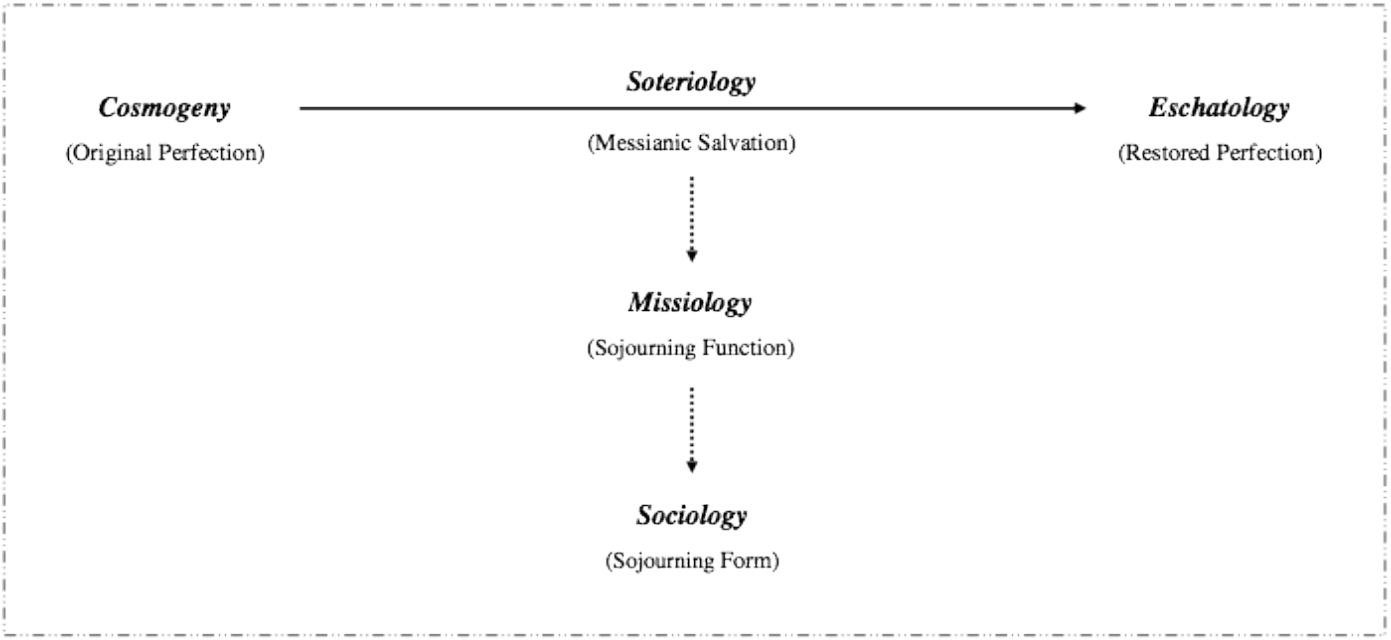
BIBLICAL THEOLOGY OF MISSION

Class 3a: The Glory Of The Original Earth — John Harrigan

THE SLIDES RELATED TO THIS TEACHING ARE PLACED THROUGHOUT THESE NOTES FOR EASIER INTEGRATION OF THE MATERIAL BEING SHARED.

BIBLICAL THEOLOGY OF MISSION – BIBLICAL THEOLOGICAL FLOW CHART

Metaphysical Construct: *Heavens and Earth*



Messianic Worldview:
The all-encompassing view of the heavens and the earth within which all of creation is restored (i.e. soteriology) at the end of the age (i.e. eschatology) to its original state of perfection (i.e. cosmogeny) by means of the Messianic Seed (cf. Gen. 3:15).

I. INTRODUCTION: "THE KEY TO ESCHATOLOGY IS COSMOGENY."[1]

Remember this and stand firm, recall it to mind, you transgressors, [9] remember the former things of old; for <u>I am God, and there is no other</u>; I am God, and there is none like me, [10] <u>declaring the end from the beginning</u> and from ancient times things not yet done saying, "My counsel shall stand, and I will accomplish all my purpose." (ESV Isaiah 46:8-10)

[1] Cosmogeny is "the branch of astrophysics that studies the origins and structure of the universe." (HyperDictionary.com, "Cosmogony," available from http://www.hyperdictionary.com/search.aspx?define=cosmogony) It is more commonly known as "cosmogony" (which derives from the Greek *kosmogonia* "creation of the world," based on *kosmos* "order, world-order, world" + *gonia* "begetting," which is based on *gonos* "child, procreation"), but I prefer the slightly antiquated alternative "cosmogeny" because it seems to better communicate the PIE root "gen," from which we derive "gen-esis," "gen-erate," "gen-eration," etc. Thus, it clearly and concisely communicates that which concerns the knowledge and study of the creation of the heavens and the earth (i.e. the *genesis* of the *cosmos*) in Genesis 1:1 and following.

A. Biblical eschatology is essentially restored cosmogeny.

Repent therefore… [20] that He may send Jesus Christ, who was preached to you before, [21] whom heaven must receive until <u>the times of restoration</u> *(Gk. apokatastasis)* ***<u>of all things</u>, which God has spoken by the mouth of all His holy prophets <u>since the world began</u>*** *(i.e. post-Fall)****. (NKJV Acts 3:19-21)***

- <605> avpokata,stasij *apokatastasis* {ap-ok-at-as'-tas-is}

  Meaning: 1) restoration 1a) of a true theocracy 1b) of the perfect state before the fall

  Origin: from 600; TDNT - 1:389,65; n f

  Usage: AV - restitution 1; 1 [Acts 3:19]

- <600> avpokaqi,sthmi *apokathistēmi* {ap-ok-ath-is'-tay-mee}

  Meaning: 1) to restore to its former state 2) to be in its former state

  Origin: from 575 [*apo*, "away from"] and 2525 [*kathistēmi*, "to set one over a thing (in charge of it), to appoint one to administer an office"]; TDNT - 1:387,65; v

  Usage: AV - restore 7, restore again 1; 8

Jesus said to them, "I tell you the truth, at the <u>renewal</u> *(Gk. paliggenesia, "regeneration" KJV/NKJV/NASB)* ***<u>of all things</u>, when the Son of Man sits on his glorious throne, you who have followed me will also sit on twelve thrones, judging the twelve tribes of Israel. (NIV Matthew 19:28)***

- <3824> paliggenesi,a *paliggenesia* {pal-ing-ghen-es-ee'-ah}

  Meaning: 1) new birth, reproduction, renewal, recreation, regeneration 1a) hence renovation, regeneration… the word often used to denote the restoration of a thing to its pristine state… 1b) the renovation of the earth after the deluge 1c) the renewal of the world to take place after its destruction by fire… 1d) the signal and glorious change of all things… that restoration of the primal and perfect condition of things which existed before the fall of our first parents, which the Jews looked for in connection with the advent of the Messiah, and which Christians expected in connection with the visible return of Jesus from heaven.

  Origin: from 3825 [*palin*, "anew, again"] and 1078 [*genesis*]; TDNT - 1:686,117; n f

  Usage: AV - regeneration 2; 2 [Mt. 19:28; Tit. 3:5] [2]

- <1078> ge,nesij *genesis* {ghen'-es-is}

  Meaning: 1) source, origin 1a) a book of one's lineage, i.e. in which his ancestry or progeny are enumerated 2) used of birth, nativity 3) of that which follows origin, viz.

[2] Note its use in Titus 3:5, "he saved us, not because of works done by us in righteousness, but according to his own mercy, by the washing of regeneration [Gk. *paliggenesia*] and renewal [Gk. *anakainosis*] of the Holy Spirit." It is used as a synonym of *anakainosis* (also used twice in the NT, cf. Rom. 12:2 and the "renewal of your mind"), meaning "a renewal, renovation, complete change for the better." Again, the "Genesis anew" (*paliggenesia*) is essentially a "renovation" (*anakainosis*).

existence, life 3a) the wheel of life (Jas 3:6), other explain it, the wheel of human origin which as soon as men are born begins to run, i.e. its course of life

Origin: from the same as 1074; TDNT - 1:682,117; n f

Usage: AV - generation 1, natural 1, nature 1; 3

B. The gospel message is essentially one of restoration, which rests upon the assumption of a perfect creation. Not only will man be restored to his original glory, but so also will all of creation itself be restored.

	Original Glory	Distorted Glory	Restored Glory
Cosmology	Perfect environment	Groaning creation	New heaven and earth
Anthropology	Perfect body	Body of death	Resurrected body
Soteriology	Existence without Death	Death entered	Death swallowed up
Government	Worldwide theocracy	Worldwide anthropocracy	Worldwide theocracy
Relationship	Perfect dwelling of God with man on the earth	Fellowship broken	Complete reconciliation of dwelling

C. Studying cosmogeny sets our feet on a solid foundation for eschatological interpretation. Eschatological interpretation is not based on a few random prophetic verses (which often seem to be contradicted by the verses immediately surrounding them), but rather it is based on the primary themes developed in Genesis 1-3. The primary reason the Church today has no ultimate sense of destiny and purpose is because it has no sense of original destiny and purpose.[3]

D. Human beings were made to live in existential perfection *on this earth*, and thus our souls long at the deepest levels for its *restoration*. Studying cosmogeny evokes and stirs longing and hope for our salvation in the renewed heavens and earth (cf. Rom. 8:18-23). This is the base cry of humanity: restoration of cosmological perfection and anthropological righteousness. Studying cosmogeny gives us practical handles for hope to grab hold of.

The creation waits in <u>eager expectation</u> for the sons of God to be revealed. [20] For the creation was subjected to frustration, not by its own choice, but by the will of the one who subjected it, in hope [21] that the creation itself will be <u>liberated from its bondage to decay and brought into the glorious freedom</u> of the children of God. [22] We know that the whole creation has been <u>groaning</u> as in the pains of childbirth right up to the

