

September 12, 2022

News and notes

Before going on to a look at some of the mammals of the [Paleogene Period](#), including the link between a social commentator, [James Howard Kunstler](#), and a giant prehistoric mammal, [Baluchitherium](#), here are some news items that I thought were interesting.



A Royal Death

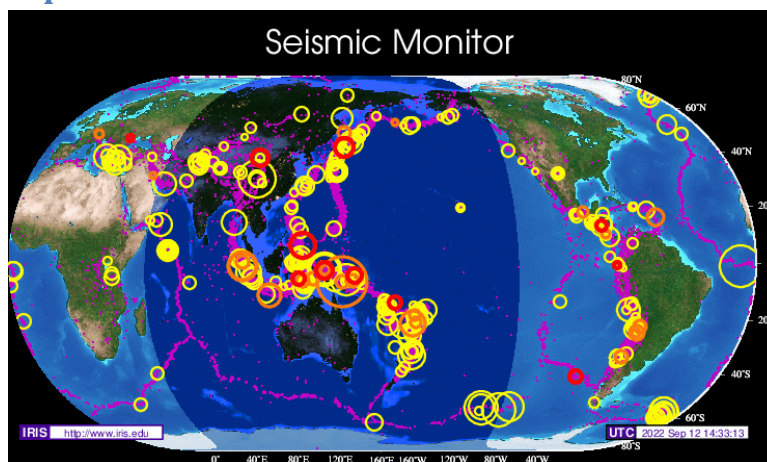
[Queen Elizabeth II](#) of the United Kingdom passed away at the age of 96 years September 8, 2022 after a reign of 70 years, 7 months - the longest reign of any British monarch. In addition to her title as Queen of the United Kingdom she was also the Queen of 14 other countries, including my own Canada.

When I joined the [North Saskatchewan Regiment](#) in 1975 as a part-time soldier, I swore an oath of loyalty to the Queen, her heirs and successors (see [6.04-Oath taken on enrolment](#)). Although I no longer wear the uniform, I remain loyal. The Queen is dead, long live the [King](#).

Queen Elizabeth II in 2021

Credit: [The Royal Navy, United Kingdom](#)
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Volcanoes, Earthquakes and Geohazards



[Seismic Monitor Link](#)

- [7.6 magnitude earthquake 67 km from Kainantu, Eastern Highlands, Papua New Guinea; United States Geological Survey report.](#)
- Earthquake research: [Discriminating seismic events using 1D and 2D CNNs: applications to volcanic and tectonic datasets.](#)
- Tsunami research: [Tsunami deposits associated with the 1983 Nihonkai-Chubu earthquake tsunami in coastal forests near Happo Town, Akita Prefecture, Japan.](#)
- Landslides: [The GOGIRA System: An Innovative Method for Landslides Digital Mapping.](#)
- Panic: [Cloud over Mount Rainier stirs panic after people mistake it for sign of eruption.](#)
- Volcano research: [Pre-eruptive excess volatiles and their relationship to effusive and explosive eruption styles in semi-plugged volcanoes.](#)
- [The World Is Not Ready For The Next Super-Eruption, Scientists Warn.](#)

Research

- Coastal geology: [Coral Reef Exposure to Damaging Tropical Cyclone Waves in a Warming Climate](#); Phys.org summary [here](#).
- Continental glaciation and crustal deformation: [Identifying Geographical Patterns of Transient Deformation in the Geological Sea Level Record](#); Phys.org summary [here](#).
- Structural geology of a hidden coral reef: [Enigmatic annular landform on a Miocene planar karst surface, Nullarbor Plain, Australia](#); Phys.org summary [here](#).
- Mid-Proterozoic events: [Rapid timescale for an oxic transition during the Great Oxidation Event and the instability of low atmospheric O₂.](#)
- Tridymite quartz from Mars: [Unraveling the Mystery of a Rare Mineral on Mars.](#)

Plate Tectonics

- [Reduced plate motion controlled timing of Early Jurassic Karoo-Ferrar large igneous province volcanism](#); Phys.org summary [here](#).
- Commentary: [Editorial: Tibetan Plateau uplift and environmental impacts: New progress and perspectives.](#)
- More commentary: [Editorial: Subduction and collision dynamics of tectonic plates.](#)

Paleontology

- Life's origins and iron mineralogy: [Biogeochemical fingerprinting of magnetotactic bacterial magnetite](#); behind a paywall, Phys.org summary [here](#).
- Early tetrapod evolution: [Early tetrapod cranial evolution is characterized by increased complexity, constraint, and an offset from fin-limb evolution](#); Phys.org summary [here](#).
- Evolution of proteins in different groups of animals: [Proteotype coevolution and quantitative diversity across 11 mammalian species](#); Phys.org summary [here](#).
- Why do plants evolve into trees: [The evolution of insular woodiness](#); behind paywall, Phys.org summary [here](#).

