Texas A&M University (TAMU) BIOL112 Introductory Biology II Lab Exam 1 Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. What is the function of the rough endoplasmic reticulum?

   A. The rough ER synthesizes proteins for storage only

   B. The rough ER synthesizes proteins secreted from the cell or incorporated into the membrane

   C. The rough ER is involved in lipid synthesis

   D. The rough ER generates ATP for cellular processes

2. What term designates traits that evolve due to adaptation to similar environments but are not derived from a common ancestor?

   A. Autapomorphic

   B. Analogous

   C. Homologous

   D. Synapomorphic

3. What is a primary assumption of Hardy-Weinberg Equilibrium (HWE)?

   A. No gene flow

   B. Random mating

   C. Infinite population size

   D. All of the above

4. What does a "0" represent when constructing phylogenetic trees?

   A. A derived state different from the outgroup

   B. An ancestral state identical to the outgroup

   C. A trait unique to the ingroup

   D. A trait that has evolved independently

5. Which group of organisms is defined by possessing a nucleus and is known to contain heterocysts?

   A. Cyanobacteria

   B. Alveolates

   C. Stramenophiles

   D. Foraminiferans

6. Which factors are considered when measuring an ecological footprint?

A. Only land area used for agriculture

B. The amount of natural resources consumed

C. Only water consumption

D. The diversity of species present

7. Which type of organism has a distinct nucleus and a membrane-bound sac?

A. Rhizarians

B. Stramenophiles

C. Alveolates

D. Cyanobacteria

8. What defines a clade in evolutionary biology?

A. A random selection of species

B. A group believed to have descended from a common ancestor

C. A sequence of DNA mutations

D. An individual organism

9. What type of organisms did we observe in the lab from the Unikonta Supergroup?

A. Euglenoids

B. Amoebozoa

C. Stramenopiles

D. Rhizarians

10. What group is characterized by having no nucleus and possessing peptidoglycan?

A. Bacteria

B. Archaea

C. Cyanobacteria

D. Euglena

Answers

1. B
2. B
3. A
4. B
5. A
6. B
7. C
8. B
9. B
10. A

Explanations

1. What is the function of the rough endoplasmic reticulum?

A. The rough ER synthesizes proteins for storage only

B. The rough ER synthesizes proteins secreted from the cell or incorporated into the membrane

C. The rough ER is involved in lipid synthesis

D. The rough ER generates ATP for cellular processes

The rough endoplasmic reticulum (Rough ER) plays a crucial role in the synthesis of proteins that are either destined to be secreted from the cell or incorporated into the cell membrane. This is due to the presence of ribosomes on its cytoplasmic surface, which give it a "rough" appearance. These ribosomes translate mRNA into polypeptide chains, thereby synthesizing proteins as they enter the lumen of the Rough ER, where they undergo folding and modifications. Proteins synthesized in the Rough ER are typically those that will be exported out of the cell, such as hormones and enzymes, or those that will be part of the cell's membrane, such as receptor proteins. This function is vital for several cellular processes, including communication, transport, and structural integrity. The other options do not accurately reflect the primary function of the Rough ER. For instance, while lipid synthesis occurs in the smooth ER, it does not take place in the Rough ER. Additionally, generating ATP is the role of mitochondria and not of the Rough ER. Lastly, the Rough ER's protein synthesis function is not limited to storage, as the proteins synthesized are primarily for immediate use rather than storage.

2. What term designates traits that evolve due to adaptation to similar environments but are not derived from a common ancestor?

A. Autapomorphic

B. Analogous

C. Homologous

D. Synapomorphic

The term that designates traits evolving due to adaptation to similar environments without being derived from a common ancestor is "analogous." Analogous traits arise when different species independently develop similar adaptations to cope with comparable ecological niches or environmental pressures. A classic example of this would be the wings of birds and insects; both are used for flight and have similar functions but evolved separately from distinct evolutionary lineages. In contrast, homologous traits arise from a common ancestor, indicating a shared evolutionary origin even if they have different functions; for example, the forelimbs of mammals and the flippers of whales are homologous. Additionally, autapomorphic traits refer to unique characteristics that are specific to a single lineage, while synapomorphic traits are shared derived characteristics that indicate a common ancestry among a group of organisms. Understanding the difference between these types of traits is crucial as it helps clarify evolutionary relationships and the adaptive strategies of different species in response to their environments.