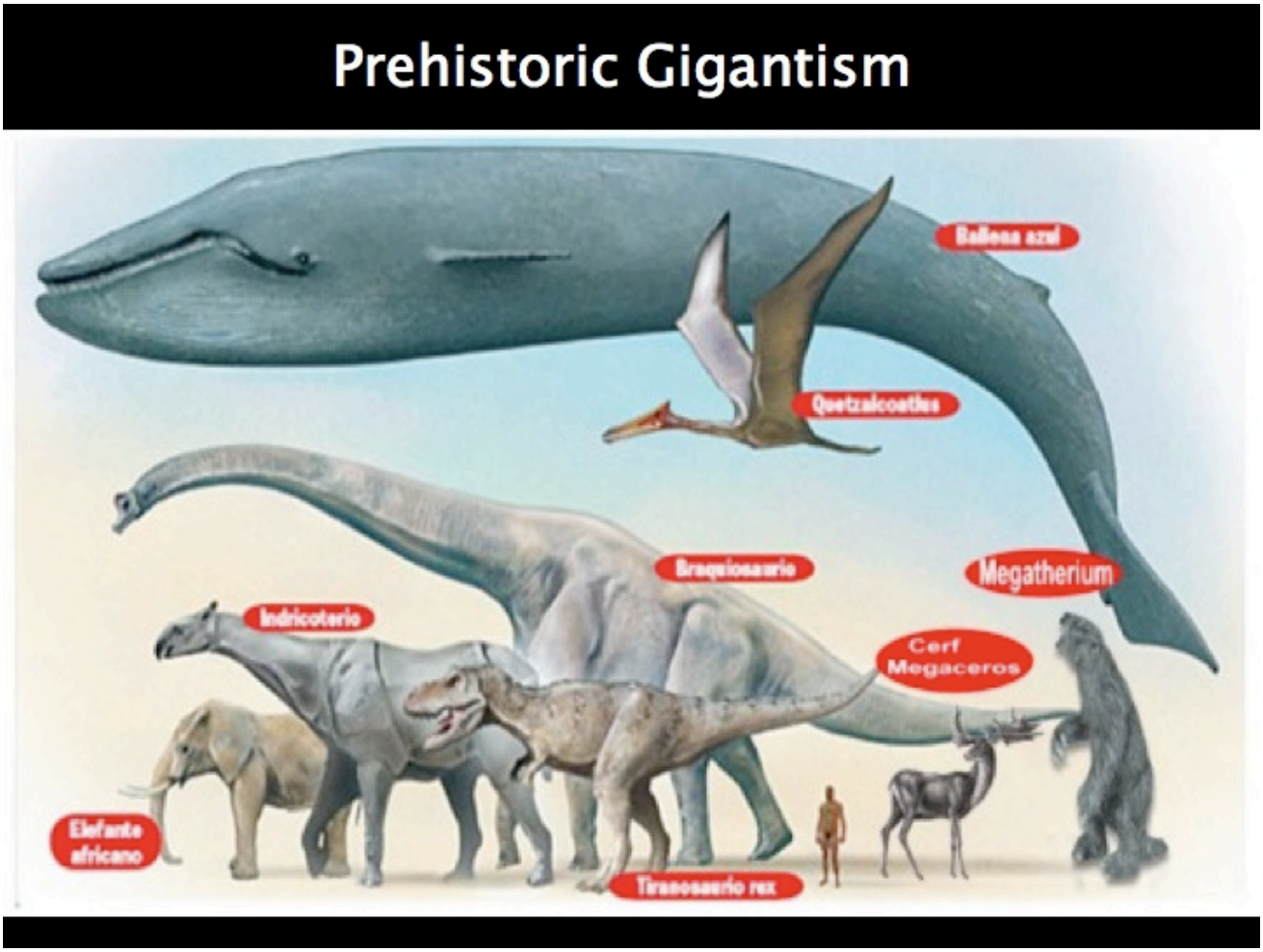
[3] "The Bible is not only consistent from beginning to end, it has a perfect symmetry. The last 3 chapters of Revelation mirror the first 3 of Genesis. At the beginning of Genesis we find the creation, the planting of the Garden of Eden, the marriage of Adam and Eve, and the victory of the serpent. At the end of Revelation, we find the new creation, the restoration of the Garden of Eden, the marriage of Yeshua and His bride, and the defeat of the serpent. In Genesis 3 man sins. In Revelation 20 (3rd from the end), sin comes to its final judgment. [Revelation 20 explains that the serpent of Genesis 3 was actually Satan.] No engineer, architect or contractor in his right mind would ever lay the first brick or dig the first shovel until every last screw, wire and detail of the building were already planned out in the written blueprint. Before God ever said, 'Let there be light', He already had planned the ending of the book of Revelation. The rabbis say that the Torah and the Messiah existed before the creation in Genesis. God planned His kingdom 'before the foundation of the earth (Matthew 25:34, Ephesians 1:4, I Peter 1:20, Revelation 13:8).' Another rabbinic saying goes: 'the last to be done is the first to be planned.' Everything in Genesis was done with the final perfection of Revelation already in mind. Before God wrote the first pages of His book, He had a happy ending planned for the last few chapters." [Asher Intrater, "Old Testament in the Book of Revelation," ***Revive Israel Update*** **(5 July 2009); archived at** http://www.revive-israel.org/2009/07-05-old-testament-book-revelation-part-2.html**.]**

present time. [23] Not only so, but we ourselves, who have the firstfruits of the Spirit, groan inwardly as we <u>wait eagerly</u> for our adoption as sons, <u>the redemption of our bodies</u>. [24] For in this hope we were saved. ([NIV] Romans 8:19-24)

II. THE COSMOGENICAL GLORY OF CREATION REVEALED IN THE FOSSIL RECORD

A. The Reality of Gigantism in the Fossil Record

"One of the most cherished features of dinosaurs—their gigantism—is also one of the most mysterious. Why in the world were these animals so huge?"[4]

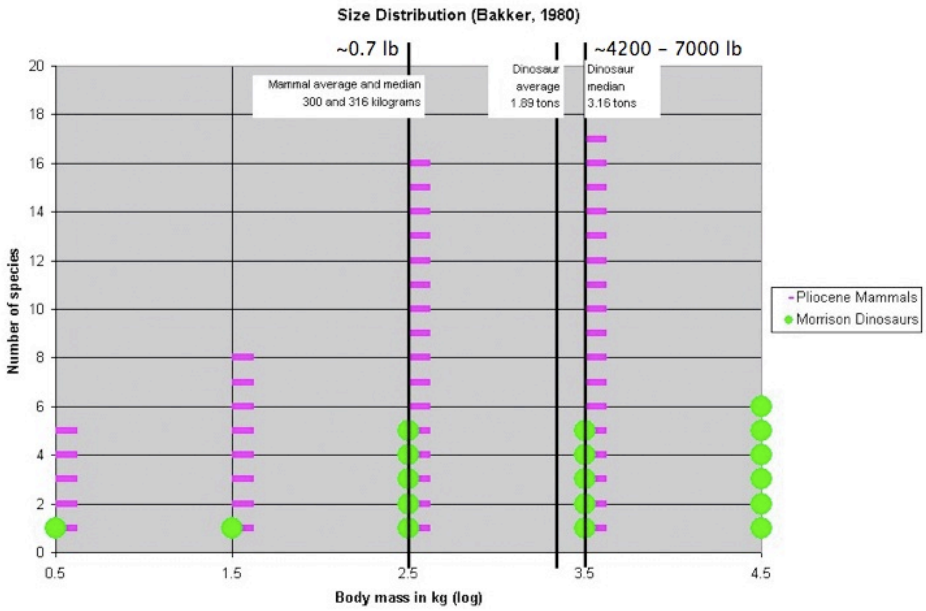


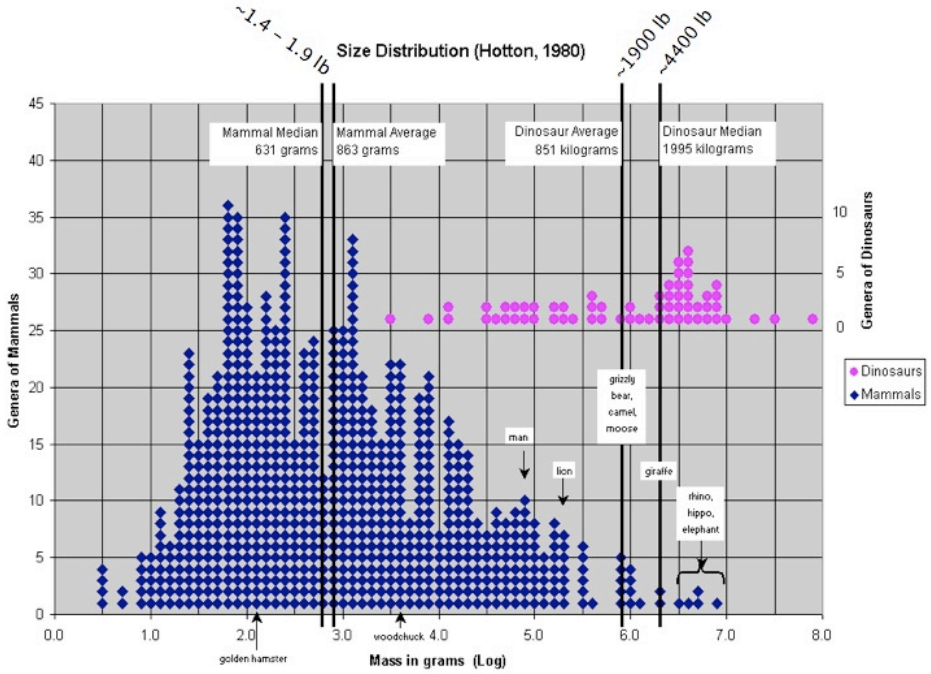
1. Professional paleontologists are forever pointing out that "not all dinosaurs were giants" (e.g. ***Compsognathus***), but for the most part dinosaurs were actually enormous. Estimates of median dinosaur mass range from 500 kg to 5 metric tons (1100-11,000lb),[5] but a conservative estimate would be about 2000lb. The largest verifiable finds on record

[4] Joel Achenbach, "Why were dinosaurs so humongous?" *National Geographic Online* (July 2005); web article at http://www7.nationalgeographic.com/ngm/0507/resources_who.html#weblinks.

[5] Nicholas H. Hotton III (Curator of Vertebrate Paleontology for the National Museum of Natural History, Smithsonian Institute), "An alternative to dinosaur endothermy: The happy wanderers," in D.K. Thomas and E.C. Olson, eds., *A Cold Look at the Warm Blooded Dinosaurs* (Washington, D.C.: American Association for the Advancement of Science, 1980), 311-350.

have exceeded 100 tons,[6] "and given the astronomical odds against the fossil preservation of any given animal, it is nearly certain that larger dinosaurs existed but were not preserved or have not yet been found."[7]





[6] That is, *Argentinosaurus* [see J.F. Bonaparte, and R.A. Coria, "Un neuvo y gigantesco Saurópodo Titanosaurio de la Formación Río Limay (Albiano-Cenomaniano) de la Provincia del Neuquén, Argentina," *Ameghiniana* 30:271-282 (1993)].

[7] William C. Erickson, "Dinosaur Giantism," in *On the Origin of Dinosaurs and Mammals* (online publication), 19; available at http://microlnx.com/dinosaurs/OriginOfDinosaursAndMammals.pdf.

2. Based on 63 dinosaur genera, Hotton's data yielded an average generic mass in excess of 850 kg (~grizzly bear) and a median generic mass of nearly 2 tons (~giraffe). This contrasts sharply with extant mammals (788 genera) whose average generic mass is 863 grams (~large rodent) and a median mass of 631 grams (~smaller rodent). The smallest dinosaur was bigger than two-thirds of all living mammals, and the majority of dinosaurs were bigger than all but 2% of living mammals.[8]

3. Size comparison examples:[9]

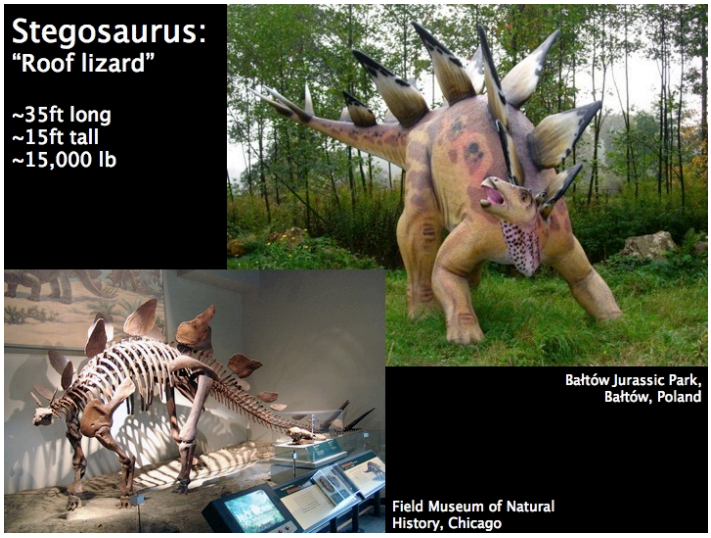
   a) Giraffe (tallest land animal): ~18ft tall, 3000lb

   b) Savanna Elephant (largest land animal): ~18ft long, 11ft tall, 18,000lb

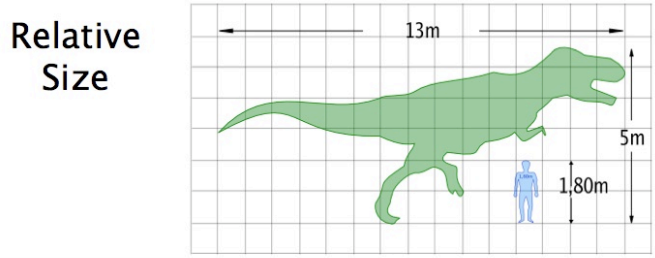
[8] Robert Bakker (prominent paleontologist and initiator of the "Dinosaur Renaissance") believes Hotton overstated the size difference, maintaining that the modern fauna, dominated by very small mammals and devoid of very large ones, is atypical in the history of mammals. Yet even when all of the mammals smaller than the smallest dinosaur (4kg) are excluded from Hotton's data set, the size gap between the mammals and dinosaurs is only marginally reduced: the average generic mass of mammals is raised to 36kg (~large dog) and median mass is raised to 25kg (~smaller dog). Both values are still orders of magnitude less than dinosaurs. [See R.T. Bakker, "Dinosaur heresy—dinosaur renaissance: Why we need endothermic archosaurs for a comprehensive theory of bioenergetic evolution," in D.K. Thomas and E.C. Olson, eds., *A Cold Look at the Warm Blooded Dinosaurs* (Washington, D.C.: American Association for the Advancement of Science, 1980), 351-462.]