- Hiding in plain sight: [A new massopodan sauropodomorph from Trossingen Formation \(Germany\) hidden as 'Plateosaurus' for 100 years in the historical Tübingen collection; Eureka Alert summary \[here\]\(#\).](#)
- Stromatolites: [Rare stromatoporoids from the Lower Devonian \(Emsian\) of Nevada, and their biostratigraphic and paleobiogeographic significance.](#)
- Brachiopods: [The last representatives of the Superfamily Wellerelloidea \(Brachiopoda, Rhynchonellida\) in the westernmost Tethys \(Iberian paleomargins\) prior to their demise in the early Toarcian Mass Extinction Event.](#)
- Trilobites: [The Ordovician trilobite *Oeonella* and the new family Oeonellidae, with new species from western Newfoundland, Canada.](#)
- Ancient insects: [A new titanopteran *Magnatitan jongheoni* n. gen. n. sp. from southwestern Korean Peninsula.](#)

Mining and Energy

- Gold is the currency of kings: [Putin's 12,000 Tonne Gold Hoard Sets The Stage For Asian Bretton Woods And The New Moscow Gold Standard.](#)
- Geology of lead/zinc deposits: [Trace element signatures of sphalerite in the Sichuan Daliangzi Ge-rich Pb-Zn deposit and its implications for deep ore prospecting.](#)
- Rig counts, i.e. exploration activity, down in [Canada](#) and the [USA](#).
- Shale oil in China: [Preliminary study on nanopores, nanofissures, and in situ accumulation of Gulong shale oil; in Chinese, Phys.org summary \[here\]\(#\).](#)
- [Assessing Canada's Natural Gas Future – Will Politics & Policies Allow Canada to Develop this Global Resource?](#)
- Energy and the economy: [Schachter's Eye on Energy: WTI Crude Oil Falls US\\$6/b Over The Last Week As European & China Economies Head Into Recessions.](#)
- [The Most Suitable Regions for Carbon Storage Around the World.](#)
- She writes well: [Commentary: Facts, Fiction, and Fatih – Irina Slav.](#)
- Coalbed methane production: [The inflow performance relationship in fractured, vertical, and dewatered coalbed-methane wells.](#)
- Well logging and exploration: [A method for calculating gas hydrate saturation by dual parameters of logging.](#)
- From the United States Energy Information Agency (USEIA): [In the first half of 2022, 24% of U.S. electricity generation came from renewable sources.](#)

Environmental Geology and Hydrogeology

- After the disaster: [The Fate of a Lake After a Dramatic Mining Disaster.](#)

Pretty Shiny Rocks

- [Red Amber: Natural Rare Red Variety of Amber.](#)

