

## 9.01 Study Questions

### Sessions 23-25 Lecture Questions

1. What is different about generating a rhythm of motor output by a) reflex pathways, b) feedback circuitry in the CNS, and c) endogenous activity of single cells? Answer by indicating how the rhythm is generated in each case. What determines the period of the rhythm in each case? How could the rhythm be initiated or terminated in each case?
2. Give an example of rhythmic motor output and how stimuli from outside the CNS can modulate the rhythm's phase, period or amplitude.
3. What does "phase dependent reflex reversal" mean? Explain a simple experiment that can illustrate it.
4. What is the role of "intersegmental neurons" in relation to the generation of cyclic movement patterns by CPGs (Central Pattern Generators) such as in the swimming of the crayfish or walking of the cockroach? Where would the axons of neurons with a similar role in a vertebrate be found ?
5. How can you be certain that the sleep-wake cycle is controlled by an endogenous rhythm and not by periodic signals coming from outside the organism?
6. What is the "biological clock" in mammals, and where is it located? Is there only one such clock?
7. Why do we sleep? Is sleep necessary? If so, for what? How much sleep is needed? What may be the reason(s) that infants sleep so much more than adults, with a much greater percentage of time spent in REM sleep?
8. How were the various stages of sleep discovered? What are the major types of sleep, and what are their main characteristics? Do EEG recordings always correlate with behavioral states of arousal?
9. Is REM sleep essential for sanity? What functions of this type of sleep have been proposed?
10. Describe some pathologies of sleep: sleep apnea, narcolepsy (and cataplexy), insomnia, nightmares, night terror, sleepwalking. What is hypnagogic imagery, or hypnagogic hallucination?
11. Contrast effects of lesions of the hypothalamus (Nauta, 1946) and effects of lesions of the hindbrain (of the locus coeruleus or of the raphe nuclei) on sleep.

12. Discuss the interaction of sleep and the immune system.

**Sessions 23-25 Reading Questions**

**Rosenzweig Chapter 14.**

From the study Guide:

Biological Rhythms, Sleep, and Dreaming

1.1, 2.2, 3.1, 8.4, 21.3, 22.1, 24.5, 27.2, 27.3

Important Terminology