

## Discovery Place Nature

formerly, Charlotte Nature Museum, a division of Discovery Place,  
1658 Sterling Rd, Charlotte, NC 28209

### Merit Badge Workshops 2018

<https://nature.discoveryplace.org/programs-and-classes/scout-programs>

All Merit Badges are scheduled for 9:00 am to 4:00 pm and will meet in the Naturalist Lab at Discovery Place Nature.

<b><u>Date and Time</u></b>	<b><u>Merit Badge Workshop</u></b>
Saturday, January 13, 9:00 am to 4:00 pm	Astronomy*
Saturday, February 10, 9:00 am to 4:00 pm	Astronomy*
Saturday, March 10, 9:00 am to 4:00 pm	Environmental Science
Saturday, March 24, 9:00 am to 4:00 pm	Geocaching*
Saturday, April 14, 9:00 am to 4:00 pm	Nature*
Saturday, May 12, 9:00 am to 4:00 pm	Mammal Study
Saturday, June 9, 9:00 am to 4:00 pm	Environmental Science
<b>July</b>	<b>NO MERIT BADGES</b>
Saturday, August 11, 9:00 am to 4:00 pm	Insect Study
Saturday, August 25, 9:00 am to 4:00 pm	Reptile and Amphibian Study*
Saturday, September 8, 9:00 am to 4:00 pm	Bird Study
Saturday, October 13, 9:00 am to 4:00 pm	Environmental Science
Saturday, November 10, 9:00 am to 4:00 pm	Astronomy*
Saturday, December 8, 9:00 am to 4:00 pm	Environmental Science

\*Astronomy, Geocaching, Nature, and Reptile and Amphibian Study are workshops for which Scouts can qualify for partial completion. **Additional homework is required to complete the requirements for these merit badges.**

Other merit badge workshops offer opportunity for completions **IF** Scouts complete pre-course homework and present the homework to the Merit Badge Counselor when the course meets.

For all merit badges, Scouts can meet with Merit Badge Counselors at Discovery Place Nature when they have completed their requirements for review of their outside work and to obtain blue card signatures if they know the subject material.

All workshops take place at Discovery Place Nature (formerly, Charlotte Nature Museum, a division of Discovery Place) at 1658 Sterling Road, Charlotte, NC 28209, phone 704 372 6291, extension 300.

Marvin Bouknight  
Director/Naturalist, Discovery Place Science  
(704) 372-6261 ext. 601  
(704) 348-1965 – *office*  
(704) 619-0576 - *cell*  
[MarvinB@discoveryplace.org](mailto:MarvinB@discoveryplace.org)

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1658 Sterling Rd, Charlotte, NC 28209

### Merit Badge Workshops 2018



**Website:** <https://nature.discoveryplace.org/programs-and-classes/scout-programs>

**Location of event:** Discovery Place Nature (formerly, Charlotte Nature Museum, a division of Discovery Place), 1658 Sterling Rd, Charlotte, NC 28209, Phone 704 372 6261

**Minimum class size:** 8

**Maximum class size:** 20

**Cost:** Cost is \$20 for one class.

**Refunds:** Discovery Place Nature is not able to offer a refund if a Scout is not able to attend. However, if a Scout is not able to attend, he may notify Discovery Place Science of his situation and either recruit a Scout to take his place or ask Discovery Place Science to apply his paid fee toward his registration for a future merit badge program.

**Method of registration:** Please call Discovery Place Nature through the Discovery Place Science registration number at 704 372 6261 ext. 300 to register. Scouts must register in advance to participate.

**Registration opens:** Monday, 6 weeks before the course date

**Registration closes:** Wednesday, 3 days before the course date

**Age requirement:** None. All Boy Scouts 11 through 17 may participate.

**Rank requirement:** None. All Boy Scouts 11 through 17 may participate.

**Blue card requirement:** Each Scout must present to the counselor a separate blue card signed by their Scoutmaster indicating permission to participate in the course(s). Scouts should fill out the requirement grid portion of the card and have the Merit Badge Counselor initial this section of the card for each completed requirement and indicate incomplete requirements. When the Scout has completed all requirements, a Merit Badge Counselor, either with Discovery Place Nature or with his home troop, must sign and date the card on 2 places. Each Scout is responsible to obtain these signatures and to turn the card in to his Scoutmaster so that merit badge can be registered and awarded.

Parents are welcome to attend all sessions.

**Partial or Full Completion:** Full completion of any of these merit badges is possible IF Scouts complete above preparations before class. If a Scout does not finish all requirements, he can work with their counselor to list and initial requirements completed on their blue card for later completion with the counselor. Scouts should follow the buddy system with 2-deep adult leadership for all merit badge sessions and for all meetings with Counselors.

**Food:** Scouts should pack their own lunches and eat them on the back deck of the Discovery Place Nature facility. There is no place to purchase food at the Discovery Place Nature facility. Eating or drinking during the class sessions will not be allowed. Bring a reusable water bottle and a small daypack since part of the day will be outside.

**Clothing:** Scouts are expected to wear their field uniform ("Class A" uniform) with Scouts pants and shirt to demonstrate participation as a Scout and to reinforce Scouting values and behavior during the course. Scouts must wear closed-toe shoes or boots (not sandals) with socks to classes for safety. Scouts should wear clothing that is appropriate for outdoor weather. Scouts should wear sun block and a hat. **Scouts will be outside for part of each class.** Neckerchiefs and merit badge sashes and medals are not expected or required.

**Cell phones:** Scouts may have cell phones with them during the course, but cell phones should be turned completely off during all class sessions. If a Scout chooses to send or receive even a

single text message or talk on his cell phone during class, he will be expected to loan his cell phone to the instructor or to his parent or to a Scout leader for safe keeping during the rest of the day, to be returned when the class ends.

**Preparation for All Merit Badges before class:**

1. Scouts must read the merit badge book before class.
2. Scouts may print Merit Badge requirements from <http://www.scouting.org/meritbadges.aspx> or from [http://www.meritbadge.org/wiki/index.php/Merit\\_Badge\\_Worksheets](http://www.meritbadge.org/wiki/index.php/Merit_Badge_Worksheets)  
Scouts find that workbooks from the [www.meritbadge.org](http://www.meritbadge.org) site can be very helpful in organizing their work but these printouts are not required.
3. Scouts must bring blank paper and pen to the course for their notes and research.
4. All Scouts are expected to bring pre-course homework assignments with them to class and present these notes and projects to the merit badge counselor as evidence of your preparation.

**Preparation for All Merit Badges during class:**

All Scouts are expected to take notes and to write down answers to requirement questions as the information is presented during the course. These notes should be available at the end of the day to show the Merit Badge Counselor on-site and to demonstrate your participation and learning to your Scoutmaster and other troop leaders. Scouts should keep these notes to avoid any concerns about the level of participation or accomplishment at Boards of Review or Scoutmaster Conferences.

