



AMAZING ANATOMIES

By the end of Year 8 or Stage 4, students are able to understand that multi-cellular organisms contain systems of organs carrying out specialised functions that enable them to survive and reproduce.

A visit to Currumbin Wildlife Sanctuary provides a holistic experience where the curriculum area is presented using real world examples and encounters, creating a meaningful teaching and learning experience.

By combining the knowledge from one of our experienced Education Officers, with the experience of “seeing” the curriculum, students will become engaged in the topic area.

YEAR LEVEL: Year 8, Stage 4

DESCRIPTION: Did you know that wombat poo is square and the digestive system of the Koala is two metres in length? Have you ever thought about how an eel breathes on the land? Animals have amazingly diverse anatomies and there is so many unique and different systems. Currumbin Wildlife Sanctuary has many interesting animals on display, from egg-laying monotremes to marsupials that can put their pregnancy ‘on embryonic diapause’. This lesson touches on the differences between several types of anatomies in the animals students will meet.

EXCURSION FORMAT: This excursion provides a mix of self-guided activities as well as a lesson presented by one of our educators. Students will learn about physiology, strategies and adaptations that assist with digestion, respiration and digestion as they embark upon a learning journey to complete the provided work sheet (optional), as well as meet and interact with some of our resident animals.

AUSTRALIAN CURRICULUM LINKS:

YEAR 8: ACSSU150; ACSIS124; ACSIS139; SC4-14LW

ACTIVITIES



BEFORE YOUR VISIT:

Divide the class into groups of three. Assign each group with one of the animals on display at Currumbin Wildlife Sanctuary (see our suggested list best suited for this particular topic below). Assign as many animals from the list as possible so the groups can report back and the whole class can learn about as many animals as possible –

Koala
Wedge-tailed Eagle
Spiny Leaf Insect
Eastern Grey Kangaroo
Dingo

Common Wombat
Magnificent Green Tree Frog
Coastal Carpet Python
Short Beaked Echidna
Ghost Bat



Have one person in each group research one of the following three body systems for their assigned group animal. Spend 15 minutes doing a Google research to write one paragraph about each body system for each animal. Also, provide definitions for any new terms that you come across –

- Digestive System
- Respiratory System
- Reproductive System

Groups report back to the class.

DURING YOUR VISIT – SELF GUIDED:

In small groups (with an adult), have students complete the work sheet, 'Amazing Animal Anatomies', to discover the interesting ways some of our animals 'poo, eat, breathe and mate'! This worksheet covers multiple topics and is sectioned by park locations. Teachers can adapt this worksheet to suit their specific topic focus, if required.

WILDLIFE DISCOVERY EXPERIENCE – LESSON – OPTIONAL

Our Education Officer will introduce your students to three various animals focusing on their respective digestive, respiratory and reproductive systems*. Animals may include Barking Owl or parrot, echidna, Spiny Leaf Insect or frog.

Students will be able to have a close look at these animals, while our Education Officers discuss and point out a few of their key adaptations that assist them with digestion, respiration and reproduction.

Students will also have the opportunity to investigate herbivore poo and owl casts! (Unless teacher indicates no digestion topic required)

Students will have time to ask questions of our Education Officers (it would be great if questions could be prepared beforehand).

*Please inform us during initial booking if you have one specific topic focus

AFTER YOUR VISIT:

Individually, have students research and present the organs and overall function of a system of one animal they observed at Currumbin Wildlife Sanctuary.



DETAILED AUSTRALIAN CURRICULUM LINKS

Australian Curriculum links:		Elaborations:
Year 8 Biological Sciences ACSSU150	Multi-cellular organisms contain systems of organs carrying out specialised functions that enable them to survive and reproduce	<ul style="list-style-type: none">Identifying the organs and overall function of a system of a multicellular organism in supporting the life processesdescribing the structure of each organ in a system and relating its function to the overall function of the systemexamining the specialised cells and tissues involved in structure and function of particular organscomparing similar systems in different organisms such as digestive systems in herbivores and carnivores, respiratory systems in fish and mammalsdistinguishing between asexual and sexual reproductioncomparing reproductive systems of organisms
Science Inquiry Skills ACSIS124	Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge	<ul style="list-style-type: none">working collaboratively to identify a problem to investigaterecognising that the solution of some questions and problems requires consideration of social, cultural, economic or moral aspects rather than or as well as scientific investigationusing information and knowledge from previous investigations to predict the expected results from an investigation
Science Inquiry Skills ACSIS139	Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge	<ul style="list-style-type: none">considering whether investigation using available resources is possible when identifying questions or problems to investigaterecognising that the solution of some questions and problems requires consideration of social, cultural, economic or moral aspects rather than or as well as scientific investigationusing information and knowledge from their own investigations and secondary sources to predict the expected results from an investigation



