

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Dissect the Living Architecture: 12th Grade Advanced Cytology Quiz

Synthesize complex interactions between endomembrane systems and energetic organelles to evaluate cellular homeostasis and signaling pathways.

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**1. In the context of the Endosymbiotic Theory, which piece of evidence best supports the autonomous nature of mitochondria and chloroplasts within a eukaryotic host?**

- A. Presence of a phospholipid bilayer similar to the plasma membrane.
- B. The existence of circular DNA and 70S ribosomes within the organelle matrix.
- C. The ability to synthesize glycolipids for extracellular signaling.
- D. The presence of linear chromosomes wrapped in histone proteins.

**2. The \_\_\_\_\_ is a specialized compartment in plant cells that contains enzymes for the glyoxylate cycle, converting stored lipids into carbohydrates for the emerging seedling.**

- A. Amyloplast
- B. Plasmodesma
- C. Glyoxysome
- D. Tonoplast

**3. Consider a mutation that renders the signal recognition particle (SRP) non-functional. Predict the immediate consequence for the cell's proteome.**

- A. Cytosolic proteins will be incorrectly tagged for lysosomal degradation.
- B. The nucleolus will cease the production of ribosomal RNA subunits.
- C. Endomembrane and secretory proteins will be translated in the cytosol instead of the ER.
- D. Vesicular transport from the Golgi to the plasma membrane will accelerate.

**4. The Fluid Mosaic Model posits that the lateral mobility of integral membrane proteins is entirely unrestricted across the entire surface of the cell membrane.**

- A. True
- B. False

**5. Which cytoskeletal element is characterized by its dynamic instability and plays a critical role in the spatial organization of organelles and chromosome segregation?**

- A. Actin microfilaments
- B. Intermediate filaments
- C. Microtubules
- D. Keratin fibers

**6. In the process of autophagy, the \_\_\_\_\_ fuses with an autophagosome to facilitate the enzymatic degradation of dysfunctional cytoplasmic components.**

- A. Peroxisome

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- B. Lysosome
- C. Centrosome
- D. Nucleosome

**7. Desmosomes are specialized cell junctions that primarily facilitate the rapid electrical coupling and chemical exchange between neighboring cardiac muscle cells.**

- A. True
- B. False

**8. How does the Smooth Endoplasmic Reticulum facilitate homeostatic balance in hepatocytes (liver cells) following toxin exposure?**

- A. By increasing the surface area for ribosomal protein synthesis.
- B. By synthesizing hydrolytic enzymes for intracellular digestion.
- C. By adding hydroxyl groups to drug molecules to increase their solubility.
- D. By storing genetic information in the nuclear envelope.

**9. The \_\_\_\_ face of the Golgi apparatus is the primary receiving site for vesicles arriving from the Endoplasmic Reticulum.**

- A. Trans
- B. Cis
- C. Basal
- D. Apical

**10. Cholesterol functions as a bidirectional regulator of membrane fluidity, preventing excessive rigidity at low temperatures and excessive fluidity at high temperatures.**

- A. True
- B. False