**Check in and participation procedures:**

As Scouts check in on arrival to Discovery Place Nature, a record of his presentation will be recorded, including

1. Punctuality
2. Uniform
3. Appropriate shoes and socks
4. Pre-course homework
5. Pen and paper
6. Water
7. Packed lunch

During his classroom and outdoor course work, a record of his participation will be recorded, including

8. Cell phone use
9. Talking and horseplay

A report of his presentation and participation will be emailed to the Scout, his parent(s), and Scoutmaster.



## Astronomy Merit Badge

Scouts must bring all written homework to class to receive credit.

### **Before class:**

1. Scouts must Be Prepared by completing requirements 1abc, 4cd, 7abc, 9 at home and by bringing written results with them to class.

### **During class:**

2. Scouts will have instruction in requirements 2, 3abcd, 5abc, 6cd. Scouts will practice identifying stars and constellations at different dates and times, so that they can complete requirements 4abc and 6ab at home.

### **After class:**

3. Scouts will need to complete 4abc, 5d, 6ab, and 8 at home. Scouts can then schedule a meeting with their Counselor at Discovery Place Nature to go over their completed work to secure the Counselor's signature on his blue card indicating completion.



## Bird Study Merit Badge

Scouts must bring all written homework to class to receive credit.

### **Before class:**

1. Scouts must Be Prepared by completing **requirement 2** at home.
2. Scouts must Be Prepared by completing **requirement 4 g** at home. Do research and make a list of “Nonnative bird (introduced to North America from a foreign country since 1800)”.
3. Scouts must Be Prepared by working on **requirement 7 b** at home . Do your research and bring your written results with you to class.
4. Scouts are encouraged to bring **binoculars** if they have them.

### **During class:**

1. Scouts will cover requirements: 1, 3, 4a-f, 5, 6, and 8





## Environmental Science Merit Badge

Scouts must bring all written homework to class to receive credit.

### Before class:

1. Scouts must Be Prepared by completing **requirement 2** at home and by bringing written results with them to class. The workbook contains the terms:  
[https://meritbadge.org/wiki/images/3/3a/Environmental\\_Science.pdf](https://meritbadge.org/wiki/images/3/3a/Environmental_Science.pdf)
2. Scouts must Be Prepared by completing **requirements 3d and 3e** before class and must bring their completed work to class. Here is some information on endangered animals in North Carolina: [http://www.fws.gov/raleigh/es\\_tes.html](http://www.fws.gov/raleigh/es_tes.html)
3. Scouts must Be Prepared by completing **requirement 3f** at home and must bring their completed work to class. Here is some information on reducing pollution at home: [http://epa.gov/oaqps001/peg\\_caa/reduce.html](http://epa.gov/oaqps001/peg_caa/reduce.html)
4. Scouts must Be Prepared by completing **requirement 6** at home and must bring their completed work to class. Here is some information on career opportunities in environmental science: <http://www.collegexpress.com/interests/science-and-engineering/articles/studying-sciences/environmental-science-majors-and-potential-careers/>

### During class:

1. Scouts will cover requirements: 1, 3a1, 3b3, 3c2, 4a, and 5



## Geocaching Merit Badge

Scouts must bring all written homework to class to receive credit.

### Before class:

1. Scouts must Be Prepared by working on **requirements 1abc, 2abc, 3, 4, 5a, 7** at home, including writing definitions of the terms from the requirements 3 and 5. The merit badge book will be helpful for your work. Scouts must bring their notes to class.

For completion of requirements 7 and 8, Scouts will need to obtain parent permission and help and will need to set up a free user account with [www.geocaching.com](http://www.geocaching.com).

2. Scouts must Be Prepared by working on **requirement 4** at home. Make notes on the **EDGE** method of teaching in Scouting. Bring your written results with you to class.

See <http://www.scouting.org/filestore/pdf/26-242.pdf> pages 11-13.

The Boy Scout Handbook is another resource.

**Explain** how it is done.

**Demonstrate** the steps.

**Guide** learners as they practice.

**Enable** them to succeed on their own.

3. Scouts must Be Prepared by working on **requirement 8**. Do research and find out what “Cache to Eagle” means and what “Cache In Trash Out” means and make written notes.

### During class:

1. Scouts will cover requirements: 5bcd, 6, 7, 8, 9

### After class: ????

1. Complete **requirements 8, 9**. Schedule a follow-up visit with your your Merit Badge Counselor to review your notes about your experiences and relevant photos to confirm completion and to sign off your blue card.



## Insect Study Merit Badge

Scouts must bring all written homework to class to receive credit.

### Before class:

1. Scouts must Be Prepared by working on **requirement 1**. Write out a list of hazards. Write out definitions of *mitigate*, *shock*, *anaphylactic shock*.
2. Scouts must Be Prepared by completing **requirements 2, 3, and 4** at home.
3. Scouts must Be Prepared by working on **requirement 5** at home. Bring your scrapbook, even if incomplete, to class.
6. Scouts must Be Prepared by working on **requirements 6, 7, 8, 11, 12, 13** at home.

### During class:

1. Scouts will cover **requirement 10a** during class.

### After class:

1. Complete **requirement 9**. Schedule a follow-up visit with your your Merit Badge Counselor to review your notes about your experiences and relevant photos to confirm completion and to sign off your blue card.



## Mammal Study Merit Badge

Scouts must bring all written homework to class to receive credit.

### **Mammal Study Merit Badge Preparation before class:**

3. Scouts must Be Prepared by completing **requirement 1** at home.
2. Scouts must Be Prepared by working on **requirement 2** at home .
3. If Scouts choose to complete **requirement 3c**, please write your report at home and bring to class.
4. If Scouts choose to complete **requirement 4c or 4g**, please write your report at home and bring to class.

### **Mammal Study Merit Badge Preparation during class:**

1. Scouts will work on **requirement 5** during class.

# Mammal Study Merit Badge Study Guide

## Requirements

1. Explain the meaning of "animal," "invertebrate," "vertebrate," and "mammal." Name three characteristic that distinguish mammals from all other animals.
2. Explain how the animal kingdom is classified. Explain where mammals fit in the classification of animals. Classify three mammals from phylum through species.
3. Do ONE of the following:
  - a. Spend 3 hours in each of two different kinds of natural habitats or at different elevations. List the different mammal species and individual members that you identified by sight or sign. Tell why all mammals do not live in the same kind of habitat.
  - b. Spend 3 hours on each of 5 days on at least a 25-acre area (about the size of 3 ½ football fields). List the mammal species you identified by sight or sign.
  - c. From study and reading, write a simple history of one **nongame** mammal that lives in your area. Tell how this mammal lived before its habitat was affected in any way by man. Tell how it reproduces, what it eats, what eats it, and its natural habitat. Describe its dependency upon plants, upon other animals (including man), and how they depend upon it. Tell how it is helpful or harmful to man.

See <http://www.ncwildlife.org/Learning/Species.aspx> for list of game and non-game mammals in North Carolina and links to information. See below.