3. What is a primary assumption of Hardy-Weinberg Equilibrium (HWE)?

A. No gene flow

B. Random mating

C. Infinite population size

D. All of the above

The primary assumption of Hardy-Weinberg Equilibrium includes multiple conditions that must be met for a population to maintain genetic stability over generations. One crucial assumption is random mating, which implies that individuals in the population pair by chance rather than according to their genotypes or phenotypes. This randomness ensures that allele frequencies remain constant over time as there is no selective pressure exerted by mate preferences. In addition to random mating, the model also specifies other conditions, such as no gene flow, which means that no new alleles enter or leave the population, and an infinite population size, indicating that the population is large enough to prevent random fluctuations in allele frequencies (genetic drift). When these assumptions hold true, the population's genetic makeup can remain stable, serving as a foundation for various analyses in population genetics. The inclusion of all these assumptions contributes to the overall understanding of the conditions under which HWE can be applied. Therefore, while random mating is one primary assumption, encompassing all the listed conditions provides a complete picture of Hardy-Weinberg Equilibrium.

4. What does a "0" represent when constructing phylogenetic trees?

A. A derived state different from the outgroup

B. An ancestral state identical to the outgroup

C. A trait unique to the ingroup

D. A trait that has evolved independently

In the context of constructing phylogenetic trees, a "0" typically represents an ancestral state that is consistent with the outgroup. The outgroup is a species or group that is closely related to, but not part of, the group of organisms being studied (the ingroup). By using the outgroup as a reference, researchers can determine which traits are considered ancestral and which traits are derived. In this scenario, a "0" indicates that the trait in question is retained from the common ancestor shared with the outgroup, meaning it has not changed or evolved in the ingroup since that point. This is critical in phylogenetics because it helps clarify evolutionary relationships and lineage diversification, illustrating how traits have evolved over time among related species.

5. Which group of organisms is defined by possessing a nucleus and is known to contain heterocysts?

A. Cyanobacteria

B. Alveolates

C. Stramenophiles

D. Foraminiferans

The group of organisms defined by possessing a nucleus is Eukaryotes, which includes a wide variety of organisms. In the context of the question, heterocysts are specialized cells that are primarily associated with certain cyanobacteria, which are a group of prokaryotic organisms. They are not classified as eukaryotes, as they lack a true nucleus. The correct answer revolves around recognizing that while cyanobacteria are known for heterocyst development, they do not possess a nucleus like eukaryotic organisms. Therefore, relating heterocysts specifically to a group possessing a nucleus points towards eukaryotic organisms that may have similar specialized cells as a form of adaptation; however, the inclusion of heterocysts points more closely to cyanobacteria specifically. To summarize correctly, the question may contain a misunderstanding in that heterocysts are often misattributed to organisms in groups that possess nuclei, confusing them with cyanobacteria's prokaryotic nature. In reality, heterocysts are unique to those organisms but do not relate correctly to eukaryotic groups which would typically be where a nucleus is present. Eukaryotic organisms would otherwise be represented truly by groups such as Alveolates, Stramenoph

6. Which factors are considered when measuring an ecological footprint?

A. Only land area used for agriculture

B. The amount of natural resources consumed

C. Only water consumption

D. The diversity of species present

The measurement of an ecological footprint primarily focuses on the amount of natural resources consumed by an individual, population, or activity. This encompasses various factors, such as the total land area required to support a person's or community's lifestyle, including the resources needed for food, energy, transportation, and waste management. By examining the overall natural resource consumption, researchers can evaluate the sustainability of different lifestyles and the impact on the environment. The other options highlight specific elements that, while important in environmental studies, do not encompass the broader focus of the ecological footprint measurement. For example, land area used for agriculture is a component of resource consumption but does not account for other essential resources such as fossil fuels and timber. Similarly, focusing solely on water consumption or the diversity of species present would only provide a limited view of ecological impact rather than a comprehensive understanding of resource use and environmental sustainability.

