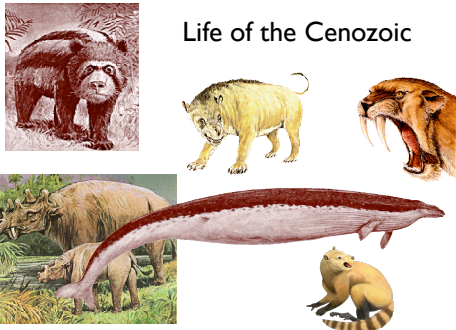


### Life of the Cenozoic



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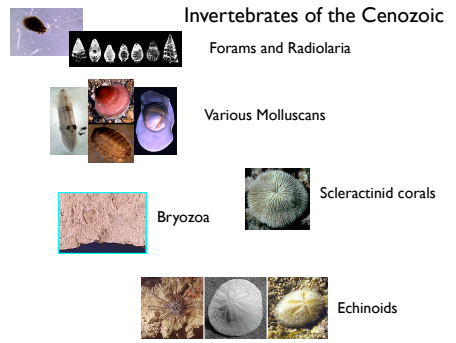
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### Invertebrates of the Cenozoic



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### Various Terrestrial Aspects of Life

- Dominance of flowering plants (Angiosperms)
- Widespread appearance of grasses - SAM (Olig) - Rest World (Miocene)
- Giant 60 foot long crocodilian
- Dinosaur-like crocodiles that were terrestrial and bipedal
- Large carnivorous flightless birds in Paleogene
- Various radiations of placental mammals

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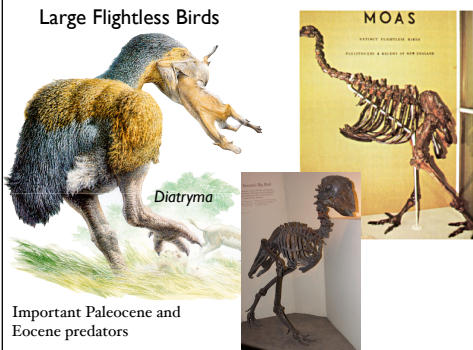
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### Large Flightless Birds



Important Paleocene and Eocene predators

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# The Warm Fuzzies

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**Allotherians**

Multituberculates were common in the late Mesozoic and survived into the Paleocene (though most went extinct at the end of the Cretaceous). They were the size of medium to small rodents and were the ecological equivalent of rodents.

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**Three remaining groups of mammals**

Prototheria	Eutheria	
Monotremes	Marsupials	Placentals
 <ul style="list-style-type: none"> <li>Milk sweated on chest</li> <li>Lay eggs</li> <li>Small brain</li> <li>Single opening for urethra, anus &amp; birth canal (cloaca)</li> </ul>	 <ul style="list-style-type: none"> <li>Mammary glands</li> <li>Live birth fetus</li> <li>Marsupium (pouch)</li> <li>Medium brain</li> <li>Anus separate from cloaca</li> </ul>	 <ul style="list-style-type: none"> <li>Live term birth</li> <li>Placenta</li> <li>Large brain</li> <li>Urethra, anus and birth canal all separate</li> </ul>

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**Monotremes - Cretaceous to Recent - Mainly New Zealand and Australia, but wider spread in the fossil record.**

*Platypus*      *Echidna*

Two living forms are toothless, but fossil forms had teeth.

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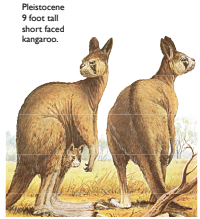
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**Marsupials - Cretaceous to Recent**  
 Mainly S.America and Australia, but found on other continents



Wide variety of herbivorous forms ranging from mouse-like to cow-like. Some were heavily built but others were graceful like gazelles.



