The vertebrate Eye: Nerve Transmission

Retina

Area of the eye that **detects light** via **rod** and **cone photoreceptor** cells:

1. Rod Photoreceptors

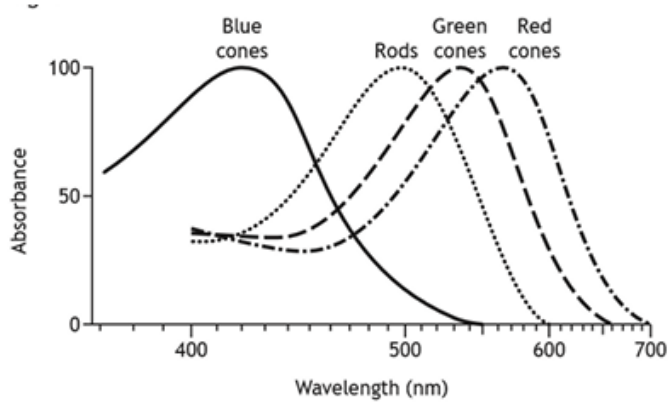
   Function in **dim light** but do not allow colour perception

   Adaptation— A **very high** degree of **amplification**

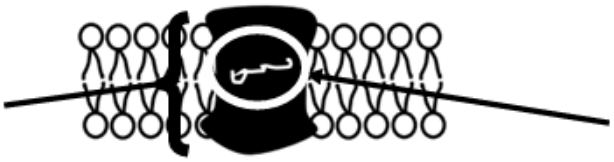
2. Cone Photoreceptors

   Enable **colour vision** but only function in bright light.

   Adaptation—**Different forms of opsin** enable different photoreceptor cells to have a maximal sensitivity to **red, green, blue or UV wavelengths (birds)**.



` Structure of Animal Photoreceptors



membrane protein
opsin

Retinal
Light sensitive molecule

In rod cells the retinal-opsin complex is called **rhodopsin**

Function of Rhodopsin

When a photon of light is absorbed, a nerve impulse is generated.

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Nerve Transmission Mechanism in Rod Cones

Retinal absorbs a photon of light and rhodopsin changes conformation to form a single **photoexcited rhodopsin**

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A **cascade of proteins amplifies** the signal

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Photoexcited rhodopsin activates **hundreds** of **G protein transducing**

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This activates **hundreds of phosphodiesterase** (PDE) enzymes per second

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PDE catalyses the hydrolysis of **thousands of cyclic GMP** (cGMP) per second

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This **closes ion channels** in the membrane of rod cells.

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Nerve impulse triggered in retinal neurones