

Module 3: Animal Features are Bone Deep

By the Archbold Biological Station Education Department, 2013
with support from the Southwest Florida Water Management District

At a Glance

Students work in groups to complete a skull matching activity after watching a video about mammal skull features.

Directions

1. Introduce the lesson.
2. Students watch “Animal Features are Bone Deep” video and (optional) complete accompanying worksheet.
3. Divide students into small groups and hand out supplies. Each group needs a full set of skull illustration cards and mammal skull photo cards. Show the first slide of the Skull ID PowerPoint and leave it up during the matching activity.
4. Students work together in groups to match their skull photos with the proper skull illustrations.
5. As a class, use the Skull ID PowerPoint presentation to review the answers. Read the species facts aloud from the skull illustration cards.

Learning Goals

- Emphasize the importance of observation and comparison in learning and in the practice of science.
- Introduce basic concepts of comparative vertebrate anatomy.
- Show that specific skull features such as eye placement, tooth type and size, and brain size are related to function and these features are adaptations, or adjustments in the animal’s body and behavior that make it better fit for survival in its environment.
- Show that skulls from different kinds of animals can share similar features and skulls can be grouped according to these similarities. (Herbivores, carnivores, omnivores, insectivores)
- Demonstrate how a combination of certain skull features can help identify specific animal species.
- Highlight natural history information about 8 animals that live in Florida; the Black Bear, Bobcat, White-tailed Deer, Virginia Opossum, Nine-banded Armadillo, Coyote, Raccoon, and Cottontail Rabbit.

LENGTH

1 hour prep
8 min video
45 minute activity

MATERIALS

Video
Print-outs
Skull ID PowerPoint

Key Vocabulary

Vertebrate
Invertebrate
Mammals
Adaptations
Carnivore
Herbivore
Omnivore
Insectivore
Predator
Prey
Molar
Canine
Incisor

GOING FURTHER

Students draw or sculpt skulls from real or imagined creatures

Compare skulls of other animals

NEXT GENERATION FLORIDA SUNSHINE STATE STANDARDS

SC.3.N.1.1
SC.3.N.1.6
SC.3.L.15.1
SC.4.N.1.1
SC.4.L.16.3
SC.5.E.5.3
SC.5.L.17.1

Background Information For Teachers

Comparing Skull Features	
<p>Position of the Eyes</p> <ul style="list-style-type: none"> - Herbivores, like rabbits and deer, have eyes on the side of the head, giving them a wide field of view and making it easier to see predators. - Carnivores, such as bobcats, have eyes that aim forward (binocular vision) because they need to determine exact distance for pursuing prey. - “Eyes up front, likes to hunt. Eyes on the side, like to hide” can be a helpful tool in most cases. - The larger the eye sockets in relation to the skull, the better the eyesight. 	<p>Size of Brain Cavity</p> <ul style="list-style-type: none"> - Large brain size compared to the skull size (raccoon) means the animal is more adaptable and has a greater ability to learn. - Small brain size compared to the skull size (opossum) means the animal is less adaptable and has less ability to learn.
<p>Skull Features of Herbivores</p> <ul style="list-style-type: none"> - Sharp front teeth for cutting and ripping off vegetation. - Teeth in front for grooming and biting off parts of plants. - Huge gap between front teeth and grinding teeth so the tongue can move food around when they chew. - Big rear molars to grind up tough plant material. - Eyes on the sides of their head to look out for predators. This creates a blind spot in front, but a well-developed sense of smell helps overcome this handicap. 	<p>Skull Features of Carnivores</p> <ul style="list-style-type: none"> - Very long/sharp upper and lower fangs (canine teeth) for killing prey. - Sharp cutting side teeth that carve off chunks of meat to be swallowed whole. - Small grooming teeth in front. - Eyes face forward, giving it accurate distance perception (binocular vision) for seeing and pursuing active prey. - Large brain relative to skull and contained in the round back part of the skull.
<p>Skull Features of Omnivores</p> <ul style="list-style-type: none"> - Combination of both herbivore and carnivore characteristics give them a wider choice of food selection. - Long pointed teeth for catching prey. - Sharp, scissor-like teeth for shearing meat. - Rounded teeth for grinding and crushing plant material (fruits, berries, and soft plant tissue) 	<p>Skull Features of Insectivores</p> <ul style="list-style-type: none"> - Narrow snout, long skull. - Tiny peg-like molars. - Small eye sockets (rely on smell, hearing and touch).
<p>Additional Resources</p> <ul style="list-style-type: none"> - Mammals of Florida, American Society of Mammalogists: www.mammalsociety.org/mammals-florida - Florida Mammals Guide: www.wildflorida.com - Smithsonian National Museum of Natural History (mammal section): http://www.mnh.si.edu/mna/main.cfm 	

