

November 28, 2022

## News and notes

Before going on to a look at mammals from the [Neogene Period](#), here are some news items that I thought were interesting.

### Geopolitics – China

- This might be the big story this week: [Protests erupt across China in unprecedented challenge to Xi Jinping's zero-Covid policy](#); what if the Communist Party of China loses the “[Mandate of Heaven](#)”?
- [More Bad News For Oil Demand As China's Covid Cases Soar](#).
- From Mining.com: [China actions spark Canada review of rules on foreign investment](#).

### Research

- Plate tectonics and petrology: [Low-degree melt metasomatic origin of heavy Fe isotope enrichment in the MORB mantle](#); Phys.org summary [here](#).
- India-Asia collision in the Cenozoic research: [Interplay between oceanic subduction and continental collision in building continental crust](#).
- Plate tectonics and the Alps: [The Importance of Rift Inheritance in Understanding the Early Collisional Evolution of the Western Alps](#).
- Petrology research: [Intracrystalline deformation microstructures in natural olivine with implications for stress estimation](#).
- Geochemistry: [Extensive crystal fractionation of high-silica magmas revealed by K isotopes](#).
- Coastal geology: [Going Local: How Coastal Environmental Settings Can Help Improve Global Mangrove Carbon Storage and Flux Estimates](#).
- Proxies for climate and temperature: [Millennial-timescale quantitative estimates of climate dynamics in central Europe from earthworm calcite granules in loess deposits](#); Phys.org summary [here](#).
- Sedimentology: [An automatic sediment-facies classification approach using machine learning and feature engineering](#).

### Paleontology

- Mass extinctions: [Reduced Marine Molybdenum Inventory Related to Enhanced Organic Carbon Burial and an Expansion of Reducing Environments in the Toarcian \(Early Jurassic\) Oceans](#); Phys.org summary [here](#).
- The earliest animals in the fossil record: [Guts, gut contents, and feeding strategies of Ediacaran animals](#); behind a paywall, Phys.org summary [here](#).

- Pleistocene paleontology: [Southward migration of Arctic Ocean species during the Last Glacial Period](#); Phys.org summary [here](#).
- Brain evolution: [The lower Cambrian lobopodian \*Cardiodictyon\* resolves the origin of euarthropod brains](#); Eureka Alert summary [here](#).
- [Drought Reveals Rare American Lion Fossil in Dried-Up Mississippi River](#).
- Ants in amber: [An Eocene army ant](#); GeologyIn summary [here](#).
- Missing links: [A transitional species of \*Daspletosaurus\* Russell, 1970 from the Judith River Formation of eastern Montana](#).

## Environmental Geology and Hydrogeology

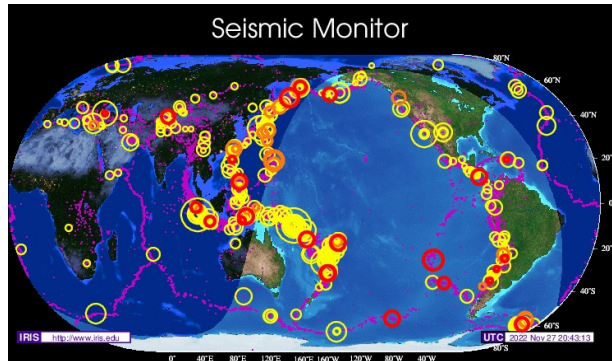
- [Dispersed Urban-Stormwater Control Improved Stream Water Quality in a Catchment-Scale Experiment](#); Phys.org summary [here](#).
- Inexpensive stream monitoring: [Raspberry Pi Reflector \(RPR\): A Low-cost Water-level Monitoring System based on GNSS Interferometric Reflectometry](#); Phys.org summary [here](#).
- Pollution can go a long way: [The transport and fate of microplastic fibres in the Antarctic: The role of multiple global processes](#); Phys.org summary [here](#).
- Persistent environmental contaminants, perfluoroalkyl acids (PFAAs): [Adsorption of PFAAs in the Vadose Zone and Implications for Long-Term Groundwater Contamination](#); Phys.org summary [here](#).
- Pathogens: [Bacteria Travel Thousands of Kilometers on Airborne Dust](#).

