CELL PROBLEMS

6. You have five electron micrographs depicting cells from five different kingdoms. The labels have dropped off, and you have to figure out which cells belong to which kingdoms. The only clues you have are the organelles you can recognize from the pictures.

Two of the micrographs (which for convenience you re-label A and B) show cells with large central vacuoles; three cells (D, E, and F) do not have such vacuoles. Among the cells with large central vacuoles, one (A) has chloroplasts and the other does not. Among the cells without large central vacuoles, one (C) has cilia; the others do not. Among the cells without cilia, one (D) has a cell wall; the other does not.

What are the most likely identities of the five cells?

7. In the diagram below question 8, the best word for A is:
   a. organelles  b. nucleus  c. cell wall  d. motility  e. microtubules

8. In the diagram below question 8, the best word for B is:
   a. plastids  b. vacuoles  c. motility  d. nucleus  e. Organelles

9. In the diagram below, the best word for C is:
   a. cell walls  b. DNA  c. photosynthesis  d. nucleus  e. ribosomes

- organisms
  - without A = animals
    - with A
      - without B = plants
      - with B
        - without C = bacteria
        - with C = fungi
10. Cytochalasin is a poison that inhibits the polymerization and thus the function of microfilaments. A scientist observed that cells derived from liver and placed in a tissue culture medium secreted proteins into the medium; when treated with cytochalasin, that secretion quickly stopped. Provide a hypothesis to explain why.

11. A plant cell is said to have over 20 compartments—that is, places to which newly synthesized proteins may be directed. How many of these can you name? (Hint: the plasma membrane is one.)

12. The pathway of newly synthesized proteins through the cell can be followed by a “pulse-chase” experiment. Proteins are synthesized for a short time with a radioactive isotope (the “pulse”), then they are given the same compound non-radioactive (the “chase”), the presence of the radioactivity in different compartments of the cell is followed by isolating cell organelles and quantifying their radioactivity. What results would you expect for a) a lysosomal enzyme? b) a protein that is released from the cell? c) a protein that is accumulated in the mitochondrial matrix? d) a protein of the plasma membrane? e) a histone (nuclear protein)?