengths of light causing oxygen production and/or carbon dioxide fixation
F. It is the combined spectra for absorbance and fluorescence (A and B)
G. It is the combined spectra for exciton transfer and photochemistry (D and E)
H. None of the above

The answer is ***E***.

[03] Which of the following atmospheric gases do <u>not</u> absorb significant amounts of solar radiation?

A. H_2O B. CO_2 C. O_3 D. O_2
E. A and B F. A and C G. B and C H. B and D

The only gas which does not absorb significant amounts is O_2: ***D***.

There are two major electron orbital transitions allowed in porphyrins containing a divalent magnesium ion complexed with the N-atoms of the cyclic tetrapyrolle. What wavelength range do these transition energies usually correspond to (choose the closest answer)?

[04] Most energetic transition:

A: infrared (>740 nm) B: red (625-675 nm) C: orange (565-615 nm) D: yellow (545-595 nm)
E: green (485-535 nm) F: blue (450-500 nm) G: violet (375-425 nm) H: UV (250-300 nm)

[05] Least energetic transition:

F *is the most energetic absorption band of chlorophyll,* ***B*** *is the least energetic.*

[06] The cytochrome b_6/f complex performs which of the following function(s) in photosynthesis?

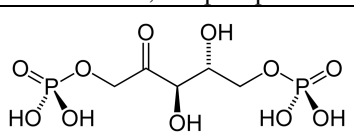
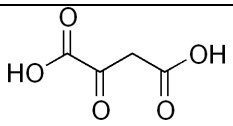
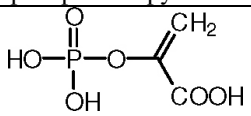
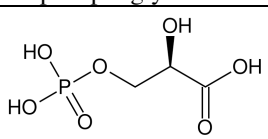
A. It accepts electrons from *only* P_{680}
B. It accepts electrons from *only* P_{700}
C. It transfers *both* electrons and protons across the thylakoid membrane, into the chloroplast stroma
D. It transfers *only* protons across the thylakoid membrane, into the chloroplast stroma
E. It transfers *only* protons across the thylakoid membrane, into the chloroplast lumen
F. It transfers *both* electrons and protons across the thylakoid membrane, into the chloroplast lumen
G. A and C
H. B and E

This major complex transfers <u>both</u> electrons and protons into the lumen (electrons to PS I, protons to synthesize ATP): ***F***.

[07] What are the substrates of the enzyme responsible for the initial carbon dioxide fixation in C4 photosynthesis?

A. oxaloacetate and carbon dioxide
B. oxaloacetate and bicarbonate
C. phosphoenolpyruvate and carbon dioxide
D. phosphoenolpyruvate and bicarbonate
E. ribulose 1,5 bisphosphate and bicarbonate
F. phosphoglycerate and bicarbonate
G. ribulose 1,5 bisphosphate and carbonate
H. none of the above

The substrates of PEPCase are phosphoenolpyruvate and bicarbonate: ***D***.

ribulose 1,5 bisphosphate	oxaloacetate	phosphoenolpyruvate	phosphoglycerate
			

[08] Which one of the following compounds is produced from 3-phosphoglycerate (in reactions requiring ATP and NADPH), and used in the chemical recombinations of the Calvin cycle that result in regeneration of ribulose 1,5-bisphosphate?

A. glyceraldehyde-3 phosphate
B. 1,3-bisphosphoglycerate
C. phosphoglycolate
D. phosphoenolpyruvate
E. sedoheptulose 1,7-bisphosphate
F. fructose 6-phosphate
G. xyulose 5-phosphate
H. ribulose 5-phosphate

The three carbon glyceraldehyde-3 phosphate: ***A***.

[09] Which of the following are characteristics that distinguish prokaryotic from eukaryotic cells?

A. Prokaryotic cells evolve solely by mutations arising during binary fission, while eukaryotic cells mutate, and exchange genetic material in their sexual cycle
B. The motility mechanism of the eukaryotic flagella (the undulipodium) relies upon a rotatory motor
C. Prokaryotic cells contain a circular DNA chromosome usually located in the 'nucleoid', while eukaryotic cells contain linear DNA chromosomes usually located in a membrane-bound 'nucleus'
D. Prokaryotic cells lack internal membrane structures while eukaryotic cells contain an endomembrane system
E. Prokaryotic cells lack internal membrane structures while eukaryotic cells contain double membrane organelles (chloroplasts and mitochondria)
F. A, C and D
G. B, C and E
H. C, D and E

Bacteria 'conjugate' to exchange DNA (and thereby evolve); cyanobacteria can have surprisingly complex internal membrane structures. Only prokaryotes have a nucleoid: ***C***.

[10] Which of the following could be used to identify coliform bacteria?

A. Lactose
B. Succinate
C. Gram-staining
D. CO_2 production in liquid cultures
E. A, B and C
F. A, C and D
G. B, C and D
H. A, B and D

Lactose is the preferred carbon source, they are Gram-negative, and they ferment, producing CO_2 in liquid cultures: ***F***.