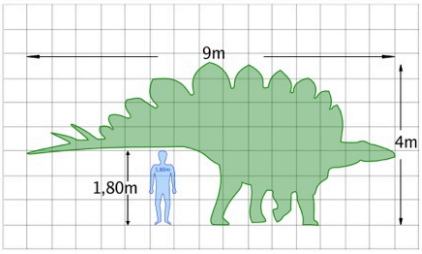
[9] Information generally derived from respective articles on Wikipedia Online Encyclopedia, available from http://en.wikipedia.org. Sizes are an average of opinion. For example, *Brachiosaurus* (a step larger than the *Apatosaurus*) is estimated, by equally top experts in paleontology (Edwin H. Colbert vs. R. McNeill Alexander), to range from more than 80 tons to less than 50 tons, respectively—a difference of over 60,000lbs! [See E.H. Colbert, "The weights of dinosaurs," *American Museum Novitiates* 2076:1-16 (1962); and R.M. Alexander, *Dynamics of Dinosaurs and Other Extinct Giants* (New York: Columbia University Press, 1989).]

c) *Stegosaurus*: ~35ft long, 15ft tall, 15,000lb

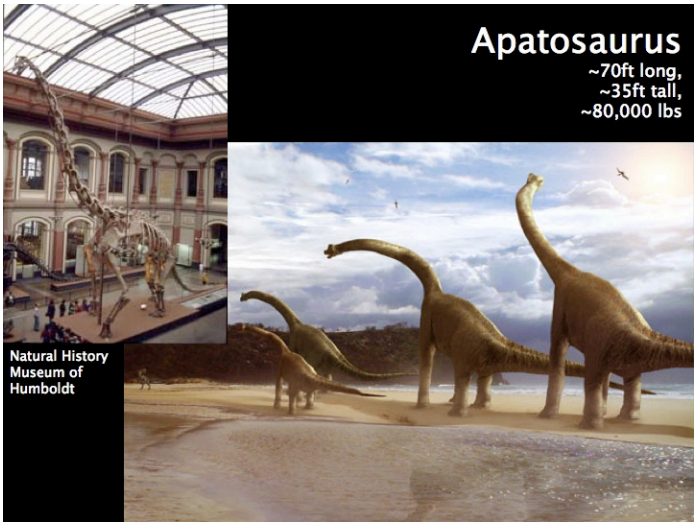


d) *Tyrannosaurus*: ~45ft long, 16ft tall, 16,000lb

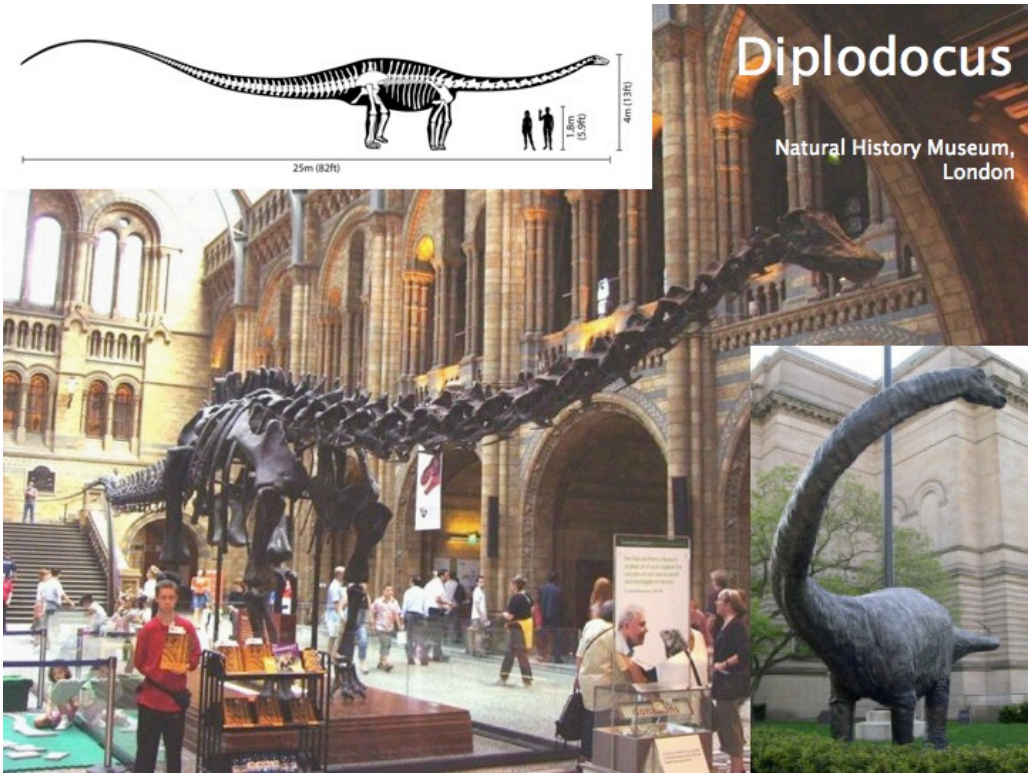




e) *Apatosaurus*: ~70ft long, 35ft tall, 80,000lb

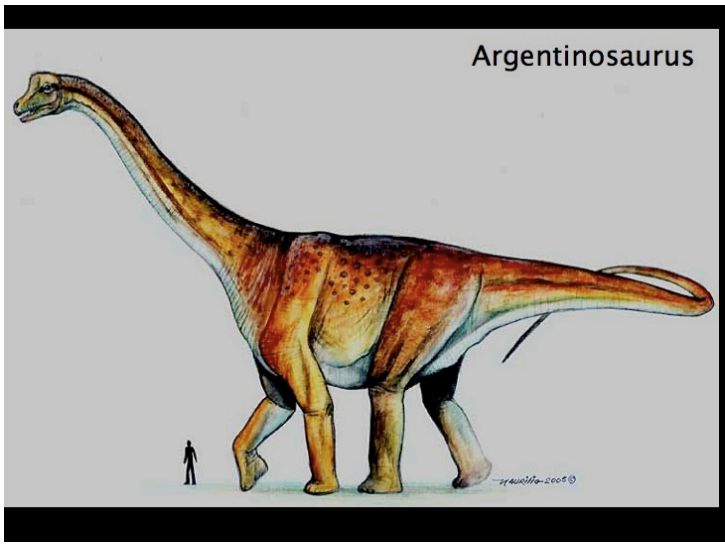


f) *Diplodocus*: ~90ft long, 45ft tall, 90,000lb



g) *Sauroposeidon*: ~90ft long, 60ft tall, 110,000lb

h) *Argentinosaurus*: ~120ft long, 70ft tall, 220,000lb

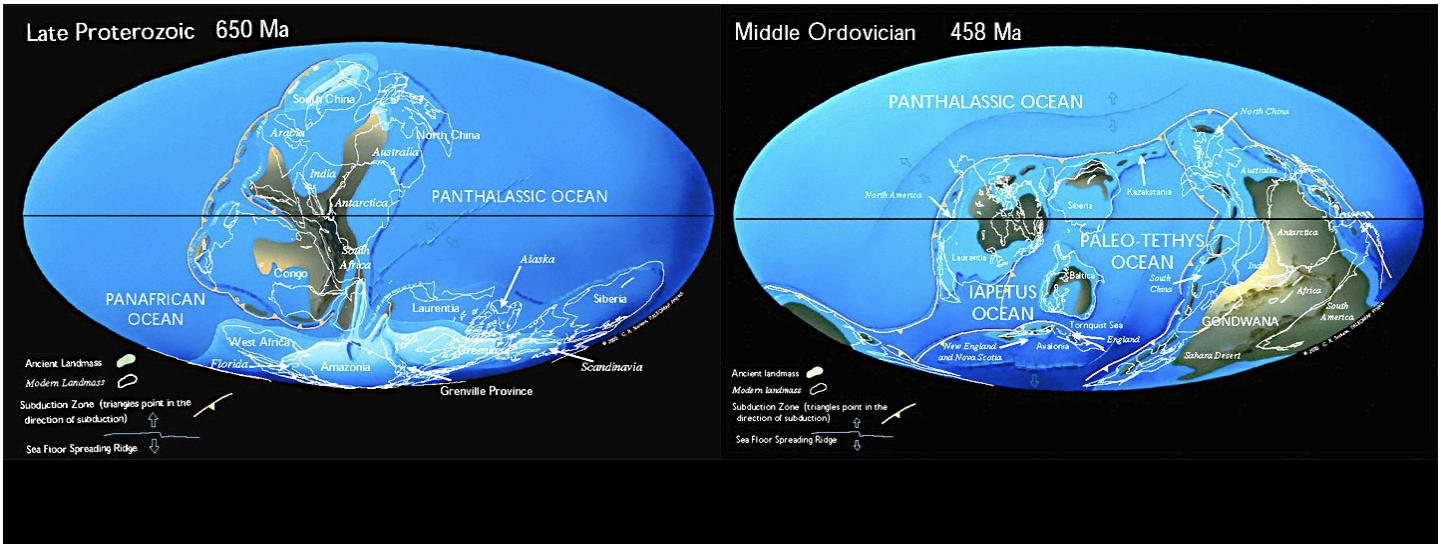


i) *Bruhathkayosaurus*: ~145ft long, 400,000lb[10]

[10] Meaning "huge bodied lizard," *Bruhathkayosaurus* was found near the southern tip of India, to the northeast of Kallamedu village in the late 1980s. However, the find was poorly collected and analyzed [see P. Yadagiri and K. Ayyasami, "A carnosaurian dinosaur from the Kallamedu Formation (Maastrichtian horizon)," *Symposium on Three Decades of Development in Palaeontolgy and Stratigraphy in India: Geological Survey of India Special Publications* 11(1):523-528 (1989).] Thus, until the remains are properly described, the validity of any estimates should be held in question.

4. Historically, evolutionists have always struggled with explaining how such humongous animals could have ever survived on this earth.[11] Particularly, sauropod gigantism runs into significant problems because of ecological limits.[12] Moreover, its sudden evolutionary development is even more difficult to explain.[13]

"Accustomed with the typically large size of dinosaurs, most scientists take dinosaur giantism for granted. As a result, they tend to ignore or belittle the very real mechanical problems associated with size."[14]