4. Do ONE of the following:
  - a. Under the guidance of a nature center or natural history museum, make two study skins of rats or mice. Tell the uses of study skins and mounted specimens respectively.
  - b. Take good pictures of two kinds of mammals in the wild. Record light conditions, film used, exposure, and other factors, including notes on the activities of the pictured animals.
  - c. Write a life history of a native **game** mammal that lives in your area, covering the points outlined in requirement 3c. List sources for this information.

See <http://www.ncwildlife.org/Learning/Species.aspx> for list of game and non-game mammals in North Carolina and links to information. See below.

- d. Make and bait a tracking pit. Report what mammals and other animals came to the bait. See *Scouting* magazine, May/June 1975:

This is simply a lure for animals. It is best used overnight on a camp-out because most mammals will come to the bait only at night or early morning when no humans are around. Set it some distance from the campsite.

Prepare by loosening the soil in a four-foot square. Punch holes around a coffee can about an inch from the top. Place meat or fish in the can and sink it (with holes above the soil) in the center of the pit. Place plastic lid on and sprinkle birdseed on top.

<http://mdc.mo.gov/discover-nature/common-plants-and-animals/mammals/animal-tracks>

This page shows diagrams of mammal tracks to scale.

[http://www.concord.org/~btinker/guide/tracks/tracks\\_activities.html](http://www.concord.org/~btinker/guide/tracks/tracks_activities.html)

This page references capturing tracks with a floured circle and casting tracks with plaster or melted wax from a candle.

e. Visit a natural history museum. Report on how specimens are prepared and cataloged. Explain the purposes of museums.

f. Write a report of 500 words on a book about a mammal species.

g. Trace two possible food chains of carnivorous mammals from the soil through four stages to the mammal.

For food chain for bears, see

<http://wwwrcamnl.wr.usgs.gov/isoig/projects/fingernails/results/foodchain.html>

For overview of food chains, see

<http://www.ekcsk12.org/faculty/jbuckley/leclass/ecologyqz3.html>

[http://king.portlandschools.org/files/houses/y2/animalmaineia/files/species/coyotebq/foodweb/Food\\_Web.html](http://king.portlandschools.org/files/houses/y2/animalmaineia/files/species/coyotebq/foodweb/Food_Web.html)

<http://york.conroeisd.net/Teachers/jlutke/Food%20Chains>

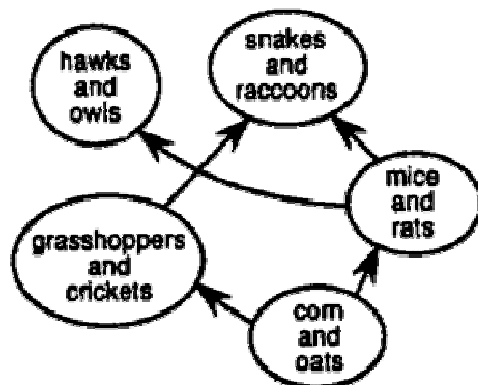
bears during salmon season

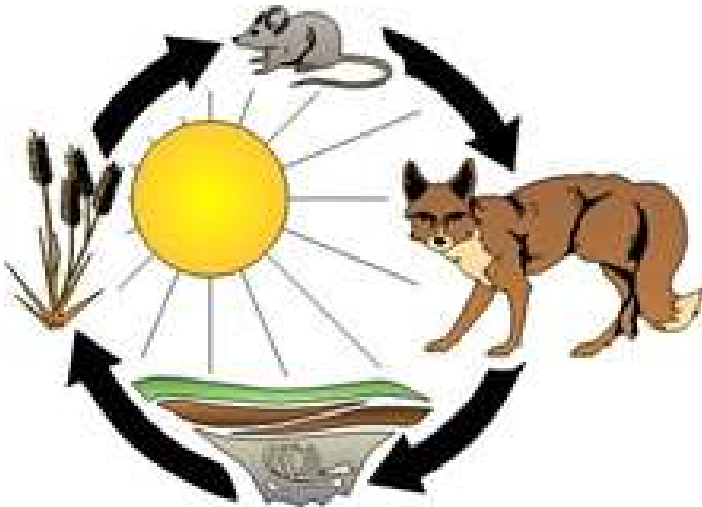
soil or water

primary herbivores

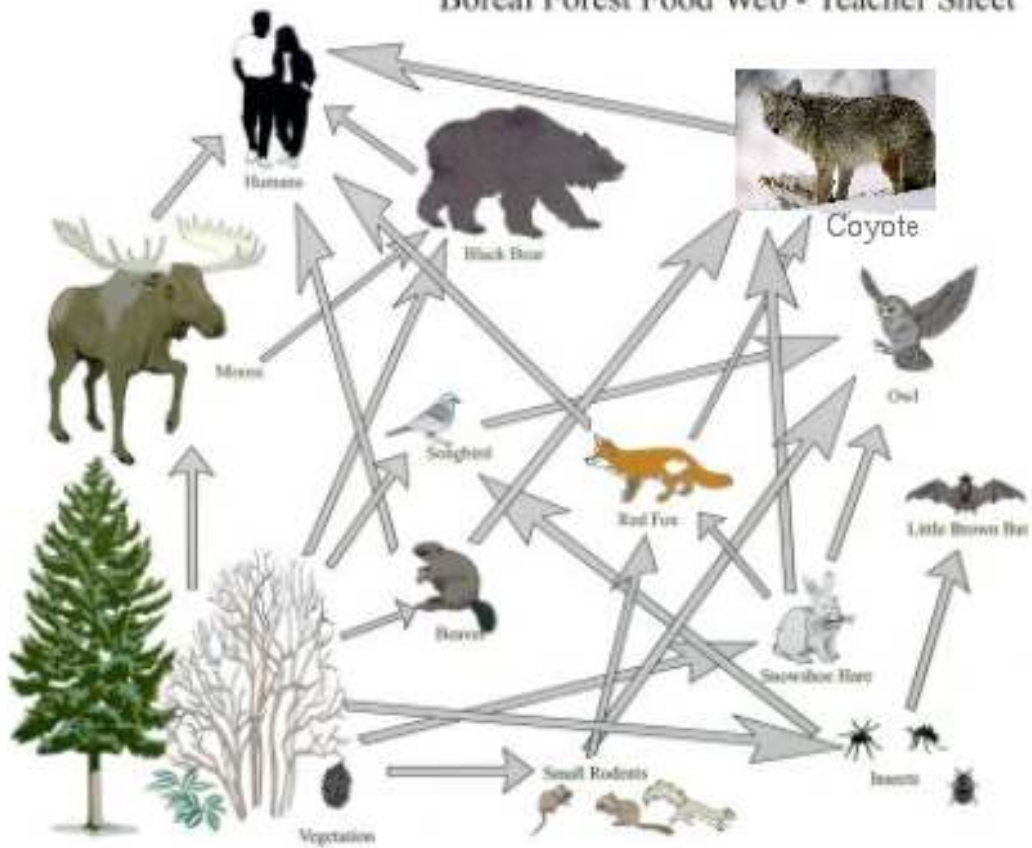
omnivores (various fish species including salmon)

bear (carnivore)





Boreal Forest Food Web - Teacher Sheet



What does “boreal” mean?

