Biology 102 Summer 2004 Second Term Midterm Exam

YOUR NAME:_____   YOUR TA's NAME:_____

Section 1

Give the BEST answer in each case:

1) Plant cell walls are made mainly of

a) cellulose
b) protein
c) starch
d) sugar   answer _____

2) A theory is

a) innocent until proven guilty.
b) a best guess, based on available observations.
c) formed using inductive logic.
d) A hypothesis supported by a body of evidence.   answer _____

3) The group formerly known as the blue-green algae are best described as

a) eukaryotic algae.
b) bacteria.
c) always blue-green in color and non-motile.
d) Rhodophyta.   answer _____

4) The algal class Charophyceae includes

a) Choleocheate.
b) Ulva.
c) red algae.
d) brown algae.   answer _____

5) Erasmus Darwin

a) did not believe in evolution.
b) was a strong believer in the authority of the monarchy.
c) was a medical doctor and knew nothing about plants.
d) Suggested life began as simple cells in an ancient ocean.   answer _____

6) Flowers

a) contain the female gameteophyte.
b) are common in lycophytes.
c) produce naked seeds.
d) produce sperm.   answer _____

7) The rate of evolution

a) is always the same.
b) can vary depending on various factors.
c) was fastest during the first billion years of life on Earth.
d) is fastest in very large populations where selection is absent.   answer _____

8) The phylum Phaeophyta

a) includes red algae.
b) includes red bacteria.
c) includes diatoms and chrysophytes
d) includes bacteria, euglena and dinozoans.   answer _____

9) Rhizobium bacteria

a) make it easier for farmers to efficiently and cheaply grow legumes.
b) add phosphorous to the soil.
c) make it easier for soy beans to compete with rye grass.
d) produce nitrogen gas in the soil around the roots of certain plants.   answer _____

10) Which best describes the scientific method?

a) observation > experiment > hypothesis > induction > conclusion
b) theory > experiment > proven conclusion
c) observation > hypothesis > experiment > theory
d) hypothesis > theory > law   answer _____

11) Humans don't eat wood because

a) it contains no nutrients.
b) it causes harmful bacteria to accumulate in our guts.
c) we have no cellulase to digest it.
d) Humans cannot eat sporophytes.   answer_____

12) Deductive logic involves

a) inventing a general rule based on observations of some specific events.
b) following a general rule to its logical conclusion in specific instances.
c) proving something to be true using logical rules.
d) showing something to be false using experimental evidence.   answer _____

13) Gynosperms include

a) phylum bryophyta
b) class monotyledones
c) phylum anthophyta
d) genus *ephedra*   answer _____

14) "Positivist epistemology" involves

a) the belief that there is a single reality that we can discover through science.
b) falsifying ideas that are pseudoscientific.
c) scientific revolutions.
d) the idea that reality depends only on your point of view.   answer _____

15) Organelles such as chloroplasts

a) are present in both eubacteria and archebacteria.
b) appeared in cells spontaneously as a result of mutations.
c) include antheridia, archegonia and sori.
d) may have lived as separate cells at one time.   answer _____

16) The central dogma of cell biology says:

a) RNA > glucose > cellulose
b) nucleus > cell > organism > ecosystem
c) DNA > RNA > protein
d) DNA > enzymes > RNA   answer _____

17) A good experiment

a) controls independent variables.
b) gives similar results each time it is repeated.
c) yields objective data that can be measured with an instrument.
d) all the above
e) only a and b.   answer _____

18) Thomas Kuhn contributed to the philosophy of science by

a) describing how paradigms can be overturned by new, contradictory observations.
b) inventing inductive logic.
c) describing how to recognize pseudoscience.
d) suggesting that natural phenomena can be understood by gathering empiric data.

answer _____

19) Photosynthesis

a) uses starch to turn sunlight into nitrates
b) turns carbon dioxide and water into carbohydrates
c) requires oxygen as a raw material
d) burns carbohydrates to release energy   answer _____