## Mining and Energy

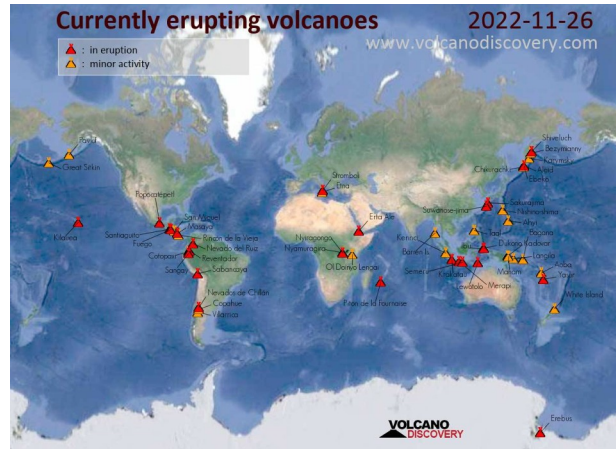
- Geology of a mineral deposit: [Diversity of Net-Textured Sulfides in Magmatic Sulfide Deposits: Insights from the Eagle's Nest Ni-Cu-\(Platinum Group Element\) Deposit, McFaulds Lake Greenstone Belt, Superior Province, Canada](#).
- Coal mining safety research: [Insights into fundamental problems of rockburst under the modern structure stress field](#).
- DIY mining: [Mining coal in your garden is a lucrative business in Poland](#).
- Key mineral shortages, from Mining.com: [Graphite poised to do a lithium](#).
- From the United States Energy Information Administration (USEIA): [Real U.S. gasoline prices this Thanksgiving are mostly unchanged from last year](#).
- Also from the USEIA: [Natural gas imports from Canada continue providing winter reliability to U.S. markets](#).
- From OilPrice.com: [Oil Prices On Course For A Third Consecutive Weekly Loss](#).

- A cold winter is coming: [Germany Warns Of Rationing This Winter If Gas Storage Dips Below 40%](#).

## Volcanoes, Earthquakes and Geohazards



[Link](#)



[Link](#)

- Mauna Loa eruption – [live cam!](#)
- Earthquake clusters: [Surface faulting earthquake clustering controlled by fault and shear-zone interactions](#).
- Japanese earthquake research: [Seismic velocity structure along the Sea of Japan with large events derived from seismic tomography for whole Japanese Islands including reflection survey data and NIED MOWLAS Hi-net and S-net data](#).
- Tsunamis and melting glaciers: [Internal tsunamigenesis and ocean mixing driven by glacier calving in Antarctica](#); Phys.org summary [here](#).

## From Out of this World

- Extraterrestrial volcanoes: [Geologically Recent Areas as One Key Target for Identifying Active Volcanism on Venus](#).
- An earth shattering kaboom: [Scientists Glimpse Incoming Asteroid Just Hours Before It Makes Impact](#).
- Meteorite: [Man Keeps Rock For Years, Hoping It's Gold. It Turns Out to Be Far More Valuable](#).

## Geologists in the News

- Colin Campbell (1931-2022), the petroleum geologist who coined the term “Peak Oil” has passed away, [obituary here](#).

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## Terrestrial Vertebrates of the Neogene – Mammals, Part 1

