
# Pathfinder Honour:
## Trainer's Notes

# Marsupials & Monotremes

### Instructions to Trainers / Instructors of this Honour

Thankyou for being involved with this Honour. These notes have been developed to assist in teaching / instructing this honour. We recognise that there is much more information available and we are grateful that you should share your expertise.

Please remember that Honours are designed to develop our Pathfinders in many ways; their interests, their knowledge and their relationship with their Saviour and Creator. Your enthusiasm and creativity will have a huge impact on those doing the honour.

To complete an Honour, the following (where applicable) must be completed satisfactorily:

- Physical and Practical Requirements.
- Honour Workbook.
- Honour Assessment Sheet. *(On SPD Honour Website but Leader's level access is required)*

### Additional Reference Material

### Acknowledgements

Wikibooks: http://en.wikibooks.org/wiki/Adventist_Youth_Honors_Answer_Book/Nature/Marsupials
This site provided much useful material for the updated layout of this honour, but be aware that material on any Wikibooks site or any other site is beyond the control of the SPD.

Please refer to the text of these notes for further citations.

"*The Complete Book of Australian Mammals"* by The Australian Museum edited by Ronald Strahan, Angus and Robertson Publishers, London, 1983.

# Marsupials & Monotremes Honour

**REQUIREMENT 1: Have the Mammals 1 Honour**

**REQUIREMENT 2: Distinguish:**

**a. Mammals from other animals**.

The mammals are the class of vertebrate animals characterized by the presence of mammary glands, which in females produce milk for the nourishment of the young.

**b. Placentals, marsupials and monotremes from one another**.

Placentals

The placentals are distinguished from other mammals in that the foetus is nourished during pregnancy via a placenta. The baby live inside the mother's body for a long time and so are born well developed.

Marsupials

Marsupials are mammals in which the female typically has a pouch (called the marsupium) in which it rears its young through early infancy. They differ from placental mammals in their reproductive traits.

Monotremes

Monotremes are mammals that lay eggs instead of giving birth to live young like marsupials and placental mammals. They do not have teats but exude milk from a number of ducts opening on to the abdomen.

They have only a few member species, being the platypus and long-beaked and short-beaked echidnas.

Their order name, Monotremata, means "one hole" mono – 'one' and tremata – 'hole'. They only have one hole for both urine and faeces; one more reason for early scientists to think they were related to birds.

**REQUIREMENT 3: Be able to explain the difference between, monotreme reproduction, marsupial reproduction and that in true mammals (ie. placentals).**

First let's consider the placental mammals: pigs, cats, horses, elephants, giraffes – humans.

**Placental Mammals**

The placenta is a temporary organ composed of two parts; one of which is part of the foetus, the other part of the mother. It is implanted in the wall of the uterus, where it receives nutrients and oxygen from the mother's blood and passes out waste. This interface forms a barrier, the placental barrier, which filters out some substances, which could harm the foetus.

Because of the long gestation time, these babies are born well developed.

Source of pictures:

http://upload.wikimedia.org/wikipedia/commons/5/59/Sow_with_piglet.jpg
http://en.wikipedia.org/wiki/File:Laitche-P013.jpg

# Marsupials & Monotremes Honour

## Marsupial Reproduction

The *pregnant female marsupial develops a kind of yolk sack in her womb*, which delivers nutrients to the embryo. The embryo is born at a very early stage of development (at about 4-5 weeks), upon which it crawls up its mother's belly and attaches itself to a nipple which is located inside the pouch. It remains attached to the nipple for a number of weeks. Some marsupial offspring later pass through a stage where they temporarily leave the pouch, returning for warmth and nourishment. Others such as quolls do not return, but cling to their mother's fur once they leave the pouch.

Pictured: Kangaroo Joey inside the pouch
http://en.wikibooks.org/wiki/File:Joey_in_pouch.jpg

## Monotreme Reproduction

Platypus and echidnas represent the most unusual, exciting and amazing representation of God's diverse creativity, anywhere on earth.

*These animals lay eggs*. This was said to be the case by aborigines, but it was not until 1884 that a scientist working near Bundaberg Queensland, found eggs of both the platypus and the echidna. This was over 90 years after the arrival of Europeans to Australia. Such is the secretiveness of both animals.

In the case of the platypus, 1 or 2 eggs are laid and incubated by the mother's stomach and held in place by her tail for 1 to 2 weeks. She does not leave them during this time. She then feeds them milk for 4 to 5 months but she has no nipples so it oozes out of ducts.