20) liverwort gameteophytes

a) are microscopic
b) produce sperm and eggs in special structures
c) produce spores
d) produce pollen   answer _____

21) "Scouring rush" is a common name that pioneers sometimes applied to a type of:

a) lycopod.
b) fern.
c) cyanobacteria.
d) horsetail.   answer _____

22) Large DNA molecules

a) travel slowly through gels
b) travel quickly through gels
c) cannot be cut using enzymes
d) cannot be condensed into chromosomes   answer _____

23) Charles Darwin

a) noticed that organisms vary, but resemble their parents.
b) noticed that most organisms produce very few offspring.
c) is solely responsible for the current theory of evolution.   answer _____
d) founded a school for girls.

24) Plant cells

a) feature a large central vacuole.
b) contain only one chromosome.
c) are filled with a green fluid called chlorophyll.
d) have much less DNA than animals.   answer _____

25) Plants need nitrogen

a) so they can carry out the haber process.
b) to make protein
c) to make carbohydrates
d) like a carrot needs a rabbit.   answer _____

26) <u>Azolla</u>

a) is an aquatic fern containing cyanobacteria.
b) is a coralline red algae.
c) is a dinozoan containing an endosymbiotic algae.
d) is a type of bryophyte with a dominant sporophyte.   answer _____

27) <u>Porphyra</u>

a) is an edible genus of red algae
b) is a phylum that includes red algae
c) is a green algae
d) is a type of bryophyte   answer _____

28) <u>Caulerpa</u>

a) is an invasive green algae
b) is an invasive brown algae
c) belongs to the phylum Phaeophyta
d) Belongs to the phylum Rhodophyta   answer _____

29) Diatoms

a) are red algae
b) are in the phylum chlorophyta
c) have no cell wall
d) have a cell wall made of silica (glass)   answer _____

30) Euglena

a) is a common symbiotic algae found inside corals and worms.
b) can be "cured" of its chloroplasts, forcing it to eat food.
c) is a common cyanobacteria
d) is a unicellular green algae from the class "Ulvophyceae"   answer _____

31) Dinozoans

a) sometimes live in root nodules
b) sometimes live in Azolla
c) sometimes live inside coral
d) sometimes live inside polar bears   answer _____

32) Which of these is not a major phylum of algae?

a) Rhodophyta
b) Chlorophyta
c) Charophyceae
d) Phaeophyta   answer _____

33) Which of these is most closely related to the land plants?

a) Rhodophyta
b) Chlorophyta
c) Chara
d) Choleochaete   answer _____

34) Angiosperms include:

a) the family Asteraceae
b) gymnosperms
c) non-vascular land plants
d) mosses and hornworts
e) none of the above   answer _____

35) Which of these is not true of soy beans?

a) Their hilum is analogous to a belly button.
b) They have two seed leaves that act as storage organs.
c) they have a rich supply of well developed, diploid endosperm.
d) they have a modified fruit in the form of the pod that surrounds them.
e) they are an example of a seed plant.   answer _____

36) metacognition

a) is thinking about metaphysics.
b) helps science learning through reflections on one's own thoughts.
c) helps the pace of scientific research by making scientists more dogmatic
d) slows the pace of science by making scientists less certain.   answer _____

37) layers of sediment called cyclothems show that

a) The ocean has passed by Columbus perhaps 5 times in the last 500 million years.
b) All the sediment layers exposed in Ohio are about the same age.
c) sediment exposed in Ohio was created by cycads during the time of the dinosaurs.
d) The ocean has passed by Columbus perhaps 100 times in the last 500 million years.

answer _____

38) Scientists believe that our solar system

a) is about 10 billion years old.
b) was around for hundreds of billions of years before life appeared.
c) is about 4.5 billion years old.
d) is about 60 million years old   answer _____

39) Scientists believe that eukaryotic algae first appeared

a) about 1-3 billion years ago.
b) suddenly during the cambrian explosion.
c) because of a meteor impact about 60 million years ago.
d) long before the first bacteria.   answer _____