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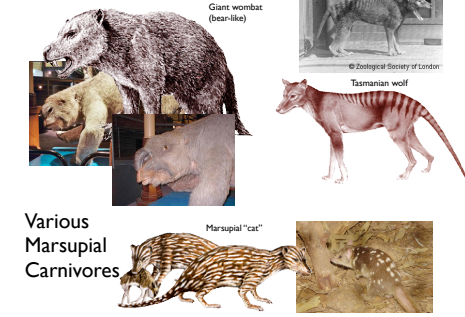
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**Marsupials**



**Various Marsupial Carnivores**

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The last known Tasmanian Wolf (1936)

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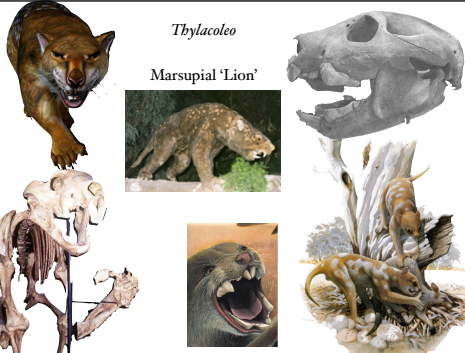
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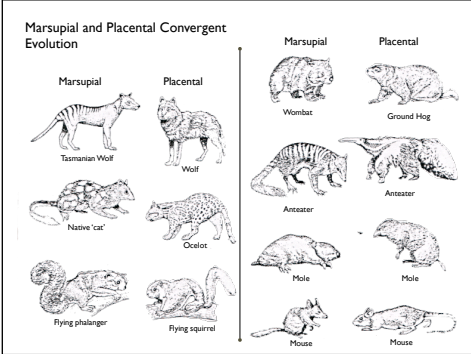
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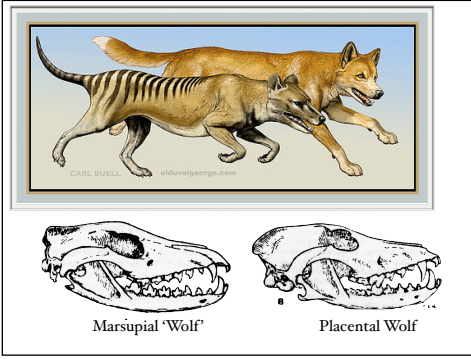
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**Placental Mammals** are the most numerous and successful mammals on the earth today.

There are many groups of placental mammals, most of which have living representatives, though many forms are now totally extinct. Many of the extinct forms, however, gave rise to modern groups, as we shall see.

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**“Insectivora”**  
Mid Cretaceous to Recent

Shrews - Hedgehogs - Moles

This now defunct order includes small voracious animals such as shrews. They will attack animals many times their sizes and are the only mammals with colored tooth enamel.



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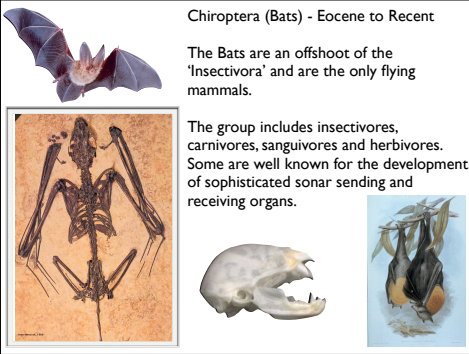
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Chiroptera (Bats) - Eocene to Recent

The Bats are an offshoot of the 'Insectivora' and are the only flying mammals.

The group includes insectivores, carnivores, sanguivores and herbivores. Some are well known for the development of sophisticated sonar sending and receiving organs.

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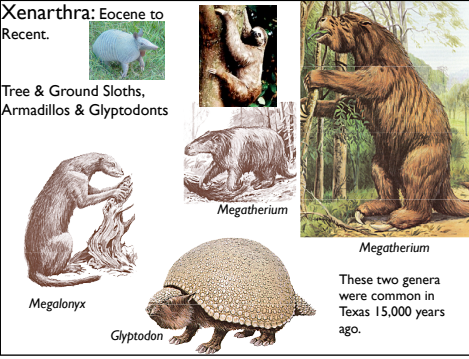
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**Xenarthra: Eocene to Recent.**



Tree & Ground Sloths, Armadillos & Glyptodonts

*Megatherium*

*Megatherium*

*Megalonyx*

*Glyptodon*

These two genera were common in Texas 15,000 years ago.