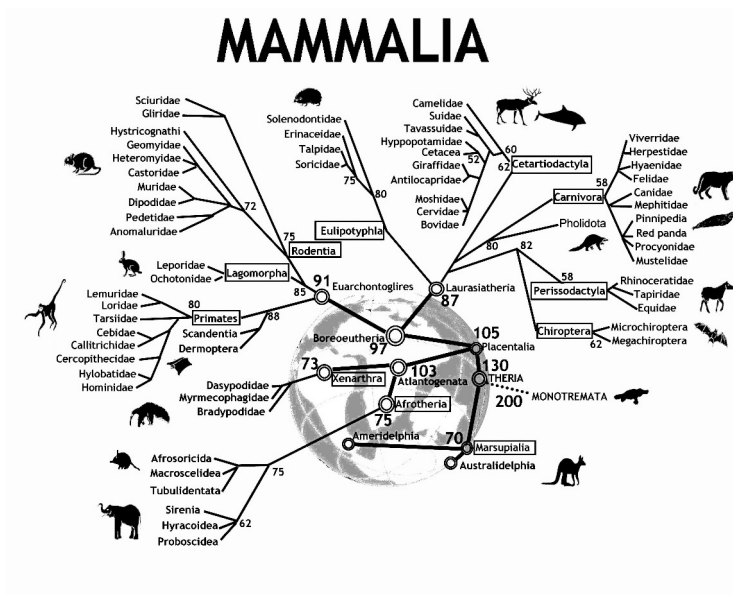


Figure 1 – An evolutionary tree of mammals

Credit: [Graphodatsky et al](#), [Creative Commons Attribution 2.0 Generic](#) license

Deposits from the [Neogene Period](#) contain a wealth of mammalian fossils. We'll look at a few this week and some more later.