of, relating to, or comprising the northern biotic area characterized especially by dominance of coniferous forests

From: <http://www.merriam-webster.com/dictionary/boreal>

5. Work with your counselor, select and carry out one project that will influence the numbers of one or more mammals.

For information on brush piles, see

[http://www.humanesociety.org/animals/resources/tips/brush\\_piles.html](http://www.humanesociety.org/animals/resources/tips/brush_piles.html)

and

[http://www.ct.gov/dep/lib/dep/wildlife/pdf\\_files/outreach/fact\\_sheets/brshpls.pdf](http://www.ct.gov/dep/lib/dep/wildlife/pdf_files/outreach/fact_sheets/brshpls.pdf)

and

<http://www.dgif.virginia.gov/habitat/brush-piles-rabbit.pdf>

Armadillo, Nine-banded	<i>Dasypus novemcinctus</i>	NonGame
Bat	<i>Chiroptera</i>	Endangered
Bear, Black	<i>Ursus americanus</i>	Big Game
Beaver	<i>Castor canadensis</i>	Furbearer
Bobcat	<i>Lynx rufus</i>	Game & Furbearer
Cougar, Eastern	<i>Felis concolor</i>	Extinct
Coyote	<i>Canis latrans</i>	NonGame
Deer, White-tailed	<i>Odocoileus virginianus</i>	Big Game
Fox, Gray	<i>Urocyon cinereoargenteus</i>	Game & Furbearer
Fox, Red	<i>Vulpes vulpes</i>	Game & Furbearer
Groundhog	<i>Marmota monax</i>	NonGame
Mink	<i>Mustela vison</i>	Furbearer
Muskrat	<i>Ondatra zibethicus</i>	Furbearer
Nutria	<i>Myocastor coypus</i>	NonGame
Opossum, Virginia	<i>Didelphis virginiana</i>	Game & Furbearer
Otter, River	<i>Lontra canadensis</i>	Furbearer
Raccoon	<i>Procyon lotor</i>	Game & Furbearer
Skunk, Spotted	<i>Spilogale putorius</i>	Furbearer
Skunk, Striped	<i>Mephitis mephitis</i>	Furbearer
Squirrel, Carolina Northern	<i>Glaucomys sabrinus coloratus</i>	Endangered
Squirrel, Fox	<i>Sciurus niger</i>	Game
Squirrel, Southern Flying	<i>Glaucomys volans</i>	NonGame
Weasel, Long-tailed	<i>Mustela frenata</i>	Furbearer
Wolf, Red	<i>Canis rufus</i>	Endangered

From: <http://www.ncwildlife.org/Learning/Species.aspx>



## What is a Mammal?

Mammals are animals.

Yes but so are Insects, Reptiles, Spiders, Sponges and Slugs. We need to do better than that.

Mammals have a back-bone. Yes, but so do Fishes and Frogs and they are not mammals.

Mammals are warm-blooded. Yes but so are birds, and birds are not mammals either.

So how do we describe a mammal??

Obviously, what we need in order to define a mammal are some characters, or traits that are possessed by all mammals and are unique to mammals, i.e. they do not occur in fishes and slugs etc. Fortunately, scientists have already worked it all out for us. So here are six solid indications that an animal is a mammal

### Character One

The first characteristic that guarantees that an animal is a mammal is that it (if it is female) can produce milk to feed its young. This milk is produced by modified sweat glands called 'mammary' glands. It is from these glands that the whole group takes its name, 'Mammals'.

### Character Two

The second test is the possession of hair, something humans often have problems with but which they should respect more. No other animal has hair in the same form as mammals, and all mammals have some hair at least at the beginning of their lives - baby whales and dolphins are born with a moustache.

### Character Three

The lower jaw in mammals is a single bone on either side. In all other vertebrates there are more than one bone on each side of the jaw.

### Character Four

The mammal middle ear, and only the mammal middle ear, contains 3 bones. The Stapes or (Stirrup), Incus or (Anvil) and the Malleus or (Hammer). Once these bones were part of the lower jaw, but during the early evolution of mammals they changed jobs and became a part of our hearing apparatus instead.

### Character Five

In mammals the main artery leaving the heart curves to the left becoming the aortic arch. In birds it curves to the right and in all other vertebrates there are more than one main artery leaving the heart.

### Character Six

Finally mammals have a diaphragm. A sheet of muscle and tendon that separates the body cavity into two sections. Heart and lungs before/above, liver, kidneys, stomach, intestines, etc, behind/below. No other animal has a diaphragm.

Other characteristics which are sure indicators that an animal is a mammal, but which may not be present in all mammals include:

1. The possession of a placenta in the females which allows the mother's system to nourish the growing young without being attacked by the mother's immune system. This applies to all the Eutheria which is why they are called placental mammals. Cows, horses, dogs, cats and people are all placental mammals.
2. Mammals have only two sets of teeth. Reptiles and fish have many sets and can replace lost teeth with new ones all their lives.
3. Mammals are heterodontic, meaning that their teeth are different shapes, except those with no teeth at all. We have some or all of: incisors, canines, molars and premolars. Reptiles and fish have teeth that are all basically the same, though they can vary in size throughout the mouth. See image above.
4. The Buccal Cavity (the mouth) has a false palate as a roof, meaning that the nostrils do not lead directly into the mouth. Effectively, this means that if your mouth is full of food you can still breathe, but a reptile has to breathe around its food.
5. The body is maintained at a constant temperature, meaning mammals are endothermic; they generate heat within their bodies metabolically and also have special cooling mechanisms. Not all mammals choose the same temperature, and some are not very good at it. Bats, for instance, tend to cool down considerably when at rest, this is partly because of the large surface area for heat loss supplied by their wings. Finally there are the Naked Mole Rats, *Heterocephalus glaber* which have lost this ability, probably because they do not need it anymore. Birds are also endothermic. For more information on this see - On Being Warm-blooded.

So now you have a better idea of what a mammal is. Ultimately though, mammals are part of the beauty and diversity of life that makes this world so good to live in. Unfortunately, many people in positions of power fail to appreciate this beauty and the precious fragility of life and many mammal species are currently in danger of disappearing for ever. So far 86 species and 24 subspecies, a total of 110 distinct taxa of mammals have already become extinct since mankind started keeping records. Apart from these 241 taxa of mammal are currently on the IUCN critically endangered list. Another 436 taxa are listed as Endangered and a further 776 are classed as vulnerable. In total this means 1453 taxa or over 25% of all living mammals are listed in the IUCN Red Data book.

From: <http://www.earthlife.net/mammals/mammal.html>

## Comparative Vertebrate Heart Anatomy

fish heart = two chambers and single circuit circulation = atrium and ventricle; blood flows from the sinus venosus from the body (deoxygenated) into the atrium through an atrioventricular valve into a ventricle and out through the conus arteriosus to the ventral aorta to flow through the branchial arches over the gills to the dorsal aorta out to the capillaries of the body.