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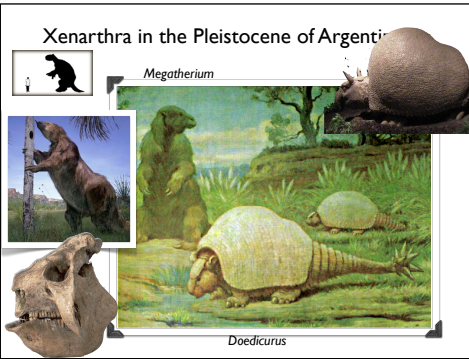
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**Xenarthra in the Pleistocene of Argentina**



*Megatherium*

*Doedicurus*

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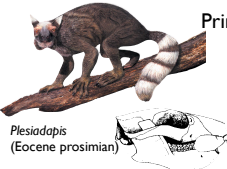


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**Primates: Cretaceous to Recent**

- large brains
- stereoscopic vision
- social
- arboreal

*Plesiadapis*  
(Eocene prosimian)

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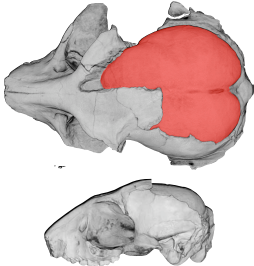
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*Rooneyia*  
35 ma Oligocene - Texas

One of the oldest known new-world monkeys.

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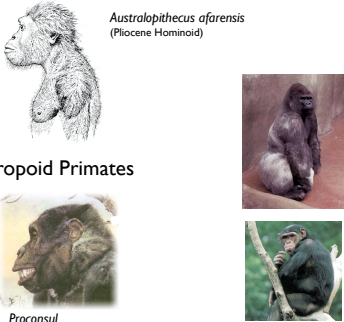
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**Anthropoid Primates**

*Australopithecus afarensis*  
(Pliocene Hominoid)

*Proconsul*  
(Miocene Anthropoid)

Living nonhominoid anthropoids



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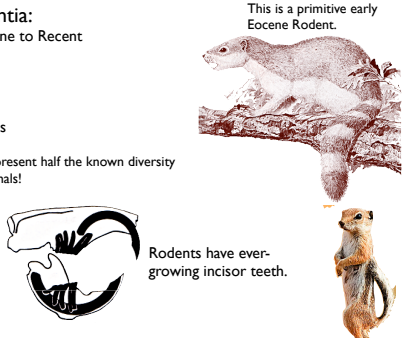
**Rodentia:**  
Paleocene to Recent

Mice  
Rats  
Beavers  
Squirrels

They represent half the known diversity of mammals!

This is a primitive early Eocene Rodent.

Rodents have ever-growing incisor teeth.



