

# SELF-GUIDED TOUR



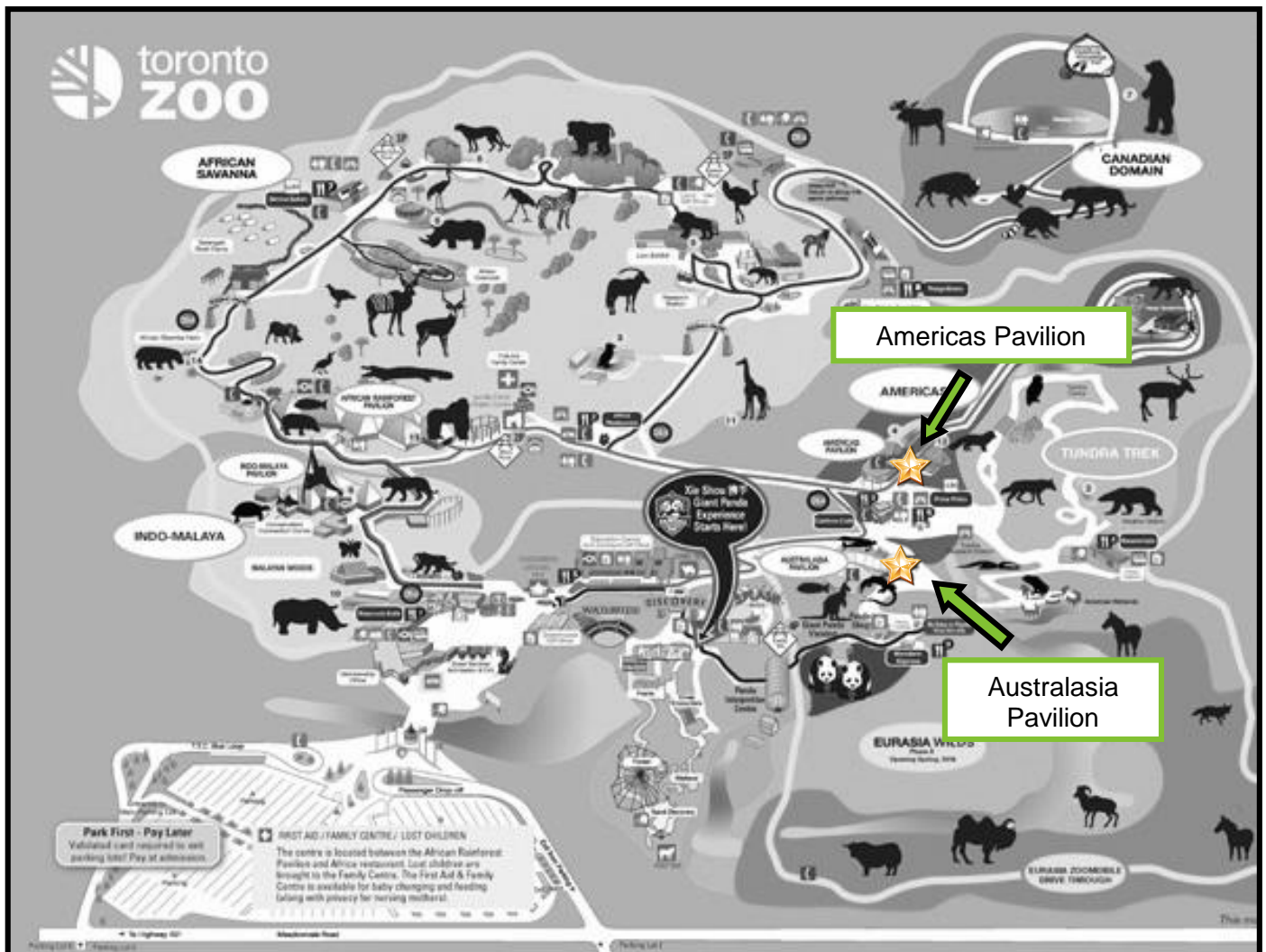
Grade 2

**Growth and Change  
in Animals**

# TABLE OF CONTENTS

<b>Toronto Zoo Map</b> .....	3
<b>Curriculum Expectations</b> .....	4
<b>Introduction</b> .....	4
<b>Classifying Creatures and Growth &amp; Change</b>	
<b>Self-guided Tour</b>	
<b>Australasia Pavilion</b> .....	6
Matschie’s tree kangaroo, MacLeay’s spectre, red-bellied short neck turtle, green tree python, emerald tree boa, short-beaked echidna, Komodo dragon, and moon jellyfish	
<b>Americas Pavilion</b> .....	12
Golden lion tamarin, various anemones, red-breasted piranha, axolotl, black- footed ferret, American alligator, and Eastern massasauga rattlesnake	
<b>Conclusion</b> .....	17