Evaluation

School/Date:

Teacher/Grade:

of Students:

VIDEO WORKSHEET SCORES

Write the number of students that achieved each score.

Score (Questions Answered Correctly)	Number of Students		Score (Questions Answered Correctly)	Number of Students
1/10			6/10	
2/10			7/10	
3/10			8/10	
4/10			9/10	
5/10			10/10	

SKULL MATCHING ACTIVITY

Checkmark for correct answers and "X" for mismatches

Student Groups	Skull 1	Skull 2	Skull 3	Skull 4	Skull 5	Skull 6	Skull 7	Skull 8
Group 1								
Group 2								
Group 3								
Group 4								
Group 5								

If your class is visiting Archbold Biological Station, please bring us this evaluation. Thank you.

Animal Features are Bone Deep

Student Video Worksheet

Find the answers while watching the video.

EARTH (Finish the sentence)

1. The Earth is a great place for life. Overall, it's not too hot or cold and has plenty of

DOGS AND CATS (Finish the sentence)

2. Every animal is like its parents and siblings but it is also ...

VERTEBRATES AND INVERTEBRATES (Finish the sentence)

3. Animals are classified as vertebrates if they have a ...

ANIMAL GROUPS (Finish the sentence)

4. Each animal group shares certain traits. Humans and manatees are mammals, so both produce ...

PREDATOR (Circle the answer)

5. Most predators have eyes on the (front) (side) of their face.

PREY (Circle the answer)

6. Most prey animals have eyes on the (front) (side) of their face.

Match The Animal Types With Their Diet

- | | |
|----------------------|-------------------------|
| 7. Herbivore _____ | A: Eats plants and meat |
| 8. Omnivore _____ | B: Eats plants |
| 9. Insectivore _____ | C: Eats meat |
| 10. Carnivore _____ | D: Eats insects |

Animal Features are Bone Deep

Teacher Answers to Video Worksheet

Find the answers while watching the video.

EARTH (Finish the sentence)

1. The Earth is a great place for life. Overall, it's not too hot or cold and has plenty of ... **water.**

DOGS AND CATS (Finish the sentence)

2. Every animal is like its parents and siblings but it is also ... **unique** or **different.**

VERTEBRATES AND INVERTEBRATES (Finish the sentence)

3. Animals are classified as vertebrates if they have a ... **back bone** or **spine**

ANIMAL GROUPS (Finish the sentence)

4. Each animal group shares certain traits. Humans and manatees are mammals, so both produce ... **milk.**

PREDATOR (Circle the answer)

5. Most predators have eyes on the **(front)** (~~side~~) of their face.

PREY (Circle the answer)

