

CLASSIFICATION OF LIVING THINGS

TEACHER RESOURCE

Stage 4: Science

Outcomes: SC4-CLS-01, SC4-WS-01, SC4-WS-04, SC4-WS-08



Classification is a practice that allows humans to have a better understanding of the world around them. While biologists mainly associate this with putting living things into groups based on their features, it is used in many other branches of science and other aspects of our life. Learning to group things into categories is an important skill as it allows us to gain a better understanding of the world around us.

Studying classification at Taronga will allow students to draw connections between structures and functions of different animals that determine how scientists have classified them throughout history. Through keen observation, students can discover some amazing adaptations that give wildlife the edge for survival in their natural environment.

LINKS TO CURRICULUM

Outcome: SC4-CLS-01 describes the unique features of cells in living things and how structural features can be used to classify organisms

Content

- Describe the characteristics of living things
- Discuss the role and importance of classification in ordering and organising the diversity of life on Earth
- Classify species using scientific conventions from the binomial system of classification, including kingdom, phylum, class, order, family, genus and species
- Conduct an investigation to observe and identify the similarities and differences of structural features within and between groups of organisms
- Investigate how organisms in an Australian habitat are adapted to their environment and document findings in a written scientific report
- Interpret dichotomous keys to identify organisms surveyed in an Australian habitat
- Explain how plants and animals are classified in Aboriginal and Torres Strait Islander Cultures based on their uses, forms and function

CHARACTERISTICS OF LIVING THINGS

Describe the characteristics of living things

An organism must fulfil ALL seven characteristics of living things to be considered alive. The acronym MRS GREN is an easy way to remember the seven characteristics of living things; **M**ovement, **R**espiration, **S**ensitivity, **G**rowth **R**eproduction, **E**xcretion and **N**utrition.

ACTIVITY - Choose one animal and describe how it demonstrates each of the characteristics of living things.

Name of chosen animal: _____

Characteristic (MRS GREN)	Observations (What did you observe the animal doing?)
<p>Move</p> <p>The entire organism or its parts can move</p>	
<p>Respiration</p> <p>Using Oxygen to extract energy from food</p>	
<p>Sensitivity</p> <p>Sense and respond to changes around them</p>	
<p>Grow</p> <p>Grow larger and develop</p>	
<p>Reproduction</p> <p>Reproduce to make more of their kind</p>	
<p>Excretion</p> <p>Removal of waste including faeces, urine and gases</p>	
<p>Nutrition</p> <p>Take in nutrients from food and water</p>	

Respiration is not Breathing!
Breathing is taking in air; respiration is using oxygen to release energy from food.



Living things must do **ALL SEVEN** MRS GREN characteristics to be alive



CLASSIFICATION OF LIVING THINGS

Discuss the role and importance of classification in ordering and organising the diversity of life on Earth. Classify species using scientific conventions from the binomial system of classification, including kingdom, phylum, class, order, family, genus and species.

WHAT IS CLASSIFICATION?

There are millions of different living things on Earth. Without a way to organise them, studying life would be very difficult. That is why scientists use a system called classification to group organisms based on their similar characteristics.

WHY CLASSIFY?

Classification is more than just naming things; it helps scientists communicate clearly, especially when studying species in different parts of the world. Classification also reveals relationships between species including common ancestors.

AVOIDING CONFUSION

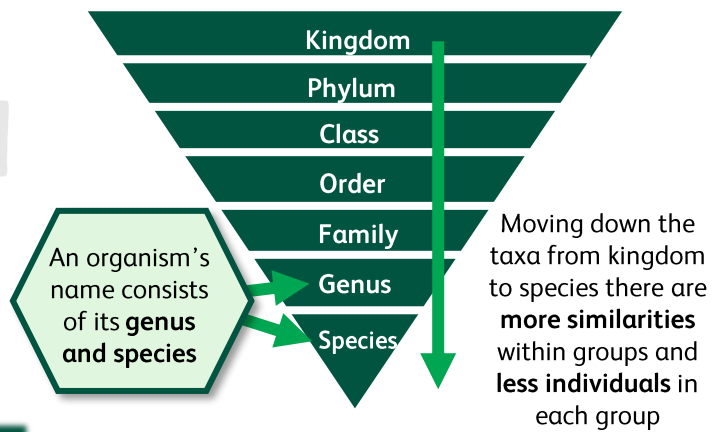


The short-beaked echidna in Australia is the same species sometimes called the 'spiny anteater' in other countries. Its scientific name, *Tachyglossus aculeatus*, prevents confusion.