### Marsupials

*Ekaltadeta ima*

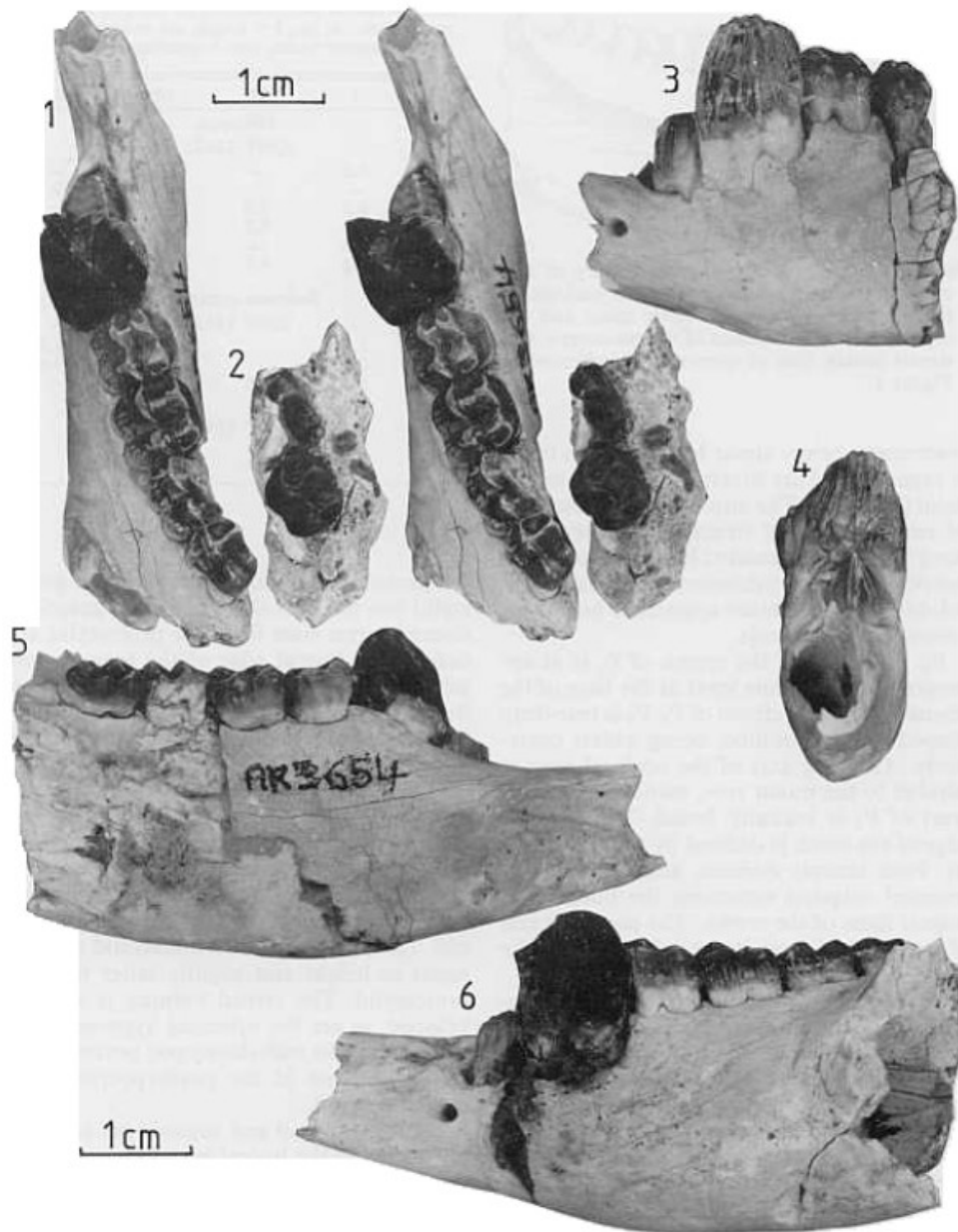


Figure 2 – *Ekaltadeta ima* Reconstruction

Credit: [Nobu Tamura](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

Found in the [Miocene](#) deposits of the [Carl Creek Limestone](#) in the [Riversleigh World Heritage Area](#) of Queensland, Australia, [Ekaltadeta ima](#) was a species of [potoroid](#) marsupial. The teeth of *Ekaltadeta ima* strongly suggests that it was a carnivorous creature.

[Michael Archer](#) and [Timothy F. Flannery](#) were the [first to describe](#) *Ekaltadeta ima* in 1985. *Ekaltadeta ima* is the type species of the genus [Ekaltadeta](#). There is one other species in the genus, [Ekaltadeta jamiemulvaneyi](#).



1, stereopair of occlusal view, 5, lingual view and 6, buccal view of QM F12423, left dentary containing P2' PJ, M2-s, holotype. 3, buccal view and 4, anterior view of QM F12424, left dentary fragment containing P2' PJ, M2-J, referred specimen. 2, stereopair of occlusal view of QM F12425, left MJ-4, referred specimen.

**Figure 3 – *Ekaltadeta ima* Bones**  
**Credit: Figure 1 in Archer & Flannery, 1985**

## *Palorchestes*



**Figure 4 – *Palorchestes azael* Fossil, Skull and Mandibles**

**Credit: [Benjamin Healley Museums Victoria](#),  
[Creative Commons Attribution-Share Alike 4.0 International](#) license**

*Palorchestes* was a genus of terrestrial, herbivorous marsupials belonging to the family [Palorchestidae](#). It lived from the Miocene till the [Pleistocene](#). *Palorchestes* were fairly large animals, one of the species, *Palorchestes azael*, was about the size of horse: about 2.5 metres (m) long and about 1000 kilograms (kg) in weight.

Most of the fossils of *Palorchestes* come from the eastern part of Australia. *Palorchestes azael* fossils have been found at the [Naracoorte Caves](#) and the genus is common in the Riversleigh fauna.

[Richard Owen](#) was the [first to describe the genus](#) in 1873. There are six species in the genus: *P. azael* (type), *P. anulus*, *P. painei*, *P. parvus*, *P. pickeringi*, and *P. selestiae*.