The echidnas have a pouch into which one egg is laid; otherwise the process is similar to the platypus.

Pictured
Platypus egg
Platypus young, newly 'hatched'

Source: Geneva Area City Schools, Geneva, Ohio
http://www.genevaschools.org/austinbg/class/gray/platypus/

# Marsupials & Monotremes Honour

**REQUIREMENT 4: Explain the role of the pouch in marsupials and the significance of the direction of the opening of the pouch.**

The pouch is a distinguishing feature of female marsupials; the name marsupial is derived from the Latin marsupium, meaning pouch.

Marsupials give birth to a live but relatively undeveloped foetus called a joey. When the joey is born, it crawls from inside the mother to the pouch. The pouch is basically a fold of skin with a single opening that covers the nipples to protect the joey as it continues to develop.

Pouches are different amongst the different marsupials. For Quolls and Tasmanian Devils, the pouch opens to the rear and the joey only has to travel a short distance to get to the opening of the pouch. While in the pouch, they are permanently attached to the nipple. Once the young have developed they leave the pouch and do not return.

When we look at the wombat, it becomes clear why some pouches open backwards. The Northern Hairy-Nosed wombat is the world's largest burrowing herbivore. It weighs 30kg and can be 1 metre long. It is a prodigious digger so the pouch faces backward so that it does not fill with dirt. *This is one of the world's most endangered animals*, with only about 100 wombats in one small fenced and guarded area at Epping Forest, near Clermont, Queensland.

Tasmanian Devils give birth to up to 50 young, each weighing approximately 0.18–0.24 grams. When the young are born, they move from the vagina to the pouch. Once inside the pouch, they each remain attached to a nipple for the next 100 days. Despite the large litter at birth, the female has only four nipples, so that no more than four young can survive birth. On average, more females survive than males. The female Tasmanian Devil's pouch, like that of the wombat, opens to the rear, so it is physically difficult for the female to interact with young inside the pouch. Unlike kangaroo joeys which frequently leave their mother's pouch and return, young devils (and other marsupials with rear-opening pouches) do not return to the pouch once they leave it. Instead, they remain in the den for another three months before becoming independent.

Marsupials with backward-facing pouches are usually diggers.

Kangaroos and related macropods

The kangaroo's pouch opens horizontally on the front of the body, and the newly-born joey must climb a relatively long way to reach it. Kangaroos and wallabies allow their young to live in the pouch well after they are physically capable of leaving.

The mother can travel at some speed with the joey safe inside its pouch.

If she is really threatened, she is able to reach in and eject the joey to save her own life and that of the joey.

# Marsupials & Monotremes Honour

**REQUIREMENT 5: Understand how marsupials and monotremes are placed into groups.**

The monotremes are easy to allot to groups, as there are only two:

1. The platypus is in a group of its own, and;
2. There are two echidnas: the short-nosed echidna and the long-nosed echidna.

The '*Complete Book of Australian Mammals*' which put out by The Australian Museum breaks the marsupials up into groups according to:

a. The shape and arrangement of the teeth;
b. The bones of the skull;
c. The shape of the hind foot, and;
d. More recently DNA matching

Marsupials have been arranged into these main groups:

1. Carnivorous Marsupials;
2. Bandicoots and Bilbies;
3. Koala and Wombats;
4. Possums;
5. Kangaroos and their relatives.

To this we need to add the marsupials of the New World which are;

6. Opossums, and;
7. Shrew possums.

**REQUIREMENT 6. Research and write a paragraph of approximately 100 words on the following. Try to include habitat, food and breeding habits. Choose different examples from those given in these trainer's notes**

**a. Monotremes (choose one)**
**b. Carnivorous Marsupials (choose one), and four from the following groups;**
**c. Bandicoots and Bilbies**
**d. Koala and Wombats**
**e. Possums**
**f. Kangaroos and their relatives**
**g. Opossums**
**h. Shrew Possums**

## a. Monotremes

**Platypus** *Ornithorhynchus anatinus*

Its mouth is located under the bill which is very sensitive and used to detect and catch prey, worms and crayfish. It hunts with its eyes closed & uses a form of electro location. It can detect minute electric fields created by muscle movement. It is able to store fat in its tail for tough times.