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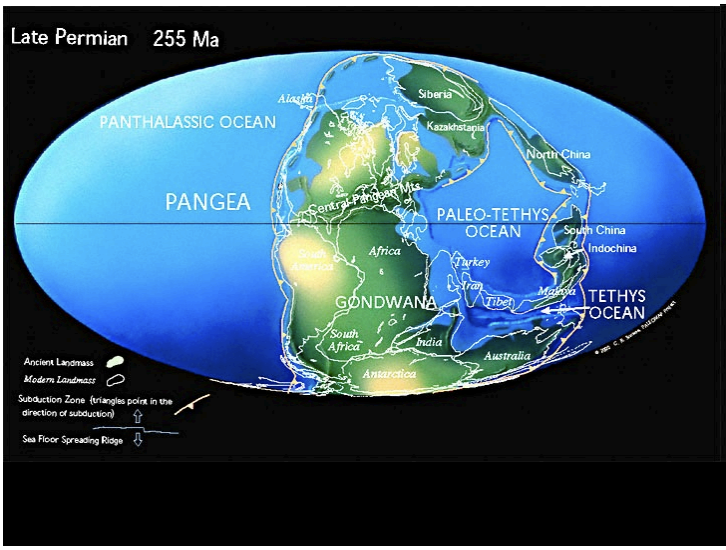
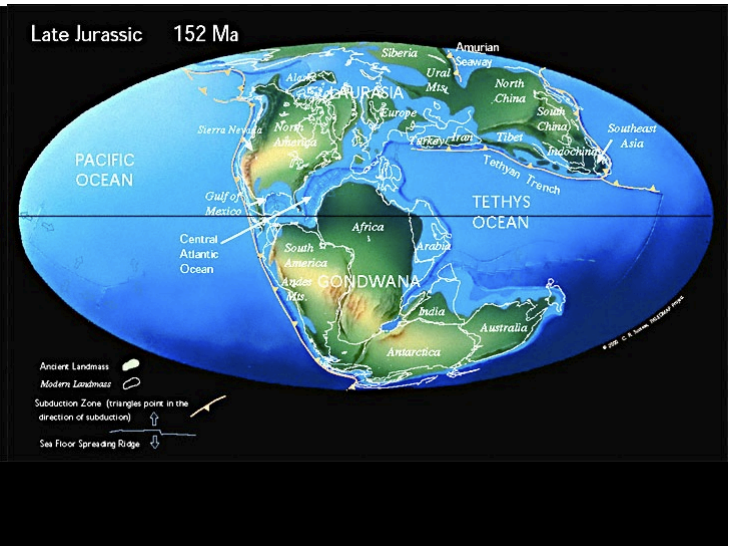
[11] When the first sauropod, *Cetiosaurus* ("whale-lizard"), was discovered in the 1840s, Richard Owen believed it to be much too large to live on land and therefore decided that it must have been a marine lizard. However, the discovery of weight-bearing limbs proved that *Cetiosaurus* was in fact a land dweller, a notion that Owen found difficult to accept. Accordingly, he decided that *Cetiosaurus* must have spent its life in lagoons and swamps, where its enormous mass could be supported buoyantly in water. Thus was born the amphibian theory of sauropods, which many leading paleontologists have since subscribed to. However the long erect limbs and deep rib cage of sauropods are similar to those of elephants and other large terrestrial mammals, and quite unlike the short, stubby limbs and barrel-shaped torso of hippos, which spend most of their lives in water. Moreover, studies in sauropod bone density and strength lend support to the idea that they were primarily land-dwellers [see R.M. Alexander, "Mechanics of posture and gait of some large dinosaurs," *Zoological Journal of the Linnaean Society* 83:1-25 (1985)].

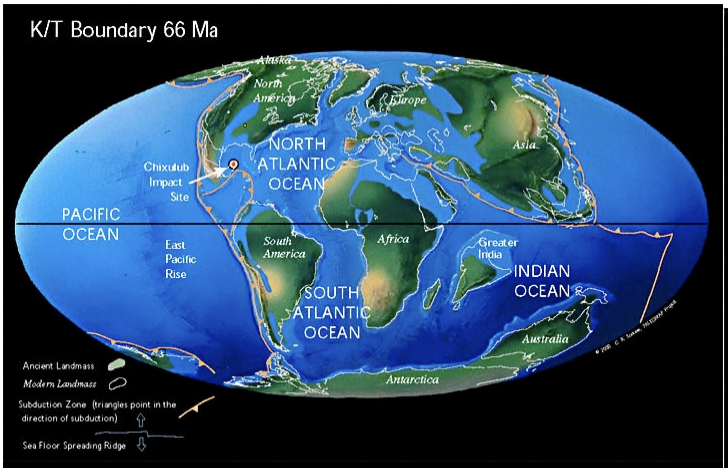
[12] Body size today is restricted by land mass size because each individual of a species requires a certain fraction of the land area as food resource. If body size gets too large, population density of the species drops below the critical value for survival of the species. Sauropod and theropod dinosaurs have been repeatedly shown to be at least an order of magnitude too large for the respective landmass they were inhabiting [see G.P. Burness, J. Diamond, and T. Flannery, "Dinosaurs, dragons, and dwarfs: The evolution of maximal body size," *Proceedings of the National Academy of Sciences USA* 98:14518-14523 (2001); and P. Colinvaux, *Why Big Fierce Animals Are Rare: An Ecologist's Perspective* (Princeton: Princeton University Press, 1978)]. However, evolutionists simply state that "somehow they were able to circumvent these ecological limits." [Martin Sander (Institute for Paleontology, University of Bonn), "Biology of the Sauropod Dinosaurs: The Evolution of Gigantism," *DFG Research Unit 533*, web article at http://www.sauropod-dinosaurs.uni-bonn.de/sauropodlong.htm]

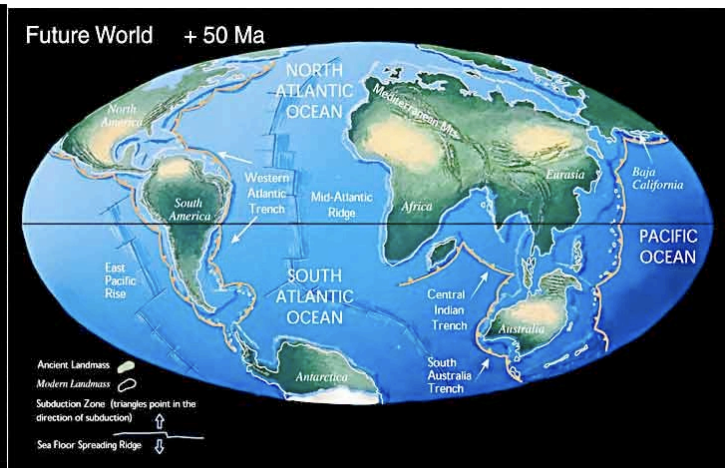
[13] "The sauropods began their long evolutionary history as giants; one might say that geologically speaking they became instantaneous giants, because the first of these great dinosaurs is found in rocks of very early Jurassic age." [Edwin H. Colbert (Professor Emeritus of Vertebrate Paleontology at Columbia University), *Dinosaurs: An Illustrated History* (Hammond, 1983)] *Barapasaurus*, at 80ft in length, was supposedly one of the first true sauropods, from the Early Jurassic. The appearance of *Barapasaurus* so early in the age of dinosaurs belies the notion that the evolution of dinosaur gigantism was a protracted and incremental process, à la Cope's Rule (which simply states that population lineages tend to increase body size incrementally over geological time) [see Jeff Hecht, "Giant dinosaurs arrived with a bang," *NewScientist.com*, 16 May 2002, web article at http://www.newscientist.com/channel/life/dinosaurs/dn2290]. However, Cope's Rule has been strongly criticized as a theory without a mechanism, simply stating the trend instead of explaining it. Thus, the sudden appearance of sauropod gigantism in the fossil record poses a significant problem for evolutionary theory.

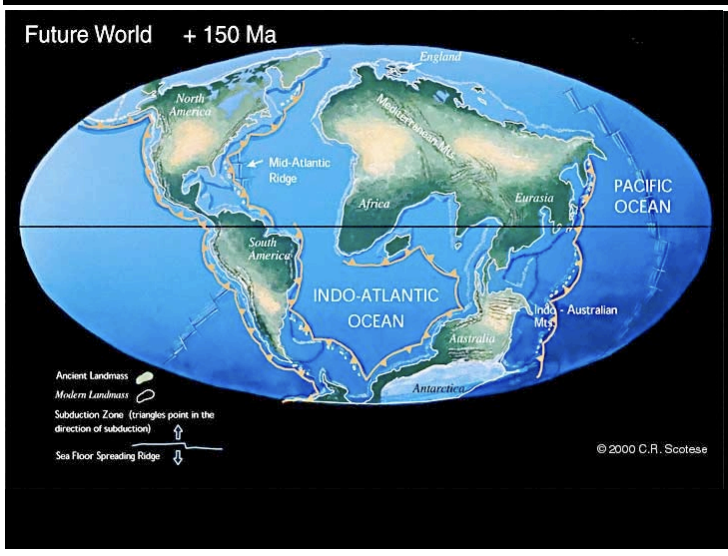
[14] Erickson, "Dinosaur Giantism," 20.

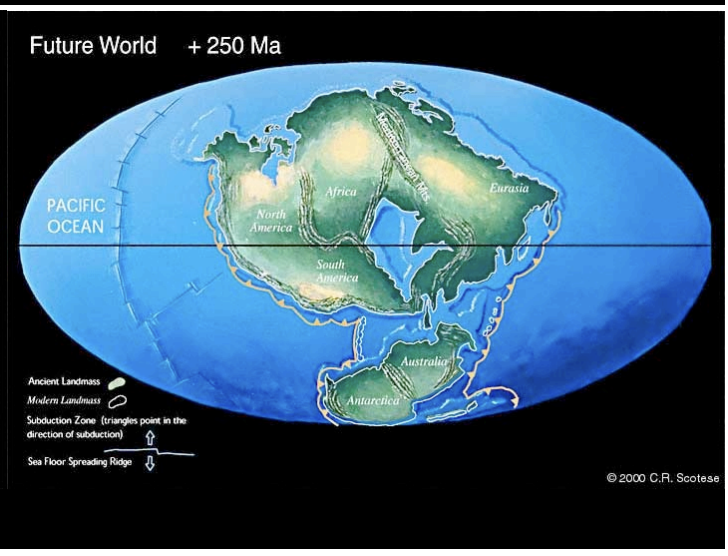








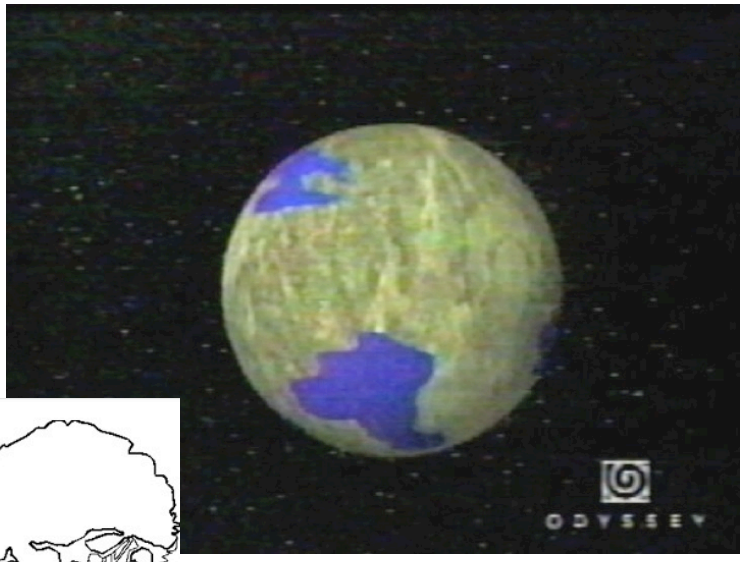


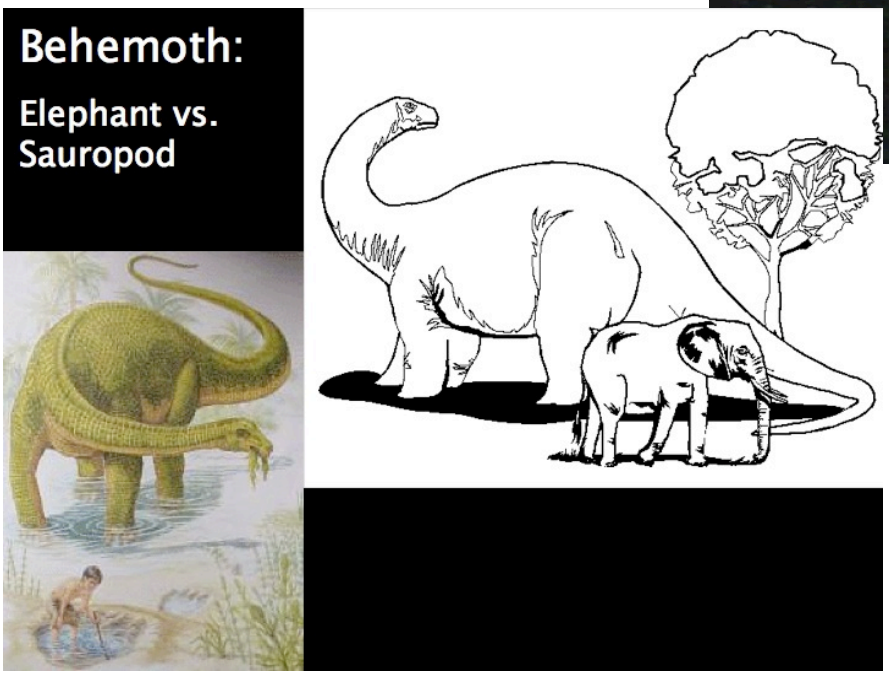


5. Evolutionist explanation – “Giant animals can evolve naturally over millions of years, when food sources are plentiful. When the climate is warmer, cold-blooded animals (like lizards),

plants, and insects grow larger, while warm-blooded animals (like mammals) shrink. When the climate is colder, such as in the Ice Ages, warm-blooded animals get larger, while cold-blooded animals evolve smaller."[15] (**see slides on previous pages**)

6. Creationist explanation – about half of the earth's present oceanic waters used to be beneath the earth's crust, which provided much more land mass and stabilized the atmosphere. Moreover, the atmosphere prior to the Flood could have been radically different than present day (cf. Gen. 1:6-8), which would have further promoted growth.