6. Most prey animals have eyes on the (~~front~~) **(side)** of their face.

Match The Animal Types With Their Diet

7. Herbivore __ **B** _____

A: Eats plants and meat

8. Omnivore __ **A** _____

B: Eats plants

9. Insectivore __ **D** _____

C: Eats meat

10. Carnivore __ **C** _____

D: Eats insects

Mammal Skull Teacher Answer Sheet



Skull 1: Black Bear



Skull 5: Nine-banded Armadillo



Skull 2: Bobcat



Skull 6: Coyote



Skull 3: White-tailed Deer



Skull 7: Raccoon



Skull 4: Virginia Opossum

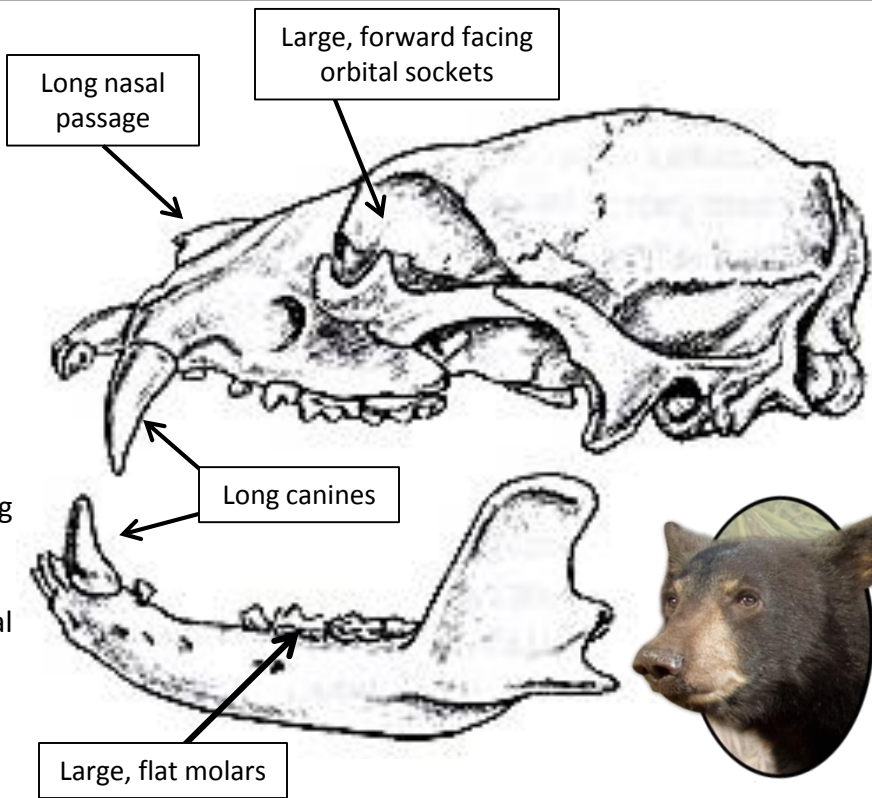


Skull 8: Cottontail Rabbit

Keep in Mind: These are photographs of real skulls found in the wild. Skulls found in the wild are often missing jaws, teeth, and other parts.

Black Bear
Ursus americanus

- Omnivore that eats insects (including honey bee larvae), berries, acorns, armadillos, grasses, etc.
- Excellent sense of smell
- Sharp claws good for climbing trees and digging
- Florida's largest land mammal
- Cars are its #1 killer