# TORONTO ZOO MAP



## Grade 2 Curriculum Expectations:

1. Assess ways in which animals have an impact on society and the environment, and ways in which humans have an impact upon animals and the places where they live
2. Investigate similarities and differences in the characteristics of various animals
3. Demonstrate an understanding that animals grow and change and have distinct characteristics

## Introduction:

### Review Classifying Creatures

- **Classifying:** grouping similar animals together based on characteristics/features they share
- **Vertebrates vs. Invertebrates:**
  - Spine/backbone: reach around and feel the bumpy bones running along your back
  - Do all animals have a backbone?
    - *Vertebrates:* animals with a backbone; mammals, fish, reptiles, birds, & amphibians
    - *Invertebrates:* animals without a backbone; insects (over 1 million species!), spiders, worms, jellyfish, anemones, octopus, etc.

### Classifying Vertebrates

- **Mammals:**
  - Have hair or fur
  - Most give birth to live babies, instead of laying eggs (few exceptions)
  - Produce milk to feed to their young
  - *Warm-blooded:* bodies produce heat; stay warm even if temperature around them decreases
  - Most live on land and have four legs, while some live in the water
- **Birds:**
  - Have feathers and wings
  - Lay eggs
  - Warm-blooded
  - Two legs
- **Fish:**
  - Have scales or fins
  - Lay many eggs
  - Most live and breathe underwater using gills
  - *Cold-blooded:* depend on other sources (e.g. the Sun) to warm their bodies
- **Reptiles:**
  - Have dry skin and scales
  - Lay eggs or have live births
  - Cold-blooded
  - Four legs or no legs

- **Amphibians:**
  - Have smooth, moist skin
  - Live on land and in water
  - Lay many eggs
  - Cold-blooded
  - When legs are present, usually have webbed feet

### Classifying Invertebrates

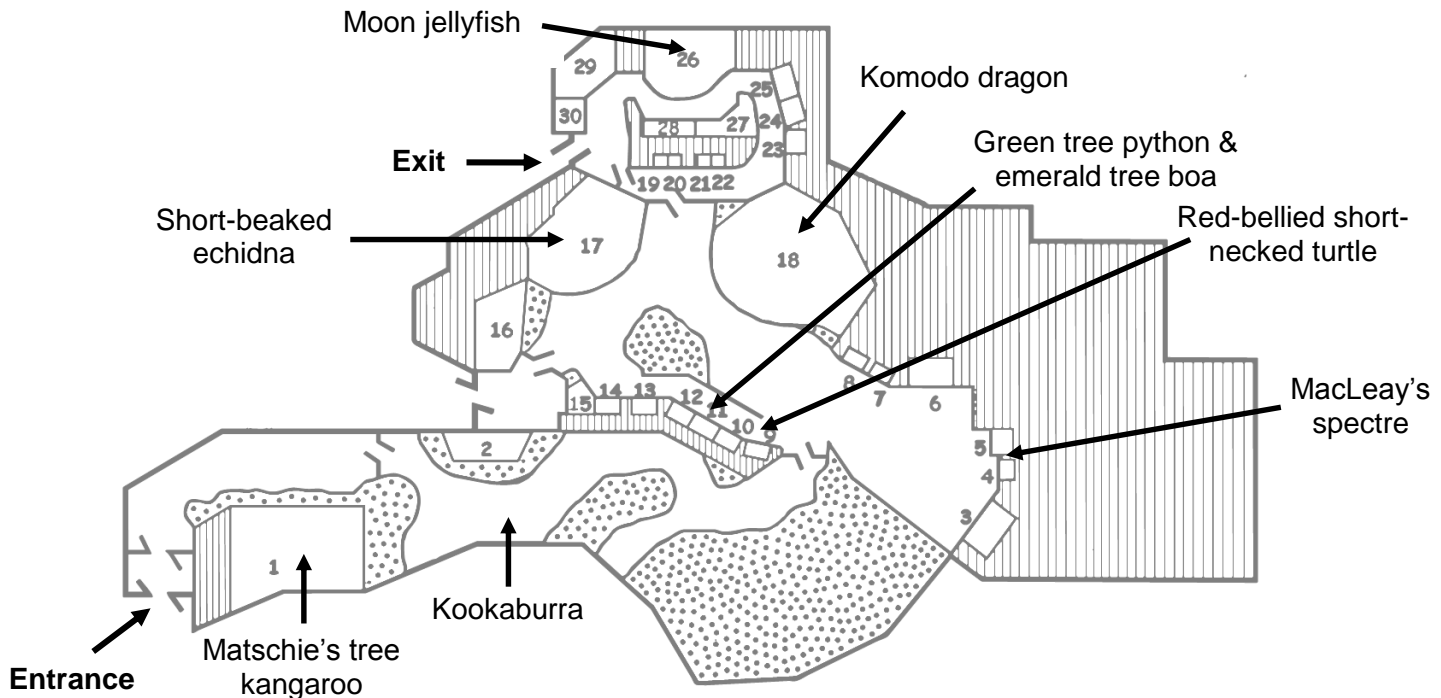
- Insects:
  - *Exoskeleton*: hard outer layer
  - Three attached body divisions: head, thorax, & abdomen
  - Six legs and zero, two, or four wings
  - Most change in shape/structure/behaviour as they grow (*metamorphosis*)
- Arachnids:
  - Two body sections: cephalothorax and abdomen
  - Eight legs and lack wings and antennae that most insects have
  - Spiders & scorpions
- Marine Invertebrates