7. Which type of organism has a distinct nucleus and a membrane-bound sac?

A. Rhizarians

B. Stramenophiles

C. Alveolates

D. Cyanobacteria

The correct answer is that the type of organism characterized by having a distinct nucleus and a membrane-bound sac is indeed found among the alveolates. Alveolates are a group of protists that possess a layer of sacs, known as alveoli, just beneath their plasma membrane. This structure is integral to their cellular organization and function. Organisms in the alveolates category, such as dinoflagellates, apicomplexans, and ciliates, are eukaryotic, meaning they have a well-defined nucleus that encloses their genetic material. The presence of the membrane-bound sac (alveoli) is a key distinguishing feature that sets them apart from prokaryotic organisms, such as cyanobacteria, which lack a nucleus and membrane-bound organelles. Understanding the cellular organization in these groups is critical in biology as it sheds light on their evolutionary relationships and functionality within ecosystems.

8. What defines a clade in evolutionary biology?

A. A random selection of species

B. A group believed to have descended from a common ancestor

C. A sequence of DNA mutations

D. An individual organism

A clade in evolutionary biology is defined as a group of organisms that includes an ancestor and all of its descendants, which means that they share a common ancestor. This concept reflects the idea of common descent, where species can be traced back to a specific point in evolutionary history. Clades are often depicted in phylogenetic trees, where branches represent the evolutionary pathways and relationships among different organisms. By focusing on shared ancestry, clades help illustrate the evolutionary connections and similarities among diverse organisms, reinforcing the understanding of the tree of life. The other options do not accurately capture the definition of a clade. A random selection of species does not take into account evolutionary relationships or common ancestry. A sequence of DNA mutations pertains to genetic changes within individuals or populations but does not define clades in terms of evolutionary lineage. An individual organism also does not represent a clade since it cannot encompass multiple descendants necessary for that classification. Thus, the emphasis on common ancestry clearly distinguishes a clade as a specific group within evolutionary biology.

9. What type of organisms did we observe in the lab from the Unikonta Supergroup?

A. Euglenoids

B. Amoebozoa

C. Stramenopiles

D. Rhizarians

The correct answer is Amoebozoa, which belongs to the Unikonta Supergroup. This group includes a diverse range of organisms characterized by their amoeboid movement, which is facilitated by the use of pseudopodia—extensions of the cytoplasm that allow the organism to move and engulf food particles. In the lab, you likely observed live specimens or cultures of organisms from this group, such as amoebas. Amoebozoans play critical ecological roles in soil ecosystems and aquatic environments as decomposers and predators of bacteria and other small organisms. Their unique characteristics, such as the ability to change shape and form, are essential for their survival and functionality in their respective habitats. This versatility and adaptability exemplify the features you would have studied while exploring this group in your lab.

10. What group is characterized by having no nucleus and possessing peptidoglycan?

A. Bacteria

B. Archaea

C. Cyanobacteria

D. Euglena

The group characterized by having no nucleus and possessing peptidoglycan is Bacteria. Bacteria are prokaryotic organisms, meaning they lack a true nucleus and other membrane-bound organelles. Their genetic material is typically found in a region known as the nucleoid, which is not enclosed by a membrane. Peptidoglycan is a vital component of the bacterial cell wall, providing structural support and shape to the cell. This polymer is made up of sugar and amino acid chains that form a rigid structure around the cell membrane. The presence of peptidoglycan is a distinguishing feature of bacteria, differentiating them from eukaryotic cells, which often have cell walls made of cellulose (in plants) or chitin (in fungi), and from archaea, which do not typically have peptidoglycan in their cell walls. Cyanobacteria, the only option among the choices that is a type of bacteria, still fall under the broader category of Bacteria and also possess peptidoglycan, but the question asks for the group in general, which is Bacteria. Euglena, on the other hand, is a eukaryotic organism that contains a nucleus and does not have pept