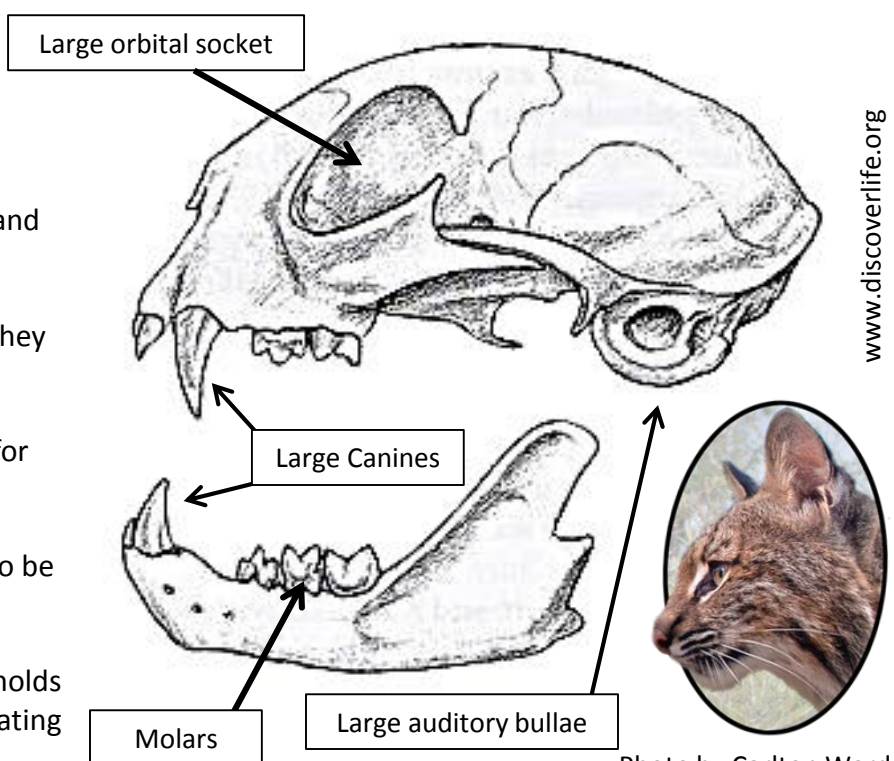


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Photo by Carlton Ward

Bobcat
Lynx rufus

- Strict carnivore, eating mainly small mammals (rabbits, rats, and mice)
- Will eat deer, birds, or hogs if they can catch them
- Travels long distances to hunt for food
- Both males and females tend to be solitary
- Has large auditory bullae that holds the middle and inner ear, indicating an acute sense of hearing



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Photo by Carlton Ward

White-tailed Deer

Odocoileus virginianus

- Herbivore that eats mostly plant material such as flowers, leaves, shoots, and grasses
- Will sometimes eat acorns, corn, and cacti
- Uses scent marking to communicate with other deer, signaling presence of predators and to mark territories
- Less well-developed sense of hearing, but has large ears
- Predators that hunt deer in Florida include panthers and alligators

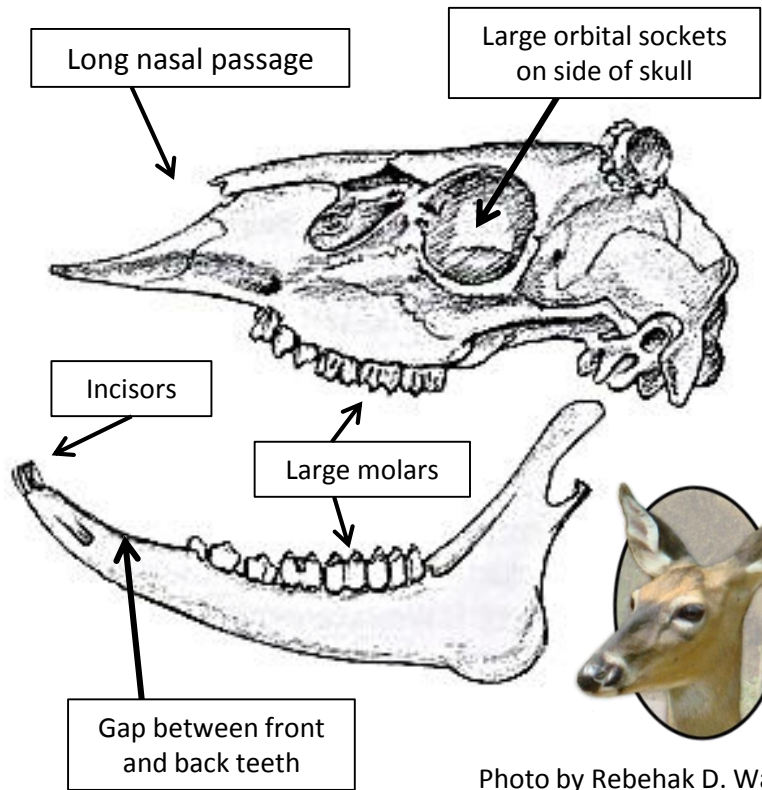


Photo by Rebehak D. Wallace

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Virginia Opossum

Didelphis virginiana

- Omnivore that eats insects, frogs, birds, fruits, seeds, snakes, grasses, earthworms, and road kills
- A marsupial, meaning it has a pouch where young opossums stay until old enough to survive outside
- Will "play dead" when threatened or harmed
- Small braincase indicates it is less adaptable and has less ability to learn.