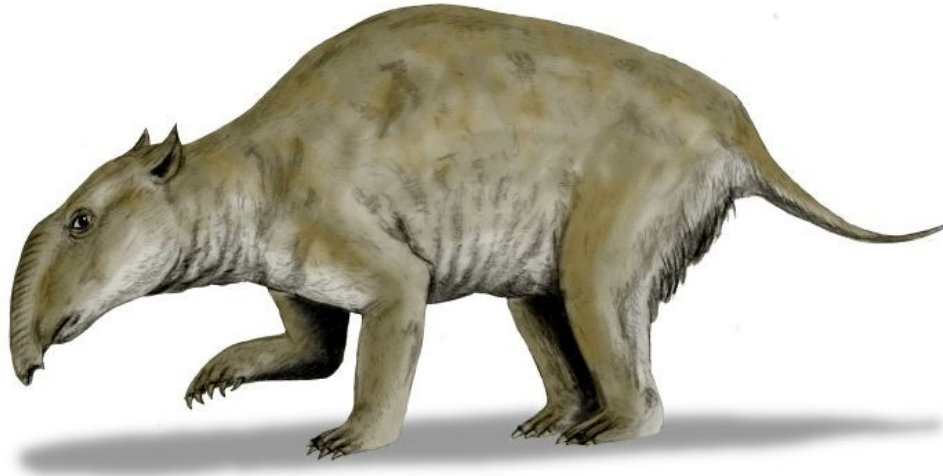


Figure 5 – *Palorchestes azael*

Credit: [Nobu Tamura](#), [Creative Commons Attribution 3.0 Unported license](#)

## Chiroptera – Bats

### *Eptesicus fuscus*

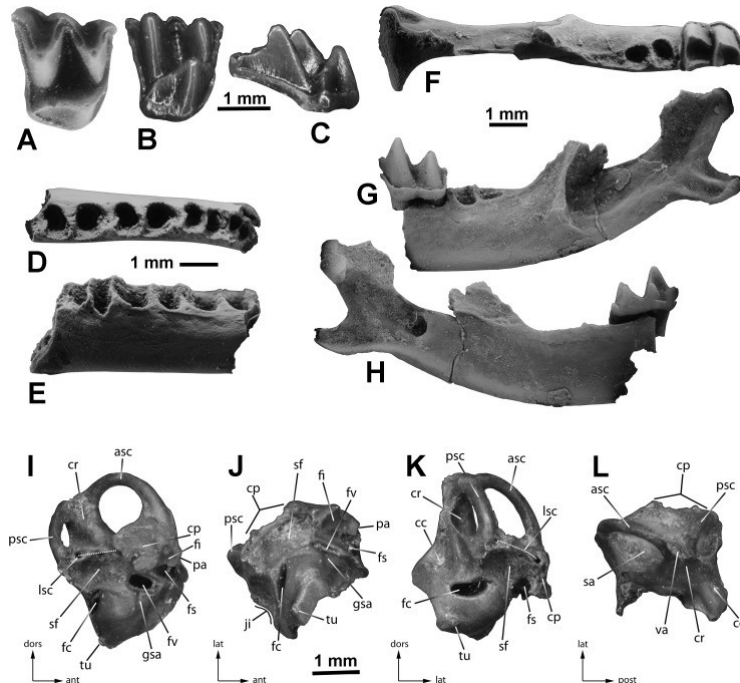


Figure 6 – Cranial elements of *Eptesicus fuscus* from the [Gray Fossil Site](#), Tennessee

Credit: [Figure 1 in Czaplewski, 2017](#)

The big brown bat, [\*Eptesicus fuscus\*](#), is a common bat, widely distributed throughout North America, the Caribbean, and the northern portion of South America. However, it has a long evolutionary history. [The earliest fossils of the bat](#) come from the [Gray Fossil Site](#) in Tennessee, late Miocene to early [Pliocene](#) in age.

Modern big brown bats are not actually that large, weighing 15 to 26 grams and with an adult body length of 110 to 130 millimetres. They are insectivores, living off a variety of insects such as beetles, flies, stone flies, mayflies, true bugs, net-winged insects, scorpionflies, caddisflies, and cockroaches. They remove a lot of pests.

*Eptesicus fuscus* was [first described in 1796](#) by French naturalist [Palisot de Beauvois](#) in *A scientific and descriptive catalogue of Peale's museum* published by [Samuel. H. Smith of Philadelphia](#). There are twelve subspecies of the bat.