September 12, 2022

Terrestrial Animals of the Paleogene - Mammals

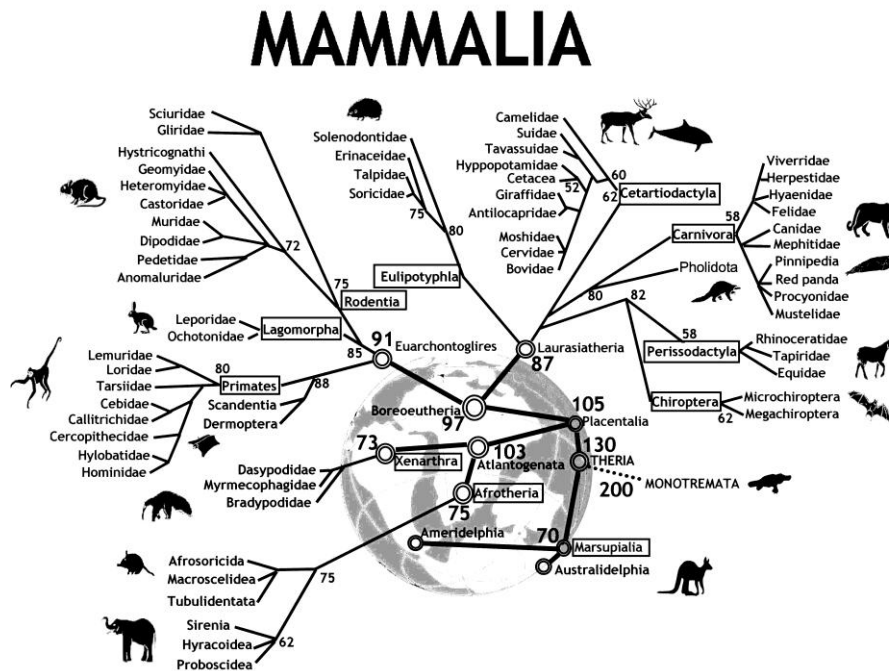


Figure 1 - Evolution of Mammals
Credit: Figure 1 in [Graphodatsky et al, 2011](#)
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After the [Cretaceous/Paleogene Mass Extinction](#), mammals [diversified and expanded](#), taking advantage of the opportunities that came from the [demise of around 75% of all species](#). In this week's post we'll look at some of the amazing, strange, or plus plain weird mammals that arose during the [Paleogene Period](#). In following weeks, we'll take a look at some more - there are lots of them. However, before going on to a look at these wonders, I want to say a few words about the nature of evolution.

When we say that living things evolve and take advantage of opportunities we are not talking about any conscious decision by the organisms involved. What we are describing is more like an [emergent phenomena](#) where the sum of small changes lead to entirely new things. How it works is first through [natural selection](#), whereby organisms are selected for survival by the conditions of their environment (e.g. heat, moisture, nutrient supply, predation, disease, etc.) Survivors will be found in whatever situation that allows them to survive and reproduce. A small insect eating mammal might acquire a taste for salad, or other animals and pass that practice onto its descendants. The few advantageous genetic mutations that arise will be propagated through selection. The organisms that best exploit the opportunities in their ecosystem will

thrive and leave descendants, those that don't will die, often without issue. There is no conscious decisions involved nor any forward thinking. The tiny mammal that developed a taste for vegetation didn't think "my descendants will be elephants". It didn't think about the future at all, it just satisfied its appetites for food and sex. So don't read too much into statements that try to make sense of the fossil record, it is simply a shorthand description of a complex process.

Perissodactyla, Paraceratherium, a.k.a Baluchitherium

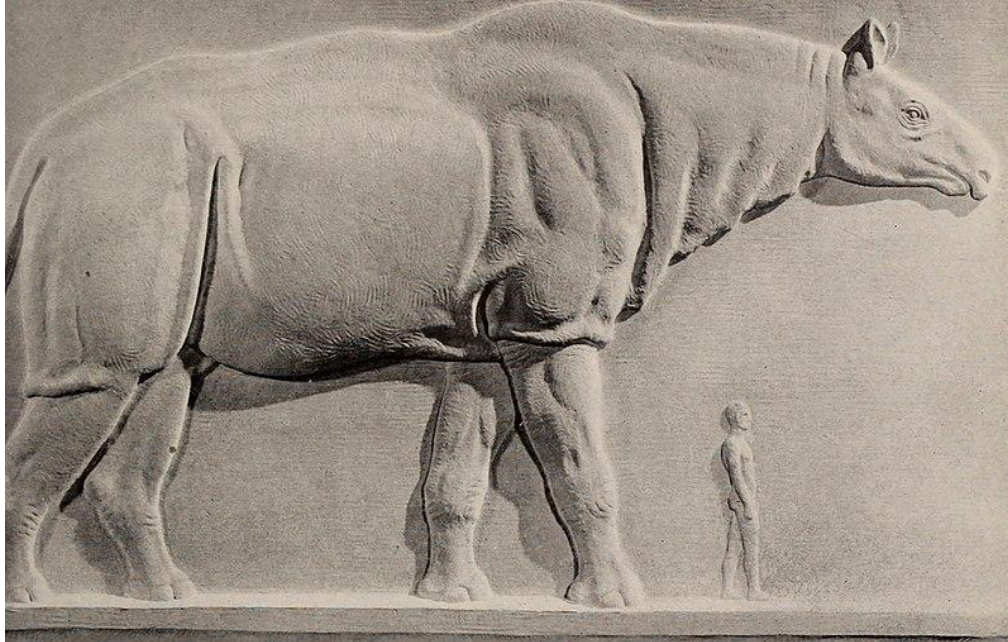


Figure 2 - Reconstruction of *Baluchitherium*, American Museum of Natural History
Credit: [American Museum of Natural History](#), [Commons:Licensing](#)

An extinct genus of hornless [rhinoceros](#), *Baluchitherium*, properly called *Paraceratherium*, lived during the [Oligocene Epoch](#) of the Paleogene Period. It was huge, it stood about 4.8 m tall and weighed 15 to 20 tonnes with a total body length of 7.2 m. Researchers describe it as "[the largest land mammal ever imagined](#)". It lived in Central Asia and the Indian subcontinent.