### Review Growth & Change

- **Life Cycle:** the stages of life that an animal goes through from birth to adulthood.
- **Metamorphosis:** the changes an animal's body structure goes through from one stage of its life cycle to another (e.g. egg → caterpillar → pupa → butterfly)
- **Adaptations:** physical or behavioural characteristics that help animals survive in their habitats
- **Behavioural Adaptations:**
  - *Migration*: when an animal move from one area to another; some migrate to warmer areas in the winter, some migrate to find food, and others migrate to raise their young; examples: monarch butterflies traveling to Mexico, salmon migrating from open water to streams to lay eggs, and caribou migrating seasonally to give birth and find food.
  - *Hibernation*: animals becoming inactive and sleeping through colder months; examples: ground hogs and most insects
  - *Dormancy*: similar to hibernation, however, the animal is not completely inactive and may occasionally rise and forage for food; examples: black bears, grizzly bears, and rabbits
- **Physical Adaptations:**
  - How do people stay warm in winter? Warm clothing, eat warm food, & stay indoors
  - Thicker coats of fur to keep some mammals warm in winter months and lighter coats to keep them cool in the summer (e.g. Bactrian camel)
  - Emperor penguins have a dense layer of tightly packed feathers to keep them warm and waterproof and have a thick layer of blubber for warmth
  - **Camouflage:** the ability of an animal to blend in with its surroundings through its colour and patterning, allowing it to hide from sight (e.g. Arctic fox has a white coat in the winter to blend with snow and a dark coat in the summer when snow has melted)

# SELF-GUIDED TOUR

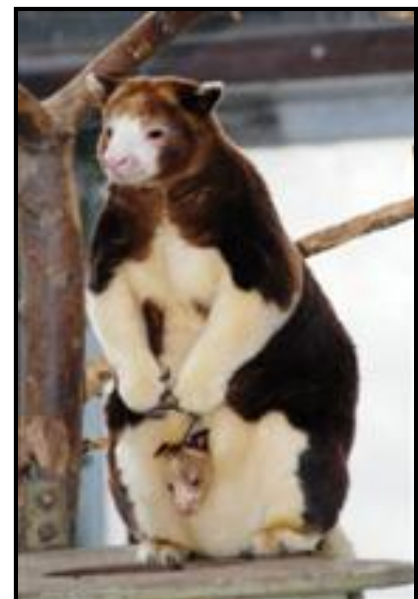
## AUSTRALASIA PAVILION



### Matschie's Tree Kangaroo (Shhhhh.... I enjoy quiet)

#### Classification

- Take a look at the tree kangaroos. **Are tree kangaroo's vertebrates or invertebrates?**
  - Tree kangaroos are vertebrates, as they have spines.
- **What type of vertebrate is a tree kangaroo? How do you know?**
  - **Mammal:** covered in fur, have four legs, give birth to and nourish live young, and are warm-blooded
  - Tree kangaroos are a special type of mammal called a **marsupial**. After giving birth to a very tiny baby, the baby finds its way into its mother's pouch where it drinks milk, grows fur, and is protected until it grows to big.



#### Life Cycle

- When marsupials are born, they are *very tiny* (think the size of a jellybean). They must use their strong limbs to climb up their mother's body to her pouch. At this stage, the baby does not look like the adult.

- For its first nine to ten months, the joey will stay in its mother's pouch for warmth and food. After that time, the joey will begin to leave the pouch, returning for milk every so often.
- Around one year of age, the joey becomes independent from its mother.
- Tree kangaroos are not social animals and prefer to live by themselves.