Classification is important in medicine, farming, and environmental science. It allows scientists to identify useful traits, predict how living things might behave, and recognise the role each species plays in the environment.

LINNEAN SYSTEM OF CLASSIFICATION

The Linnean system of classification was developed in the 18th century by Carl Linnaeus. The system arranges life into hierarchical ranked groups called taxa including kingdom, phylum, class, order, family, genus, and species.



DINGO CLASSIFICATION

- Kingdom Animalia
- Phylum Chordata
- Class Mammalia
- Order Carnivora
- Family Canidae
- Genus Canis
- Species lupus



Therefore, the Dingoes' scientific name is *Canis lupus*

ACTIVITY - Mnemonics are a simple and effective memory tool to help remember the names and order of taxa (levels) in the Linnean classification system. Using the first letter of each taxa, create a sentence or rhyme.

For example; **K**ing **P**hillip **C**omes **O**ver **F**or **G**reat **S**paghetti



Kingdom	Phylum	Class	Order	Family	Genus	Species

COMPARING STRUCTURAL FEATURES BETWEEN GROUPS OF ORGANISMS

Conduct an investigation to observe and identify the similarities and differences of structural features within and between groups of organisms

BODY COVERING

An animal's body covering is a multifaceted **structural adaptation** that assists with survival in their environment, reproduction and much more. As an observable feature, it can be a useful tool to assist us with classifying as similarities and differences are often easily identifiable.

Animals use their body covering for insulation, camouflage, protection, communication, identification, waterproofing, flight, as a sensory tool and much more.

BIRDS OF A FEATHER

All birds are covered in feathers, an important structural feature for insulation and, depending on the species, can also assist with camouflage, protection, communication, identification, waterproofing and flight.

DID YOU KNOW?

Lesser Sooty Owl feathers display countershading to camouflage them from below and above.



AMPHIBIANS

Amphibians have a thin layer of soft, moist skin that not only absorbs water but can take in oxygen.

MAMMALS

Fur or hair is a characteristic of mammals, even though it may not be as recognisable in some. In mammals, this type of body covering is useful for insulation by conserving heat, or it can be used to protect its body against heat. For example, a camel is a diurnal desert animal that benefits from the use of fur to keep sunlight off their skin.

DID YOU KNOW?

Marine mammals, such as dolphins and whales, do not have much fur so they use blubber to keep them warm.



FISH

Most fish have a body covering of scales that sit on top of their skin. They also have a slimy covering of mucus to assist them with swimming.

REPTILES

A reptile's skin is distinguishable as they are covered with scutes or scales. This is made up of keratin, the same as our hair and fingernails! Different to fish, these scales are part of the skin, not on top, and help to minimise water loss. Reptiles regularly shed the outer layer of their skin.

ACTIVITY - Identify the type of body covering of each class of vertebrate and describe how it helps that group of animals to survive in their environment.



	Fish	Amphibians	Reptiles	Birds	Mammals
Body Covering					
How it helps the animal to survive					

COMPARING STRUCTURAL FEATURES WITHIN GROUPS OF ORGANISMS

Conduct an investigation to observe and identify the similarities and differences of structural features within and between groups of organisms

ACTIVITY - Visit Taronga's Amphibian and Reptile Conservation Centre (ARC) and complete the cloze passage below

WORD BANK – eardrums, species, *Litoria*, limbs, Corroboree, webbing, visible, toe pads, pupils, *Pseudophryne*, smaller