In 1846, a British soldier named Vickary found the first fossils later identified as *Paraceratherium* in Baluchistan, now a province of Pakistan. Later, in 1907, the British geologist [Guy Ellcock Pilgrim](#) found more fossils of the creature in the [Chitarwata Formation](#) of Baluchistan, naming it *Aceratherium*. In 1911, [Clive Forster-Cooper](#) coined the term *Paraceratherium* to describe Pilgrim's finds as well as others but also used the term *Baluchitherium*. It gets complicated since many different researchers found specimens of *Paraceratherium* in Asia and published their findings in various English, Russian, and Chinese language journals. The current agreed designation is *Paraceratherium* of which there are four species: *P. bugtiense*, *P. transouralicum*, *P. huangheense*, and *P. linxiaense*.



Figure 3 - *Baluchitherium* Skull at the American Museum of Natural History
Credit: [Ryan Somma](#), [Creative Commons Attribution 2.0 Generic](#) license

The term *Baluchitherium* lives on. It was used by the American explorer [Roy Chapman Andrews](#) in his expeditions to China and Mongolia on behalf of the [American Museum of Natural History](#) and remains a favourite of theirs and also with [scientists in Pakistan](#).

Baluchitherium also shows up in the social commentary of the American author [James Howard Kunstler](#). In his writings, Kunstler compared America and his fellow Americans to the giant Oligocene mammal (for example: [here](#), [here](#), [here](#), and [here](#)). Kunstler is an entertaining and insightful writer, much better than me. I heartily recommend his work and you can follow him at his website [here](#).

Perissodactyla, Eohippus



Figure 4 - *Eohippus*, National Museum of Natural History, Washington, D.C.
Credit: [Jeff Kubina](#), [Creative Commons Attribution 2.0 Generic](#) license

One of the most famous fossils from the Paleogene, *Eohippus*, the so called "dawn horse" that lived during the Eocene Epoch. Fossils of *Eohippus* were found in New Mexico and suggest an animal about 0.6 m high and weighing around 23 kg. For a long time *Eohippus* was considered to be a species of *Hyracotherium*, however it is now considered a separate species.

Eohippus is one of the fossils uncovered by the Bone Wars and includes many of the key players in that drama. Othniel C. Marsh first described a fossil he called *Eohippus validus* in 1876. Later, in 1932, Clive Forster Cooper pointed out the similarities between Marsh's *Eohippus validus* and an earlier fossil description by Richard Owen. Modern literature review found an earlier description by Edward Drinker Cope of fossils belonging to the same species, in 1875. Cope called the bones that he found *Orohippus angustidens*. Resolving the different names resulted in the current species *Eohippus angustidens*.

The dawn horse often stars in descriptions of the evolution of horses, often in something like Figure 5, below, which shows a path of linear progress leading to modern perfection.

