Salt and Water Balance and Nitrogen Excretion

Section 52.1

1. Animals depend on excretory systems to do what?
2. The output of the excretory system is called what?
3. Animals that live in marine, freshwater, or terrestrial environments face different salt and water balance challenges. Explain how the challenge is different for each environment.
4. What’s the difference between a marine osmoconformer and a marine osmoregulator?
5. What is the purpose of nasal salt glands in penguins and sea gulls?

Section 52.2

1. The metabolism and break down of proteins and nucleic acids produces what type of waste product?
2. What are the characteristics of ammonia excretion? What types of organisms excrete ammonia? (Figure 52.3)
3. What are the characteristics of urea excretion? What types of organisms excrete urea?
4. What are the characteristics of uric acid excretion? What types of organisms excrete uric acid?

Section 52.4

1. What is the main excretory organ of vertebrates?
2. It is believed that vertebrate organisms originally evolved in what type of water?
3. How do freshwater fish osmoregulate?
4. How do marine bony fish osmoregulate to keep their body fluid osmolarity much lower than that of seawater?
5. How do cartilaginous fish (sharks and rays) osmoconform to sea water? How do they eliminate excess ingested salt?
6. What three major adaptations freed reptiles from the need to always be near water?
7. What is a major adaptation that allows mammals to conserve water and survive in environments where water is limited?
8. Note: Details about nephron structure and function are beyond the scope of the course.

Immunology: Animal Defense Systems

Section 42.1

1. What are pathogens?
2. What are the three phases of a defensive response?
3. What are some nonspecific defenses?
4. What are some basic characteristics of specific defenses?
5. What are the two major families of white blood cells? What type are B cells and T cells?
6. What is the role of antibodies?

Section 42.2

1. Review the list of nonspecific defenses in Table 42.1.
2. How does normal flora help protect you?
3. What is lysozyme?
4. What are defensins?
5. Complement proteins in the blood provide protection from pathogens.
6. How do phagocytes protect you?
7. Inflammation is a result of increased blood flow to an injured or infected part of the body. Inflammation is characterized by redness, warmth, swelling, and pain.

Section 42.3

1. What are the two major types of specific immune responses?
2. Summarize the four important features of the adaptive immune system:
   1. Specificity
   2. Distinguish self from non-self
   3. Diversity
   4. Immunological memory
3. Figure 42.6 summarizes the two arms of the specific immune system. Which type of cell plays a central role in activating both?
4. Which type of cell produces antibodies?
5. Summarize the humoral immune response.
6. Which type of cell destroys virus-infected or mutated cells?
7. Summarize the cellular immune response.
8. What does it mean that the adaptive immune system is “pre-developed”?
9. What causes specific B cells and T cells to multiply/proliferate?
10. What are effector cells?
11. What are memory cells?
12. What’s the difference between a primary immune response and a secondary immune response?
13. How do vaccines work?

Section 42.7

1. What is an allergic reaction?
2. Note: The differences between immediate and delayed hypersensitivity responses are beyond the scope of the course.
3. What is an autoimmune disease? What has gone wrong?
4. Summarize how HIV causes immune system deficiency.

How Plants Deal with Pathogens

Section 39.1

1. Why is the fungal infection Ug99 so scary?
2. What is a first line of defense for plants?
3. Plants can handle pathogen damage in a different way than animals. Explain.
4. A plant responds to pathogen infection by initiating a hypersensitive response. (Figure 39.2) Summarize the three steps of the hypersensitive response:
   1. Phytoalexins
   2. Pathogenesis-related proteins (PR proteins)
   3. Physical isolation
5. Do plants have any type of long-term “immunity”?