Look now at the behemoth, which I made along with you; <u>he eats grass</u>[16] like an ox. [16] See now, his strength is in his <u>hips</u>, and his power is in his <u>stomach muscles</u>. [17] He moves his <u>tail</u> like a cedar; the sinews of his <u>thighs</u> are tightly knit. [18] His <u>bones</u> are like beams of bronze, his ribs like bars of iron. [19] He is the first** (*"chief" KJV*) **of the ways** (*"works" NIV, ESV*) **of God; only He who made him can bring near His sword… [21] He lies under the lotus trees, in a covert of <u>reeds and marsh</u>… [23] Indeed the river may rage, yet he is not disturbed. ([NKJV] Job 40:15-23)

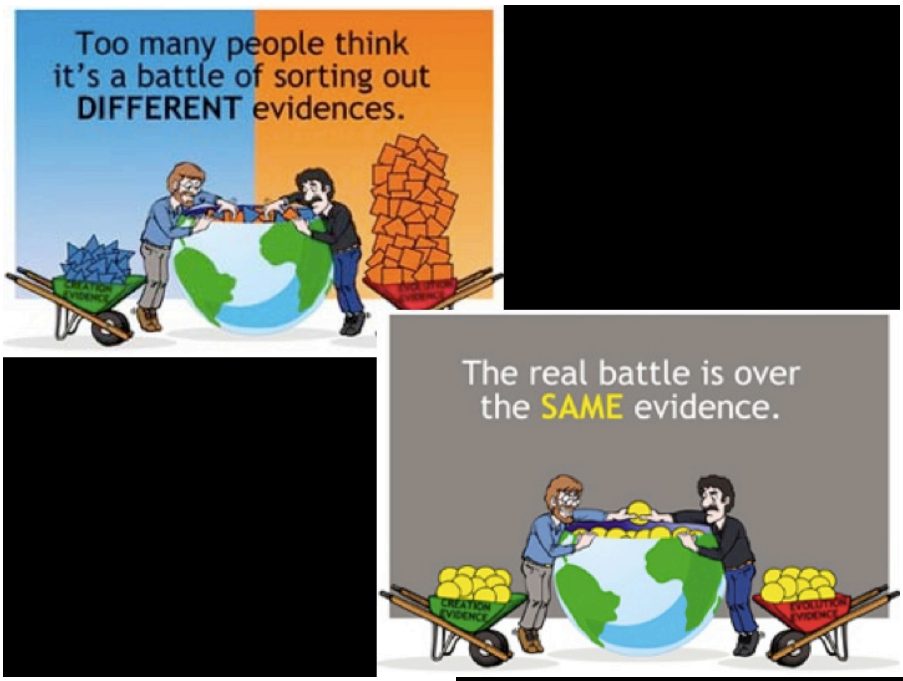
B. Survey of Prehistoric Gigantism

"Paleontology is much like politics: passions run high, and it's easy to draw very different conclusions from the same set of facts."[17]

[15] Wikipedia Online Encyclopedia, "Giant Animals," available at http://en.wikipedia.org/wiki/Giant_animals.

[16] It used to be commonly assumed that grass didn't evolve until long after dinosaurs died out, supposedly 65 Ma. However, recent microscopic examination of fossilized titanosaurus dung from India now shows that the last massive plant-eating dinosaurs ate at least five different types of grass. [See D.R. Piperno and H.D. Sues, "Dinosaurs Dined on Grass," *Science* 310:1126-1128 (18 November 2005); abstract at http://www.sciencemag.org/cgi/content/summary/310/5751/1126.]

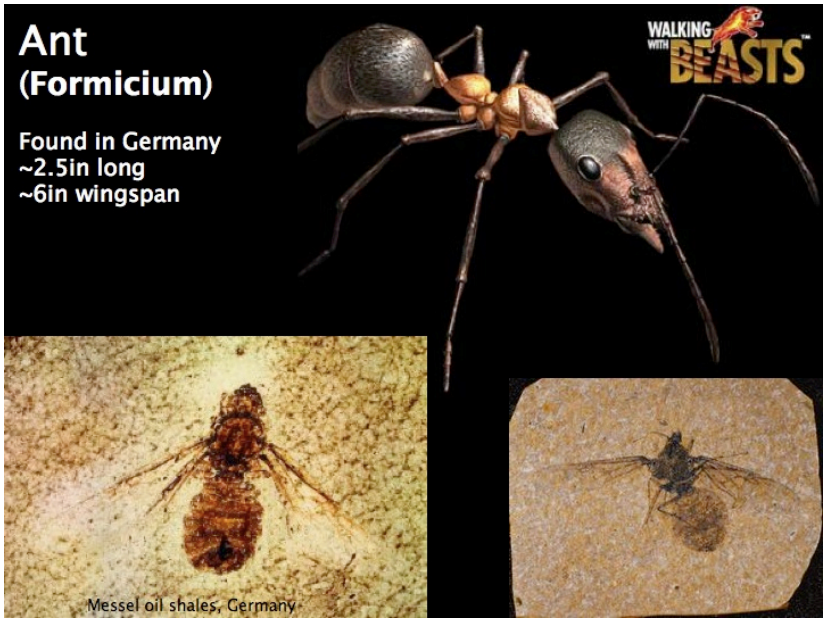
[17] M.D. Lemonick, "Parenthood, Dino-style," *Time*, 8 January 1996, p. 48.


Too many people think it's a battle of sorting out DIFFERENT evidences.
The real battle is over the SAME evidence.


THIS IS EVIDENCE FOR CREATION!
THIS IS EVIDENCE FOR EVOLUTION!

1. Invertebrates

a) Ant (*Formicium*) – found recently in the Messel oil shales and Eckfeld Maar in Germany, the ants had body lengths of 1½-3in and wingspans reaching 6+in.[18]

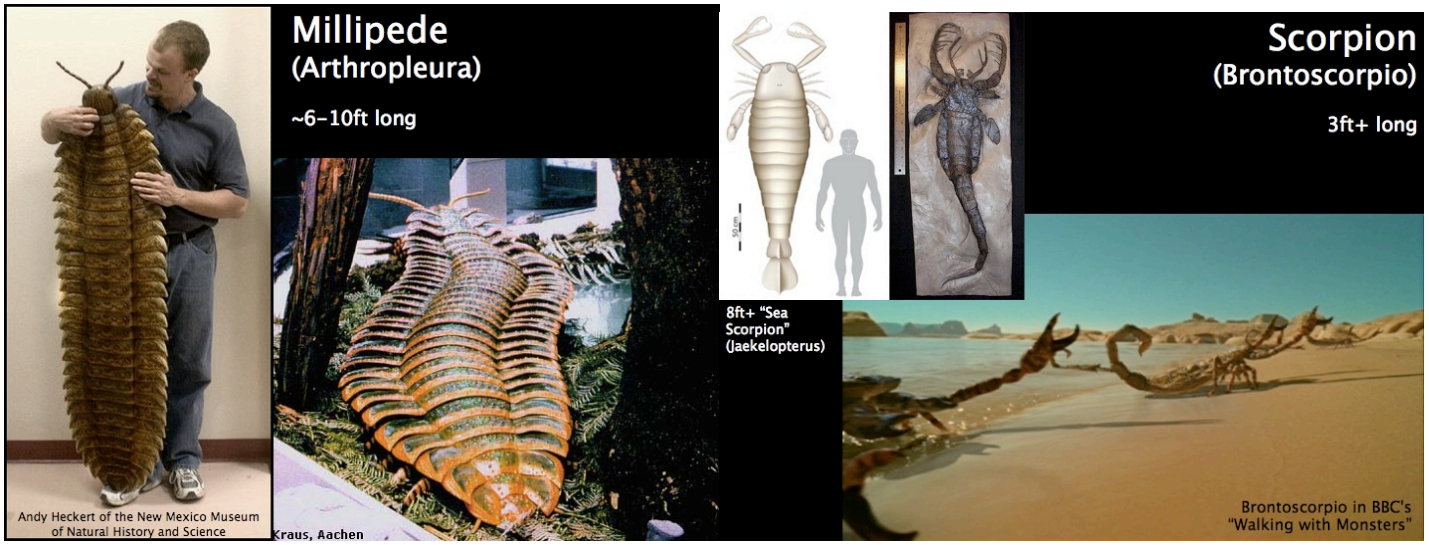


b) Cockroach (*Apthoroblattina*) – with a length of approximately 20in, it was about six times larger than the largest modern cockroach.[19]

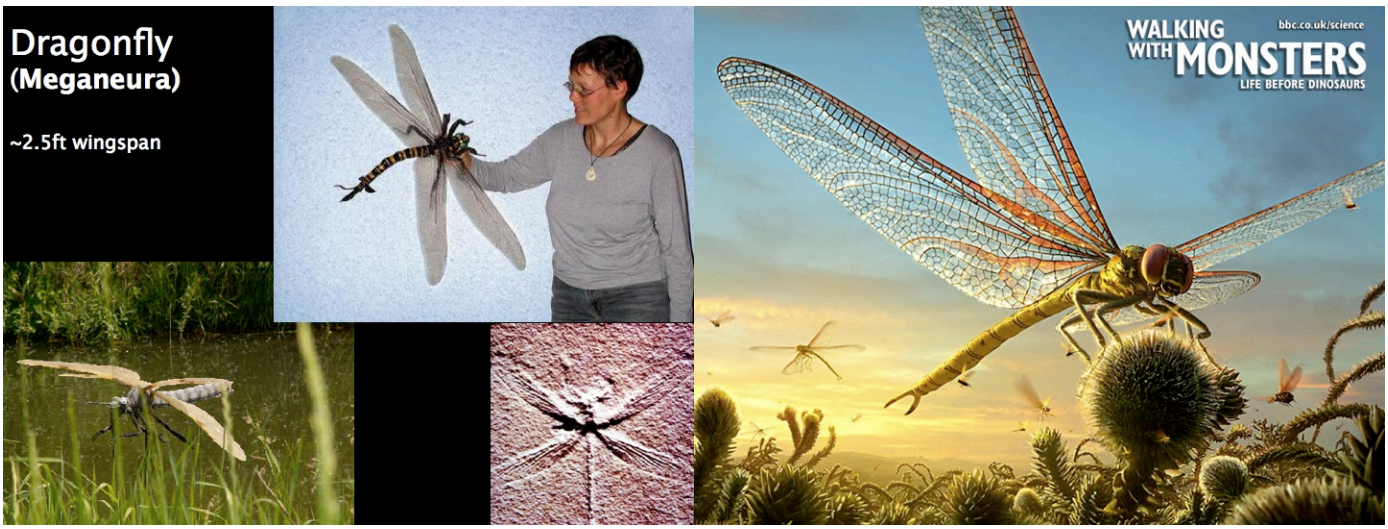
[18] "A new subfamily of the Formicidae (Insecta: Hymenoptera) from the Middle Eocene oil shell of the 'Grube Messel' near Darmstadt (W. Germany, S. Hesse)," *Senckenbergiana lethaea* 67:177-218 (1986).