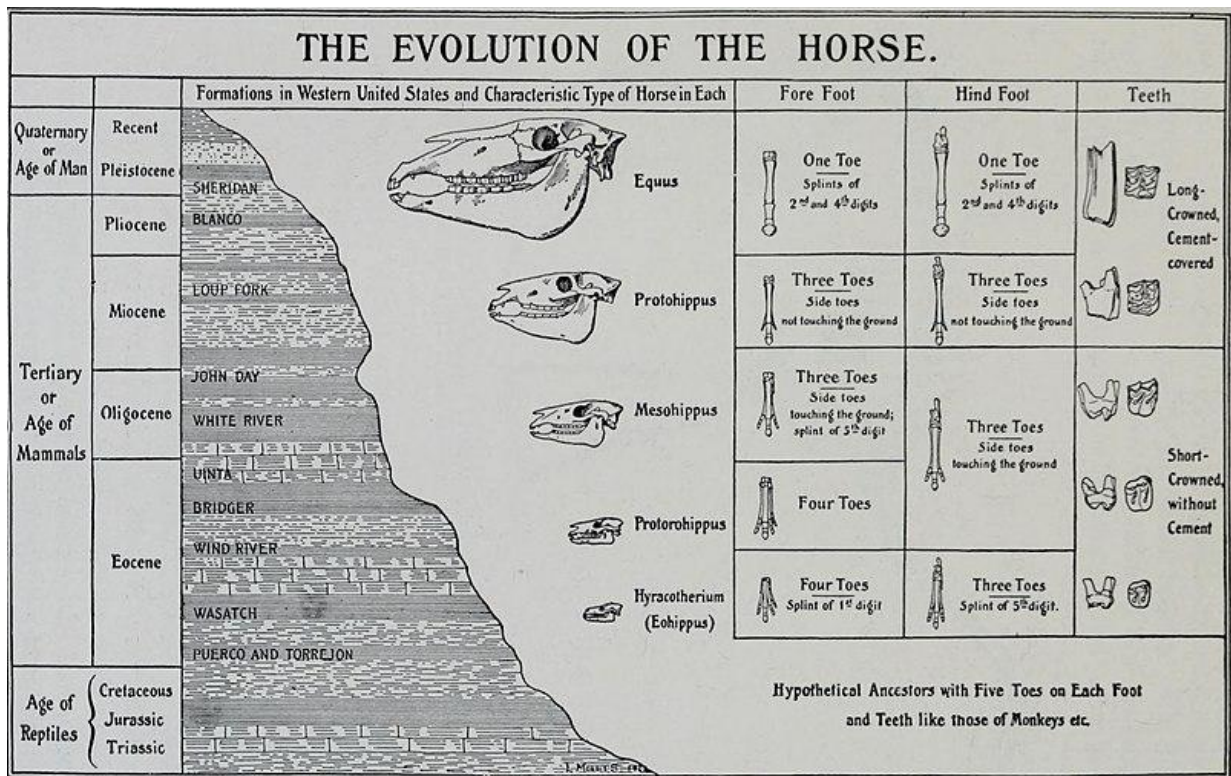


Figure 5 - Evolution of the Horse
 Credit: T. C. Chamberlin and R. D. Salisbury,
 in the book Geology, 1907, Flicker's The Commons

However, it's not so simple. Fossils of equids collected in the last 100 years show a much complicated, and messier evolutionary tree for horses. Figure 6, below, is a good example.