**Figure 7 – Big Brown Bat**

**[Credit: USFWSmidwest, Creative Commons Attribution 2.0 Generic](#) license**

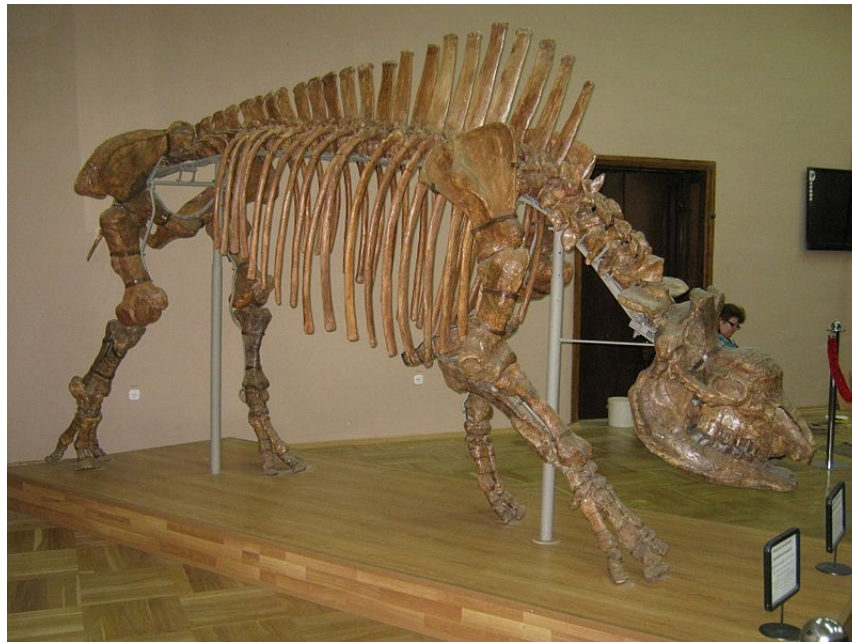
## **Perissodactyla -Odd-toed Ungulates**

[Perissodactyla](#), odd toed ungulates such as [horses](#), [rhinoceroses](#), and [tapirs](#), flourished during the Neogene. Since there were so many of them, I will look at horses in next week's posting. Here are a couple of examples of other odd toed ungulates from the Neogene.

### ***Elasmotherium***

An extinct genus of rhinoceros that lived from the Late Miocene through the [Late Pleistocene](#), [Elasmotherium](#) roamed on the to the [Pontic–Caspian steppe](#) as well as in the Caucasus Mountains and Central Asia. A huge creature, *Elasmotherium* were 4 to 5 m in length and weighed up to 5000 kg. It had

a keratinous horn, like modern rhinos, and may have been covered in a shaggy wool coat, like the [Woolly Rhinoceros](#). Also, its teeth suggest that it was a grazer, feeding on grass.



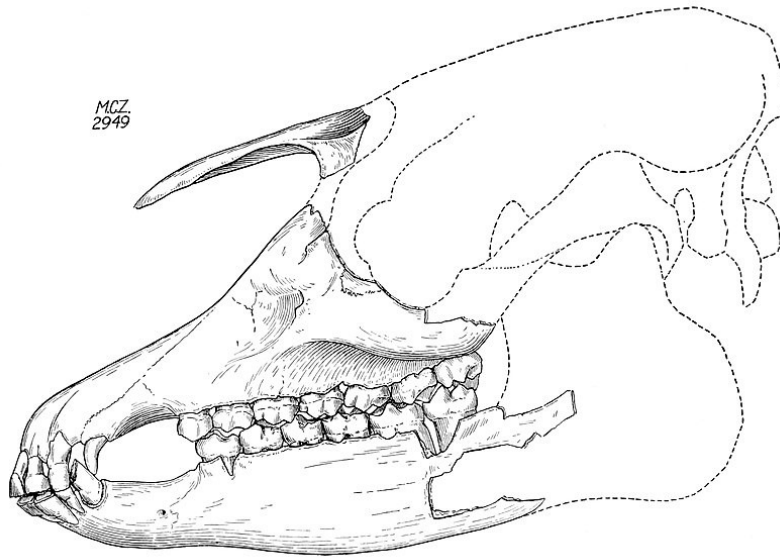
**Figure 8 – *Elasmotherium caucasicum* in the [Azov Museum of History, Archaeology and Palaeontology](#)  
Credit: [Радион](#), [Creative Commons CC0 1.0 Universal Public Domain Dedication](#)**

