



## EVOLUTION REVOLUTION — WALK AND TALK

By the end of Year 10, students are able to understand that the theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence.

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 10, Stage 5

DESCRIPTION: Get lost in ‘Lost Valley’ and discover how these animals have evolved over time as your Education Officer guides your class on an exclusive Wildlife Discovery Tour. Go back in time, back to the formation of Gondwana when dinosaurs ruled the earth, and many of the major animal groups we know today began their evolution journey. Continue the journey with your class and learn more about our unique Australian animals from mega three tonne wombats to carnivorous kangaroos! Curious and curiouser! Students will also discuss sustainability.

EXCURSION FORMAT: This excursion provides a mix of self-guided activities as well as an exclusive **educational tour\*** guided by one of our educators. Students will have the opportunity to observe adaptations in action and discover how each of these animals has evolved over time as they embark upon a guided tour with one of our educators. Students will continue the evolution journey with their teacher as they complete the provided work sheet (optional).

**\* Please confirm four animals for tour during initial booking (Green Iguana OR Goodfellow’s Tree Kangaroo option - see p.g. 4). Please note: there is no direct animal interaction included in this presentation however students will observe animals interacting with enrichment (food and/or toy items).**

AUSTRALIAN CURRICULUM LINKS:

YEAR 10: ACSSU185; ACSSU189; ACSHE191; ACHGKO70; SC5-15LW; GE5-5



## ACTIVITIES



### BEFORE YOUR VISIT:

As a class, watch the suggested video to study the similarities between Chimpanzees and humans.

<https://www.smithsonianmag.com/science-nature/thinking-like-a-chimpanzee-55484749/>

As a class, discuss the following -

How do Chimpanzees communicate? How is this similar to humans?

What kinds of tools do Chimpanzees use and what for? Discuss similar human tools.

How do Chimpanzees learn how to use tools? How do humans learn how to use tools?

How does their method of movement differ to humans?

In pairs, research the diet of the Chimpanzee. Spend 15 minutes doing a Google research to write a paragraph. Also, discuss how this diet compares to a human diet.

Various evolution and adaptation activities by Arkive -

Biodiversity and Evolution - Darwin's Finches

Darwin and Natural Selection

Evolution and Adaptation

Primate Evolution - Family Ties

<http://www.arkive.org/education/teaching-resources-14-16>

Using geological change and evolution -

<http://www.scottle.edu.au/ec/viewing/R10546/index.html>

Various evolution videos by ABC -

<http://education.abc.net.au>

### DURING YOUR VISIT — SELF GUIDED:

In small groups, have students complete the work sheet, 'Evolution Revolution', to discover how some animals have evolved over time.

### WILDLIFE DISCOVERY EXPERIENCE — LESSON — OPTIONAL — GUIDED TOUR

The guided tour will be conducted by an Education Officer and visit the following four animals in 30 minutes:

Animals include: Southern Cassowary, Green Iguana or Goodfellow's Tree Kangaroo, Cotto-top Tamarin and Ring Tailed Lemur



Students will conduct observations of each of these animals engaging with enrichment (food and/or toy items) and be introduced to information about each of these animals including adaptations. Students will observe adaptations in action and discover how each of these animals has evolved over time.

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

\* Please confirm iguana OR tree roo option during initial booking. Please note: there is no direct animal interaction included in this presentation however students will observe animals interacting with enrichment (food and/or toy items).

## AFTER YOUR VISIT:

In pairs, assign each group with one of the Australian animals from our suggested list best suited for this particular topic below. Assign as many animals from the list as possible so the pairs can report back and the whole class can learn about as many animals as possible –

Animal include: Koala, Kangaroo, Dingo, Emu, Crocodile, Wombat, Echidna, Platypus, Little Penguin, Tasmanian Devil

Have each student in each pair research their animal's adaptations and how they have evolved over time. Spend 15 minutes doing a Google research and taking notes.

Students report back to their pair, collate information and write a paragraph.

Pairs report back to the class.

How can we protect our amazing biodiversity?

As a class, discuss simple achievable actions that students can undertake to minimise the effect of human activities e.g. introduced species > responsible pet ownership and deforestation > planting a wildlife friendly habitat in your backyard and constructing and erecting a nest box in your backyard.



## GLOSSARY

What is evolution? (1) The change in genetic composition of a population over successive generations, which may be caused by natural selection, inbreeding, hybridisation, or mutation.

(2) The sequence of events depicting the development of a species or of a group of related organisms; phylogeny.

What is natural selection? A process in nature in which organisms possessing certain genotypic characteristics that make them better adjusted to an environment tend to survive, reproduce, increase in number or frequency, and therefore, are able to transmit and perpetuate their essential genotypic qualities to succeeding generations.

What is variation? A difference or deviation (e.g. in structure, form, function) from the recognised norm or standard

(genetics) Genetic differences within and among species or a population

(genetics) A variant or a mutant.