(Sourced from Mammals 1 Honour Trainer's Notes)

Natural Habitat: Australian creeks

Food: Worms, crayfish

Breeding Habits: Mother lays eggs.

Pictured: Platypus *Ornithorhynchus anatinus*
http://en.wikipedia.org/wiki/File:Platypus.jpg

**b. Carnivorous Marsupials**

The carnivorous marsupials are comprised of the Dasyurids, (Rodent-like animals in the main, ranging in size from 3 grams to 9 kilograms), the Numbat (a small animal that eats only ants and termites) and the Marsupial Mole.

Most of us will never see a Dasyurid, apart from the Tasmanian Devil, which is in most zoos. This is despite the fact that there are about 50 plus species and they are spread across Australia and New Guinea from the driest desert to the tropical rainforest.

This is because, they are very small, nocturnal, live a very short life, exist in very small, often inaccessible areas. At least eight are highly endangered.

Oddly enough many of the dasyurids do not possess a pouch but they are still marsupials. Some have just a circular section of stomach skin with nipples. The young dangle from these until they are weaned.

Now let us look at one of the carnivorous marsupials.

**Tasmanian Devil** *Sarcophilus harrisii*

The Tasmanian Devil also referred to simply as "the devil", is the largest Dasyurid being the size of a small dog, but stocky and muscular and is now the largest carnivorous marsupial in the world after the extinction of the Thylacine in 1936.

It is characterised by its black fur, offensive odour when stressed, extremely loud and disturbing screech, and viciousness when feeding. Although it is usually solitary, it sometimes eats with other devils.

Pictured: Tasmanian Devil
http://en.wikibooks.org/wikilei/F:Tasdevil_large.jpg

Natural Habitat: Now found only in the Australian island state of Tasmania

Food: Tasmanian Devils can take prey up to the size of a small wallaby, but in practice they are opportunistic, and eat carrion more often than they hunt live prey. Although the devil favours wombats, it will eat all small native mammals, domestic mammals (including sheep), birds, fish, insects, frogs and reptiles. Their diet is widely varied and depends on the food available. On average, they eat about 15% of their body weight each day; however, they can eat up to 40% of their body weight in 30 minutes if the opportunity arises. Tasmanian Devils eliminate all traces of a carcass, devouring the bones and fur in addition to the meat and internal organs. In this respect, the devil has earned the gratitude of Tasmanian farmers, as the speed at which they clean a carcass helps prevent the spread of insects that might otherwise harm livestock

Breeding Habits: Please refer to Requirement 4

Tasmanian Devils were hunted heavily until 1941, when they were declared a protected species. Since the late 1990's, devil facial tumour disease has reduced the devil population significantly and now threatens the survival of the species, which in 2008 was declared to be endangered. Programs are currently being undertaken by the Tasmanian government to reduce the impact of the disease.

### c. Bandicoots and Bilbies

The members of this group are strictly terrestrial. They have long pointed heads and compact bodies. The fore-limbs are short and the hind-limbs resemble that of macropods, being long. The forefoot has long, curved claws on the second, third and fourth toe for digging. When foraging, it digs a small round hole and explores the hole with its snout.

It is usually accepted that marsupials do not have a placenta to nourish the young. However, bandicoots do have a sort of placenta, but it does not develop. It has only a short gestation. The shortest gestation in mammals belongs to the Long-nosed Bandicoot of 12.5days.

**Southern Brown Bandicoot** *Isoodon obesulus*
http://en.wikipedia.org/wiki/Southern_Brown_Bandicoot

The Southern Brown Bandicoot is a short-nosed bandicoot.

The average male length is 330 mm; with a tail of 120 mm. Females are about 30 mm shorter, with a 10 mm shorter tail. Their fur is coarse and colored a dark greyish to yellowish brown, with the undersides a creamy-white. It has short, round ears.

Pictured: Southern Brown Bandicoot
http://upload.wikimedia.org/wikipedia/commons/thumb/d/d5/Bandicoot

Natural Habitat: Mostly in southern Australia

Food: These animals a re mainly carnivorous, eating insects, worms and grubs.

Breeding Habits: Reproduction is closely linked to local rainfall patterns. Many breed all year around.

### d. Koalas and Wombats

Although they do not look very much alike and live quite different lives, the koala and wombat are related. In each, the tail is short, the pouch faces backwards and only has two nipples. They have cheek pouches and each has a special stomach system for handling their vegetable food.