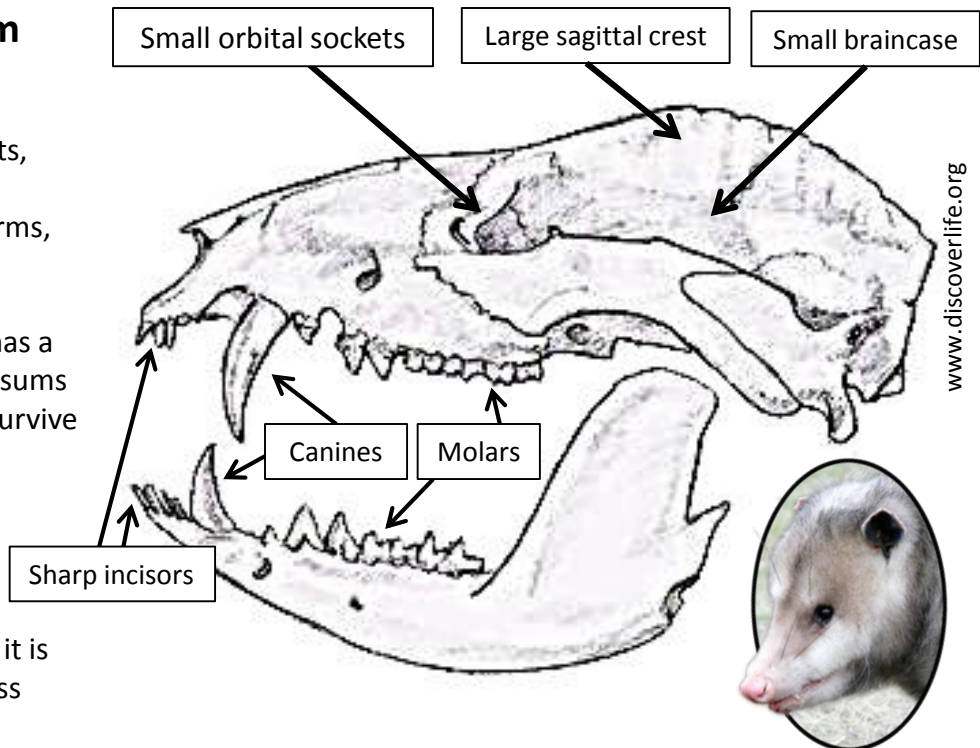


Photo by William Krause

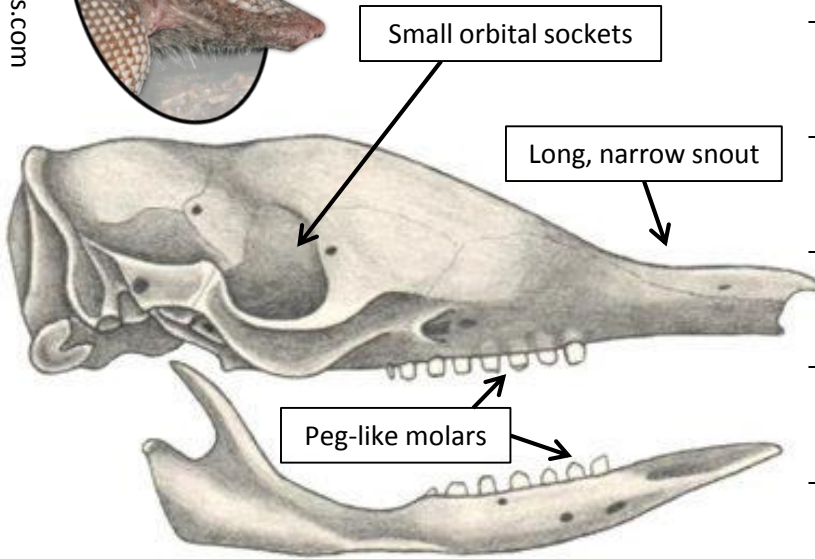
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Birdphotos.com