[19] Wikipedia Online Encyclopedia, "Apthoroblattina," available from http://en.wikipedia.org/wiki/Apthoroblattina; see also a recent find of a whole cockroach in the NE Ohio 7-11 Coal Mine (though falsely labeled the "largest fossil cockroach"), Pam Frost Gorder, "Largest Fossil Cockroach Found; Site Preserves Incredible Detail," *Ohio State Research News*, 7 November 2001; archived at http://researchnews.osu.edu/archive/bigroach.htm.

c) Millipede (*Arthropleura*) – found in North America and Scotland, it was 6-10ft long, the largest known land invertebrate of all time, and was covered in a thick tough armour-like skeleton.[20]



d) Dragonfly (*Meganeura*) – meaning "big genes," it had a wingspan of over 75cm (2.5ft), the size of a modern day hawk.[21] First found in the Stephanian Coal Measures of Commentry in France in 1880, it is the largest known flying insect.



e) Oyster (*Plagiostoma*) – over 500 bi-valve, ocean dwelling mollusks were found by Cuban paleontologist, Arturo Vildozola near the town of Acostambo, Peru (13,000ft

[20] To see one of the largest ones ever found, see Sue Vorenberg, "Spectacular specimen: this bug's a big one--8 feet long--and New Mexico scientists nabbed some of its fossils," *Albuquerque Tribune*, 14 April 2005; available at http://s8int.com/mega6.html; see also Wikipedia Online Encyclopedia, "Arthropleura," available from http://en.wikipedia.org/wiki/Arthropleura.

[21] W.A. Shear and J. Kukalova-Peck, "The ecology of Paleozoic terrestrial arthropods: the fossil evidence," *Canadian Journal of Zoology* 68:1807-1834 (1990); D.E.G. Briggs, "Gigantism in Palaeozoic arthropods," *Special Papers in Palaeontology* 33:157 (1985).

above sea level in the Andes Mountains) in January, 2001.[22] Found over a wide area, the fossilized oysters reached a width of 12ft and weighed up to 650lb.[23]

2. Fish

   a) Salmon (*Oncorhynchus rastrosus*) – akin to modern Pacific salmon, *Oncorhynchus rastrosus* were enormous salmon that had two gigantic fangs in their upper jaw, weighed ~400lb, and reached 8-10ft in length.[24]

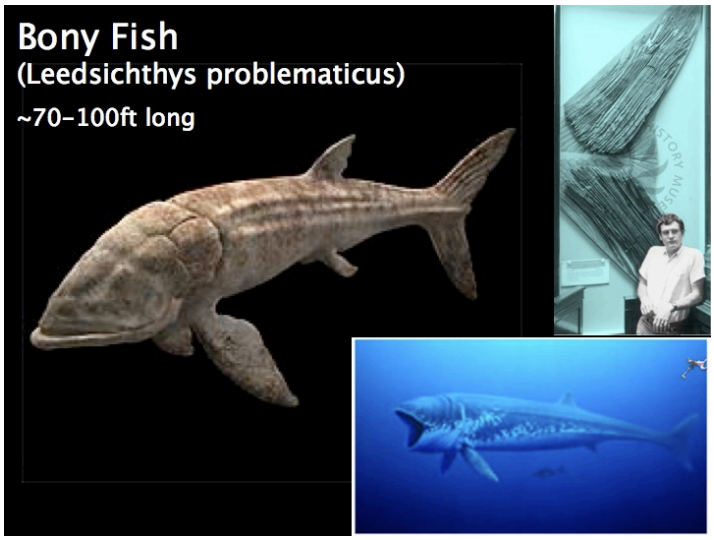
[22] See *Express Times*, 2 March 2001, p. A-2; *The Cairns Post*, 3 March 2001, p. 24; *Sunday Herald Sun*, 11 March 2001; etc. See also David Catchpoole, "Giant oysters on the mountain," *Creation Ex Nihilo* 24(2):54-55 (March 2002); archived at http://www.answersingenesis.org/creation/v24/i2/oysters.asp.

[23] Vildozola named them *Plagiostoma giganteum* and placed the age of the fossils at "200 million years." However, bi-valve mollusks open when they die, so the fact that the oysters were found closed suggests that they did not die a natural death, but rather were buried rapidly—a condition better explained by a global flood.

[24] Also known as *Smilodonichthys rastrosus*, see T.M. Cavender and R.R. Miller, "*Smilodonichthys rastrosus*, a new pleistocene salmonid fish from the western United States," *University of Oregon Museum of Natural History Bulletin* 18:1-144 (1972).

b) Piranha (*Megapiranha paranensis*) – Something of a gigantic hybrid between a modern piranha and its close herbivorous relative, the Pacu, this fish was over 3ft long, four times as large as piranhas living today.[25]

c) Bony fish (*Leedsichthys*) – believed to be the largest fish to have existed, *Leedsichthys problematicus* was a planktivore, akin to modern baleen whales or basking sharks.[26] The largest specimen was discovered recently by two paleontology students in clay pits near

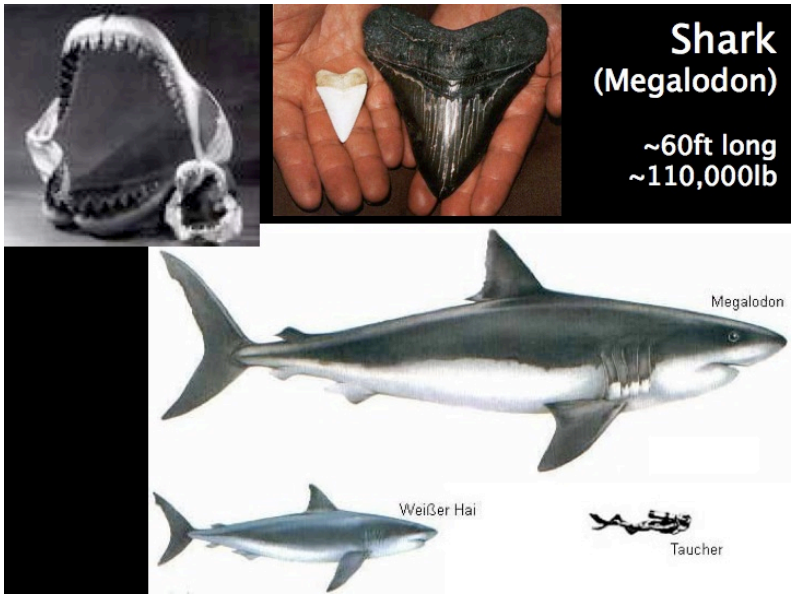


[25] This is based on the formation of the teeth found in the jawbone. Piranhas have a single row of triangular teeth, while Pacu have two rows of square teeth. The new fossil shows an intermediate pattern of teeth in a zig-zag row. The Megapiranha fossil was originally collected in a riverside cliff in northeastern Argentina in the early 1900s, but remained unstudied until paleontologist Alberto Cione of Argentina's La Plata Museum rediscovered the specimen in a museum drawer. [See Alberto Luis Cione, et al., "*Megapiranha paranensis*, a new genus and species of Serrasalmidae (Characiformes, Teleostei) from the Upper Miocene of Argentina," *Journal of Vertebrate Paleontology*, 29(2):350-358 (June 2009).]

[26] The name Leedsichthys means "Leeds's fish," after fossil collector Alfred Leeds, who discovered it in 1889 near Peterborough, England. The fossils found by Leeds and other Leedsichthys fossils found in Germany gave the fish the species descriptor "Problematicus," because it would have been so enormous that it was difficult to imagine it existed.

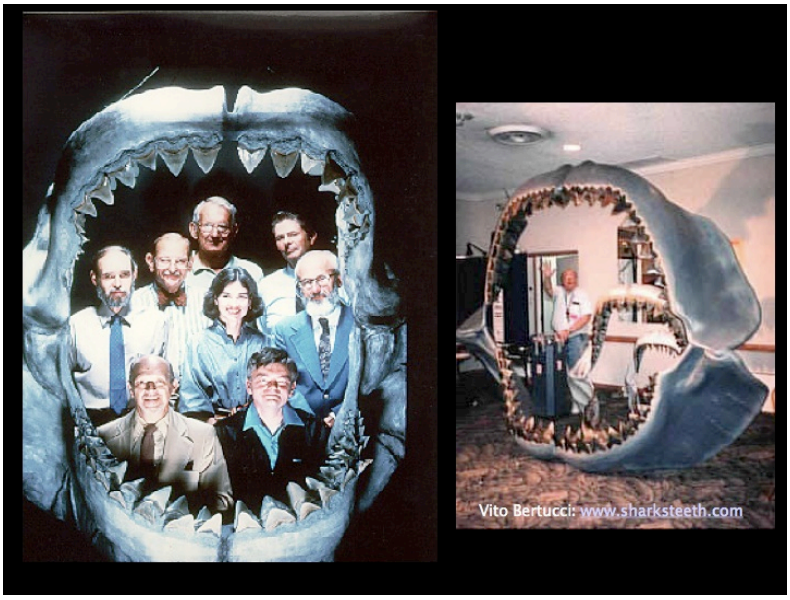
Peterborough, England.[27] Estimated to be 70-100ft long, it was twice as large as the whale shark, the biggest fish in the ocean today.

d) Shark (*Megalodon*) – considered to be the largest predatory fish to have ever lived, it is considered to be a much larger and bulkier version of the modern great white shark, attaining an astonishing length of up to 60ft and



[27] First found in July 2001, full-scale excavation began in June 2002 by dig leader Jeff Liston; details available at his website, http://www.big-dead-fish.com. The specimen gained recognition when it was documented by *National Geographic* in 2003 (James Owen, "'Biggest Fish Ever Found' Unearthed in U.K." *National Geographic News*, 1 October 2003; web article at http://news.nationalgeographic.com/news/2003/10/1001_031001_biggestfish.html).

weighing over 110,000lb.[28] With jaws ~7ft wide and triangular teeth up to ~7in (vs. the largest great white shark at ~2in), it could swallow a cow whole and broad.



3. Amphibians

   a) Salamander (*Paracyclotosaurus*) – Fossils 6-10ft long have been found in Australia, India and South Africa (all areas of the supposed continent of Gondwana).[29] The most notable and complete specimen, *P. davidi*, was 2.75m (~9ft) long, found in a series of brick pits (the Wianamatta Shales) near Sydney, Australia.[30]

[28] Such estimates are gleaned mainly from teeth and a few skeletal components; see M.D. Gottfried, et al., "Size and skeletal anatomy of the giant 'Megatooth' shark *Carcharodon megalodon*," in A.P. Klimley and D.G. Ainley eds., *Great White Sharks: The Biology of* Carcharodon carcharias (San Diego: Academic Press, 1996) 55-66.

[29] See Patricia Vickers-Rich and Thomas Hewett Rich, *Wildlife of Gondwana: Dinosaurs and Other Vertebrates from the Ancient Supercontinent* (Indiana University Press, 1993).

[30] D.M.S. Watson, "A new labyrinthodont (Paracyclotosaurus) from the upper Trias of New South Wales," *Bulletin of the British Museum* 3(7):233-262 (1958).

b) Frog (*Beelzebufo*) – Found in Madagascar, the frog weighed over 10lb and was over 16in long,[31] far surpassing the today's largest living frog, the Goliath Frog (*Conraua goliath*) of West Africa, that can reach ~7lb and ~12in.[32] Recovered from strata dated by Big Science to the late Cretaceous Period (~70Ma), the find has created something of a "paleontology puzzle."[33] **(see slides on next page**)

Frog
(Beelzebufo)
"Devil Toad"

From Madagascar
~16in long
~10lb

vs. largest known living Malagasy frog, Mantydactylus ampinga

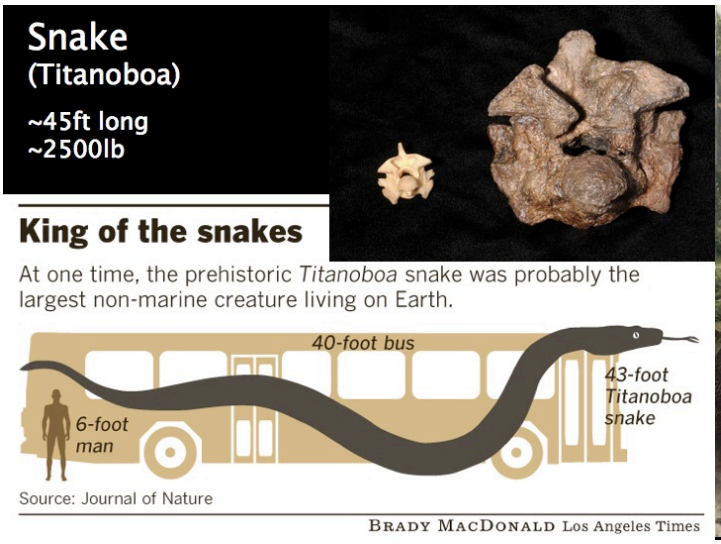
[31] Susan E. Evans, Marc E.H. Jones, and David W. Krause, "A giant frog with South American affinities from the Late Cretaceous of Madagascar," *Proceedings of the National Academy of Sciences of the United States of America*, 105(8):2951-2956 (February 19, 2008); abstract at http://www.pnas.org/cgi/content/abstract/105/8/2951.

