Swanson, Larry W. (2012) *Brain architecture: understanding the basic plan*, 2nd edition (New York: Oxford University Press) 331 pp.

Contents

Preface to First Edition

- 1. Thinking about the Brain: Body and Mind
- 2. How the Brain Works: History, Structure and Function
 - a. Three biological perspectives
- 3. The Simplest Nervous Systems: Neurons, Nerve Nets, and Behavior
 - a. Unicellular organisms: behaviors essential for survival
 - b. Animals without neurons: independent effectors
 - c. The first nervous system: hydra's body and behavior
 - d. Sensory neurons: functional polarity of dendrites and axon
 - e. Motor neurons: a second distinct neuron type
 - f. Nerve nets: amacrine extensions and activity patterns
 - g. Interneurons: sign switchers and pattern generators
 - h. Overview: evolution of architecture not building blocks
- 4. Centralization and Symmetry: Ganglia and Nerves
 - a. Flatworms: bilaterally symmetrical predators
 - b. Segmented worms: inner ventral nerve cord
 - c. More evolved invertebrates
 - d. Overview: polarity, regionalization, bilateral symmetry, segments
- 5. The Basic Vertebrate Plan: Transverse Divisions
 - a. Embryological perspectives
 - b. Earliest stages of mammalian development
 - c. Neural plate: central nervous system divisions
 - d. Neural tube: transverse brain divisions
 - e. Neural crest and placodes: peripheral nervous system
- 6. Neurogenesis: Longitudinal Divisions, Parts List, and Adult Flatmap
 - a. Generating neuron types: longitudinal CNS divisions
 - b. Generating gray matter regions

- c. Macroconnections, mesoconnections, and microconnections
- d. A nervous system flatmap for mammals
- e. Overview: parts of the nervous system
- 7. Brain and Behavior: A Four Systems Network Model
 - a. Reflex and voluntary control of behavior
 - b. Behavioral state control
 - c. Feedback
 - d. Topography versus systems
 - e. Overview: defining each system
- 8. The Motor System: Coordinating External and Internal Behaviors
 - a. Motor neuron varieties
 - b. Introduction to the somatic motor system: flexion
 - c. Distribution of somatic motor neuron pools
 - d. Central pattern generators—sets of motor neuron pools
 - e. Pattern initiators and controllers: drive and motivation
 - f. The autonomic motor system
 - g. The neuroendocrine motor system
 - h. The cerebellum: motor coordination and learning
 - i. Overview: integration within and between motor systems
- 9. The Behavioral State System: Intrinsic Control of Sleep and Wakefulness
 - a. Circadian rhythms: the day-night cycle
 - b. Reproductive cycles
 - c. Sleep-wake cycles
 - d. Modulating behavioral state
- 10. The Cognitive System: Thinking and Voluntary Control of Behavior
 - a. Cerebral cortex regionalization
 - b. Cortical cellular organization
 - c. Cortical outputs
 - d. The cerebral nuclei
 - e. Triple caudal (descending) projection from cerebrum
- 11. The Sensory System: Inputs from Environment and Body

- a. Evolution and development of sensory neurons
- b. Overview of sensory neurons
- c. Overview of sensory pathways
- d. Forebrain sensory systems: olfactory, visual, humoral, and osmotic
- e. Ganglion cell sensory systems: submodalities
- f. Affect: pain and pleasure, emotion, and mood
- 12. Modifiability: Learning, Stress, Cycles, and Damage Repair
 - a. Learning: changing synaptic strength
 - b. Stress: biochemical switching
 - c. Cycles: circadian and reproductive
 - d. Damage repair: regrowth
- 13. Genome and Connectome

Appendices

- A. Describing Position in the Animal Body
- B. Naming and Classifying Nervous System Parts
- C. Methods for Analyzing Brain Architecture

Glossary

Index