German/Russian palaeontologist [Gottlieb Fischer von Waldheim](#) first [described \*Elasmotherium\*](#) in 1809 based on a fossils donated to Moscow University by [Ekaterina Dashkova](#) in 1807. There are five species of *Elasmotherium*: *E. sibiricum* (type), *E. caucasicum*, *E. chaprovicum*, *E. peii*, and *E. Primigenium*.



**Figure 9 – *Elasmotherium*  
Credit: [Heinrich Harder](#) (1858-1935), [public domain](#)**

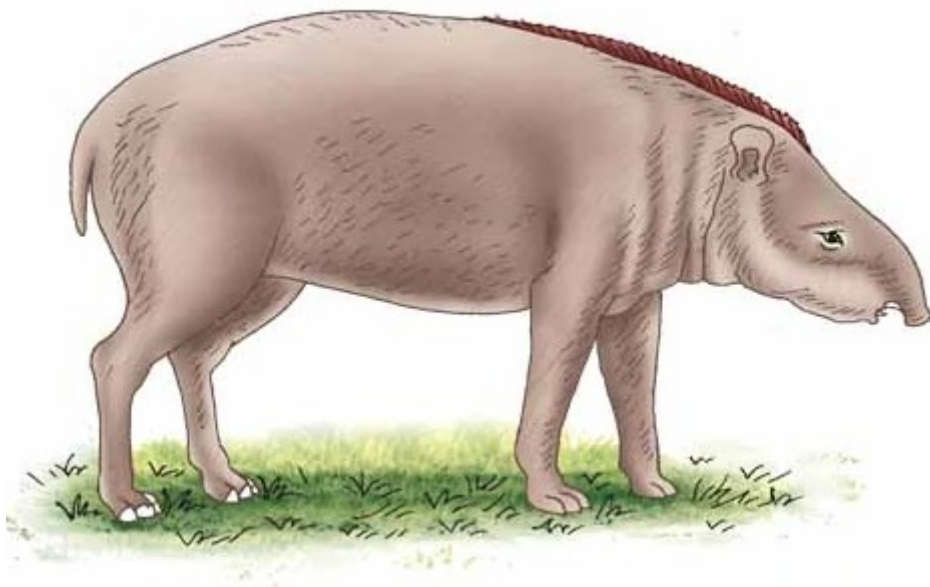
*Miotapirus harrisonensis*



**Figure 10 – *Miotapirus harrisonensis*, Lateral View of the Skull**

**Credit: [Helen Ziska](#), [Creative Commons CC0 1.0 Universal Public Domain Dedication](#)**

An extinct species of tapir, *Miotapirus harrisonensis* is lived during the early Miocene Epoch in North America. *Miotapirus* was very similar to modern tapirs, about two metres long and weighing 150 to 300 kg. Based upon its similarity to modern tapirs, *Miotapirus* may have been nocturnal forest dweller that lived on a diet of leaves, fruit and berries. Also, like modern tapirs, it had a prominent proboscis.



**Figure 11 – *Miotapirus harrisonensis* Reconstruction**

**Credit: [Jacksonwarrier](#), [CC-BY-SA](#)**

The first fossils of *Miotapirus harrisonensis* came from the Lower Miocene [Harrison beds](#) of the [Arikaree Formation](#) near [Goshen Hole, Wyoming](#). American geologist [Erich Maren Schlaikjer](#) first [described \*Miotapirus harrisonensis\* in 1937](#). *Miotapirus harrisonensis* is the only one species in the genus.

## Notoungulates

An interesting group of mammals are the [notoungulates](#), which thrived in South America from the early [Paleocene](#) to the [Holocene](#). Here are a couple of examples from the Neogene.