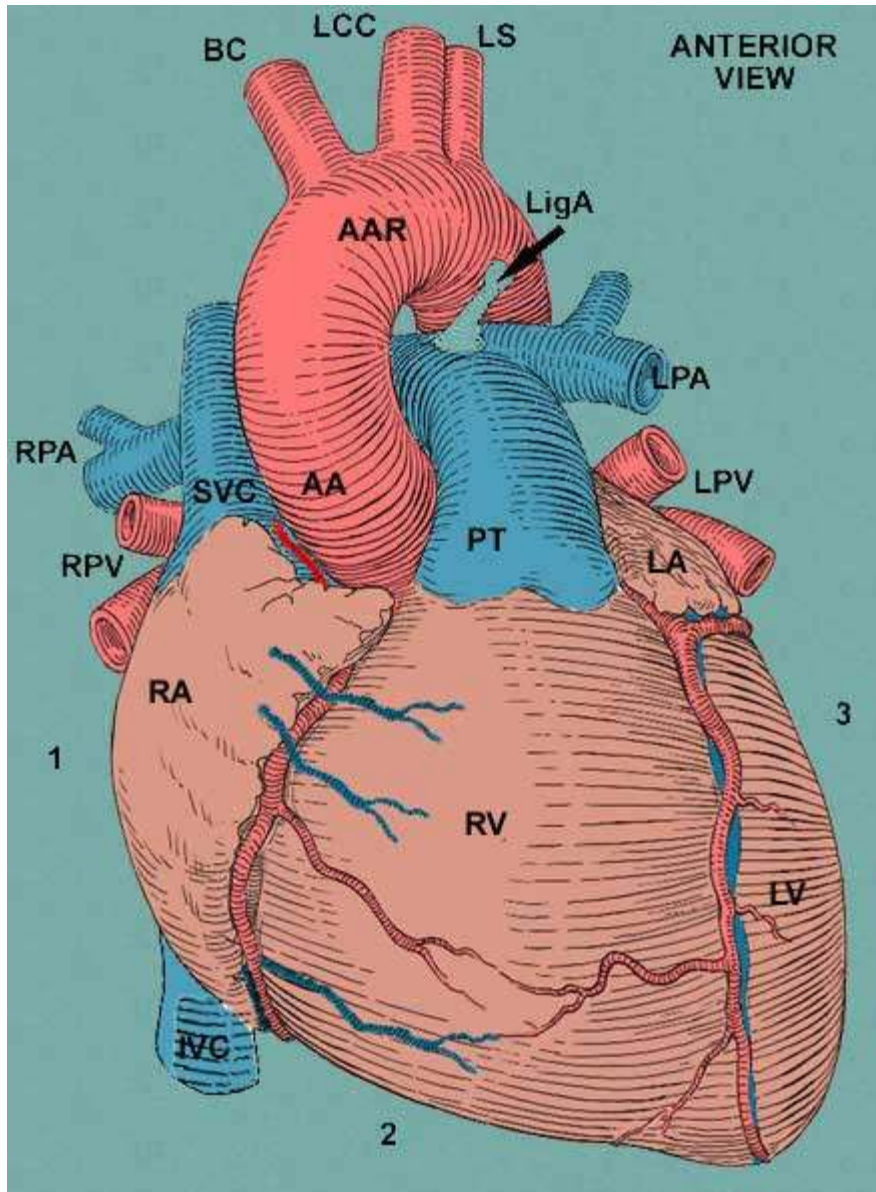
amphibian heart = three chambers = left atrium receives blood from the pulmonocutaneous veins (oxygenated), right atrium receives blood from the systemic veins (deoxygenated), blood flows through left and right atrioventricular valves into the ventricle where the blood is partially separated by blood flow patterns, but oxygenated and deoxygenated blood mixes in the ventricle before it is pumped out through the separate aorta (carries blood to systemic arteries) and pulmonocutaneous arteries (carries blood to the lungs and skin for gas exchange). Amphibians retain a left and right aortic arch.

turtle heart = three chambers with partially separated ventricle = left atrium receives blood from the pulmonary veins, right atrium receives blood from systemic veins (via inferior (or post) and superior (or pre) vena cava), blood flows through right and left atrioventricular valves into the ventricle which is mostly subdivided by an interventricular septum into a right and left half. Oxygenated and deoxygenated blood is somewhat separated but mixing occurs. The ventricle pumps blood into the aorta and systemic arteries and into the pulmonary artery (trunk) which carries blood to the lungs.

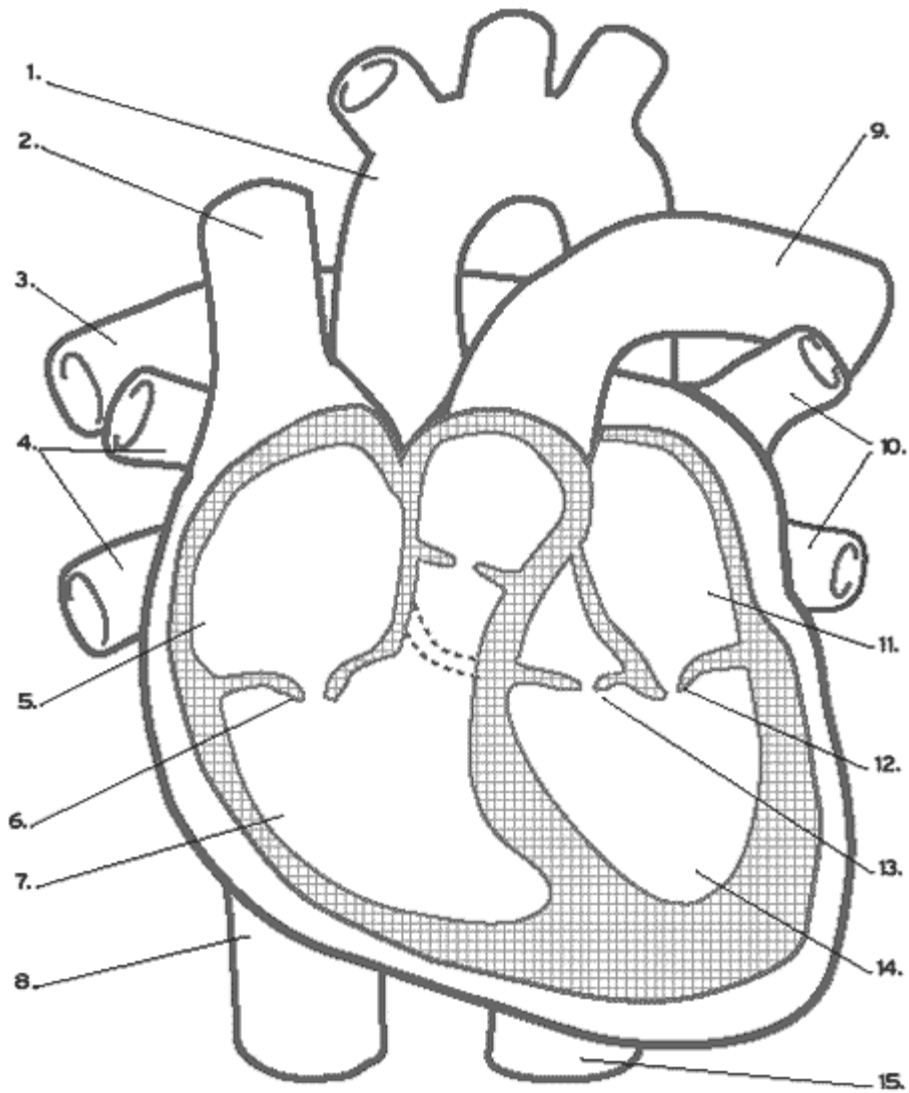
crocodile heart/bird heart = four chambers = left atrium receives blood from the pulmonary veins, right atrium receives blood from systemic veins (via inferior (or post) and superior (or pre) vena cava), blood flows through right and left atrioventricular valves into the left ventricle which pumps blood into the aorta and systemic arteries and the right ventricle which pumps blood into the pulmonary artery (trunk) which carries blood to the lungs. Crocodiles retain two aortic arches. Birds retain a single right aortic arch.

