

# Test Bank for Cell Biology 3rd Pollard

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## Pollard: Cell Biology, 3rd Edition

### Test Bank

#### Chapter 2: Evolution of life on Earth

1. What is the best estimate of the number of genes in the first cell, the universal common ancestor?
  - a. 6
  - b. 60
  - c. 600
  - d. 6000

Ans: C

About 600 genes is the minimum to carry out the biochemistry that we would today count as being a viable self-renewing cell.

2. Other than carrying genetic information, what other property does RNA have that makes it likely to have been the “spark” that kindled life?
  - a. It may have catalytic activity.
  - b. It is very stable in water.
  - c. It can form membranes in water.
  - d. It contains all the essential elements for life.

Ans: A

The catalytic activity of some RNAs allows it to self-replicate, self-cleave, and catalyze formation of peptide bonds. Other catalytic activities may have contributed to the essence of early life.

3. Which other material likely worked with RNA in the prebiotic world?
  - a. Silica
  - b. Biotite mica
  - c. Calcium carbonate
  - d. Montmorillonite clay

Ans: D

Interaction with clay allows RNA to fully unfold so that it can act as a template for replication.

4. What is the name given to genes that occur in the same cell that have resulted from duplication and mutation?
  - a. Homologs
  - b. Paralogs
  - c. Captinslogs
  - d. Orthologs

Ans: B

Paralogous genes are separated by a gene duplication event. Orthologous genes are separated by a speciation event.

5. Genes are normally inherited from a parent cell. What is the process by which a cell may obtain a gene from an unrelated organism?
- Vertical transgression
  - Vertical take-up
  - Horizontal transgression
  - Lateral transfer

Ans: D

This is also known as horizontal gene transfer and is considered to be an important part in evolution that is still occurring today.

6. The simple bacteria *Mycoplasma genitalium* has lost many genes. How is this cell able to grow in a reduced state?
- It is a pathogen that obtains many nutrients from the host and so can function with reduced synthetic ability.
  - It grows extremely slowly and does not need enzymatic catalysis.
  - It grows in hot springs where the heat substitutes for many enzymes.
  - It is not known how this organism grows in this state.

Ans: A

The animal host provides many of the nutrients that it can no longer make for itself.

7. Which of the following statements concerning Bacteria and Archaea is FALSE?
- Some Bacteria and Archaea are human pathogens.
  - Bacteria and Archaea are similar in structure.
  - Bacteria and Archaea are prokaryotes.
  - Bacteria and Archaea can use energy sources such as hydrogen, sulfate, or methane.

Ans: A

Remarkably, no Archaea has yet been found to cause pathology in humans.

8. It is widely accepted that the eukaryotic mitochondrion is actually a very much altered bacterium, but which sort of bacterium was its ancestor?
- A relative of *E. coli*
  - An  $\alpha$ -proteobacterium
  - An unknown gram-negative bacterium
  - A cyanobacterium

Ans: B

Phylogenetic analysis reveals that the bacterium was an  $\alpha$ -proteobacterium related to the *Rickettsia* bacterium, which causes typhus in humans.

9. When did the last eukaryotic common ancestor (LECA) exist?

- a. 2.1 to 0.9 billion years ago
- b. 21 to 9 billion years ago
- c. 210 to 900 million years ago
- d. 21 to 9 million years ago

Ans: A

All traces of the LECA were presumably obliterated by their more successful offspring.

10. Sponges (porifera) may be the earliest multicellular animals; which group of extant protozoans do they most closely resemble?
- a. Amoebae
  - b. Choanoflagellates
  - c. Euglenoids
  - d. Excavata

Ans: B

Some species of choanoflagellates form simple colonies consistent with their being ancestors of the sponges, an idea first proposed by Dujardin in 1841.