What is isolation? Any procedure in which a given species of organism, present in a particular sample or environment, is obtained in pure culture.

What is biodiversity? The existence of a wide range of different types of organisms in a given place at a given time. The diversity of plant and animal life in a particular habitat (or in the world as a whole); a high level of biodiversity is desirable. Pertaining to the diversity and frequency of organisms in a given area.

What is artificial selection? More commonly known as selective Breeding, where professionals study the genotype and phenotype of parent organisms in the hope of producing a hybrid that possesses many of the desirable characteristics found in their parents.

What is genetics? (1) The study of the patterns of inheritance of specific traits, relating to genes and genetic information

(2) Heredity

What is fossil record? The totality of fossilised artefacts and their placement within the earth's rock strata. It provides information about the history of life on earth, for instance what the organisms look like, where and when they live, how they evolved, etc.

What is an adaptation? The adjustment or changes in behaviour, physiology, and structure of an organism to become more suited to an environment.



# DETAILED AUSTRALIAN CURRICULUM LINKS



Australian Curriculum links:		Elaborations:
<p><b>Year 10</b> <b>Biological Sciences</b> ACSSU185</p>	<p>The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence</p>	<ul style="list-style-type: none"> <li>• outlining processes involved in natural selection including variation, isolation and selection</li> <li>• describing biodiversity as a function of evolution</li> <li>• investigating changes caused by natural selection in a particular population as a result of a specified selection pressure such as artificial selection in breeding for desired characteristics</li> <li>• relating genetic characteristics to survival and reproductive rates</li> <li>• evaluating and interpreting evidence for evolution, including the fossil record, chemical and anatomical similarities, and geographical distribution of species</li> </ul>
<p>ACSSU189</p>	<p>Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere.</p>	<ul style="list-style-type: none"> <li>• investigating how human activity affects global systems</li> <li>• modelling a cycle, such as the water, carbon, nitrogen or phosphorus cycle within the biosphere</li> <li>• explaining the causes and effects of the greenhouse effect</li> <li>• investigating the effect of climate change on sea levels and biodiversity</li> <li>• considering the long-term effects of loss of biodiversity</li> <li>• investigating currently occurring changes to permafrost and sea ice and the impacts of these changes</li> <li>• examining the factors that drive the deep ocean currents, their role in regulating global climate, and their effects on marine life</li> </ul>
<p><b>Science as a Human Endeavour</b> ACSHE191</p>	<p>Scientific understanding, including models and theories, is contestable and is refined over time through a process of review by the scientific community</p>	<ul style="list-style-type: none"> <li>• considering the role of different sources of evidence including biochemical, anatomical and fossil evidence for evolution by natural selection</li> <li>• investigating the development of the Watson and Crick double helix model for the structure of DNA</li> <li>• investigating the history and impact of developments in genetic knowledge</li> <li>• investigating the development of the periodic table and how this was dependent on experimental evidence at the time</li> <li>• considering the role of science in identifying and explaining the causes of climate change</li> <li>• recognising that Australian scientists such as Brian Schmidt and Penny Sackett are involved in the exploration and study of the universe</li> </ul>
<p><b>Year 10</b> <b>Geography</b> ACHGKO70</p>	<p>Human-induced environmental changes that challenge sustainability</p>	<ul style="list-style-type: none"> <li>• discussing the concept of sustainability in relation to environmental functions</li> <li>• identifying human-induced environmental changes (for example, water and atmospheric pollution; loss of biodiversity; degradation of land, inland and coastal aquatic environments) and discussing the challenges</li> </ul>



		<p>they pose for sustainability</p> <ul style="list-style-type: none"> <li>evaluating the concept of ecosystem services and the importance of these services for sustainability of biodiversity.</li> </ul>
<b>NSW Syllabus links:</b>	<b>Outcomes:</b>	<b>Content:</b>
<p><b>Stage 5 Biological Sciences</b> SC5-15LW</p>	<p>A student explains how biological understanding has advanced through scientific discoveries, technological developments and the needs of society</p>	<p>LW4 The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence.</p> <p>Students:</p> <ol style="list-style-type: none"> <li>describe scientific evidence that present-day organisms have evolved from organisms in the past</li> <li>relate the fossil record to the age of the Earth and the time over which life has been evolving</li> <li>explain, using examples, how natural selection relates to changes in a population, e.g. in the development of resistance of bacteria to antibiotics and insects to pesticides</li> <li>outline the roles of genes and environmental factors in the survival of organisms in a population</li> </ol> <p><b>Environmental change</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>investigate human-induced environmental changes across a range of scales, for example:</li> <li>brief examination of types, and extent, of environmental change.</li> </ul>
<p><b>Geography</b> GE5-5</p>	<p>Assesses management strategies for places and environments for their sustainability</p>	