mammalian heart = four chambers = same basic flow pattern as bird above, but mammals have retained a single left aortic arch

From: <http://www.biosciweb.net/animal/pdf/cardio.pdf>



From: <http://www.wesnorman.com/thoraxlesson4.htm>



From: <http://www.smm.org/heart/lessons/heartDiagram.htm>

<b>Mammal Orders and Families</b>						
<b>Order</b>	<b>Common Names</b>	<b>Scientific Name</b>	<b>No. Genera</b>	<b>No. Species</b>	<b>IUCN</b>	<b>Distribution</b>
<b>Monotremata</b>	Echidnas	Tachyglossidae	1	1		Australia
	Platypus	Ornithorhynchidae	1	1		Australia
<b>Marsupialia</b>	Opposums	Didelphidae	12	70		Americas
	Marsupial Mice, Marsupial Cats, Tasmanian Devil	Dasyuridae	14	50		Australasia
	Tasmanian Wolf	Thylacinidae	1	1	1	Tasmania
	Numbats/Banded Anteaters	Myrmecobiidae	1	1	1	Australia
	Bandicoots	Peramelidae	8	18		Australasia
	Shrew Opposums	Caenolestidae	3	7		South America
	Possums, Cuscuses, Gledero, Ringtails	Phalangeridae	13	40		Australasia
	Noolkanger or Honey Possum	Tarsipedidae	1	1		Australia
	Koalas	Phoscolaratidae	1	1		Australia
	Wombats	Vombatidae	2	4		Australia
<b>Insectivora</b>	Kangaroo/Wallabies, Potoroos, Rat Kangaroos	Macrophodidae	15	47		Australasia
	Hedgehogs, Gymnures	Erenacudae	8	14		Africa, Asia, Europe
	Moles and Desmons	Talipidae	12	22		North America
	Tenrecs	Tenrecidae	9	32		Eurasia
	Otter Shrews	Polamogalidae	2	3		Madagascar
	Golden Moles	Chrysochloridae	5	16		Africa
	Solenodors	Solenodontidae	1	2		South Africa
	Shrews	Saricidae	24	300		Worldwide
	Elephant Shrews	Macrosalididae	5	30		Africa
	Tree Shrews	Tupaiidae	5	15		South-east Asia
<b>Dermoptera</b>	Flying Lemurs, Colugas	Cynocephalidae	1	2		South-east Asia

<b>Chiroptera</b>	Old World Fruit Bats	Pteropodidae	38	150		Africa to India, Australia Asia
	Mouse-tailed Bats	Rhinopomatidae	1	3		North Africa, South Asia
		Craseonycteridae	1	1		Thailand
	Sac-winged Bats, Sheath-tailed Bats	Emballonuridae	12	44		Pan-tropical
	Bull-dog Bats, Fish-eating Bats	Noctilionidae	1	2		Central and South America
	Hollow-faced Bats	Nycteridae	1	13		Africa, Near East, South-east Asia
	False Vampire Bats, Yellow-winged Bats	Megadermatidae	3	5		Africa, South-east Asia, Pacific, Australia
	Horsehose Bats, Noseleaf Bats	Rhinolophidae	11	130		Old World and Pacific
	New World Leaf-nosed Bats	Phyllostomidae	50	130		Americas
	Moustached Bats, Naked-backed Bats, Leaf-chinned Bats	Mormoopidae	2	8		Americas
	Vampire Bats	Desmondontidae	3	3		Tropical America
	Funnel-eared Bats	Natalidae	1	4		Tropical Central and South America
	Smokey Bats	Furipteridae	2	2		South America
	Sucker-footed Bats	Myzopodidae	1	1		Madagascar
	Common Bats	Vespertilionidae	34	280		Worldwide
	Short-tailed Bats	Mystacinidae	1	1		New Zealand
	Free-tailed Bats	Molassidae	11	82		Worldwide
<b>Primates</b>	Lemurs	Lemuridae	5	15		Madagascar
	Sifakas, Endrinans,	Indridae	3	4		Madagascar

	Woolly Lemurs					
	Aye-aye	Daubentoniidae	1	2		Madagascar
	Lorises, Pottoes, Galagos	Lorisidae	6	11		Tropical Old World
	Tarsiers	Tarsiidae	1	3		Sumatra, Phillipines
	New World Monkeys	Cebidae	11	29		The Americas
	Callimico	Collemiconidae	1	1		Peru, Columbia
	Marmosets, Tamarins	Callitrichidae	4	14		Panama, South America
	Old World Monkeys	Cercopitheidae	6	60		Eurasia
	Great Apes	Pangidae	4	8		Africa, South East Asia
	Humans	Hominidae	1	1		Worldwide
<b>Edentata</b>	Anteaters	Mermecophagidae	3	4		Central and South America
	Sloths	Bradypodidae	2	6		Central and South America
	Armadillos	Dasypodidae	9	21		Americas
<b>Pholidota</b>	Pangolins, Scaly Anteaters	Manidae	1	8		Africa, South East Asia
<b>Tubulidentata</b>	Aardvark	Orycteropodidae	1	1		Africa
<b>Largomorpha</b>	Pikas	Ochotonidae	1	14		North America, Europe, Asia
	Hares, Rabbits	Leporidae	8	50		Worldwide, since manmade introductions
<b>Rodentia</b>	Mountain Beaver, Savell	Aplodontidae	1	1		North America
	Beavers	Castoridae	1	2		North America
	Squirrels, Chipmonks,	Sciuridae	51	250		Worldwide except



