**Chapter 3**

**VISUAL SYSTEM: The Eye**

1. It was once popular to compare the human eye to a camera that takes snapshots, or even movies, of the world. In what ways is this analogy appropriate, and in what ways is it inappropriate?

*Hints and discussion: It has a lens and focuses and image onto a sensitive surface, making it similar in some ways to a camera (more accurate to say perhaps the design of the camera was modeled after the eye). However, it is less obvious that any image is captured and stored by the visual system.*

1. When vision loss occurs in adulthood, there are various ways to restore function. However, restoration does not require that patients learn how to see all over again, as noted in the textbook’s description of the Argus II device. However, in some parts of the world, children born with cataracts may not have access to treatment until they are teenagers, or older. These children do have to learn how to see. What do you think accounts for this difference in response to treatment?

*Hints and discussion: The difference is that in adult onset vision loss, the adults had a lifetime of visual experience, whereas the children born with cataracts have never had functioning vision. The function of the visual system is an example of activity-dependent development.*

1. Traditionally, the bridges of submarines were illuminated with red light, especially during night time operations. Given your knowledge of scotopic vision, why do you think this was done?

*Hints and discussion: The bridge crew needs light to see their instruments and controls, but the officer who views the surface of the water using a periscope needs to be dark adapted.*

1. According to the duplex theory of vision, we use two different visual systems in light and dark conditions, respectively. This transition from photopic to scotopic vision is illustrated in Figure 3.19. Curiously, we don’t seem to notice this change during the dark adapation process. Why not? Is there anything about Figure 3.19 that might hint at why we don’t notice the transition?

*Hints and discussion: The figure illustrates that the transition is slow and gradual, and that the rod system can be functioning at all levels of illumination.*

1. The book notes that red taillights on cars are helpful especially at night because they do not affect the dark adaptation of drivers. However, many emergency vehicles use blue flashing lights. What kind of problems might arise from the use of blue emergency lights?

*Hints and discussion: Exposure to the blue emergency lights might impair rod function and temporarily reduce the degree of dark adaptation of drivers who are passing the emergency lights. This may increase the risk of a crash – especially as drivers need to be even more careful when driving past a motor vehicle accident.*