Nine-banded Armadillo

Dasyus novemcinctus



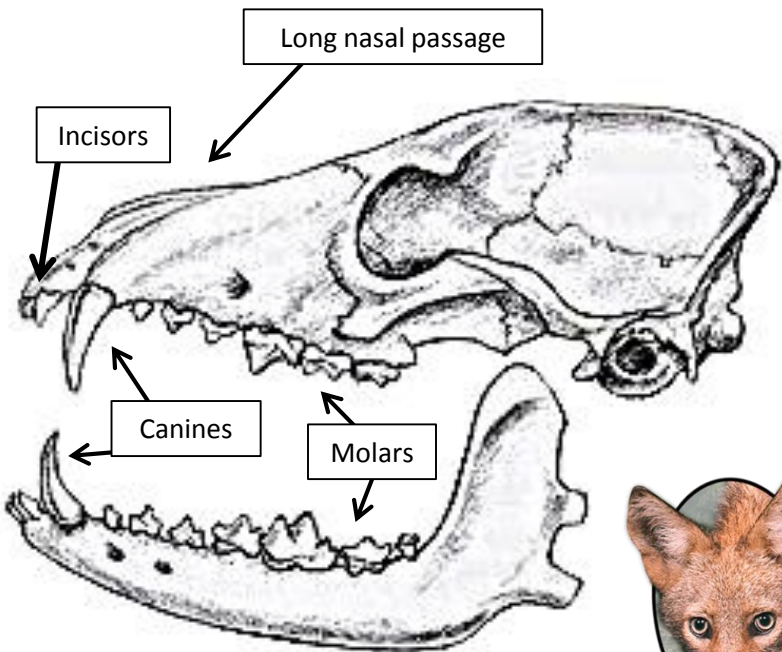
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- Eats large amounts of ants, beetle larvae, termites, and other insects
- Spends much of its time digging for insects buried in leaf litter and soil
- Poor eyesight, relies mostly on hearing
- Long narrow snout suggests keen sense of smell
- Is hunted by predators such as coyotes, bobcats, and panthers
- Boney body plates provide protection

Coyote

Canis latrans

- Omnivore that eats mostly small mammals such as rabbits, squirrels, rats, and mice, but will also eat birds, reptiles, insects, fruits, and vegetables.
- Live in small packs of several adults and young
- Mostly nocturnal
- Hunts for mice by slowly walking through grass with nose to the ground, smelling for prey



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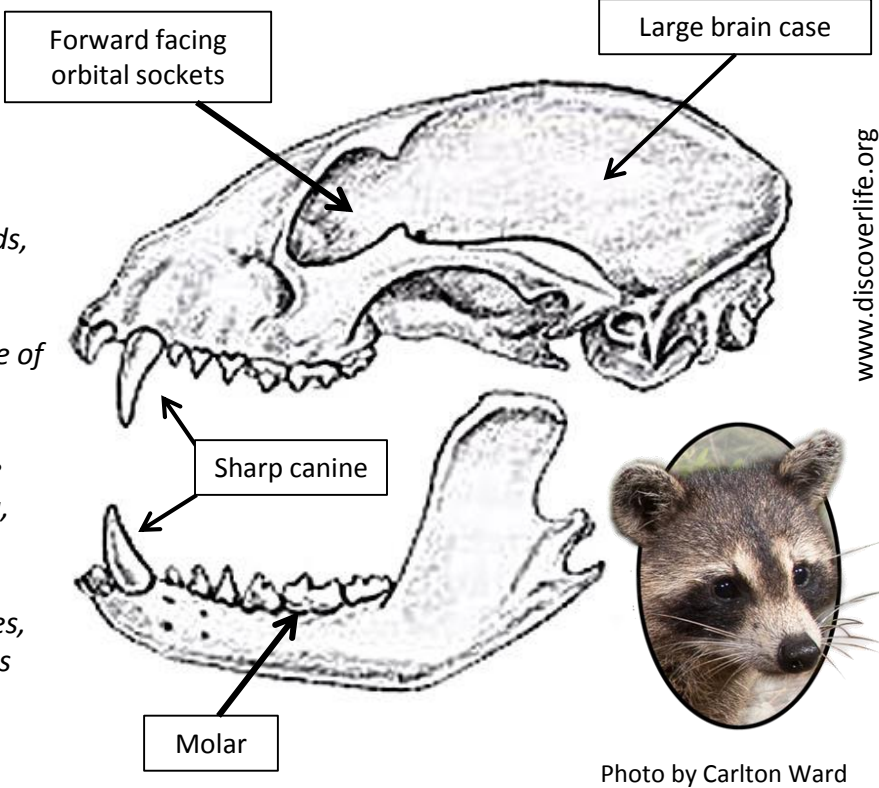