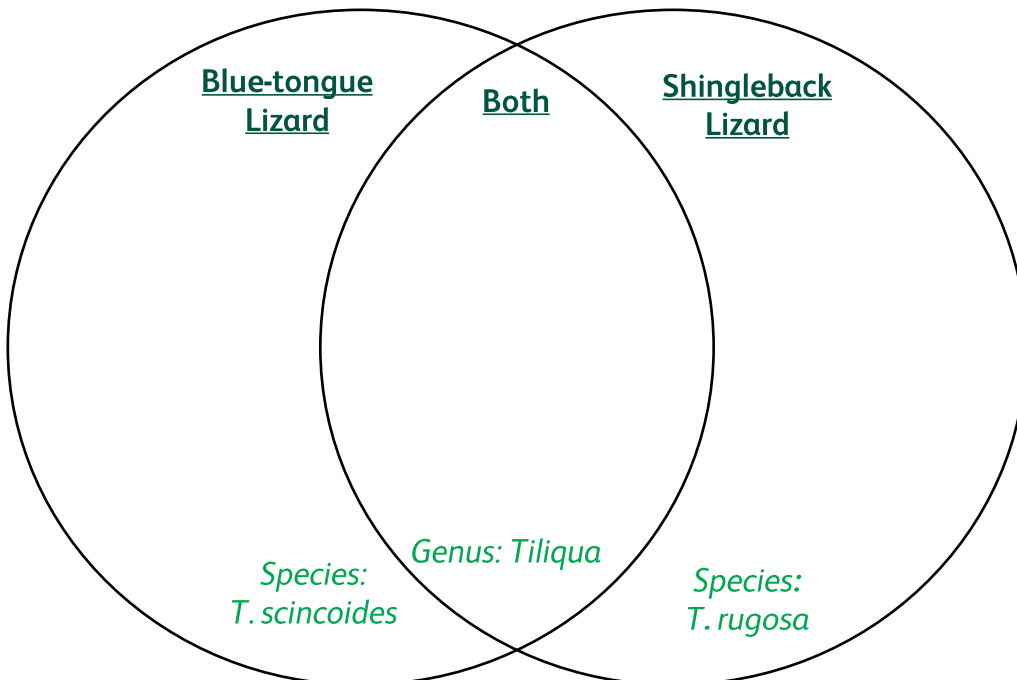
There are six different _____ of frogs at Taronga's ARC. Five of these species belong to the _____ genus. Frogs in this genus share several structural features in common including; some degree of _____ between their toes, adhesive _____, horizontal _____ and visible tympanums (external _____).



In comparison, the Southern _____ Frog belongs to the _____ genus. Frogs in this genus are _____ in size, have shorter _____, lack toe webbing and toe pads, and do not have _____ tympanums.

Eastern Blue-tongue Lizards and Shingleback Lizards belong to the same genus, *Tiliqua*.

ACTIVITY - Complete the Venn diagram below comparing the structural features of blue-tongue and shingleback lizards; e.g. appearance of scales, length and shape of tail, shape of head. Features they share in common should be written in the overlapping centre of the circles.



GOTTA CLASSIFY 'EM ALL!

Choose 8 animals that you have observed around the zoo and create trading cards for them on the following page. Draw a picture of the animal on the front and label its common name and scientific name. On the back of the corresponding card research the taxonomy of that species back at school from kingdom to species and add some structural and behavioural adaptations.

Follow the example below



Kingdom: Animalia

Phylum: Chordata

Class: Aves

Order: Pelecaniformes

Family: Threskiornithidae

Genus: Threskiornis

Species: molucca

Structural Adaptations:

Long beak foraging in wetland areas without having to submerge their nose

Behavioural Adaptations:

Live in large colonies often flying in groups in a 'V' formation to conserve their energy

BACK AT SCHOOL

After your visit to the zoo, complete your research classifying each animal from kingdom to species and identify at least one structural and behavioural adaptation.

Once complete, cut out each of your cards and work in a group of 4-6 to construct a key showing the relationship of the collection of animals from least related to most related.

PRINTING TIP**

To ensure the success of this activity please ensure that the following pages are printed back-to-back



Species:

Blank space for species name

Scientific Name:

Blank space for scientific name



Species:

Blank space for species name

Scientific Name:

Blank space for scientific name



Species:

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Scientific Name:

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Scientific Name:

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Species:

Blank space for species name

Scientific Name:

Blank space for scientific name



Kingdom: _____
Phylum: _____
Class: _____
Order: _____
Family: _____
Genus: _____
Species: _____

Structural Adaptations:

Behavioural Adaptations:

Kingdom: _____
Phylum: _____
Class: _____
Order: _____
Family: _____
Genus: _____
Species: _____

Structural Adaptations:

Behavioural Adaptations:

Kingdom: _____
Phylum: _____
Class: _____
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Species: _____

Structural Adaptations:

Behavioural Adaptations:

Kingdom: _____
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Species: _____

Structural Adaptations:

Behavioural Adaptations:

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Structural Adaptations:

Behavioural Adaptations:

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Structural Adaptations:

Behavioural Adaptations:

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Species: _____

Structural Adaptations:

Behavioural Adaptations:

Kingdom: _____
Phylum: _____
Class: _____
Order: _____
Family: _____
Genus: _____
Species: _____

Structural Adaptations:

Behavioural Adaptations:

ADAPTATIONS FOR SURVIVAL

Investigate how organisms in an Australian habitat are adapted to their environment and document findings in a written scientific report

ACTIVITY - Choose ONE animal (preferably from the cards completed in the previous activity) and further investigate its structural and behavioural adaptations that help it to survive in an Australian habitat by completing the table below.

