DIVE Biology Quarterly Exam 2 Practice (Sample)

Study Guide

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Questions

1. Which structure protects microorganisms in unfavorable environments?

A. Earspot

B. Cyst

C. Pseudopodium

D. Pellicle

2. What structure forms a fold in the plasma membrane of bacterial cells?

A. Ribosome

B. Mesosome

C. Capsule

D. Endospore

3. What does pus mainly consist of?

A. Pathogenic bacteria

B. Dead white blood cells

C. Live bacteria

D. Damaged tissue

4. What term describes the severity of a disease caused by a pathogen?

A. Virulence

B. Infectivity

C. Pathogenicity

D. Immunogenicity

5. In which process do bacteria take up genetic material from their environment?

A. Transduction

B. Transformation

C. Conjugation

D. Binary Fission

6. What term describes the addition or subtraction of one chromosome from the diploid genome?

A. Gene expression

B. Aneuploid

C. Translocation

D. Deletion

7. What is the study of genetics within a specific population called?

A. Population genetics

B. Genetic screening

C. Eugenics

D. Hybridization

8. Which structure is crucial for algae to attach securely to substrates?

A. Leaf blade

B. Holdfast

C. Thallus

D. Stipe

9. Which type of organism feeds on dead or decaying organic matter?

A. Saprophytic

B. Photosynthetic

C. Autotrophic

D. Heterotrophic

10. Which term describes the creation of offspring through the fusion of gametes?

A. Hybridization

B. Amniocentesis

C. In vitro fertilization

D. Interbreeding

Answers

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

Explanations

1. Which structure protects microorganisms in unfavorable environments?

A. Earspot

B. Cyst

C. Pseudopodium

D. Pellicle

The structure that protects microorganisms in unfavorable environments is a cyst. Cysts are dormant forms that some microorganisms can form in response to harsh conditions, such as extreme temperatures, lack of moisture, or limited food supply. By encasing themselves in a protective coating, microorganisms can significantly enhance their chances of survival until conditions improve. The cyst's tough exterior helps prevent desiccation and shields the organism from environmental stressors, making it an essential survival mechanism for many protozoa, bacteria, and algae. The other structures mentioned serve different functions. Earspots are not relevant in this context, as they generally pertain to sensory functions and do not provide protection. Pseudopodia are extensions of the cell used for movement and feeding, but they do not provide the protective mechanism that cysts do. A pellicle is a flexible outer covering found in some protists, but it primarily offers structural support and does not provide the same level of protection during unfavorable conditions as a cyst does.

2. What structure forms a fold in the plasma membrane of bacterial cells?

A. Ribosome

B. Mesosome

C. Capsule

D. Endospore

The mesosome is a structure that forms a fold in the plasma membrane of bacterial cells. It is associated with the internal membranes that arise from invaginations of the plasma membrane. Mesosomes are thought to serve various functions, including involvement in cellular respiration and DNA replication, as they provide a larger surface area for these processes to occur. In contrast, ribosomes are the cellular machinery responsible for protein synthesis and do not have a structural role in forming folds in the membrane. The capsule is a protective outer layer that surrounds some bacterial cells, offering protection and aiding in adherence but does not involve membrane folding. An endospore is a dormant, tough, and non-reproductive structure formed by some bacteria to ensure survival in harsh conditions, and it does not relate to the composition or structure of the plasma membrane itself. The mesosome's role is specific to the membrane's architecture, highlighting its importance in the overall biology of bacterial cells.

3. What does pus mainly consist of?

A. Pathogenic bacteria

B. Dead white blood cells

C. Live bacteria

D. Damaged tissue

Pus mainly consists of dead white blood cells, particularly neutrophils, which have infiltrated an area of infection or inflammation. When the body responds to an infection, these immune cells are sent to the site to fight off pathogens. In the process of combating the infection, many of the white blood cells die, and the accumulation of these dead cells, along with remaining cellular debris and fluids, forms pus. While pathogenic bacteria and live bacteria can be present in areas where pus is forming, they are not the primary constituent of pus itself. Pus is more of a reflection of the body's response to infection rather than a collection of actively dividing or living bacteria. Damaged tissue can also be present alongside pus but again, it is not the main component. The dominant feature of pus is the presence of dead white blood cells, indicating that the body is undergoing an immune response to clear out infection or debris.

4. What term describes the severity of a disease caused by a pathogen?

A. Virulence

B. Infectivity

C. Pathogenicity

D. Immunogenicity

The term that best describes the severity of a disease caused by a pathogen is virulence. Virulence refers to the degree of pathogenicity, which indicates how harmful or severe a disease can be once a pathogen infects a host. It encompasses the ability of a pathogen to evade the host's immune system, reproduce within the host, and cause damage to host tissues, leading to disease symptoms. Infectivity, while related, refers specifically to the ability of a pathogen to establish an infection in a host. Pathogenicity is a broader term that indicates whether a pathogen can cause disease, but it does not assess the severity of the disease itself. Immunogenicity pertains to the ability of a pathogen to provoke an immune response, but again, it does not directly relate to the severity of the disease caused by that pathogen. Thus, virulence is the most precise term to denote how severe the disease can be.