### *Adaptations*

- **Where do you think a tree kangaroo lives?**
  - Tree kangaroos are arboreal mammals, meaning that they spend most of their time in trees.
- Compared to kangaroos that live on the ground, tree kangaroos have many unique adaptations that allow them to survive in the trees. **See if you can spot any...**
  - Long tail for balancing while walking across branches
  - Long claws and rubbery feet to help them climb
  - Can move their hind legs independently of one another (unlike ground kangaroos), which helps them climb
  - Tree kangaroos are not like ground kangaroos. They have many unique adaptations which allow them to survive in the treetops.

## **Laughing Kookaburra**

### *Classification*

- **Is a kookaburra a vertebrate or invertebrate?**
  - Vertebrate
- **What type of vertebrate is a kookaburra? How do you know?**
  - Bird: have feathers and wings, lay eggs, two legs

### *Life Cycle*

- Kookaburras build nest in hollow trees or old tree stumps and lay 2-4 hard-shelled eggs
- After sitting on the eggs for 24-26 days, the eggs hatch
- The newly hatched chicks are blind and featherless and rely on the parents for food and protection
- The first feathers are dark in colour, but within 3 months, the chicks look identical to the adult
- Young kookaburras stay with their parents for a few years to help raise new chicks

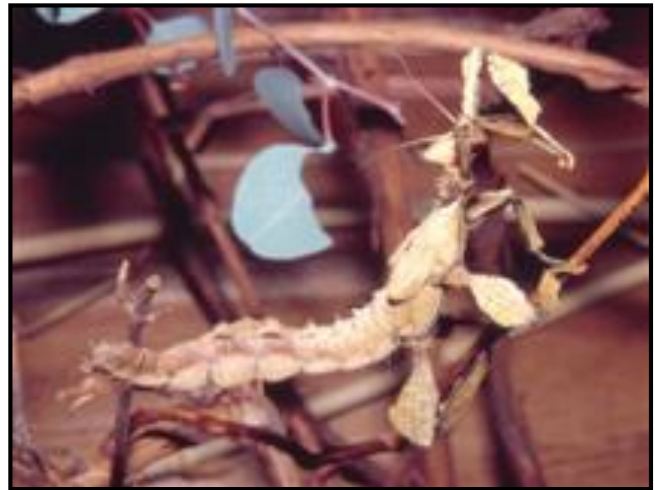
### *Adaptations*

- Their name refers to the bird's "laugh," which they use to establish their territory
- **What do you think the kookaburra uses its long, sharp beak for?**
  - Hunting!
  - Kookaburras sit and wait for prey to pass by; when prey (e.g. insects, reptiles, snakes, frogs, and rodents) are sighted, the kookaburra swoops down and grabs it with its beak; it will then carry the food to a branch and beats it several times against the branch

## MacLeay's Spectre

### Classification

- **Is this animal a vertebrate or an invertebrate?**
  - Like other insects, a MacLeay's Spectre is an invertebrate and has a hard outer layer or exoskeleton that covers its body



### Life Cycle

- **Are these insects born live or hatched from eggs?**
  - Hatch from eggs
- Early stages of life:
  - Called nymphs
  - Look like ants and change colour and appearance as they grow
- Metamorphosis consists of the nymphs moulting/shedding their exoskeletons as they grow. The change from young to adult is gradual, with small changes happening during each moult.
- Life span: less than one year.

### Adaptations

- Watch the spectres carefully. **What characteristics allow them to blend in with their surroundings (e.g. branches)?**
  - The colour and shape of MacLeay's spectre are similar to that of branches and dead leaves, allowing the spectre to hide or camouflage with their surroundings
  - These insects perform a swaying motion, which mimics the branches moving in the wind

## Red-bellied Short-necked Turtle

### Classification

- **Is this animal a vertebrate or invertebrate?**
  - Turtles are vertebrates
- **Is a turtle a mammal, bird, fish, reptile, or amphibian? How do you know?**
  - **Reptile:** have dry scales (when out of water), four legs, and are cold-blooded



### Life Cycle

- **Do turtles hatch from eggs or are they born live?**
  - Turtles hatch from eggs, which have a softer outer layer than bird eggs
- Females dig nests in loose substrate (e.g. dirt, sand). Once the eggs are laid, the female will cover the nest. Once hatch, the turtle hatchlings must dig their way out of the nest
- Baby turtles look like adults, just smaller in size. They will eventually grow to be about 25 cm long



### Adaptations

- **What is the one adaptation that all turtles have and why is it important?**
  - A hard shell that is made of bone that protects turtles from predators
  - When threatened, turtles will tuck their head and limbs inside the shell until danger has passed
- Unlike turtles found in Ontario, red-bellied short-necked turtles do not hibernate during Winter, as they live in a fairly warm environment

