

HSC Biology

Communication

Focus 2:

 Visual communication involves the eye registering changes in the immediate environment.

Describe the anatomy and function of the human eye, including the:

- Conjunctiva.
- Cornea.
- Sclera.
- Choroid.
- Retina.
- Iris.
- Lens.
- Aqueous and vitreous humour.
- Ciliary body.
- Optic nerve.

Structure	Anatomy & Function
<i>Conjunctiva</i>	Continuation of epidermis of skin. Protects eye cornea against friction.
<i>Cornea</i>	Transparent to admit light. Refracts light to assist in forming image on retina.
<i>Sclera</i>	White, tough outer coat of eye. Maintains shape of eye, protects against mechanical damage.
<i>Choroid</i>	Membrane containing pigment & blood vessels. Nourishes retina, prevents internal reflection.
<i>Retina</i>	Detects light, contains light sensitive cells connected to sensory neurones.
<i>Iris</i>	Pigmented, muscular structure. Contracts & dilates to alter amount of light entering the eye.
<i>Lens</i>	Flexible, transparent structure. Allows light to enter the rear of the eye, refracts light to finely focus image onto retina.

<i>Aqueous humor</i>	Watery fluid maintaining shape of eye.
<i>Vitreous humor</i>	Jelly like fluid maintaining shape of eye.
<i>Ciliary body</i>	Muscles which support & alter shape of lens.
<i>Optic nerve</i>	Bundles of sensory neurones that transmit impulses to brain.

Identify the limited range of wavelengths of the electromagnetic spectrum detected by humans and Compare this range with those of other vertebrates and invertebrates.

- Electromagnetic spectrum:
 - Ordered series of all known types of electromagnetic radiation.
 - Arranged by wavelength; from lowest frequency to highest.

Type of Animal	Animal	Vision Capabilities	Wavelengths Detected
<i>Vertebrate</i>	Human	Visible spectrum. - ROYGBIV.	750-380nm
	Rattlesnake	Infra-red & visible.	850-480nm
	Japanese dace fish	U.V. & visible.	As low as 360nm
<i>Invertebrate</i>	Honeybee	U.V. & visible.	700-300nm
	Mantis shrimp	U.V. & visible.	640-400nm

Plan, Choose Equipment or resources and Perform a first-hand investigation of a mammalian eye to Gather first-hand data to relate structures to functions.

- Dissection of a mammalian eye:
 - *Wear rubber gloves to prevent infection.
 - Observe eye ball, taking note of important features, structures & texture.
 - Cornea.
 - Sclera.
 - Optic nerve.
 - Trim away fat.
 - Roll in hands to soften.
 - Use a scalpel to cut a slit in top.
 - Remove vitreous humor.
 - Observe insides.
 - Retina.
 - Cornea.
 - Lens.
 - Sclera (toughness).
 - Vitreous humor.
 - Aqueous humor.

Use Available Evidence to suggest reasons for the differences in range of electromagnetic radiation detected by humans and other animals.

Type of Animal	Animal	Vision Capabilities	Reasons
<i>Vertebrate</i>	Human	Visible spectrum. - ROYGBIV.	<ul style="list-style-type: none"> - Active during the day. - Colour required for perception of objects. - Humans most effectively detect blue green (500nm).
	Rattlesnake	Infra-red & visible.	<ul style="list-style-type: none"> - Active at night. - Hunts in dark burrows. - Living things emit heat. - Infrared vision detects this.
	Hummingbird	Visible.	<ul style="list-style-type: none"> - Detect flowers over 1Km away.
<i>Invertebrate</i>	Honeybee	U.V. & visible.	<ul style="list-style-type: none"> - Detects U.V. markings on flowers. - Patterns on flowers guide to pollen. - Uses polarised light for navigation.
	Mantis shrimp	U.V. & visible.	<ul style="list-style-type: none"> - Can perceive many more colours & escape predation.