Common name	Draw a <u>labelled</u> diagram of your chosen animal in its Australian habitat
Scientific name	
Type of habitat e.g. woodland, desert, rainforest	
Australian Habitat	
Describe the Australian habitat. Include climate, food sources, water sources/availability, types of vegetation, other animals, shelter etc.	
Structural Adaptations	
Describe any physical structure (part of the body) that supports the animal's survival in its environment.	
Explain how these structures help the animal to survive in its environment.	
Behavioural Adaptations	
Describe any behaviours or actions the animal does that supports its survival in its environment.	
Explain how these behaviours help the animal to survive in its environment.	



EXTENSION – Include in your report a physiological adaptation (function or internal process) of your chosen animal that supports its survival in an Australian habitat.



USING DICHOTOMOUS KEYS

Interpret dichotomous keys to identify organisms surveyed in an Australian habitat

ACTIVITY – Conduct a first-hand investigation to survey organisms in your local environment by performing a ‘Tree Shake’ and identifying invertebrates (animals **without** backbones).

AIM: To identify invertebrates in an Australian habitat.

EQUIPMENT

- 1 Invertebrate dichotomous key
- 1 White sheet or tray
- 1 Clear jar
- 1 Small paint brush
- 1 Magnifying glass

METHOD:

1. Choose a small tree or low branch.
2. Place a white sheet or tray under the chosen tree.
3. Gently shake the tree.
4. Use a small paint brush to gently move the invertebrates into a clear jar.
5. Observe the invertebrate using the magnifying glass.
6. Record a description of each invertebrate's features and a tally of the number of each invertebrate in your result table.
7. Release the invertebrates back to the tree where they were found.



SAFTEY

Avoid directly handling the invertebrates with your hands as some may bite or sting.

RESULTS:

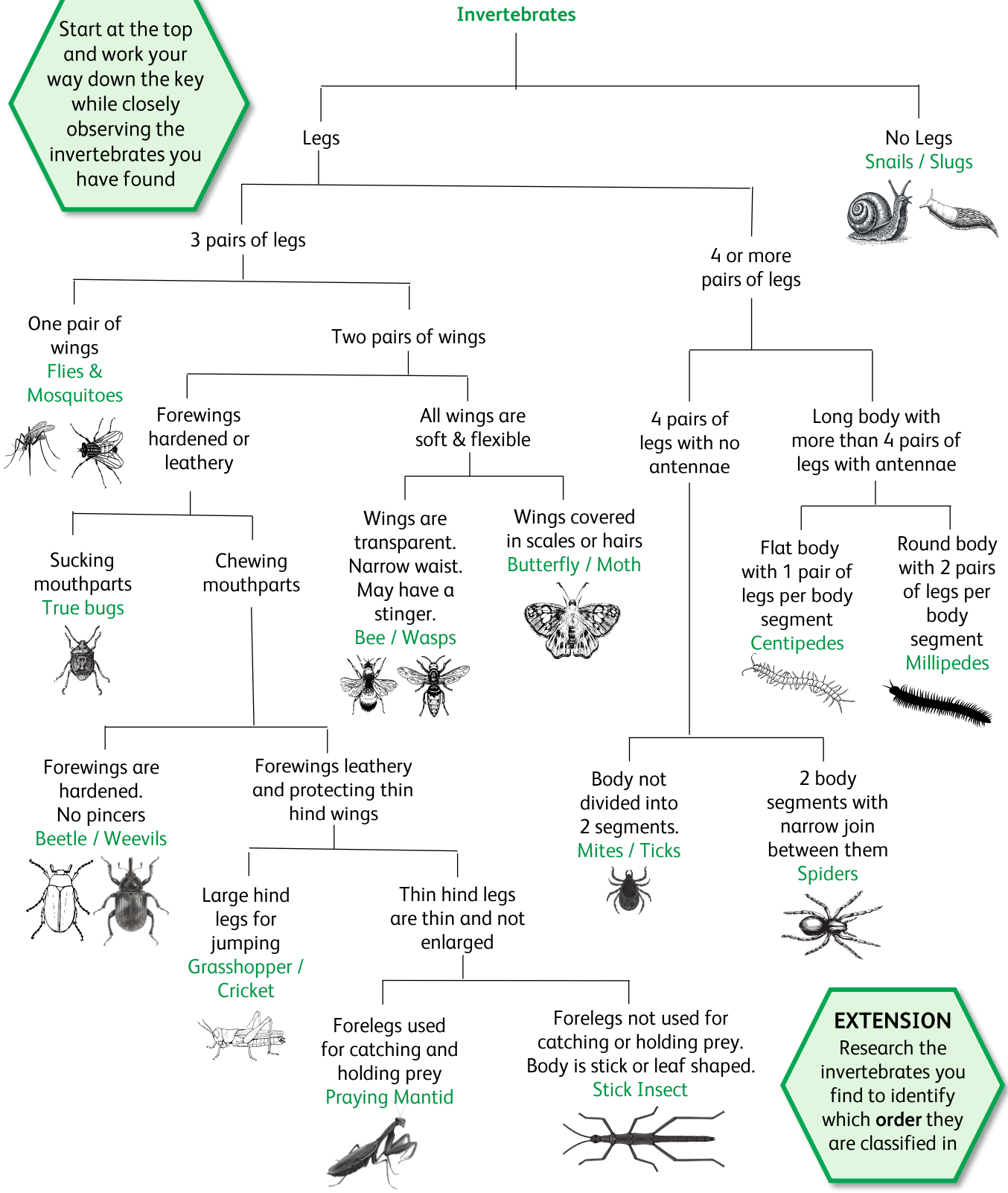
Type of invertebrate	Description of invertebrate Describe structural features of the invertebrate's body e.g. number of legs, appearance of wings	Tally