NSW Syllabus links:	Outcomes:	Content:
<p>Stage 4 SC4-14LW</p>	<p>A student relates the structure and function of living things to their classification, survival and reproduction</p>	<p>Multi-cellular organisms contain systems of organs carrying out specialised functions that enable them to survive and reproduce (ACSSU150)</p> <p>LW3 Multicellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce.</p> <p>Students:</p> <ol style="list-style-type: none"> a. identify the materials required by multicellular organisms for the processes of respiration and photosynthesis b. explain that the systems in multicellular organisms work together to provide cell requirements, including gases, nutrients and water, and to remove cell wastes c. outline the role of cell division in growth, repair and reproduction in multicellular organisms d. describe the role of the flower, root, stem and leaf in maintaining flowering plants as functioning organisms e. describe the role of the digestive, circulatory, excretory, skeletal/muscular and respiratory systems in maintaining a human as a functioning multicellular organism f. outline the role of the reproductive system in humans



GLOSSARY AND HELPFUL LINKS

Helpful video resources:

Digestive system –

How your digestive system works - Emma Bryce (Ted Ed video - **Human** digestive system) -

<https://www.youtube.com/watch?v=Og5xAdC8EUI>

Ruminants - Natural Science - Antonio Almudi

<https://www.youtube.com/watch?v=vhWpTcFqz6o>

Respiratory system –

Fish Out of Water (virtual lab tank) -

<http://www.scootle.edu.au/ec/viewing/L23/index.html>

How temperature affects the rate of respiration (interactive simulation) -

<http://www.scootle.edu.au/ec/viewing/R11940/index.html>

Reproductive system –

The three different ways mammals give birth - Kate Slabosky (Ted Ed video) -

<https://www.youtube.com/watch?v=sz3Yv3On4IE>

The evolution of animal genitalia - Menno Schilthuizen (entertaining Ted Ed video, **possibly for teachers only!**)

<https://www.youtube.com/watch?v=vcPJkz-D5II>

Teacher resource:

<http://minerva.union.edu/linthicw/endo.htm>

	Endothermic	Ectothermic
Homeothermic	Mostly birds and mammals, although the tuna and some other large fish come close.	Some tropical reptiles and possibly dinosaurs come close; of course, this box should include organisms occurring deep in the ocean or even in deep lakes.
Poikilothermic	Some birds and mammals (those that allow their body temperature to vary during certain time periods) as well as <u>many insects</u> and some other invertebrates.	Most fish, amphibians, and reptiles as well as most invertebrates.

**Glossary of terms:**

What is a digestive system? The organs that have as their particular function in the ingestion, digestion and absorption of food or nutritive elements.

What is a monogastric animal? Having only one digestive cavity.

What is a ruminant animal? An animal that has a stomach with four complete cavities, and that characteristically regurgitates undigested food from the rumen (fore stomach) and masticates it when at rest.

What is a Psuedo-ruminant animal? An animal that has a stomach with three cavities. They have an enlarged cecum (cavity in the large intestine) that allows them to digest fibrous materials. Also called 'hind-gut fermenters' or 'fore-gut fermenters'.

What is a carnivore? An animal or plant (particularly [insect](#) and [invertebrate](#)-eating plants) that requires a staple diet consisting mainly or exclusively of animal [tissue](#) through [predation](#) or [scavenging](#).

What is a herbivore? An [animal](#) that consumes [herbaceous vegetation](#).

What is an omnivore? An animal that includes both plants and animals in its normal diet.

What is an insectivore? A type of [carnivore](#) that primarily or exclusively eats [insects](#) and other similar [invertebrates](#).

