Chapter 45 – Chemical Signals in Animals

An Introduction to Regulatory Systems

1. Compare the response times of the two major systems of internal communication: the nervous system and the endocrine system
2. Explain how neurosecretory cells, epinephrine, and control of day/night cycles illustrate the integration of the endocrine and nervous systems
3. Describe the organization of a stimulus, receptor, control center, efferent signal, and effector in a simple endocrine pathways
4. Describe an example of a negative feedback loop in an endocrine pathway involved in maintaining homeostasis
5. Explain why the neurohormone pathway that regulates the release of milk by a nursing mother is an example of positive feedback

Chemical signals and their modes of action

6. List the three major classes of molecules that function as hormones in vertebrates.
7. Name the three key events involved in signaling by vertebrate hormones
8. Explain what changes may be triggered by a s signal transduction pathway initiated by the binding of a water-soluble hormone to a receptor in the plasma membrane of a target cell
9. Discuss how and why different target cells expose to the same hormone may respond in different ways.
10. Describe the nature and location of intracellular receptors for hormones that pass easily through cell membranes. Explain how their role compares to the signal-transduction pathway noted above, and describe the changes they are likely to trigger within the target cell.
11. Explain the role of local regulators in paracrine signaling. Describe the diverse functions of cytokines, growth factors, nitric oxide, and prostaglandins.

The Vertebrate Endocrine System

12. Explain how the hypothalamus and pituitary glands interact and how they coordinate the endocrine system
13. Describe the location of the pituitary. List and explain the functions of the hormones released from the anterior and posterior lobes
14. Explain the role of tropic hormones in coordinating endocrine signaling throughout the body. Distinguish between releasing hormones and inhibiting hormones.
15. List the hormones of the thyroid gland and explain their roles in development and metabolism. Explain the causes and symptoms of hyperthyroidism, hypothyroidism and goiter.
16. Note the location of the parathyroid glands and describe the hormonal control of calcium homeostasis.
17. Distinguish between alpha and beta cells in the pancreas and explain how their antagonistic hormones (insulin and glucagon)regulate carbohydrate metabolism.
18. Distinguish between type I diabetes mellitus and type II diabetes mellitus
19. List the hormones of the adrenal medulla, describe their functions
20. List the hormones of the adrenal cortex and describe their functions
21. List the hormones of three categories of steroid hormones produced by the gonads. Describe variations in their production between the sexes. Notes the functions of each category of steroid and explain how secretions are controlled.
22. Describe several examples of invertebrate hormones that function in the control of reproduction and development