

# Biology Specification 13.6 – 13.8

## ➤ 13.6 Nervous coordination

The mammalian eye

Rods and Cones

The nerve impulse

Synapses and synaptic transmission

Drugs and synapses

## ➤ 13.7 Analysis and integration

Brain and cerebral hemispheres

Autonomic nervous system

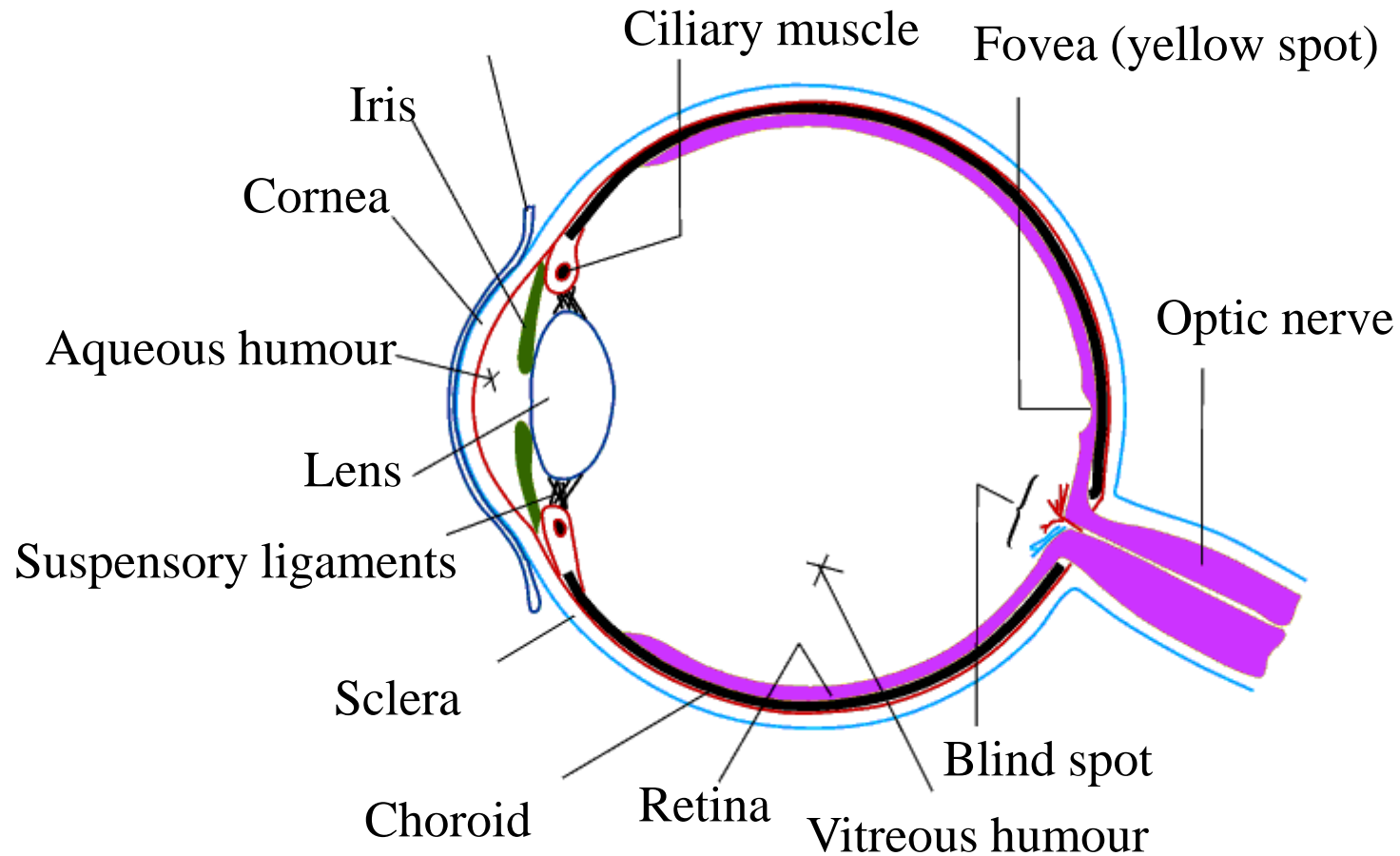
## ➤ 13.8 Muscles are effectors which enable movement to be carried out