	Marmots					Australia
	Scaly-tailed Squirrels	Anomaluridae	4	12		Africa
	Spring Hares	Peaetidae	1	1		Africa
	Rats, Mice, Voles, Gerbils, Hamsters, etc	Muridae	195	1000		Worldwide since introductions to Australasia
	Dormice	Gliridae	7	12		Africa, Asia, Europe
	Bamboo Rats, African Mole Rats	Rhizomyidae	3	6		Africa, South East Asia
	Birch Mice, Jumping Mice	Zapodidae	4	11		North America, Eurasia
	Jerboas	Dipodidae	10	27		North Africa, Arabia, Asia Minor, China
	Pocket Mice, Kangaroo Rats	Heteromyidae	5	75		America
	Pocket Gophers	Geomyidae	5	40		America
	Mole Rats	Spalacidae	1	3		Europe
	Old World Porcupines	Hystricidae	4	12		Africa, Europe, Asia, Phillipines
	New World Porcupines	Erethizontidae	4	8		America
	Guinea Pigs, etc	Cariidae	5	12		South America
	Capybara	Hydrachoeridae	1	1		South America
	Agoatis	Dasypractidae	2	9		Central and South America
	Pacas	Cuniculidae	1	2		Central and South America
	Chinchillas, Viscachas	Chinchillidae	3	5		Argentina
	Hutias, Nutria	Capromyidae	4	12		South

						America
	Octodonts, Degu, Tucu Tucos	Octodontidae	6	35		South America
	Chinchilla Rats	Abrocomidae	1	2		South America
	Spring Rats	Echimyidae	14	40		South America
	Cane Rats, Grasscutters	Thryonomyidae	1	6		South Africa
	Dassie Rate	Petromyidae	1	1		South Africa
	Blesmols, Mole Rats	Bathyergidae	5	20		Africa
<b>Carnivora</b>	Gundis	Ctenodactylidae	4	6		Africa
	Dogs, Wolves, Foxes, Jackals	Canidae	14	35		Worldwide
	Bears	Ursidae	4	8		Worldwide except Australia
	Racoons, etc	Procyonidae	7	18		America
	Weasels, Otters, Skunks, Badgers	Mustelidae	25	70		Worldwide except Australia
	Mongoosees, Civets, Genets, etc	Viverridae	36	75		Worldwide except Australia
	Hyena, Aardwolf	Hyaenidae	3	4		Africa, Asia, India
	Cats	Felidae	2	35		Worldwide except Australia
<b>Pinnipedia</b>	Eared Seals, Sea Lions	Otariidae	5	14		Worldwide coastlines only
	Walrus	Odobenidae	1	1		Atlantic, Pacific, Arctic Regions
	Seals	Phocidae	10	19		Most seas/oceans, Lake Baikal
<b>Mysticeti</b>	Right Whales	Balaenidae	2	3		All oceans

	Grey Whales	Eschirichtiidae	1	1		North Pacific
	Rorquals	Balaenapteridae	2	6		All oceans
<b>Odontoceti</b>	Beaked Whales	Ziphiidae	6	18		All oceans
	Narwhal, Beluga	Monodontidae	2	2		Arctic ocean
	Sperm Whales	Physeteridae	2	3		All oceans
	River Dolphins	Ptotanistidae	4	4		Rivers in India and China
	Porpoises	Phocaenidae	3	7		Northern oceans
	Ocean Dolphins	Delphinidae	15	30		All oceans, and some rivers and estuaries
<b>Sirenia</b>	Manatees	Trichechidae	1	3		Sub-tropical Atlantic coasts and rivers
	Dugongs	Dugongidae	1	1		Indo-Pacific coastal waters
<b>Proboscidae</b>	Hyraxes	Procariidae	3	11		Africa, Middle East
	Elephants	Elephantidae	2	2		Africa, South East Asia, India
<b>Perissodactyla</b>	Horses, Zebras, Asses	Equidae	1	7		Africa, Middle East, South East Asia
	Tapirs	Tapiridae	1	4		South East Asia, South America
	Rhinoceroses	Rhinocerotidae	4	5		Africa, India, South Asia
<b>Artiodactyla</b>	Pigs	Suidae	5	8		Europe, Africa, Asia (introduced to America and Australia)

	Peccaries, Javelinas	Tayassuidae	2	3		America
	Hippopotamuses	Hippopotamidae	2	2		Africa
	Camels	Camelidae	3	6		Asia, North Africa, South America
	Chevrolains, Mouse Deer	Tragulidae	2	4		South East Asia, India, Africa
	Deer, etc	Cervidae	11	37		Worldwide
	Giraffes	Giraffidae	2	2		Africa
	Cattle, Sheep, Goats, Antelopes, etc	Bovidae	40	110		Worldwide, except Australis and the Poles

From: <http://www.earthlife.net/mammals/families.html>

Kingdom     Animalia  
 Phylum    Chordata  
 Subphylum Vertebrata  
 Class       Mammalia  
 Subclass    **Prototheria** or Monotremes (2 species)  
               **Metatheria** or Marsupials (275 species)  
               **Eutheria** or placental mammals (3982 species)

There are about 4260 species of mammals known on this planet at the moment, though taxonomists are still arguing.

Mammals are not the most speciose animal group on the planet, three other groups of vertebrates out-number them at the moment, Reptiles 6787 species, Birds 9703 species and Fishes with approximately 28000 species. Invertebrates, of course, have groups with huge numbers of species that outnumber all the vertebrates put together; Molluscs 80 000 and Insects 1 000 000; while Arachnids with a mere 44 000 species still outnumber any 3 groups of vertebrates put together.

<http://www.earthlife.net/mammals/welcome.html>

<http://www.earthlife.net/mammals/mammal.html>

The **eastern gray squirrel** or **grey squirrel** (depending on region) (*Sciurus carolinensis*) is a **tree squirrel** in the genus *Sciurus* native to the **eastern** and **midwestern United States**, and to the southerly portions of the eastern provinces of Canada. The native range of the eastern gray squirrel overlaps with that of the **fox squirrel** (*Sciurus niger*), with which it is sometimes confused, although the core of the fox squirrel's range is slightly more to the west.

[http://en.wikipedia.org/wiki/Eastern\\_gray\\_squirrel](http://en.wikipedia.org/wiki/Eastern_gray_squirrel)

- **Kingdom:** [Metazoa](#) (=Animalia) multicellular animals)
- **Phylum:** [Chordata](#) (chordates)
- **Class:** [Mammalia](#) (mammals)
- **Order:** [Rodentia](#) (rodents)
- **Family:** [Sciuridae](#) (squirrels)
- **Genus:** [Sciurus](#)
- **Species:** *Sciurus carolinensis*
- **Common Names:** Eastern Gray Squirrel, Eastern Grey Squirrel

[http://www.floridanature.org/species.asp?species=Sciurus\\_carolinensis](http://www.floridanature.org/species.asp?species=Sciurus_carolinensis)

Taxonomy of bears

<http://www.americanbear.org/evolution%20-%20taxonomy.htm>

Taxonomy is a hierarchical system for classifying and identifying organisms. This system was developed by Swedish scientist [Carolus Linnaeus](#) in the 18th century.

Keep Plates Clean Or Family Gets Sick.

King Phillip Came Over For Good Spaghetti

Kingdom, Phylum, Class, Order, Family, Genus, and Species.