## Green Tree Python & Emerald Tree Boa



Green tree python



Emerald tree

### Classification

- **Are pythons and boas vertebrates or invertebrates?**
  - Vertebrates: they have a backbone (and ribs) that runs the entire length of the snake
- **What type of vertebrate are snakes?**
  - Reptiles: dry scales and zero legs

### Life Cycles

- While these two snakes look very similar, they have different life cycles
  - Emerald tree boas give live birth to about ten live young at a time
  - Green tree pythons lay eggs and can produce over twenty at a time
- For both species, young are independent (don't rely on mom) as soon as they are hatched/born
- The young snakes have a distinctly different colouring from the bright green adults:
  - Boas are born orange or red with green and white markings
  - Pythons hatch bright yellow or red with white markings. As they grow their colours change to the adult green and white form

- While some animals eat different types of prey at different life stages, both of these snakes eat small mammals throughout the life cycle
- Both snakes can grow up to 1.8 m (six feet) in length.
- Throughout their life, snakes regularly shed their skin in a process that gets eliminates old scales

### Adaptations

- While these snake species look similar, they are not related to one another and are from different parts of the world
  - Green tree python: Australia
  - Emerald tree boa: Central and South America
- **Why do you think these two snakes are both bright green? How does the colouring and patterning of the snakes help them in their habitat?**

- Both live in rainforest environments and spend most of their time in trees
- The colour and patterning allows them to camouflage with the trees they live in
- Some researchers think the bright colours of juvenile tree boas allow them to mimic the appearance of brightly coloured venomous vipers, possibly providing protection, as predators have learned to avoid prey that can injure them
- Green tree pythons exhibit a behaviour called “**caudal luring**,” where the snake waves the tip of its tail in front of possible prey. **Why do you think they do this?**
  - This behaviour may help to attract the prey’s attention, allowing the python to strike

## Short-beaked Echidna

### Classification

- **What type of vertebrate is an echidna?**
  - **Mammal:** covered in fur/spines (modified fur), four legs, **but they lay eggs!**
  - While most mammals give birth to live young, echidnas and platypus are the two exceptions, with both laying soft-shelled, leathery eggs.
  - Echidnas belong to a group of egg-laying mammals called **monotremes**

### Life Cycles

- Echidna females lay one egg, sometimes two, at a time; she will curl up around the egg and deposit it into her pouch, where it stays until it hatches
- Baby echidnas hatch totally bare with no spines; like other marsupials, the baby feeds off of the mother’s milk while in the pouch
- Once the spines begin to develop, the baby leaves the mother’s pouch, but still feeds from the mother until it is old enough to be on its own

### Adaptations

- While they are warm-blooded, echidnas don’t keep their bodies as warm as other mammals do and will sometimes hibernate for very brief periods of time in colder weather
- Echidnas are not able to sweat and do not do well with heat. **What behavioural adaptation does the echidna have that allows it to survive in hot weather?** (hint: it has something to do with why you might not be able to see it during the day)
  - It’s nocturnal! The echidna spends its day resting underground in tunnels, coming out at night when it is cooler to find food
- Look carefully at the echidna (or find a picture of it on a sign if you cannot see it). How does its spines, feet, and snout help it survive?
  - **Spines:** protection from predators; they will curl up into a ball so predators cannot eat them
  - **Feet and claws:** strong front limbs and claws allow them to quickly dig a burrow and tear apart large logs to find food
  - **Snout, tongue and teeth:** long snout and long, sticky, and flexible tongue allows the echidna to dig deep into nests, mounds, and logs and reach ants and termites. Their “teeth” are backward-facing and located on the roof of the mouth cavity, which allows it to capture and grind food.

## Komodo Dragon

### Classification

- Komodo dragons are reptiles. **How do we know that it is a reptile?**
  - Komodos have scales, dry skin, four legs, lay eggs, and are cold-blooded.



### Life Cycle

- Komodo dragons hatch from eggs, 8 months after they are laid; the mother lies on the eggs to provide protection
- Females can lay over 20 eggs at one time! These eggs are not hard like chicken eggs, but are softer and more leathery.
- Komodos are independent after hatching and must quickly climb high up in trees to avoid being eaten by adult Komodo dragons, including their mother. For safety, they will spend their first few years of life living in trees
- The hatchlings look much like adults, but are much smaller
- As they grow, they periodically shed their skin, leaving a new layer underneath and can grow to be up to 0.9 m (three feet) long
- Komodo dragons are scavengers, meaning that they eat bodies of dead animals, but they also hunt for prey, including larger mammals like water buffalo. Young dragons eat insects, geckos, eggs, and other small animals