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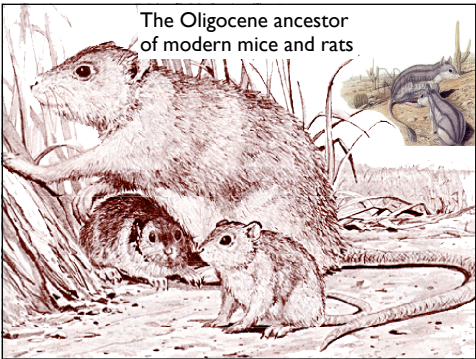
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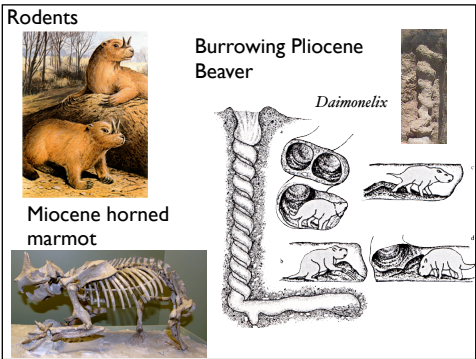
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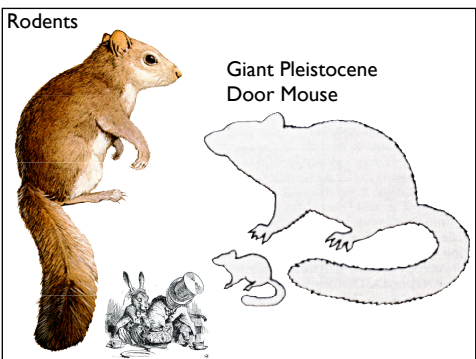
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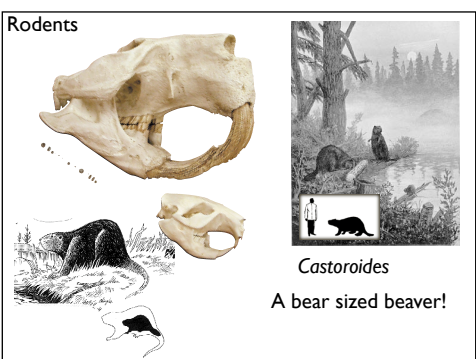
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Rodents

Largest modern rodent - *Capybara* of South America

29

Creodonts: Cretaceous to Pliocene. The oldest placental carnivores were convergent in many ways on modern Carnivora but were not ancestral to them.

*Oxyaena*

*Paleonictis*

30

Creodonts

A lion-sized hyaenodontid creodont

31

Creodonts

Giant Miocene Creodont

Tiger

32

carnassial tooth

**Carnivora:**  
Eocene to Recent

These are early primitive (Miacid) carnivores.

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**Carnivora**

The "Bear Dogs" (Amphicyonids - Eocene-Miocene) belonged to an extinct group of carnivores that lay close to the origins of the bears and dogs.

**Miocene**  
*Amphicyon*

Was the size of a modern grizzly bear.

**Oligocene**  
*Daphoenodon*

Was adapted for high speed running.

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**Carnivora**

*Canis dirus*

*Hesperocyon* was one of the very earliest dogs (Eocene).

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**Carnivora**

A Miocene Bear (Ursid)

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**Carnivora**

**Pleistocene Cave Bear** **Pliocene Giant Raccoon**

Restoration of a cave bear (*Ursus spelaeus*). This very large species was abundant in Europe during the Pleistocene ice ages and many died while hibernating in caves.

Restoration of Chapabatisia, a giant panda-like raccoon from the Pliocene of South America.

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*Arctodus* - common in Texas during the Pleistocene until about 12.5 ka.

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**Carnivora**

**Sea Lions**

Late Miocene

Early Miocene

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**Carnivora** **Felidae: The cats**

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Carnivora

Pleistocene Cave Lion

The American Lion (*Panthera atrox*)

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Carnivora

*Smilodon*

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Carnivora

Texas' Own *Homotherium*

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The largest group of large herbivorous placental mammals are the **Ungulates**, or 'hooved mammals'.

The most primitive group of Ungulates are the **Condylarths** which first appeared in the late Cretaceous(?) and vanished in the Eocene. More than likely this group is polyphyletic.