### *Homalodotherium*



[Homalodotherium](#) was a notoungulate that lived in South America during the middle Miocene. About 2 m long and around weighing 300 kg, *Homalodotherium* was a browsing herbivore that lived in a forest environment. The shape of its hind limbs suggest that it often stood up, probably to better feed off of trees and shrubs. In this way, it lived a similar lifestyle to the [ground sloths](#) of the Pleistocene, although it was not related to them.

The first fossils of *Homalodotherium* came from the [Santa Cruz Formation of Argentina](#). [Thomas Henry Huxley](#), a.k.a “Darwin’s Bulldog”, first described *Homalodotherium* in 1870 in [The Quarterly journal of the Geological Society of London](#), volume 26, page 57. There are five species of *Homalodotherium*: *H. canepai*, *H. crassum*, *H. cunninghami*, *H. excursum*, and *H. segoviae*.

Figure 12 – *Homalodotherium cunninghami* at the [Field Museum, Chicago](#)

Credit: [Smokeybjb](#), [Creative Commons](#), [Creative Commons Attribution 3.0 Unported](#) license

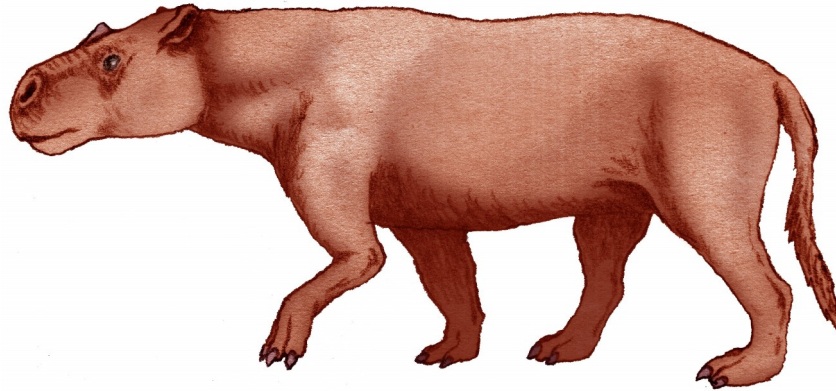
### *Adinotherium*



Figure 13 – *Adinotherium* at the [Museum für Naturkunde, Berlin](#)

Credit: [FunkMonk](#), [Creative Commons](#), [Creative Commons Attribution 3.0 Unported](#) license

Another notoungulate from the Miocene of South America was [Adinotherium](#) ("not terrible beast"). Fossils of *Adinotherium* have been found in the Santa Cruz Formation and [Ituzaingó Formation](#) of Argentina as well as in the [Chucal](#) and [Río Frías Formations](#) of Chile. It was about 1.5 m long and 250 kg in weight and apparently a herbivore.



**Figure 14 - *Adinotherium* Reconstruction**

**Credit: [Ghedoghedo](#), [Creative Commons](#), [Creative Commons Attribution 3.0 Unported](#) license**

Argentine paleontologist [Florentino Ameghino](#) was the first to describe *Adinotherium* in 1887. (The Argentines are quite proud of Ameghino – [they named a town after him](#).) There are eight species in the genus *Adinotherium*: *A. ovinum* (type), *A. corriguenense*, *A. ferum*, *A. haplodontoides*, *A. karaikense*, *A. nitidum*, *A. robustum*, and *A. splendidum*.

## Wrapping it Up

There are lots more mammals from the Neogene and we will be looking at some more next week. Here are some links that you might want to follow up on:

- [Neogene mammals](#)
- [Miocene mammals](#)
- [Pliocene mammals](#)

## Standard Caveat

The purpose of my weblog postings is to spark people's curiosity in geology. Don't entirely believe me until you've done your own research and checked the evidence. If I have sparked your curiosity in the subject of this posting, follow up with some of the links provided here. If you want to, go out into the field and examine some rocks on your own with the help of a good field guide. Follow the evidence and make up your own mind.

In science, the only authority is the evidence.