Antagonistic muscle action

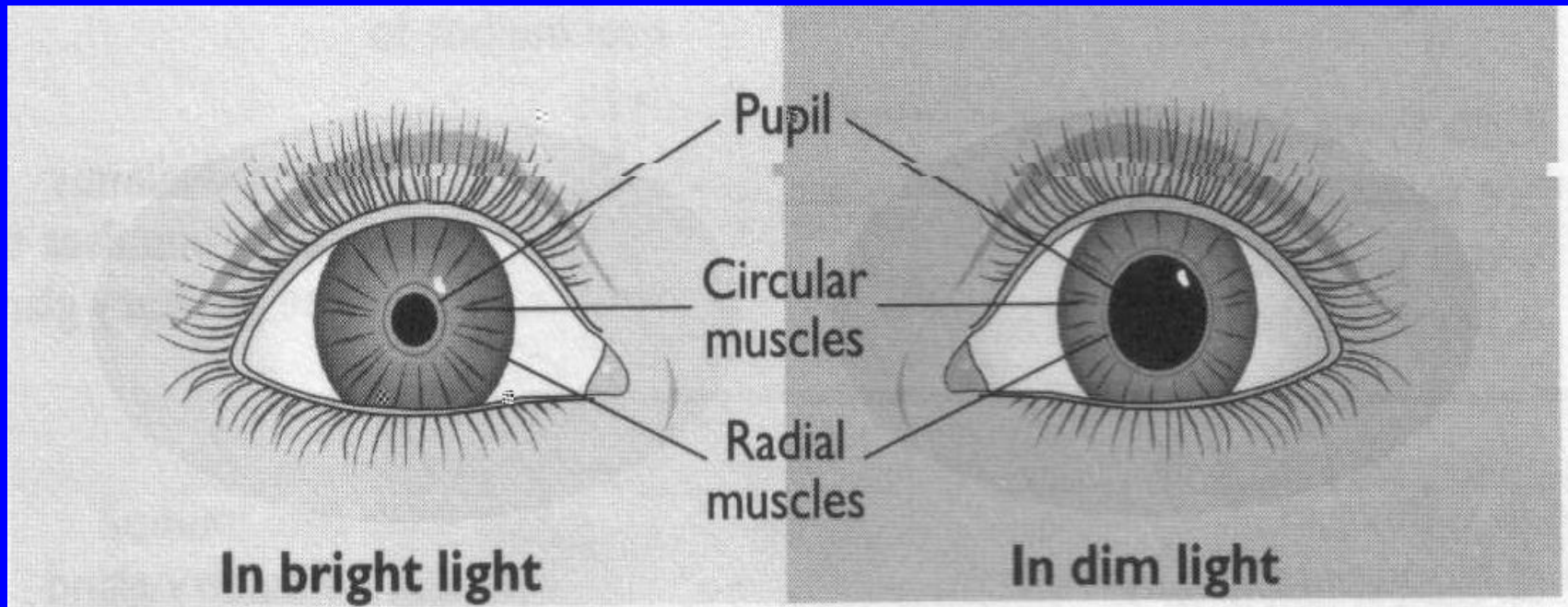
Muscle structure

Muscle contraction

# Section through a mammalian eyeball



# Reflex Action and *Antagonistic Muscle Action*



Why is it important that the amount of light entering the eye is regulated?

Circular muscles contract

Radial muscles relax

Pupils *constricted*

Radial muscles contract

Circular muscles relax

Pupils *dilated*

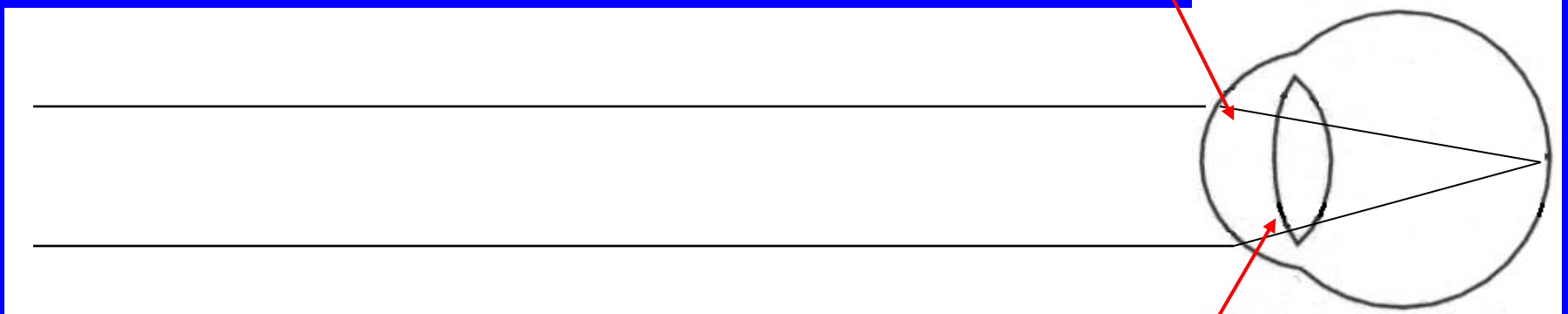
# Accommodation

Accommodation is the ability to focus objects which are at different distances from the eye.