Wombats are short-legged, muscular quadrupeds, approximately one metre (3 feet) in length and with a very short tail. Wombats have an extraordinarily slow metabolism, taking around 14 days to complete digestion, and generally move slowly. When required, however, they can reach up to 40 km/h and maintain that speed for up to 90 seconds.

When attacked, they can summon immense reserves of strength — one defence of a wombat against a predator (such as a dingo) underground is to crush it against the roof of the tunnel until it stops breathing.

**The Common Wombat** *Vombatus ursinus*
http://en.wikipedia.org/wiki/Common_Wombat

It is also known as the Coarse-haired Wombat.

Natural Habitat: Widespread in the cooler and better watered parts of southern and eastern Australia, including Tasmania.

Food: They are vegetarian, eating shoots and leaves.

Breeding Habits: The Common Wombat can breed every two years and produce a single joey, which leaves the backwards-facing pouch after nine to eleven months (weighing between 3.5 and 6.5 kg). The joey is usually independent at 18 months.

Pictured: Common Wombat
http://en.wikibooks.org/wiki/File:Wombat_at_Lone_Pine.jpg

**e. Possums (Pygmy Possums, Ringtail Possums, Brushtail Possums, Gliders and Cuscus)**

Possums are small marsupials with brown or grey fur, ranging in size from the length of a finger (Pygmy Possums and Wrist-winged Gliders), to the length of a forearm (Brushtails and Ringtails).

All possums are nocturnal and omnivorous, hiding in a nest in a hollow tree during the day and coming out during the night to forage for food. They fill much the same role in the Australian ecosystem that squirrels fill in the northern hemisphere and are broadly similar in appearance.

They move on all fours, have along flexible tail and generally are vegetarian.

The two most common species of possums - the Common Brushtail and Common Ringtail - are also among the largest.

**Common Brushtail Possum** *Trichosurus vulpecula*

It is the Australian marsupial most often seen by city-dwellers, as it is one of few that thrive in cities as well as a wide range of natural and human-modified environments.

In New Zealand, where it was introduced in the 1800's, it is a major agricultural and conservation pest.

Natural Habitat: The east coast of Australia. They need a safe hole for daytime sleeping.

Food: Around human habitations, the Common Brushtails are inventive and determined foragers with a liking for fruit trees, vegetable gardens, and kitchen raids.

Their natural food is flowers and fruits.

Breeding Habits: The mother carries one joey at a time until it is quite large. When it can no longer fit in the pouch she will carry it on her back.

Pictured: Brush Tail Possums
http://en.wikibooks.org/wiki/File:Brushtail_possum.jpg

# Marsupials & Monotremes Honour

## f. Macropods (Kangaroos, Wallabies, Wallaroos, Pademelons, Tree Kangaroos, Hare Wallabies, Nail-tail Wallabies, Narbarlek, Rat Kangaroos, Bettongs and Potoroos)

Macropod means 'big foot'. All members have forward facing pouches.

There are a large number of species which are endangered or near extinction in this group.

On the other hand, several species of kangaroos have multiplied into plague proportions in some areas. Subject to government control, these are harvested for their skins and meat.

**Red Kangaroo** *Macropus rufus*
It is the largest surviving marsupial in the world. A large male can be 2 metres (6 ft 7 in) tall and weigh 90 kg (200 lb).

It can jump 12 metres (40 feet) in one leap. Leaping is nearly effortless to a kangaroo, as it uses its long legs, tail, breathing and stored energy from a landing to rebound for the next leap.

Natural Habitat: the Red Kangaroos occupy the arid and semi-arid centre of the continent.

Food: These are grass grazers.

Breeding Habits: They live in family groups. The male may have several females. The female is able to control birth until the conditions are good. She may also have two different sized joeys in her pouch. So she may have three babies at the one time - one that can leave the pouch, one attached to a teat and one in the womb.

Pictured: Red Kangaroo
http://upload.wikimedia.org/wikipedia/commons/thumb/f/f1/Red_kangaroo_-_melbourne_zoo.jpg

## g. Opossums

Opossums are nocturnal marsupials found in the Western Hemisphere. They are small to medium-sized creatures, about the size of a large house cat. Although there are many exceptions, most of them spend time living both in trees and on the ground, and they eat many different things (plants and animals).