### Adaptations

- Young Komodo dragons have a unique behavioural adaptation that protects them from hungry adult Komodo dragons
  - When they come down from the trees for food, they will roll around in feces to make themselves an unappealing meal. Yuck!
- Female Komodo dragons only lay their eggs in September. **How might this benefit the babies?**
  - Babies will hatch around April of the following year, a time when the rainy season is ending and insects are thriving. Insects are the main food source for the young dragons

## Moon Jellyfish

### Classification

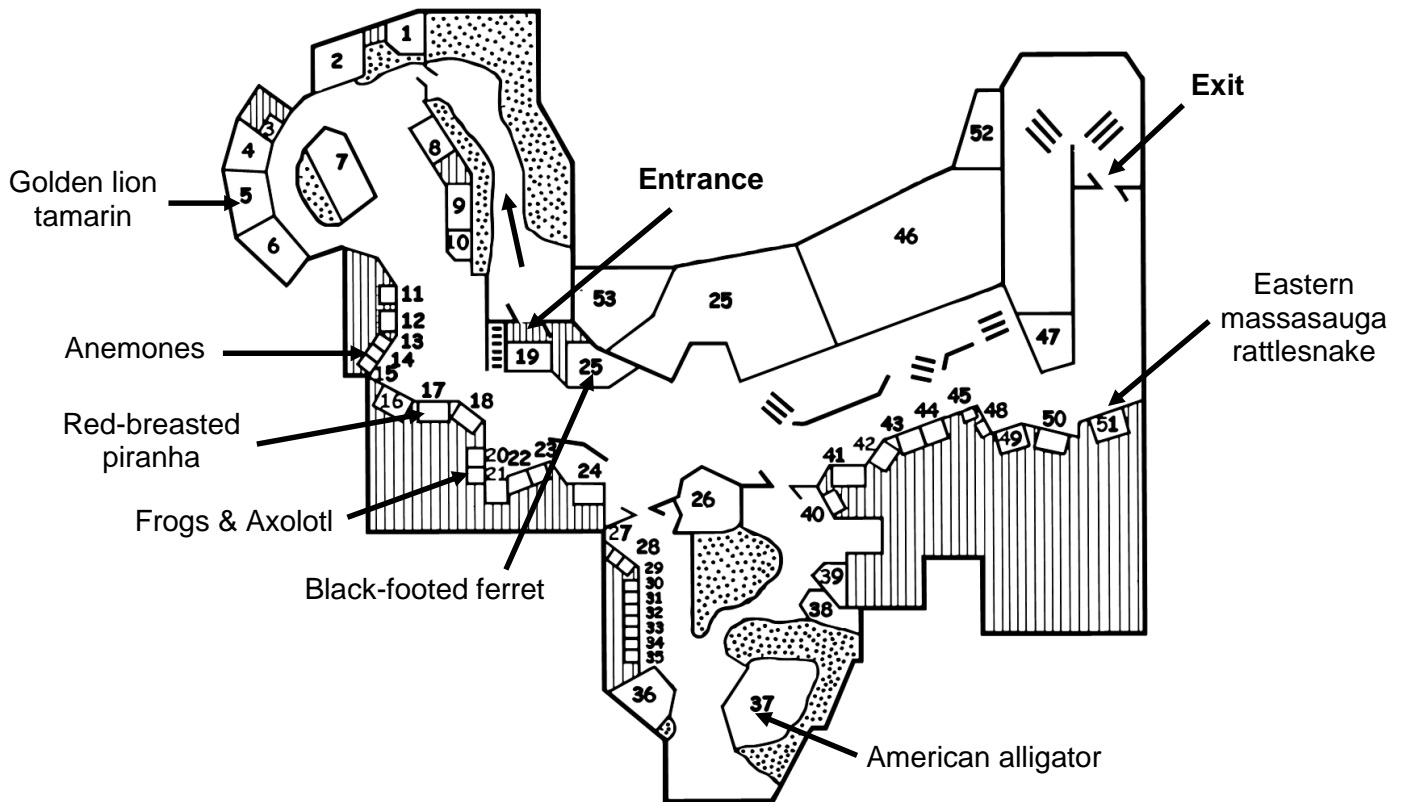
- **Is a jellyfish a vertebrate or an invertebrate?**  
Look closely.
  - Jellyfish are invertebrates and have no backbone (or any other bones), heart, or even a brain!



### Adaptations

- **How is the jellyfish protected from predators?**
  - Jellyfish are transparent/clear, which make them harder to see, allowing it to camouflage with the water
  - Jellyfish can use their tentacles to sting potential predators.