Focusing occurs via refraction – the change in the speed of light as it passes from one medium into another. Most refraction occurs at the interface between air and the cornea. The lens refracts the light only slightly

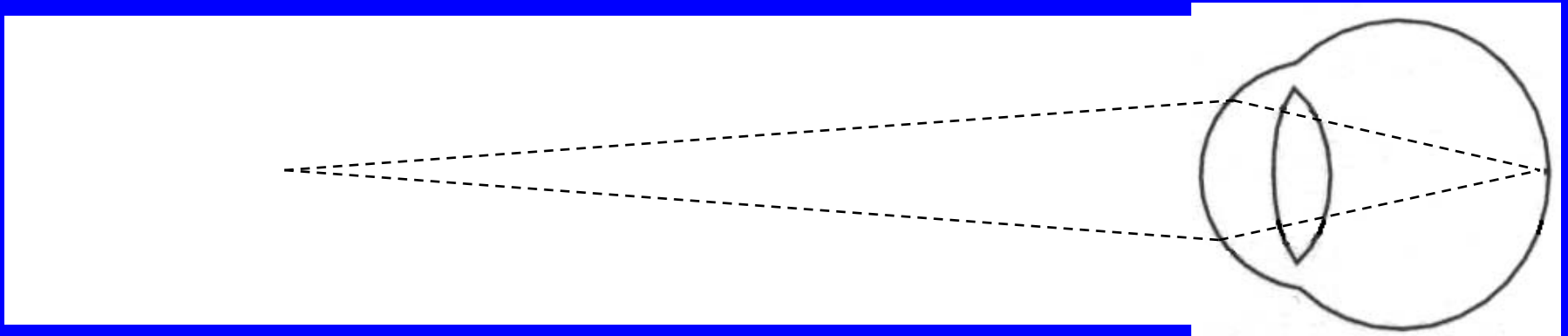
Most Refraction at air-cornea interface

Light from a distant object



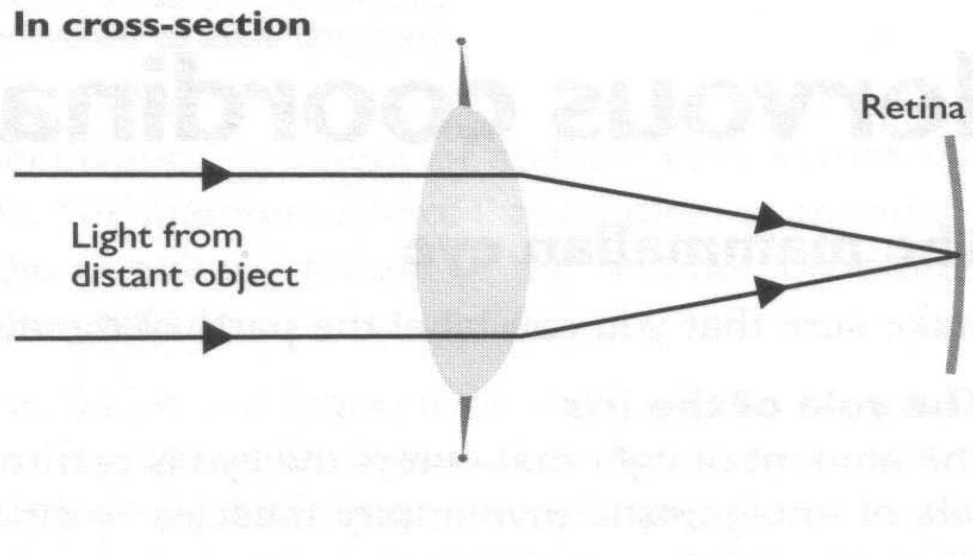
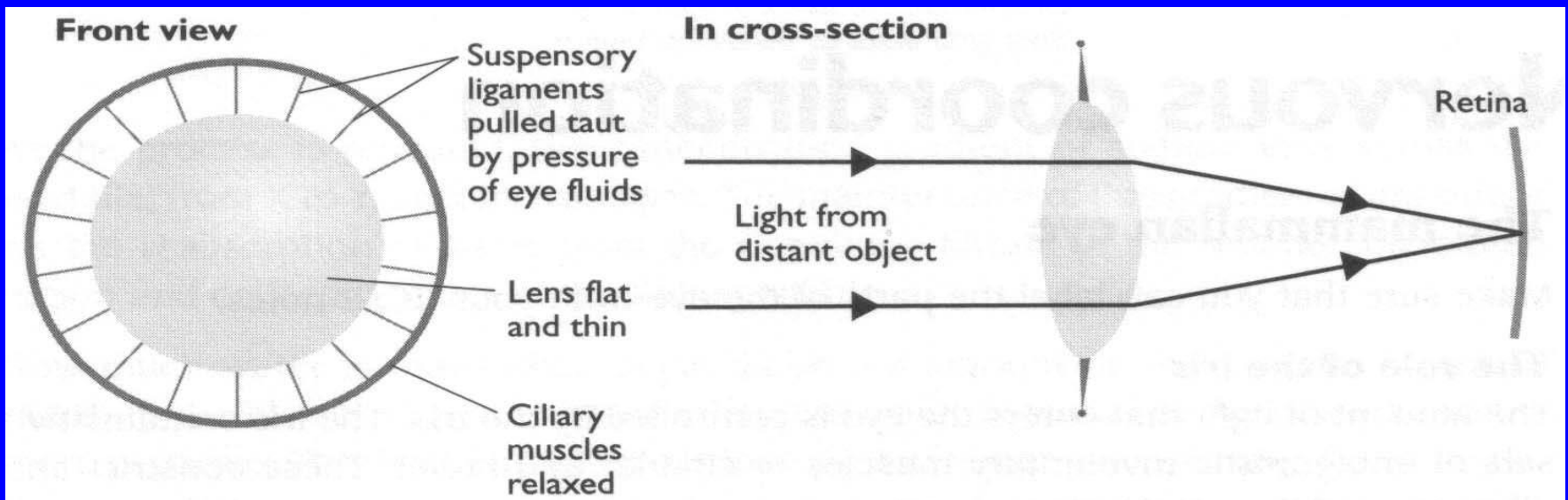
Limited refraction at aqueous humour-lens interface