[11] Which of the following distinguishes Gram-negative from Gram-positive bacteria?
A. Crystal violet stains only Gram-positive bacteria
B. Mordants (which fix the dye) penetrate only Gram-positive bacterial walls
C. Mordants (which fix the dye) penetrate only Gram-negative bacterial walls
D. Only Gram-positive bacterial walls are dissolved by solvents (e.g., acetone or ethanol)
E. Only Gram-negative bacterial walls are dissolved by solvents (e.g., acetone or ethanol)
F. Safranin stains only Gram-negative bacteria G. A and F H. None of the above
*The answer is **E**, it is all in the walls…..*

[12] Which of the following characteristics **could not** be used to classify procaryotes (choose the best answer)?
A. cocci/bacilli/spirilli morphology B. aerobic/anaerobic requirement C. presence/absence of nucleoid
D. sensitivity to specific antibiotics E. carbon source requirement F. ribosomal RNA sequences
G. Eand F H. all of the above can be used
*The answer is **C** (nucleoids are normal, not a distinguishing characeristic).*

[13] Some protist groups exhibit triple-membrane-bound chloroplasts (reported in Euglenoids, for example), while others have chloroplasts that are bounded by four membranes (Cryptophyta). Which of the following endosymbiotic (or other) events would result in four membranes?
A. A procaryote ingesting a photosynthesizing eukaryote
B. A eucaryote ingesting a photosynthesizing eukaryote
C. A procaryote ingesting a photosynthesizing prokaryote
D. A eucaryote ingesting a photosynthesizing prokaryote
E. A four membrane bound chloroplast would only result from the autogenous mechanism in a prokaryote
F. A four membrane bound chloroplast would only result from the autogenous mechanism in a eukaryote
G. either A or B
H. either C or D
*Ingesting a eukaryote would create a 4-membrane organelle: **G**.*

Match the three unicellular divisions of the Protists with the one most distinguishing characteristic for each division. Choose the best answer.

[14] Cryptophyta **D**
[15] Chrysophyta **F**
[16] Euglenophyta **H**

A. Chlorophyll b and phycobilins
B. Cell wall composed of cellulose plates
C. Cell wall composed of non-cellulose polysaccharides
D. Starch food reserve
E. Chlorophylls a and b
F. Chrysolaminarin food reserve
G. Laminarin food reserve
H. Paramylon food reserve

Match the three major multicellular, autotrophic divisions of the Protists with the one most distinguishing characteristic for each division. Choose the best answer.

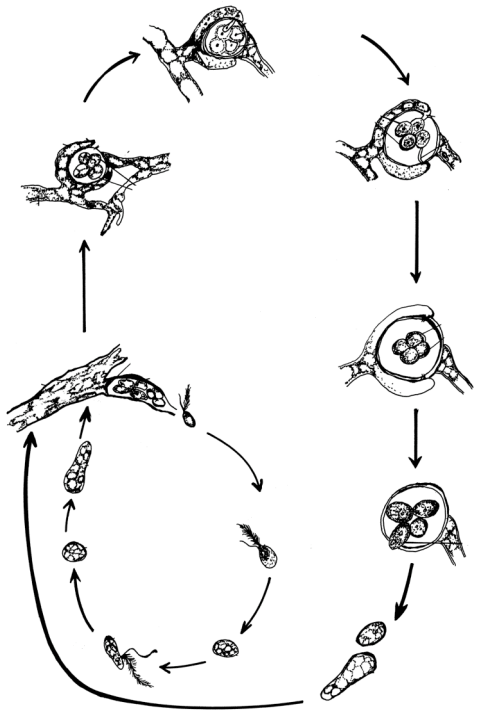
[17] Rhodophyta **E**
A. laminarin/mannitol food reserve
D. startch food reserves
G. cellulose walls

[18] Phaeophyta **A**
B. carotenoids
E. Floridean starch food reserve
H. peridinin

[19] Chlorophyta **D**
C. chlorophylls a
F. glycogen

[20] Which of the following are correct for the life cycle (from your lab manual)?

A. It is a Zygomycete life cycle
B. It is a Dictyosteliomycota life cycle
C. It is an Oomycete life cycle
D. It is a wheat rust (*Puccinia*) life cycle
E. It is a *Fucus* life cycle
F. It is an *Ectocarpus* life cycle
G. It is a *Polysiphonia* life cycle
H. It is a Bacillariophyta (diatom) life cycle



The Oomycete Saprolegnia ferax. You can see the oogonium and its heterokont zoospores if you can remember the diagram more directly: ***C****.*

Match the following major heterotrophic divisions of the Protists with the one most distinguishing characteristic for each division. Choose the best answer.

[21] Oomycota **C**
A. cellulosic cell walls
D. only terrestrial
G. chitinous walls

[22] Myxomycota **F**
B. no undulipodia
E. zoospores
H. glycogen food storage

[23] Chytridiomycota **G**
C. heterokont
F. no cell walls

[24] What property/properties of *Pilobolus* (Zygomycota) play a role in spore dispersal (choose the best answer)?

A. the spores attach themselves to animal fur and are carried long distances
B. the spores are released from conidiophores that break through the exoskeleton of the decomposed insect host
C. the spores become attached to vegetation (grass blades etcetera), are eaten by herbivores and expelled in the dung a long distance away.
D. the spores attach themselves to the host plant, form an appresorium that releases the spores into the host
E. the sporangiophore grows away from light, to ensure the spores are expelled near the animal host
F. a light-focusing lense dries out the spores in preparation for their release from the sporangiophore
G. C and F
H. none of the above

Passage through the digestive tract of herbivores adds reproduction: ***C****.*

[25] Which of the following is true of the Zygomycota (choose the best answer)?

A. it undergoes gametic meiosis
B. it undergoes zygotic meiosis
C. it undergoes sporic meiosis
D. it can be a symbiotic partner with terrestrial animals
E. it does not have a dikaryotic state
F. it does not undergo karyogamy
G. A and E
H. B and D

Like other fungal clades, Zygomycota undergo zygotic meiosis: ***B****.*