Tips for using dichotomous keys

- Read each step of the dichotomous key carefully and make sure you understand both choices before deciding.
- Take your time and observe your invertebrate from different angles so you don't miss any important features.

INVERTEBRATE DICHOTOMOUS KEY

Start at the top and work your way down the key while closely observing the invertebrates you have found



EXTENSION
Research the invertebrates you find to identify which **order** they are classified in

This key doesn't include all invertebrate. If you can't identify your invertebrate using this key, do some additional research to help figure it what it is. A good website to start with is ento.csiro.au/education/

CULTURAL CLASSIFICATION

Explain how plants and animals are classified in Aboriginal and Torres Strait Islander Cultures based on their uses, forms and functions

Aboriginal and Torres Strait Islander Peoples have rich and detailed ways of classifying the natural world. These systems are based on **thousands of years of observation** and often organise plants and animals differently from the Linnean Classification System. Instead of grouping living things by only physical features, Indigenous classification focuses on **uses, forms and functions**, and how each organism fits into its environment and culture.

USES

How people **use** the plants and animals, such as:

- Food
- Medicines
- Tools and materials
- Cultural or spiritual significance

FORMS

The **observable features** of the plants and animals, such as:

- Shape
- Size
- Sound
- Taste
- Animal movement

FUNCTIONS

The **roles** plants and animals play in the ecosystem, such as:

- Pollinators
- Plants that provide shelter
- Animals that act as “cleaners”
- Species connected through seasonal changes

ACTIVITY – Read about each of the plants and animals and complete the last column by deciding whether the information provided it linked to its **use, form or function**. The first one has been done for you as an example.



Plant or Animal	Indigenous knowledge used for classification	Use, Form or Function?
Echidna	Echidna’s sharp quills can be used as tools for sewing or piercing materials like skins, bark or woven fibres.	
Wattle	When wattle trees (Acacia species) bloom in late winter to early spring it signals that mullet fish are migrating and becoming available for fishing.	
Goanna	Goannas feed on dead animals, helping to keep Country clean and reduce the spread of diseases.	
Emu	Emu fat and oil can be used to treat colds, muscle pain and skin conditions due to its soothing properties.	
Lomanda	Long, strong and flexible leaves make the Lomandra plant ideal for weaving into baskets, mats, ropes, fishing nets and traps.	
Kangaroo	Kangaroos are large muscular animals with long high legs and strong tails which allow them to hop efficiently.	