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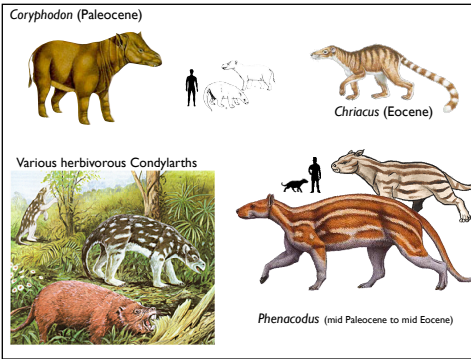
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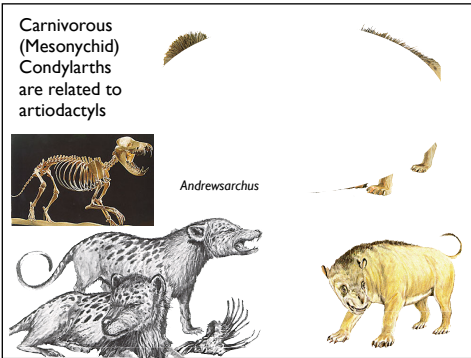
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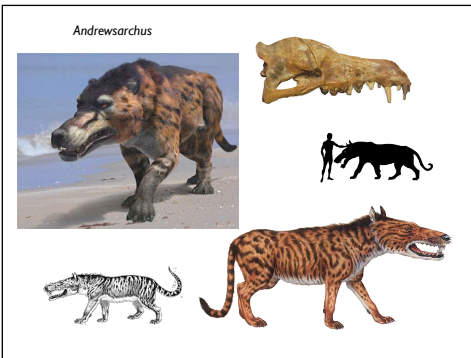
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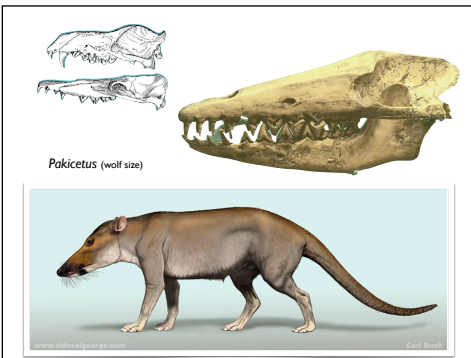
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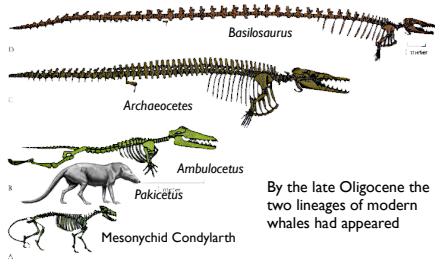
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**Cetaceans (Whales and Dolphins):**  
During the Eocene...



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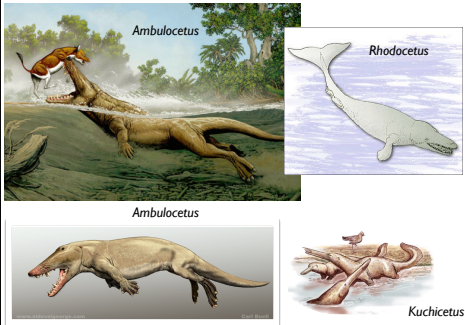
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**Cetaceans**



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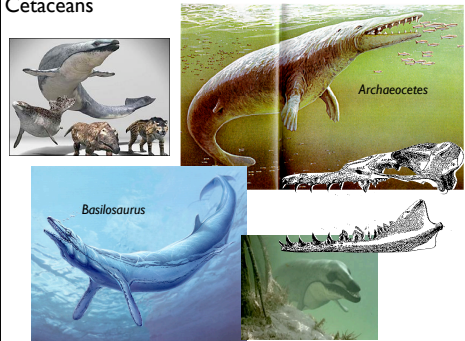
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**Cetaceans**



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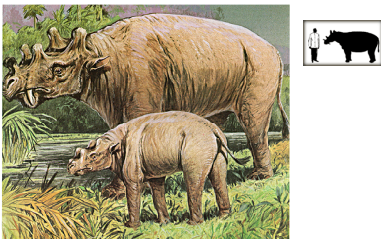
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There were several large-body, early Tertiary, Condylarth derivatives.



Uintatherium (Eocene) is one example of such forms.