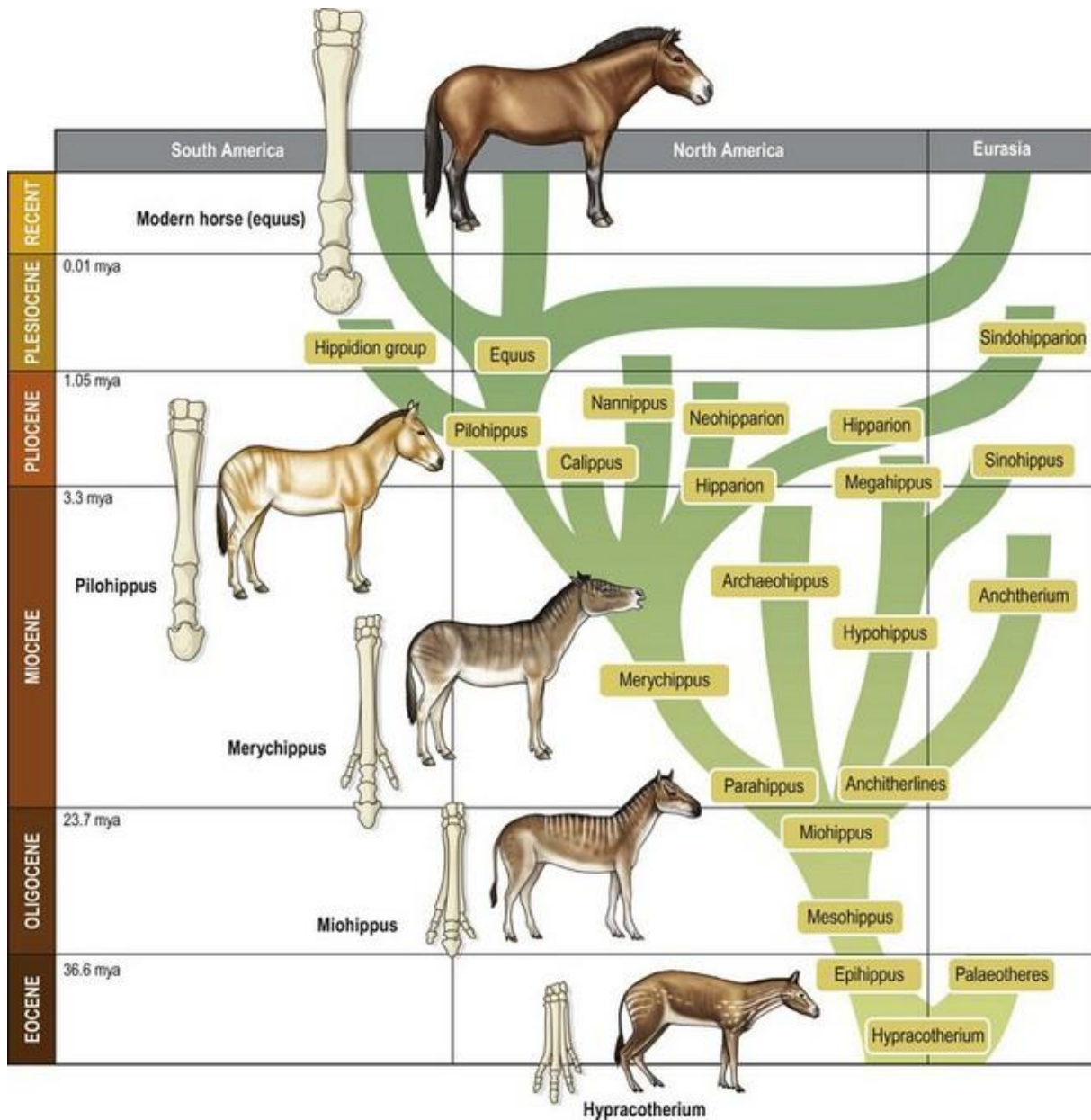


Figure 6 - Horse Evolution
 Credit: [Veterian Key, Ethology and welfare aspects](#)

Carnivora, Cynodictis

Cynodictis was a small, 30 cm tall, carnivore that lived in Eurasia from the [Late Eocene](#) to the [Early Oligocene](#). From its small size, it probably specialized in hunting small animals like a modern fox or coyote,

Researchers found fossils of *Cynodictis* came in the [Lushi Formation](#) of Mengjiapo, China, near [Weisserburg](#), Germany, at [Les Saleres in the Ager Basin of Spain](#), the [Bembridge Limestone](#) and

[Bembridge Marls](#) Formations of the Isle of Wight, Great Britain as well as the Perrière and [Quercy Phosphorites](#) Formations and [La Débruge](#) in France.



Figure 7 - *Cynodictis* Fossil, Natural History Museum Vienna

Credit: [DagdaMor](#), [Creative Commons Attribution 4.0 International](#) license

Cynodictis was first described by [Pierre Joseph Auguste Bravard](#) and [Auguste Nicolas Pomel](#) in 1850. There are nine species in the genus: *C. cayluxens*, *C. crassus*, *C. elegans*, *C. exilis*, *C. ferox*, *C. lacustris*, *C. longirostris*, *C. parisiensis*, and *C. peignei*.

Artiodactyla, Archaeotherium



Figure 8 - *Archaeotherium mortoni*

Credit: [Ryan Somma](#), [Creative Commons Attribution 2.0 Generic](#) license

A species of [entelodont artiodactyl](#) (even toed ungulate), *Archaeotherium* lived during the [Eocene](#) and [Oligocene](#) in North America. Researchers most commonly find fossils of *Archaeotherium* in the [White River Formation](#) of Colorado, Nebraska, South Dakota, and Wyoming. It also occurs in the [John Day Basin](#) of Oregon and the [Trans-Pecos](#) area of Texas. The fossils of *Archaeotherium* came from formations with a depositional environment consistent with riverbanks within woodlands.

Like many other entelodonts, *Archaeotherium* was probably an omnivore, with the general appearance of a modern pig. It was about 1.2 m tall at the shoulder about 2 m and probably weighed in the order of 150 to 250 kg, similar in size to some modern wild boars. Some specimens of *Archaeotherium* suggest an animal 1.5–1.6 m tall at the shoulder and weighing up to 500–600 kg. Entelodonts have the distinction of being "[one of the ugliest creatures ever to have lived](#)".



Figure 9 - *Archaeotherium mortoni* Reconstruction
Credit: [Stanton F. Fink](#), [Creative Commons Attribution 3.0 Unported](#) license

[Joseph Leidy](#) (1850) named *Archaeotherium* in 1850. There is only one species in the genus, *Archaeotherium mortoni*.

We'll pause for now and take a look at more fascinating mammal fossils from the Paleogene in next week's posting.

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.