# Light Rays from a near object

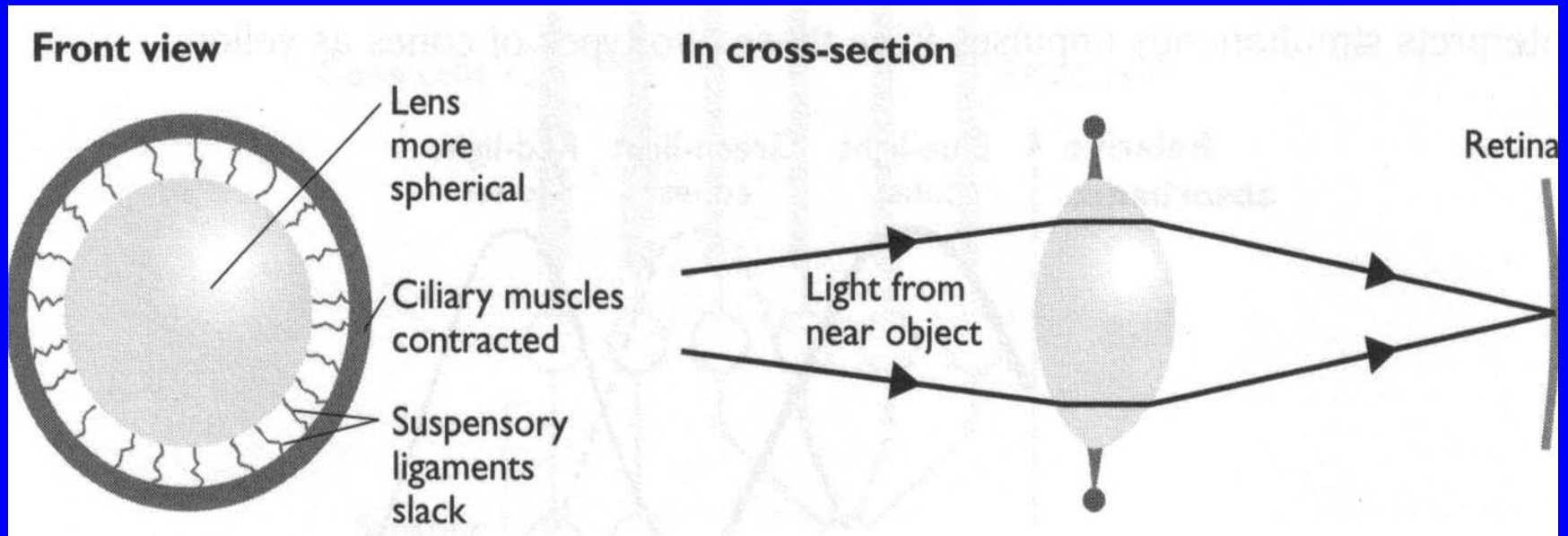


How does the eye alter the pathways of light rays?

Muscle action and lens shape in focusing distant objects:



## Muscle action and lens shape in focusing near objects:



- Cornea refracts most light
- Lens is elastic and changes its shape, altering the degree to which the light is refracted.
- Ciliary muscles and suspensory ligaments bring about the change in shape of the lens
- As we age the elasticity of the lens decreases