## 生物物理学 Ⅱ Handout No. 10

2

## (B) Vertebrate photoreceptor

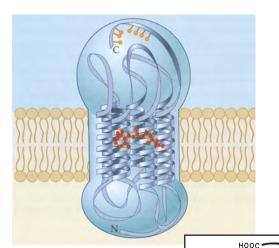
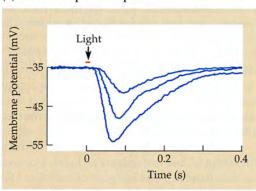


FIGURE 19.5 Responses of Photoreceptors. (B) Photoreceptors of a vertebrate (a turtle) respond with a hyperpolarization that is graded

hyperpolarization that is graded according to the intensity of the flash. (A aher Fuortes and Poggio, 1963; B after Baylor, Fuortes, and O'Bryan, 1971.)

(5)



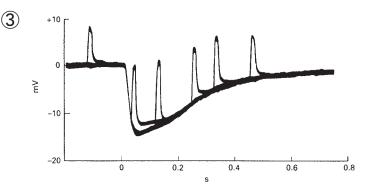
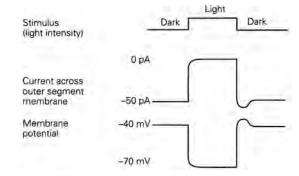


Figure 15.25. Evidence that light increases the membrane resis- tance in turtle cones. Superimposed tracings show six responses to brief flashes of light at zero time. For each trace a brief pulse of depolarizing current, of the same strength but occurring at different times, was applied through the microelectrode. The voltage changes produced by this pulse are larger during the hyperpolarization following the flash of light. (From Baylor & Fuortes, 1970.)



**Figure 26-5C.** An inward current of -50 pA is suppressed by a bright light, hyperpolarizing the cell to -70 mV, the equilibrium potential for K<sup>+</sup>. A light of intermediate intensity would hyperpolarize the cell to potentials between -40 and -70 mV.

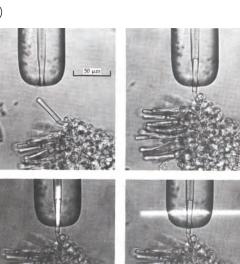


FIGURE 19.13 Method for Recording Membrane Currents of a Rod Outer Segment. A suction electrode with a fine tip is used to suck up the outer segment of a rod that protrudes from a piece of toad retina. Slits of light illuminate the receptor with precision. Since the electrode fits tightly around the photoreceptor, current flowing into it or out of it is recorded. (From Baylor, Lamb, and Yau, 1979.)

FIGURE 19.6 Structure of Vertebrate Rhodopsin in the Membrane. The helix is partly opened to show the position of retinal (red). C = carboxy terminus; N = amino terminus. (After Stryer and Bourne, 1986.)

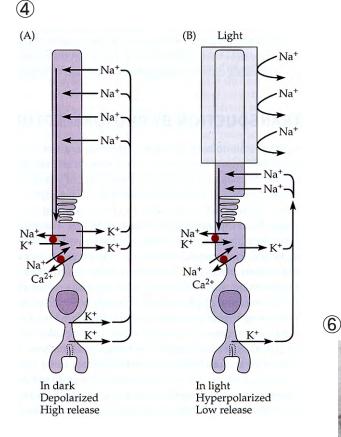


FIGURE 19.10 Dark Current in a Rod. (A) In darkness, sodium ions flow through cation channels of the rod outer segment, causing a depolarization; calcium ions also enter through the cation channels. The current loop is completed through the neck of the rod with the outward movement of potassium through the inner segment membrane. (B) When the outer segment is illuminated, the channels close because of a decrease in intracellular cyclic GMP, and the rod then becomes hyperpolarized. This hyperpolarization reduces transmitter release. Sodium, potassium, and calcium concentrations of the rod are maintained by pumps and exchangers in the inner segment (red circles); calcium exchangers are also present in the outer segment (see Box 19.1). (After Baylor,1987.)

## (1)