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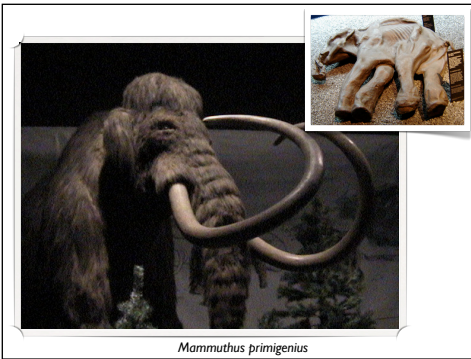
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*Mammuthus primigenius*

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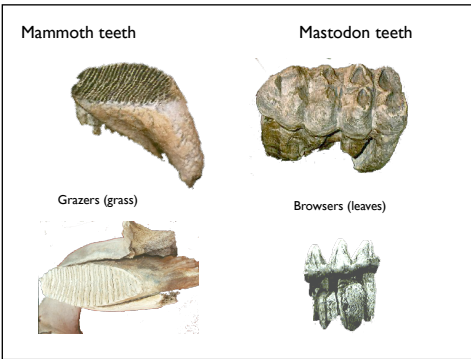
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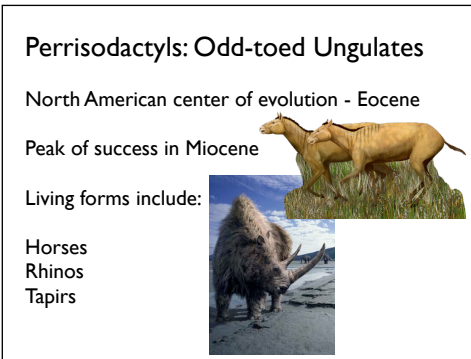
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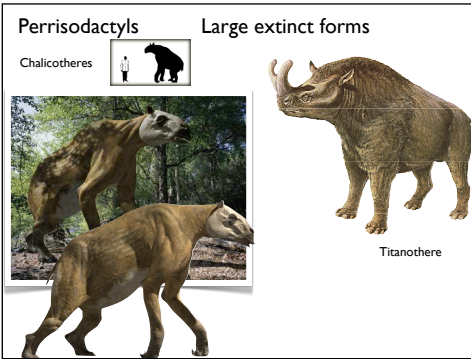
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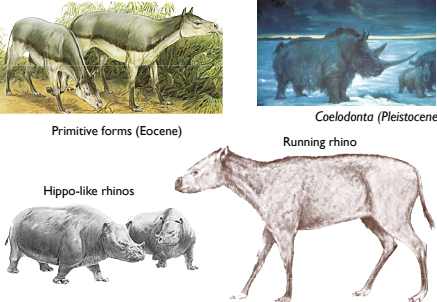
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**Perrisodactyls**      **Various Rhinoceroses**



Primitive forms (Eocene)      *Coelodonta* (Pleistocene)

Hippo-like rhinos      Running rhino

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*Coelodonta* (Pleistocene)

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**Perrisodactyls**

The oldest (Eocene) horse, *Hyracotherium*, about the size of a cocker spaniel.



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**Perrisodactyls**

Details of horse evolution

First terrestrial grasses.



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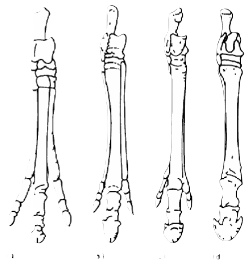
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**Perrisodactyls**

The largest terrestrial mammal

*Indrichotherium*

from the Oligocene of Asia.



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**Artiodactyls: Even-toed Ungulates**

Asia was center of evolution, probably from condylarths - Eocene

Includes modern forms such as:

- Hippos
- Giraffes
- Camels
- Cattle and relatives
- Deer and Elk
- Pigs
- Sheep and Goats



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*Hypsodus*

This rat-sized animal was either one of the last Condylarths or the oldest (Eocene) known Artiodactyl!

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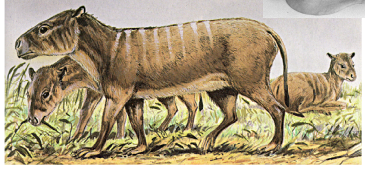
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Artiodactyls



Oreodonts, the most common early Tertiary artiodactyl. In places, herds of thousands were killed by volcanic eruptions.