Classification					
	<b>Brown Bear</b>	<b>House Cat</b>	<b>Dog</b>	<b>Killer Whale</b>	<b>Wolf</b>
<b>Kingdom</b>	Animalia	Animalia	Animalia	Animalia	Animalia
<b>Phylum</b>	Chordata	Chordata	Chordata	Chordata	Chordata
<b>Class</b>	Mammalia	Mammalia	Mammalia	Mammalia	Mammalia
<b>Order</b>	Carnivora	Carnivora	Carnivora	Cetacea	Carnivora
<b>Family</b>	Ursidae	Felidae	Canidae	Delphinidae	Canidae
<b>Genus</b>	<i>Ursus</i>	<i>Felis</i>	<i>Canis</i>	<i>Orcinus</i>	<i>Canis</i>
<b>Species</b>	<i>Ursus arctos</i>	<i>Felis catus</i>	<i>Canis familiaris</i>	<i>Orcinus orca</i>	<i>Canis lupus</i>

<http://biology.about.com/od/evolution/a/aa092304a.htm>

Brown bears include

*Ursus arctos californicus* –California golden bear (extinct)

*Ursus arctos horribilis* –Grizzly bear

*Ursus arctos middendorffi*– Kodiak bear

And other subspecies from around the world: [http://en.wikipedia.org/wiki/Brown\\_bear](http://en.wikipedia.org/wiki/Brown_bear)

*Ursus americanus*--American black bear: [http://en.wikipedia.org/wiki/American\\_black\\_bear](http://en.wikipedia.org/wiki/American_black_bear)

*Ursus maritimus*--polar bear: [http://en.wikipedia.org/wiki/Polar\\_bear](http://en.wikipedia.org/wiki/Polar_bear)

**Classification of *Ursus americanus*, the American black bear:** Kingdom: Animal, Phylum: Chordata, Class: Mammalia, Subclass: Theria, Infraclass: Eutheria, Order: Carnivora, Suborder: Fissipedia, Family: Ursidae, Subfamily: Ursinae (all bears except the giant panda and the spectacled bears), Genus: *Ursus*, Subgenus: *Euarctos*, Species: *americanus*.

Taxonomists generally separate black bears into 16 subspecies based on minor differences in appearance and DNA.

*Ursus americanus altifrontalis* (Pacific Northwest)

*U. a. amblyceps* (Southwestern US)

*U. a. americanus* (widespread from Alaska to the Atlantic)

*U. a. californiensis* (interior California)

*U. a. carlottae* (Queen Charlotte islands of British Columbia)

*U. a. cinnamomum* (WY, eastern CO, ID, western MT, southwestern Alberta, southeastern British Columbia)

*U. a. emmonsii* (coastal AK from Glacier Bay to Prince William Sound)

*U. a. eremicus* (northeastern Mexico and the Big Bend area of Texas)

*U. a. floridanus* (FL, southern GA, southern AL)

*U. a. hamiltoni* (Newfoundland)

*U. a. kermodei* (portion of coastal BC)

*U. a. luteolus* (southern LA, and southern MS)

*U. a. machetes* (northwestern Mexico)

*U. a. perniger* (Kenai Peninsula of AK)

*U. a. pugnax* (southeastern Alaska)

*U. a. vancouveri* (Vancouver Island).

Taxonomists update subspecies classifications as they learn more about regional differences in DNA, body form, and behavior.

Black bear

[http://216.27.49.98/fs\\_index\\_07\\_conservation.htm](http://216.27.49.98/fs_index_07_conservation.htm)

<http://www.earthlife.net/mammals/mammal.html>

[http://www.bear.org/Black/Black\\_Bear\\_Facts.html](http://www.bear.org/Black/Black_Bear_Facts.html)

[http://216.27.49.98/pg06\\_CoexistingWildlife/pg6a1\\_blackbear.pdf](http://216.27.49.98/pg06_CoexistingWildlife/pg6a1_blackbear.pdf)

<http://wdfw.wa.gov/living/bears.html>

A comprehensive report of keeping safe with bears in the back country and of their biology.

<http://www.merckmedicus.com/medical-media-library/#?f2=107.2&f4=en&q=heart+comparative+anatomy&s=4&f0=-1&sps=1>

[http://en.wikibooks.org/wiki/Scouting/BSA/Mammal\\_Study\\_Merit\\_Badge](http://en.wikibooks.org/wiki/Scouting/BSA/Mammal_Study_Merit_Badge)

[http://members.relia.net/thedane/mammal\\_passport.pdf](http://members.relia.net/thedane/mammal_passport.pdf)



## Nature Merit Badge

Scouts must bring all written homework to class to receive credit.

### Before class:

1. Scouts must Be Prepared by completing **requirements 1, 2 and 3** at home and by bringing written results with them to class.

Check out:

<http://ncagr.gov/plantindustry/plant/plantconserve/plist.htm>

[http://www.fws.gov/raleigh/es\\_tes.html](http://www.fws.gov/raleigh/es_tes.html)

<http://www.ncwildlife.org/Conserving/Species.aspx>

Define food chain.

Please read the handout for Mammal Study Merit Badge that is appended to this flyer for information on mammal food chains

See <http://www.teara.govt.nz/en/diagram/11628/freshwater-food-web> and other sources for information on water food chains.

### During class:

2. Scouts will work on **requirement 4** during class. If you have specimens you have collected at home, please bring those to class to show your counselor

### After class:

3. Scouts will need to complete requirement 4 at home. Scouts can then schedule a follow-up visit with the Merit Badge Counselor to review notes and specimens to confirm completion and to sign off the blue card indicating completion.





## Reptile and Amphibian Study Merit Badge

Scouts must bring all written homework to class to receive credit.

### **Before class:**

1. Scouts must Be Prepared by completing **requirements 1, 7, 10** at home and by bringing written results with them to class.
2. Each Scout must prepare his talk for **requirement 9c** before class and come prepared to give his talk to the class.

### **During class:**

1. Scouts will complete **requirements 3, 4, 5, 6, 9b, and 9c**. Scouts will deliver their speeches for 9c during class.
2. Scouts will discuss with the Merit Badge Counselor how they will complete **requirement 8** during the class.

### **After class:**

1. Scouts can complete **requirement 8** in cooperation with Discovery Place Nature staff.

**Note from Discovery Place Nature:**

*Please be aware of the longevity of, and needs of, reptiles and amphibians (as well as other animals) before purchasing them for requirement 8a. Pets are a huge responsibility and should not be purchased to fill a short term requirement. In addition, ecosystems are delicate. Releasing of any animal into the wild can cause an imbalance that could be detrimental to the health of a habitat, area, or ecosystem. Discovery Place Nature does not condone the purchasing of a reptile or amphibian specifically for the short term observation requirement **UNLESS THAT ANIMAL WILL BE TAKEN CARE OF FOR THE LIFESPAN OF THE ANIMAL** (which, in case of turtles, could be 30 to 60 years). We also do not condone the release of purchased animals into the wild, nor the capture and release of native or wild species for the purpose of this requirement. Because of these concerns, Discovery Place Nature will be happy to work with Scouts to help them satisfy this requirement by granting temporary admission upon request for observation of our reptiles and amphibians (8b).*