What is a crop? A secular diverticulum (cavity or passage) of the oesophagus just anterior to the entrance to the thorax (chest). Present in all birds. An organ in the 'avian digestive system'.

What is a (bird) gizzard? The [second](#), or true, [muscular stomach](#) of [birds](#), in which the [food](#) is crushed and [ground](#), after being softened in the [glandular stomach](#) (crop), or lower part of the oesophagus; the [gigerium](#). An organ in the 'avian digestive system'.

What is uric acid or urates? An insoluble precipitate of nitrogenous waste excreted by land snails, insects, birds, and some reptiles.

What is faeces? The waste material eliminated by the gastrointestinal tract.

What is a cast or pellet? Indigestible cast or pellet of bones, claws, beaks, fur and feathers produced the gizzard of birds or prey and some other carnivorous animals.

What is a respiratory system? The structures and passages involved with the intake, expulsion, and exchange of oxygen and carbon dioxide in the vertebrate body.

What is permeable skin? Capable of being permeated or passed through, used especially of substances where fluids can penetrate or pass through.

What is an air sac? Thin-walled [sacs](#) or [spaces](#) which [function](#) as a part of the [respiratory system](#) in [birds](#), [fishes](#), [insects](#), and [mammals](#).

What is a tracheal breathing system? A gas exchange system of branched, chitin-lined tubes that infiltrate the body and carry oxygen directly to cells in insects.

What are spiracles? [L. *spirare*, to breathe] One of the external openings of the respiratory system in terrestrial arthropods.

What is ectothermic? [Gk. *ecto*, outside + *therme*, heat] An animal such as a reptile, fish, or amphibian, that must use environmental energy and behavioral adaptations to regulate its body temperature.



What is endothermic? (**en-doh-thurm**) [Gk. *endon*, within + *therme*, heat] An animal that uses metabolic energy to maintain a constant body temperature, such as a bird or mammal.

What is a Poikilotherm? An animal whose body temperature adjusts depending on the environment (see also teacher resource).

What is a Homeotherm? An animal that has a constant body temperature (see also teacher resource).

What is hibernation? [L. *hiberna*, winter] A physiological state that allows survival during long periods of cold temperatures and reduced food supplies, in which metabolism decreases, the heart and respiratory system slow down, and body temperature is maintained at a lower level than normal. For example, a bear experiences voluntary 'deep sleep' driven by cold weather.

What is brumation? A state or condition of sluggishness, inactivity, or torpor exhibited by reptiles during winter or extended periods of low temperature.

What is torpor? In animals, a physiological state that conserves energy by slowing down the heart and respiratory systems. For example, some mammals experience involuntary 'light sleep' driven by ambient (surrounding) temperature e.g. echidna.

What is a reproductive system? An [organ system](#) that functions primarily for the purpose of [reproduction](#), and is comprised of [sex organs](#).

What is sexual reproduction? A type of reproduction in which two parents give rise to offspring that have unique combinations of genes inherited from the gametes of the two parents.

What is asexual reproduction? A type of reproduction involving only one parent that produces genetically identical offspring by budding or by the division of a single cell or the entire organism into two or more parts.

What is parthenogenesis? (**par-then-oh-jen-eh-sis**) [Gk. *parthenon*, virgin + *genesis*, birth]
A type of (asexual) reproduction in which females produce offspring from unfertilized eggs.

What is internal fertilisation? Internal fertilisation is a method of sexual reproduction in which the male gametes are introduced inside the female reproductive organism, as opposed to external fertilisation.

What is external fertilisation? The union of male and female gametes (male and female reproductive cells) outside the bodies from which they originated, such as frogs and most fish.

What is a marsupial? (**mar-soop-ee-ul**) [Gk. *marsypos*, pouch, little bag]

A mammal, such as a Koala, kangaroo, or possum, whose young complete their embryonic development inside a maternal pouch called the marsupium.

What is embryonic diapause? A state of inactivity and arrested development accompanied by greatly reduced metabolism, as in many egg, insect pupae and plant seeds. It is a mechanism for surviving adverse weather conditions.

What is a monotreme? [Gk. *monos*, single + *trema*, hole] An egg-laying mammal, represented by the Platypus and echidna.

What is a placental mammal? A member of a group of mammals, including humans, whose young complete their embryonic development in the uterus, joined to the mother by a placenta.