5. In which process do bacteria take up genetic material from their environment?

A. Transduction

B. Transformation

C. Conjugation

D. Binary Fission

Bacteria take up genetic material from their environment through a process known as transformation. During transformation, a bacterial cell absorbs naked DNA present in its surroundings, which can originate from the remains of other cells that have lysed and released their genetic material. This process allows for genetic variation among bacterial populations, enabling them to gain new traits, such as antibiotic resistance, metabolic capabilities, or virulence factors. The significance of transformation is highlighted by its role in horizontal gene transfer, which contributes to evolution and adaptation in bacterial species. Unlike transduction, which involves the transfer of DNA via bacteriophages, or conjugation, which entails direct cell-to-cell contact for the transfer of plasmid DNA, transformation is characterized by the uptake of free DNA from the environment. Binary fission, on the other hand, is a method of asexual reproduction where a single bacterial cell divides into two identical daughter cells, and does not involve the exchange or uptake of genetic material.

6. What term describes the addition or subtraction of one chromosome from the diploid genome?

A. Gene expression

B. Aneuploid

C. Translocation

D. Deletion

The term that describes the addition or subtraction of one chromosome from the diploid genome is "aneuploid." This condition occurs when an organism has either more or fewer chromosomes than the typical diploid number, resulting in an abnormal chromosome count. For instance, if a human has 47 chromosomes instead of the usual 46, this would be categorized as an aneuploid condition, which is often associated with various genetic disorders, such as Down syndrome, which is caused by the presence of an extra copy of chromosome 21. Gene expression refers to the process through which information from a gene is used to synthesize functional gene products, typically proteins, and does not pertain to the number of chromosomes in a genome. Translocation involves the rearrangement of chromosomes, specifically when a segment of one chromosome breaks off and attaches to another chromosome, which is different from the simple addition or subtraction of entire chromosomes. Deletion involves the loss of a portion of a chromosome, which may affect genetic material, but it does not describe the overall aneuploid condition itself.

7. What is the study of genetics within a specific population called?

A. Population genetics

B. Genetic screening

C. Eugenics

D. Hybridization

The study of genetics within a specific population is known as population genetics. This branch of genetics focuses on the distribution and change in frequency of alleles within populations, and how evolutionary forces such as natural selection, genetic drift, mutation, and gene flow influence these genetic variations. Researchers in this field analyze genetic variations and their relation to the phenotypic traits of individuals in a population, as well as how these traits evolve over time within the context of a specific population, rather than looking at genetics at a broader scale. Population genetics is essential for understanding evolution, speciation, and the genetic structure of populations, making it a foundational concept in both ecology and evolutionary biology. In contrast, genetic screening refers to testing individuals for genetic disorders, eugenics involves manipulating genetic traits for perceived improvement in humans, and hybridization is the process of breeding between different species or varieties. These concepts are distinct from the focus of population genetics on the genetic composition and dynamics of populations.

8. Which structure is crucial for algae to attach securely to substrates?

A. Leaf blade

B. Holdfast

C. Thallus

D. Stipe

The holdfast is a specialized structure that plays a critical role in the attachment of algae to various substrates. This organ is designed to anchor the algae firmly to surfaces such as rocks, coral, or other underwater structures, which provides stability and prevents the algae from being washed away by water currents. The holdfast does not participate in nutrient absorption; its primary function is to secure the algae in place, allowing it to remain in an optimal position for photosynthesis and other physiological processes. In contrast, other structures mentioned in the options serve different purposes. For instance, leaf blades are responsible for photosynthesis and are not involved in attachment. The thallus refers to the entire body of an algae organism, encompassing various parts, including leaf blades and holdfasts, but it does not specifically describe the attachment mechanism. The stipe is a stem-like structure that supports the blades but also does not play a role in anchoring the algae to a substrate. Thus, the holdfast is uniquely suited for its vital role in keeping algae securely attached.

9. Which type of organism feeds on dead or decaying organic matter?

A. Saprophytic

B. Photosynthetic

C. Autotrophic

D. Heterotrophic

The term that describes organisms that feed on dead or decaying organic matter is saprophytic. Saprophytic organisms, such as many fungi and bacteria, play a crucial role in the ecosystem by breaking down dead material and recycling nutrients back into the soil. This decomposition process is vital for the health of ecosystems, as it ensures that nutrients are available for other organisms, thus supporting new plant and animal growth. In contrast, photosynthetic organisms, such as plants and some bacteria, produce their own food by converting sunlight into energy through photosynthesis, rather than feeding on decaying matter. Autotrophic organisms are primarily those that can synthesize their own food from inorganic substances, while heterotrophic organisms obtain their food by consuming other organisms, which may include living or dead matter but does not specifically refer to those that solely feed on decaying organic matter. Therefore, saprophytic is the most appropriate term to describe organisms that feed specifically on dead or decaying organic material.

10. Which term describes the creation of offspring through the fusion of gametes?

A. Hybridization

B. Amniocentesis

C. In vitro fertilization

D. Interbreeding

The term that describes the creation of offspring through the fusion of gametes is "in vitro fertilization." This process involves the external fertilization of an egg with a sperm in a controlled environment, typically a laboratory setting. Once fertilization occurs, the resultant embryos are usually implanted into the uterus, which can lead to pregnancy. This method is particularly significant in reproductive technology, allowing for the conception of children in cases where natural fertilization is not possible or has difficulties. Hybridization refers to the crossing of two different species or varieties to create a hybrid, and while it involves gametes, it is not specifically about the fusion process itself. Amniocentesis is a medical procedure used to obtain amniotic fluid for prenatal testing, which is unrelated to the creation of offspring. Interbreeding involves the mating of individuals from the same species or closely related species and the resulting offspring, but it does not specifically refer to the process of fusion in a laboratory or artificial context. Thus, in vitro fertilization is the most accurate term for the fusion of gametes to create offspring.