Opossums are usually nomadic, staying in one area as long as food and water are easily available. Though they will temporarily occupy abandoned burrows, they do not dig or put much effort into building their own. They favor dark, secure areas, below ground or above.

When threatened or harmed, they will 'play possum', mimicking the appearance and smell of a sick or dead animal. The lips are drawn back, teeth are bared, saliva foams around the mouth, and a foul-smelling fluid is secreted from glands. This response is involuntary, rather than a conscious act. Their stiff, curled form can be prodded, turned over, and even carried away. In minutes or hours, the animal will regain consciousness and escape quietly.
Source: http://en.wikibooks.org/wiki/Adventist_Youth_Honors_Answer_Book/Nature/Marsupials

**The Virginia Opossum** *Didelphis virginiana*
http://en.wikipedia.org/wiki/Virginia_Opossum

Commonly known as the North American Opossum, it is the only marsupial found in North America north of the Rio Grande River.

It is a solitary and nocturnal animal about the size of a domestic cat

It is often seen near towns, rummaging through garbage cans, or lying by the side of the road, a victim of traffic.

Natural Habitat: Found throughout Central America and North America east of the Rockies from Costa Rica to southern Ontario. It was also introduced to California in 1910 and now occupies much of the Pacific coast.

Food: Opossums are omnivorous and eat a wide range of plants and animals such as fruits, insects, and other small animals.

Breeding Habits: They may have a lot of babies at one time but only some survive.

Pictured: Virginia Opossum
http://upload.wikimedia.org/wikipedia/commons/2/27/Opossum_2.jpg

**h. Shrew Opossums**

Source: http://en.wikipedia.org/wiki/Shrew_opossum

Shrew opossums (also known as rat opossums) are about the size of a small rat (9–14 cm long), with thin limbs, a long, pointed snout and a slender, hairy tail. They are largely meat-eaters, being active hunters of insects, earthworms and small vertebrates. They have small eyes and poor sight, and hunt in the early evening and at night, using their hearing and long, sensitive whiskers to locate prey. They seem to spend much of their lives in underground burrows and on surface runways.

They are confined to the Andes Mountains of South America. They live in inaccessible forest and grassland regions of the High Andes.

Largely because of their rugged, inaccessible habitat, they are very poorly known and have traditionally been considered rare. Recent studies suggest that they may be more than had been thought.

**Dusky Caenolestid** *Caenolestes fuliginosus*
http://en.wikipedia.org/wiki/Dusky_Caenolestid

The Dusky Caenolestid, also known as the Dusky Shrew Opossum or the Silky Shrew Opossum, is a small marsupial.

It is the best known of the six surviving species of the order Paucituberculata (shrew opossums).

Natural Habitat: the alpine forests and meadows of the Andes. Its range stretches across Colombia, Ecuador, and northwestern Venezuela.

Food:They are carnivorous, mainly eating insects and their larva.

Breeding Habits: Little is known as they are rare, remote and nocturnal.

Pictured: Dusky Caenolestid
http://en.wikibooks.org/wiki/File:Shrew_opossum_-_Caenolestidae.png

# Marsupials & Monotremes Honour

**REQUIREMENT 7: Be able to explain the need for the conservation of marsupials.**

1. If you have got this far, you will realise that marsupials - apart from opossums and shrew possums - are unique to Australia and New Guinea. With a few exceptions they do not adapt well to other countries.
2. Most species occupy a very small area of habitat. This habitat can easily be threatened, by clearing, invasive pest weeds and feral animals damaging it.
3. Feral animals such as foxes, dogs and cats kill many small species.
4. Many marsupial species are on the very endangered list.
5. Just because an animal is small, only comes out at night, lives in a very remote area and looks like a mouse very few people know or care about it. These are rare and unique creatures crated by a wonderful creative God. This should be our major reason to want to conserve them

**REQUIREMENT 8: Do one of the following:-**

**a. Observe a marsupial (or group of marsupials) in its native habitat and write a report of no less than 100 words describing your observations.**
For those living in Australia, this is the preferred option.

**b. Write a report of your visit to a natural history museum, wild-life sanctuary, zoo, etc. indicating in no less than 100 words, the extent of your observations. Confine your report to marsupials.**

**c. Give a talk of at least three minutes, to a group of people about marsupials or a particular marsupial.**

**d. Guide (or assist in guiding) a group of young people (Eg. Friends or Companions) on a visit to a museum, zoo or sanctuary where there are marsupials.**