

Basic Principles of Animal Form and Function Review

Chapter 40

1. Describe how the endocrine and nervous systems help coordinate and control responses to stimuli.
2. Some signals must be received by a single cell while others must be received by many different cells. Identify which method – a hormone or a nerve impulse – would be best for each purpose. Justify your responses.
3. Suppose you are standing at the edge of a cliff and suddenly slip, barely managing to keep your balance and avoid falling. As your heart races, you feel a burst of energy, due in part to a surge of blood into dilated (widened) vessels in your muscles and an upward spike in the level of glucose in your blood. Why might you expect that this “fight-or-flight” response requires both the nervous and endocrine systems?
4. Using body temperature as an example, distinguish between a regulator and a conformer.
5. Again, using temperature as an example, describe how negative feedback can be used to maintain homeostasis.
6. a) Distinguish between endotherms and ectotherms.
b) Explain why the basic metabolic rate of an endotherm is much higher than that of an ectotherm.
7. a) A mouse and a small lizard of the same mass (both at rest) were placed in experimental chambers under identical environmental conditions. Identify which animal would consume oxygen at a higher rate. Provide reasoning to justify your response.
b) Identify the animal that must eat a larger proportion of its weight in food each day: a house cat or an African lion caged in a zoo. Provide reasoning to justify your response.
8. In 1847, the German biologist Christian Bergmann noted that mammals and birds living at higher latitudes (farther from the equator) are on average larger and bulkier than related species found at lower latitudes. Propose an evolutionary hypothesis to explain this observation.
9. Suppose the animals at a zoo were resting comfortably and remained at rest while the nighttime air temperature dropped. If the temperature change were sufficient to cause a change in metabolic rate, predict the changes you would expect in body temperature and metabolic rate for an alligator and a lion. Provide reasoning to justify your responses.
10. Animals often experience times of limited energy because food is unavailable. Explain how torpor and hibernation are adaptations for coping in during times.