## AMERICAS PAVILION



### Golden Lion Tamarin

#### Classification

- **What type of vertebrate is the golden lion tamarin? How do you know?**
  - **Mammal:** covered in fur and has four legs
  - Tree-dwelling monkey

#### Life Cycle

- **Do you think tamarins give live birth or lay eggs?**
  - Like most mammals, tamarins give birth to live young, often to twins
- For the first few weeks of their lives, babies are dependent on their mothers for nursing and carrying, although the father will assist with carrying the babies
- Golden lion tamarins live in groups that can include over ten members, with an older adult male/female pair leading the group
- Older group members may share their food with younger ones
- Once a tamarin is able to survive without its parents, it must leave the group and find a new family to live with



### Adaptations

- Communicate with family members and other groups of tamarins using a range of calls (cluck, trill, rasp, screech), including an alarm call (whine or peep) that is used when they feel threatened by a predator
- Look carefully at the hands and fingers of the tamarins. **Why do you think they have long fingers, hands, and claws?**
  - Helps them forage for prey (insects) in nooks and crannies of trees
  - Helps them hold onto vertical surfaces (trees) while they are moving

## Anemone

### Classification

- **Are anemones plants or animals?**
  - Even though it looks kind of like a plant, an anemone is actually an animal and is a predator
- **Are anemones vertebrates or invertebrates?**
  - Anemones are invertebrate and are related to jellyfish and corals

### Adaptations

- **How do anemones move?**
  - While anemones appear stationary (don't move from place to place), they have a hidden foot underneath them, which secures them to the sea floor
  - When an anemone's habitat becomes unsuitable (too dry, no food, etc) or when it is being threatened by a predator, it can remove itself from the ground and swim to a new place where its needs are met



## Red-breasted Piranha

### Classification

- **Are fish vertebrates or invertebrates?**
  - Fish are vertebrates
- **What are some characteristics of fish?**
  - Gills that they use to breathe
  - Fins used to swim
  - Lay many eggs at one time
  - Cold-blooded

### Life Cycle

- Piranhas use their tails to dust away all debris from an area on the river floor to create a nest where the young stay together for protection
- The eggs are guarded by the father and sometimes mother; after hatching, the parents will continue to protect their young for a short time
- It only takes a few days for the fish to hatch and they can swim freely within a couple of days

- Piranha will eat just about any meat they can find
  - Fry (young piranhas) will feed on things, such as small crustaceans, while adults can band together and make meals of large mammals, such as cows and other animals that venture into the water
  - In general, piranhas are scavengers and prefer to eat animals closer to their own size

## Frogs (Poison Dart Frogs, Lemur Leaf Frog, and Waxy Monkey Tree Frog)

### Classification

- **What type of vertebrate do you think frogs are? Why?**
  - **Amphibian:** smooth, moist skin, webbed feet, cold-blooded, and live on land and in water

### Life Cycle

- Female frogs lay their eggs in or near water (e.g. leaf overhanging water, male carries newly hatched tadpoles to water)
- Tadpoles live entirely in water, breathing through gills, eating algae, insects, or smaller tadpoles, and eventually undergo metamorphosis into froglets (after 6-12 weeks for these frog species)
  - During metamorphosis, the tadpoles grow legs, develop lungs, while their gills disappear, transform their digestive system, and eventually lose their tail
- Froglets and adult frogs live on land and primarily eat invertebrates (e.g. insects, arthropods, worms, snails, and slugs)

### Adaptations

- **Why are poison dart frog brightly coloured?**
  - The bright colours serves as a warning to predators
  - Poison dart frogs contain toxins in their skin that can paralyze or kill potential predators
- **How does the green colour of the Lemur Leaf frogs and Waxy Monkey frogs help them survive?**
  - The green colour allows them to camouflage with their habitat (leaves)
- **How do frogs catch their prey?**
  - Most frogs have a long, sticky tongue that can be shot out and brought back in at great speeds

## Axolotl (pronounced ax-o-lot-ul)

### Classification

- This is a tricky one... **What kind of vertebrate is this animal?**
  - **Amphibians:** have slight webbing on their hind feet, are cold-blooded, and lay hundreds of eggs at once
- Just like there are exceptions to classifying mammals (e.g. egg-laying mammals), the axolotl is an exception to the amphibian classification rule



- Most amphibians live both on land and in the water; however, axolotls spend all of their time in water

### *Life Cycle*

- Young axolotls come out of squishy eggs as larvae
- The larvae gradually develop gills, a long tail, front legs, and then finally back legs
- Once all of the limbs have developed, young axolotls look like smaller versions of adults
- These animals are carnivores and eat small fish, crustaceans, snails, and worms

## **Black-footed Ferret**

### *Classification*

- ***What type of vertebrate is the black-footed ferret? How do you know?***
  - **Mammal:** has fur, four legs, is warm-blooded, and gives birth to and nourishes live young
- Ferrets are related to skunks and produce musk (odour) from scent glands located under their tails