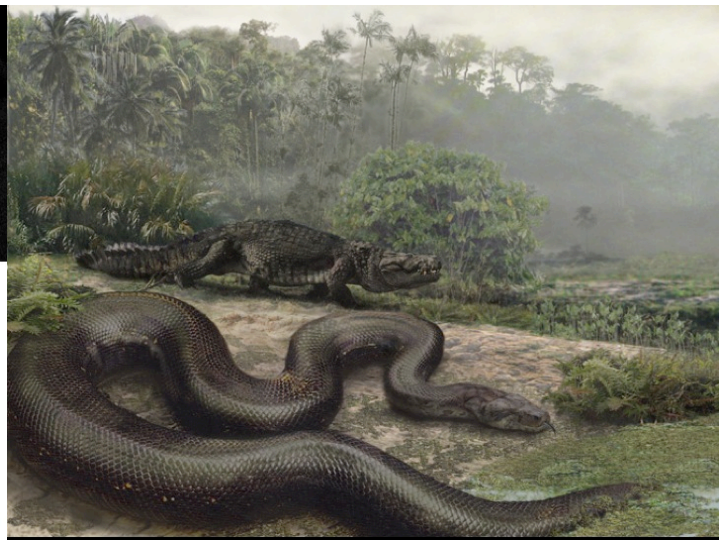
[32] However, Krause teamed with fossil frog experts from University College London (i.e. Evans et al.) and determined that Beelzebufo isn't related to African frogs, but rather it seems to be a relative of normal-sized South American horned frogs (i.e. *ceratophryine* family), sometimes called pacman frogs because of their huge mouths. Thus, Beelzebufo is more than twice the size of its nearest living relative.

[33] "The family link raises a paleontology puzzle: Standard theory for how the continents drifted apart show what is now Madagascar would have been long separated by ocean from South America during Beelzebufo's time. And frogs can't survive long in salt water, Krause noted." (Lauran Neergaard, "Scientists find 'Devil Toad' fossil: Discovery of bowling ball-sized frog raises ancient geography questions," *Associated Press* (February 18 2008); archived at http://www.msnbc.msn.com/id/23225938.

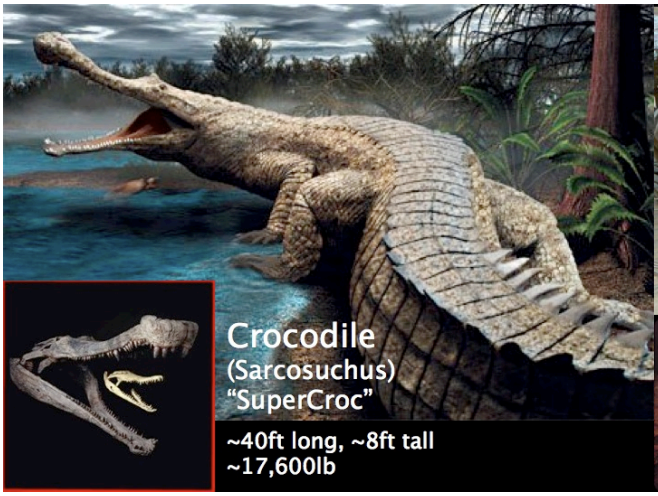
4. Reptiles

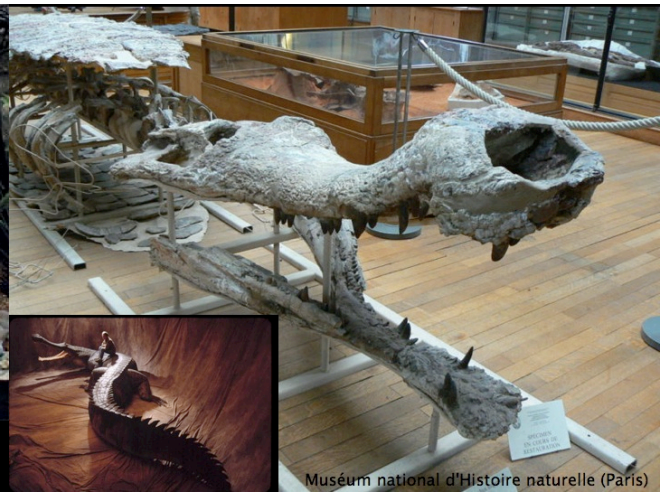
a) Snake (*Titanoboa*) – The giant, boa constrictor-like snake was found in Colombia by an international team of scientists. It is estimated to be 42 to 45 feet long and an estimated 1.25 tons, as long as a school bus and as heavy as a small car.[34]





b) Crocodile (*Sarcosuchus*) – found in Niger, Africa and referred to as "SuperCroc", *Sarcosuchus imperator* was almost twice as long (~40ft) as the largest modern crocodile and weighed up to 10 times as much (~17,600lb).[35]



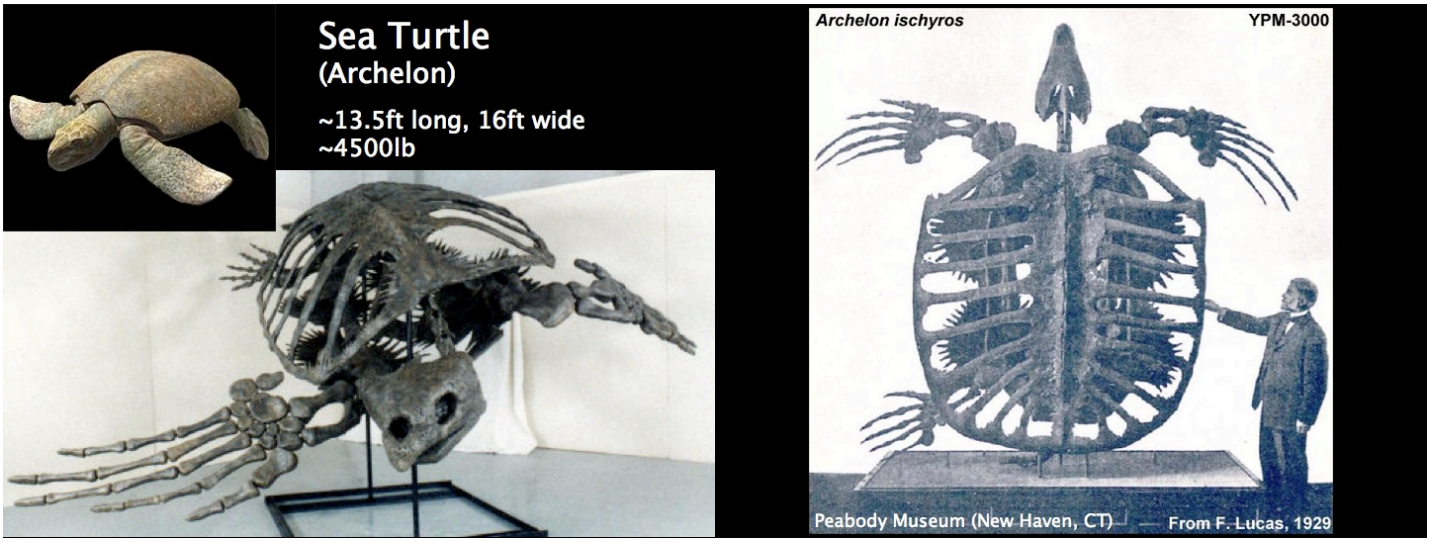


[34] Jason J. Head, et al., "Giant boid snake from the paleocene neotropics reveals hotter past equatorial temperatures," *Nature* 457:715-718 (5 February 2009).

[35] *Sarcosuchus* was first discovered by French paleontologist Albert-Félix de Lapparent, in the 1940s and 1950s in Gadoufaoua, Niger in the Ténéré Desert (part of the Sahara). However, it wasn't until Paul C. Sereno's trips in 1997 and 2000 that enough fossils were recovered to build an adequate reconstruction [see P. Sereno, et al. "The Giant Crocodyliform *Sarcosuchus* from the Cretaceous of Africa" *Science* 294:1516-1519 (16 November 2001); see also D.L. Parsell, "'SuperCroc' Fossil Found in Sahara," *National Geographic News*, 25 October 2001, archived at http://news.nationalgeographic.com/news/2001/10/1025_supercroc.html.]

c) Komodo Dragon (*Megalania*) – similar to the modern komodo dragon, conservative estimates place the length of the largest individuals at over 23ft (though some have argued it to be up to 35ft), with a conservative maximum weight of 4,250lb.[36]

d) Sea Turtle (*Archelon*) – similar to the Leatherback Sea Turtle,[37] the largest *Archelon* fossil, found in the Pierre Shale of South Dakota in the mid-1970s, measures more than 13.5ft long, and ~16ft wide from flipper to flipper. The live weight of this *Archelon ischyros* is estimated at more than 4500lb.[38]



[36] Ralph E. Molnar, *Dragons in the Dust: The Paleobiology of the Giant Monitor Lizard* Megalania (Indiana University Press, 2004); see also R. Owen, "Description of Some Remains of a Gigantic Land-Lizard (*Megalania prisca*, Owen) from Australia," *Philosophical Transactions of the Royal Society of London* 149:43-48 (1859).

[37] The Leatherback Sea Turtle (*Dermochelys coriacea*) is the biggest of all living turtles, reaching a length of over 9ft and weight of 2000lb, and is the world's 4th largest reptile, behind the larger crocodiles.

[38] This particular specimen was discovered by a private collector who later sold it to Siber and Siber of Switzerland, who in turn sold it to the Naturhistorisches Museum Wien in Vienna, Austria, where it has been on exhibit since 1982. Thus, it is referred to as the "Vienna specimen." The first *Archelon* fossil was found by G.R. Wieland in 1895 at the south fork of the Cheyenne River, 35 miles east of Black Hills, South Dakota. The famous *Archelon* specimen measured almost 11 feet from snout to tail, and when fully stretched out, it measured 15 feet from the flipper to flipper. It has been on display in Yale University's Peabody Museum of Natural History in New Haven, Connecticut since 1907.

5. Birds

a) Owl (*Ornimegalonyx*) – also known as the "Cuban Giant Owl," it was first found in western Cuba in 1954. The wood owls being its closest modern cousins, it stood at least 3.5ft tall, weighed ~20lb, and had a ~10ft wingspan.[39]

b) Seabird (*Pelagornithid*) – with a wingspan up to 20ft, it was twice as large as the largest great albatrosses (genus *Diomedea*), which have the largest wingspans of any modern bird (up to 11ft from tip to tip).[40]

c) Penguin (*Anthropornis*) – Believed to reach a height of over 6ft and a weight of over 200lb, it had a ~20cm beak. By comparison, the largest modern penguin species, the Emperor Penguin, is just ~4ft tall.[41]

[39] O. Arrendondo, "The great predatory birds of the Pleistocene of Cuba," *Smithsonian Contr. Paleobiol* 27:169-187 (1976); see also Wikipedia Online Encyclopedia, "Ornimegalonyx," available from http://en.wikipedia.org/wiki/Ornimegalonyx.

[40] Storrs L. Olson, "The fossil record of birds," in D.S. Farner, J.R. King, and K.C. Parkes, eds., *Avian Biology* 8:79-238 (New York: Academic Press, 1985).