Photo by Carlton Ward

Raccoon

Procyon lotor

- Omnivore that eats just about anything it can find; road kills, garbage, frogs, turtles, eggs, birds, insects, and mice
- Have a very well developed sense of touch
- Is nocturnal and hides during the day in a den such as a hollow log, pile of brush, or in trees
- Predators can be bobcats, coyotes, panthers, and Great Horned Owls
- Large brain case means it has a greater ability to learn.

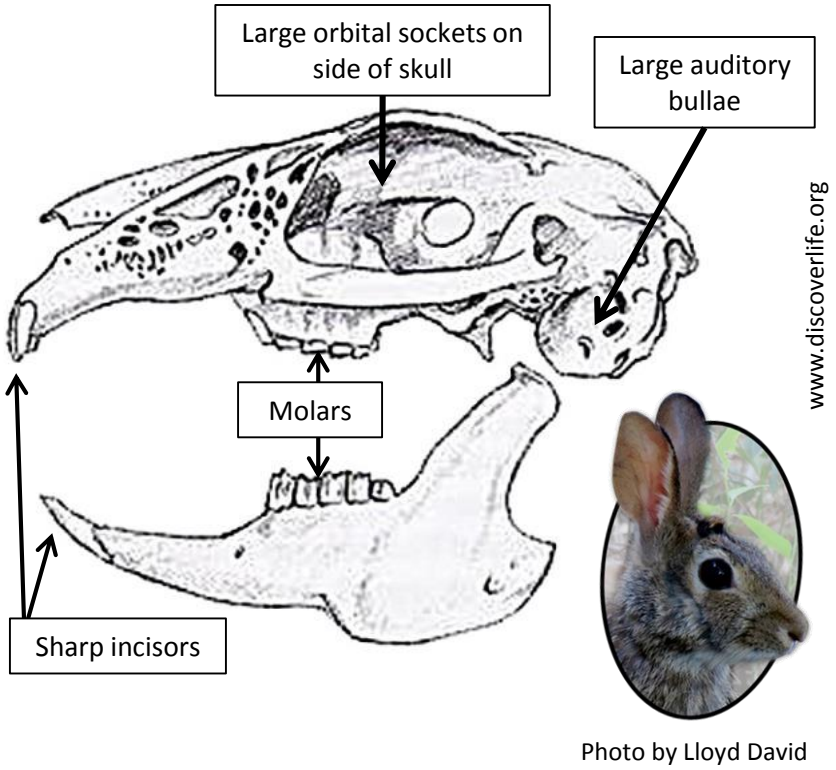


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Cottontail Rabbit

Sylvilagus floridanus

- Herbivore that feeds mostly on grasses, plant buds, leaves, and bark
- Has very good eyesight and hearing
- Freezes when danger approaches, but will run quickly and erratically if a predator gets too close
- Is nocturnal and mostly hides during the day
- Predators include coyotes, foxes, owls, hawks, and snakes



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Mammal Skull Photo Cards

Skull 1



12"

Archbold Biological Station

Skull 3



9 1/4"

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Skull 2



4 1/2"

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Skull 4



4 3/4"

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Mammal Skull Photo Cards

Skull 5



Archbold Biological Station

Skull 6



Archbold Biological Station

Skull 7



Archbold Biological Station

Skull 8



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