### *Life Cycle*

- Ferrets are born in the spring time, with about three or four per litter
- Adult ferrets are solitary, except when raising their young
- As babies, they look somewhat like tiny adults, but are white and their eyes remain closed for about a month
- Baby ferrets will stay underground in a burrow with their mother for the first few months of life, during which time she provides all of their food for them
- Ferrets are carnivores, with their diet made up of mostly prairie dogs
- Toward the late summer, the mother will start to keep the young in separate burrows, and collect them all at night time to hunt with her
- By the fall, the ferrets are able to live on their own and are fully grown after at one year of age

### *Adaptations*

- ***Do you think ferrets hibernate in the winter?***
  - Unlike most other mammals that are a similar size, ferrets do not hibernate.
  - They do become much less active, conserving most of their energy, and may stay in their burrow for a week at a time in the winter
- To keep warm in the winter months, ferrets grow a slightly thicker coat, which is also lighter in colour to help them camouflage

## **American Alligator**

### *Classification*

- **What type of vertebrate do you think an alligator is?**
  - **Reptile:** dry scales, four legs, lay eggs, cold-blooded
- **What other animal looks similar to an alligator?**
  - Crocodiles!
  - Alligators have rounded snouts (u-shaped) and their teeth on the lower jaw are hidden when mouth closed while crocodiles have more pointed snouts (v-shaped) and their teeth on the lower jaw are visible when mouth closed

### Life Cycle

- Female alligators lay their hard-shelled eggs (50+) near water and cover them with mud and vegetation
- Eggs hatch after 2 months and the mother stays nearby for protection
- The temperature of the nest will determine whether the young are male or female
  - Warmer temperatures: males
  - Cooler temperatures: females
- Once the young are ready to emerge, they make a peeping sound, alerting the mother
  - These noises trigger the mother to help dig the babies out of the nest
  - She will even assist un-hatched eggs by gently rolling them in her mouth, breaking them open
- Hatchlings look like small adults, but have bright yellow and black bands on their bodies
- Babies head straight for the water and stay with their mother for the first five months
- Young alligators eat small animals and invertebrates that they can catch, while larger alligators can eat prey as large as deer
- Alligators can keep growing into their teen years and may reach up to 4.9 m (16 feet) long

### Adaptations

- Adult alligators are known for creating gator holes
  - Dig up vegetation and clear a space around them, before using their body and tail to dig a hole in the ground where water will collect
  - This new pool of water provides homes for fish and turtles, as well as water for birds and other animals to drink during the dry season
  - For the alligator, the animals attracted to the water are easy prey
- **How is the alligator able to see where it is going while swimming underwater?**
  - A third (clear) eyelid covers the alligator's eyes when it goes underwater, allowing it to see where it is going and see potential prey

## Eastern Massasauga Rattlesnake

### Classification

- **What kind of vertebrate is the rattlesnake?**
  - **Reptile:** dry scales, no legs, cold-blooded
- Eastern massasauga rattlesnakes belong to a group of snakes called **pit vipers**
  - Pit vipers sense heat through special pits on their faces. This allows them to locate warm-blooded prey. **Can you see the heat pits?**





- They are located on the front of the snake's face
- **How do you think pit vipers kill their prey?**
  - They have hollow fangs that inject venom into the prey

### *Life Cycle*

- As you learned earlier with the green tree python and the emerald tree boa, some snakes lay eggs, while others give birth to live young. **Do you think rattlesnakes lay eggs or give birth to live young?**
  - These snakes are born live and are independent as soon as they emerge
- The young snakes look like small versions of adults, missing only the fully developed rattles
- Each time the snake sheds their skin, they add a new segment to their rattle
- Rattlesnakes eat small animals, such as mice, other rodents, or birds
- Eastern massasauga rattlesnakes can live nearly twenty years in the wild

### *Adaptations*

- During the cold winter months, these rattlesnakes go into a state called **brumation**, a type of hibernation for reptiles
  - During this time, they hide in shelters provided by rocks or natural crevices and slow their bodily processes down so that they do not have to eat
- Look carefully at the colour and pattern of the massasauga rattlesnake. **How does their colouring and patterning help them survive?**
  - Allow them to camouflage with their surroundings (leaf litter on the ground)
- Rattlesnakes are known for their rattle. What is the purpose of the rattle?
  - The sound produced by the rattle warns predators to stay away

## **CONCLUSION**

### ***Possible discussion questions:***

- What is the main difference between a vertebrate and invertebrate?
- Name some of the mammals (birds, fish, reptiles, or amphibians) we saw today and describe some of their characteristics?
- Name some of the invertebrates we saw today?
- Which animal's life cycle did you find most interesting?
- What was the most interesting animal adaptation that you learned about today? Why?