40) Scientists believe that the first land plants appeared

a) about 60 million years ago
b) about 450 million years ago
c) because of Lamarkian evolution
d) because of genetic drift in large populations   answer _____

41) Taxonomy

a) organizes living things according to the system of Carolus Linneaus.
b) organizes living things based on their evolutionary sequence.
c) is the study of preserving plants and animals for storage in a museum.
d) occurs fastest in small populations.   answer _____

42) The phylum angiospermophyta did not become the dominant type of plant life on Earth until

a) about 500 million years ago
b) about 60 million years
c) after the last pteridophytes were extinct
d) after the dinosaurs started eating fruits.   Answer _____

43) James Watson

a) discovered DNA using x-ray experiments he performed himself.
b) had an attractive sister that he introduced to Maurice Wilkins.
c) was the inspiration for Mary Shelly's "Frankenstein".
d) demonstrated that protein makes RNA which makes DNA.

                                                                answer _____
44) A gene is

a) a length of DNA that tells the organism what color or size different parts should be
b) a length of DNA that specifies the amino acid sequence of a peptide chain
c) a DNA molecule that is typically several million base pairs long
d) a protein molecule that is transformed into one enzyme   answer _____

45) Genes are

a) very concerned about the well-being of the organism that carries them.
b) active all the time.
c) transcribed and translated only in the nucleus.
d) turned on as needed by mechanisms such as the lac operon.   answer _____

46) new alleles are

a) new versions of a particular gene.
b) only rarely expressed in the way described by Gregor Mendel.
c) likely to spread through a population if they have a strong selective advantage.
d) all of the above
e) none of the above   answer _____

Questions 47 – 50 refer to the images A -D:

47) Which one of these shows a cyanobacteria?   answer _____
48) Which of these is a gymnosperm?   answer _____
49) Which of these is used to make agar?   answer _____
50) Which one of these shows a whisk fern?   answer _____

Section 2:
Answer <u>any 5</u> of the following questions, NOT ALL OF THEM! JUST PICK 5!
Please limit your answer to just a few lines. Pages and pages should not be necessary.
REMEMBER TO WRITE YOUR NAME AND YOUR TA'S NAME ON EVERY
SHEET OF PAPER YOU USE!

1) What is Science?

2) What are fossils? Include definitions for compression, cast and impression types. Can fossils show details of cell structure? How do you know?

3) Land plants have special adaptations to help them survive away from water. For example, they retain moisture using a waxy cuticle that covers their stems and leaves. Describe some other adaptations that plants have developed to help them live and reproduce on land.

4) a) What are the two possible fates for a new allele that appears in a population? b) Assuming that there is no selection, which of these fates is initially more likely (when the allele exists at a very low frequency)? c) If the new allele gives organisms a slight selective advantage, how would that affect your answer to b)?

5) Explain some of Darwin's major arguments or observations that led him to propose his hypothesis of evolution by natural selection. List a few things he didn't know that contribute to the modern form of the theory.

6) Describe any three phyla of land plants that do not have seeds. Include a very brief overview of the typical life-cycle for organisms in that phylum. Give at least one example of a representative genus (scientific or common name) for each phylum, and describe any special significance that members from each phylum have for the human economy.

7) a) What is a clade? b) What is the difference between taxonomy and phylogeny? c) Why has the difference between these two fields of study grown to become especially problematic for scientists who study algae?

8) Describe the steps and molecular apparatus involved in the second part of the central dogma, known as "translation". A simple sketch will probably help.

9) Describe two examples of symbiotic relationships that have important agricultural implications. Your description should include the identity of the organisms involved and a description of the benefits from the relationship. Mention also any special evolutionary significance of the relationship and whether or not any degeneration or other physiological adaptation has occurred in one or more of the organisms involved. Include as many details as you can.

10) Don't see anything you like? Tell me about something else you have learned in this class. Include as many specific details as you can.