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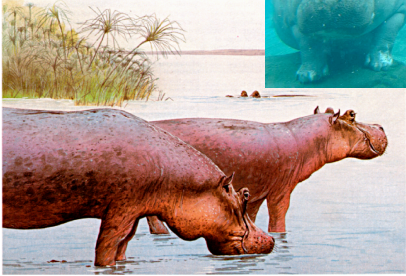
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Artiodactyls  
Hippos



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Artiodactyls  
Giraffes



Not all giraffes had long necks - this moose-like giraffe is from the Miocene of Africa.

*Sivatherium*

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Artiodactyls  
Camels

Camels have been very successful. They included giraffe-like forms and lama-like forms.



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**Artiodactyls**  
Deer and Elk

All forms here are Pleistocene

Irish Elk had a antler span of 10 feet. Most died at the end of the Pleistocene though a few survived in England for another thousand years.



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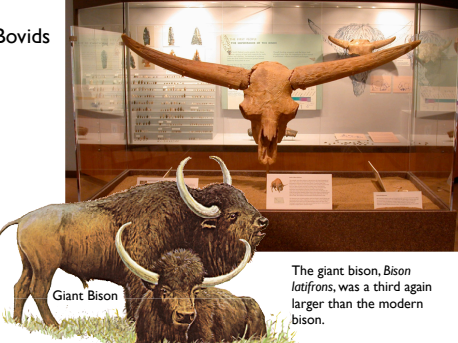
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**Bovids**

Giant Bison

The giant bison, *Bison latifrons*, was a third again larger than the modern bison.



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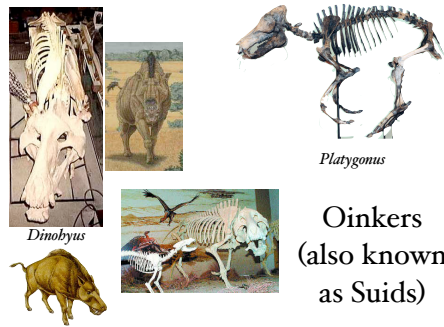
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*Dinobyus*

*Platygonus*

Oinkers  
(also known as Suids)



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**A few tableaux**



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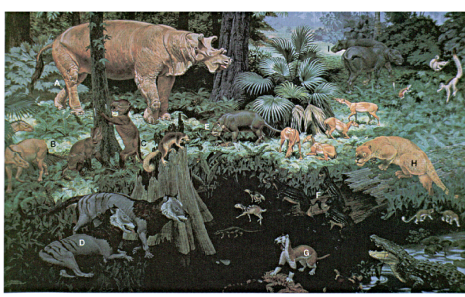
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Eocene

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Oligocene

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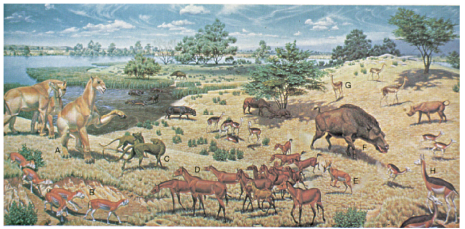
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Miocene

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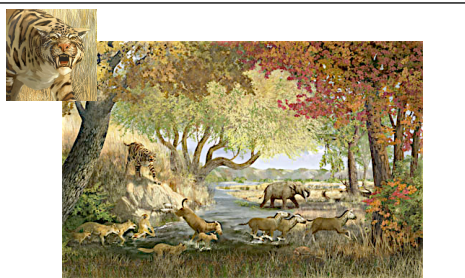
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Oklahoma in the Miocene

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## In Lieu of Fieldtrip

- Title: Geologic History of \_\_\_\_\_
- Length: Between 15 & 20 pages (not including figures, tables, references)
- Spacing: Double spaced
- Font: Times or Times New Roman - 12 point
- References: No web-based references - all from literature. No fewer than 10 references.
- Format: Microsoft Word or Apple Pages
- First Draft Deadline: April 1st
- Final deadline: April 29th

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