[41] Fossils have been found on Seymour Island off the coast of Antarctica and New Zealand [see A. Myrcha, P. Jadwiszczak, C.P. Tambussi, J.I. Noriega, A. Gazdzicki, A. Tatur, and R.A. Valle, "Taxonomic revision of Eocene Antarctic penguins based on tarsometatarsal morphology," *Polish Polar Research* 23(1):5-46 (2002).].

d) Eagle (*Harpagornis*) – known as "Haast's Eagle" and found on the South Island of New Zealand, it's the largest eagle ever found. It weighed 20-30lb and had a wingspan of 8-10ft, length of ~4.5ft, and standing height of ~3.5ft.[42] The bird still existed when the Māori arrived about 1,000 years ago, dying out around 1400AD.[43]

e) Condor (*Argentavis*) – known from three sites in Central and Northwestern Argentina, conservative estimates place its wingspan at 24-28ft, with a wing area of ~75ft^2.[44] Comparable physiologically to a modern Andean Condor, it was ~12ft long, ~7ft tall, and weighed ~150-225lb.[45] The feather size alone is estimated to have been 5ft long and 8in wide.

[42] D.H. Brathwaite, "Notes on the weight, flying ability, habitat, and prey of Haast's Eagle (Harpagornis moorei)," *Notornis* 39(4): 239-247 (1992); archived at http://www.notornis.org.nz/free_issues/Notornis_39-1992/Notornis_39_4_239.pdf; see also H.R.L. Lerner, and D.P. Mindell, "Phylogeny of eagles, Old World vultures, and other Accipitridae based on nuclear and mitochondrial DNA," *Molecular Phylogenetics and Evolution* 37:327-346 (2005).

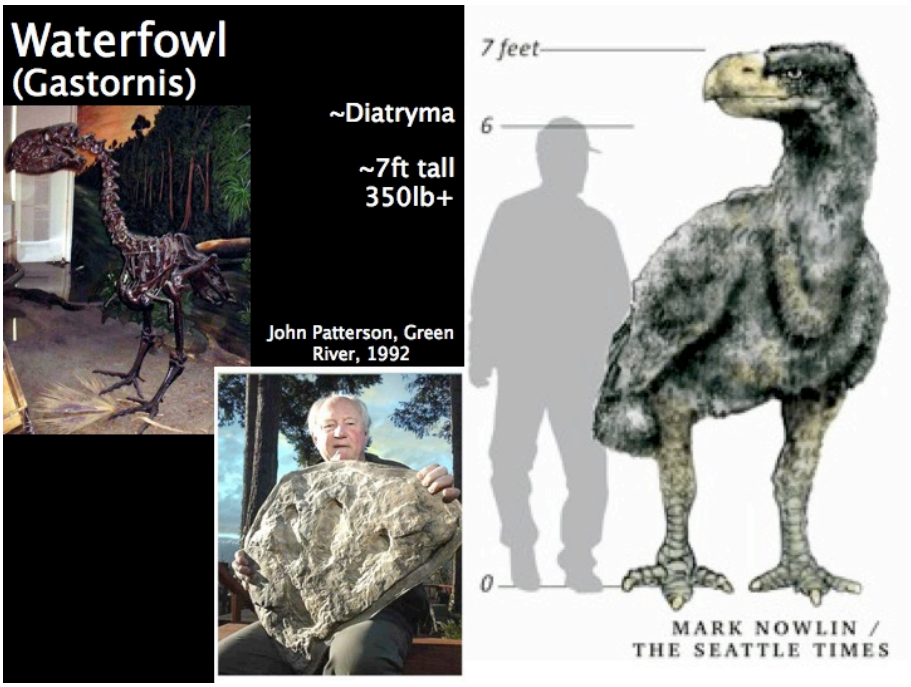
[43] T.H. Worthy and R.N. Holdaway, *The Lost World of the Moa: Prehistoric Life of New Zealand* (Bloomington: Indiana University Press, 2002).

[44] K.E. Campbell and E.P. Tonni, "A new genus of teratorn from the Huayquerian of Argentina (Aves: Teratornithidae)," *Contributions in Science, Natural History Museum of Los Angeles County* 330:59-68 (1980); K.E. Campbell and E.P. Tonni, "Size and locomotion in teratorns," *Auk* 100(2):390-403 (1983); archived at http://elibrary.unm.edu/sora/Auk/v100n02/p0390-p0403.pdf.

[45] Compare with today's largest living bird's wingspan, the Wandering Albatross (~11.5ft), the heaviest extant flying birds, the European Great Bustard and African Kori Bustard (~45lb), and the tallest flying bird, the Sarus Crane (~6ft), due to its long legs.

f) Duck (*Bullockornis*) – found in Australia and nicknamed the "Demon Duck of Doom," it is one of the "Thunderbirds", (*Dromornithidae*) standing over 8ft tall and weighing ~550lb.[46]

g) Waterfowl (*Gastornis*) – first discovered near Paris in 1855, *Gastornis* is a large European flightless herbivore, very similar to the North American *Diatryma*.[47] Known for its remarkably huge beak, it reached over 350lb and 7ft tall. [48] **(See Also Following Page)**



[46] Stephen Wroe, "The bird from hell?" *Nature Australia* 26(7):56-63; archived at http://www.amonline.net.au/mammals/fossil/bird_from_hell.htm; see also P. Rich, "The Dromornithidae, an extinct family of large ground birds endemic to Australia," *Bureau of National Resources, Geology and Geophysics Bulletin* 184:1-196 (1979).

[47] For a recent find of *Diatryma* and its similarities to *Gastornis*, see Sandi Doughton, "Big birds on the Green River? The debate continues," *The Seattle Times*, 6 December 2004; archived at http://seattletimes.nwsource.com/html/localnews/2002110396_bigbird06m.html.

[48] E. Hébert, "Note sur le tibia du *Gastornis parisiensis*," *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences (Paris)* 40:579-582 (1855); and S.L. Olson, "The fossil record of birds," 79-239 in D. Farner, J. King, and K. Parkes, eds., *Avian Biology*, Vol. VIII (New York: Academic Press, 1985).

Waterfowl (Dromornis)

~10ft tall
~1500lb

NATIONAL GEOGRAPHIC

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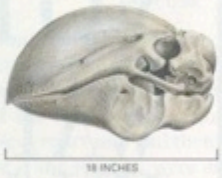
ART BY PETER F. MURRAY

Big Bird Too Large for Sesame Street

If it walks like a duck and quacks like a duck, the saying goes, then it's a duck. A ten-foot-tall, 1,500-pound bird that hung around a water hole in the outback of Australia eight million years ago didn't quack, but paleontologist Peter F. Murray says it was a gigantic duck—or maybe a goose.

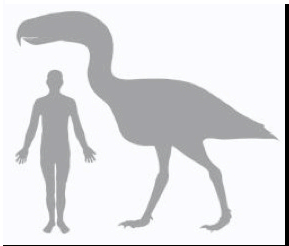
It is the biggest bird yet known, slightly larger than the previous titleholder, Madagascar's elephant bird, which became extinct about 500 years ago.



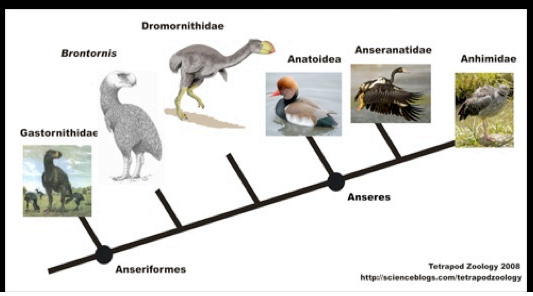
Murray has excavated remains of *Dromornis stirtoni* at Alcoota, 100 miles northeast of Alice Springs. At Camfield Station, 250 miles north of Alice, the Northern Territory Museum scientist also uncovered several skulls of a slightly smaller but related bird, *Bullockornis planei* (left and above), which was four million years older.

The two had been known only from fragmentary remains, which made it difficult for experts to place them in the avian scheme of things. But Murray's finds have enabled him to make a detailed examination of the birds' characteristics. He concludes that their closest relatives are geese and ducks, not ratites like the kiwi or the emu, as had previously been thought.

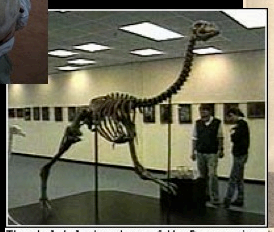
The birds' enormous size deprived them of one typical bird trait, Murray says: They were too heavy to fly.



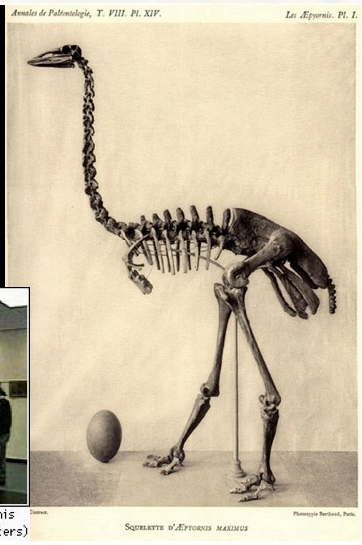
Kelenken guillermoi
BAR 3877-11 (Chiappe & Bertelli 2006) - 70cm



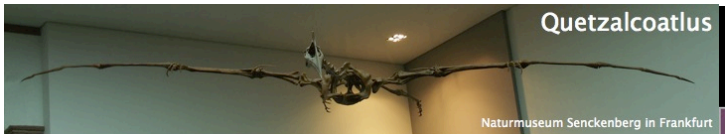
Elephant Birds (Aepyornis, Mullerornis)

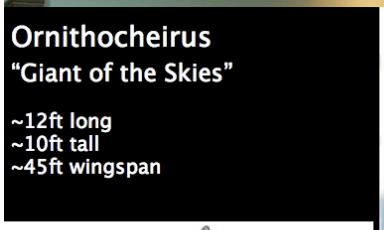


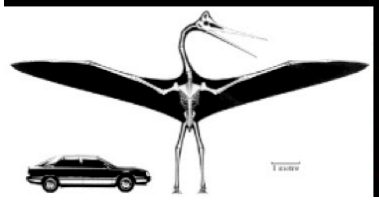
The skeletal structure of the Dromornis stirtoni (Reuters)

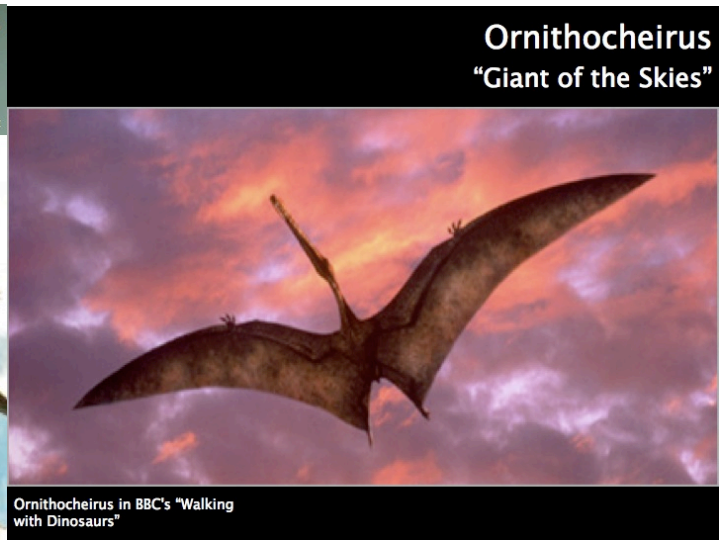


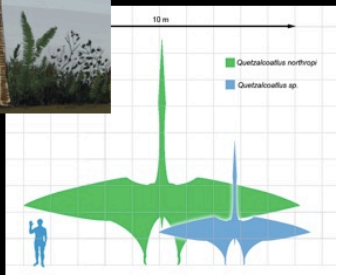
h) Pterosaur (*Quetzalcoatlus*) – first found by Douglas Lawson at Big Bend National Park, Texas in 1971, it is similar to the *Ornithocheirus*.[49] Conservative estimates place its wingspan at ~40ft, though remains on display at the Science Museum of Minnesota indicate a wingspan as large as 60ft. Flying across the world like an albatross, it was half the size of a Boeing 737 and weighed over 220lbs.[50]









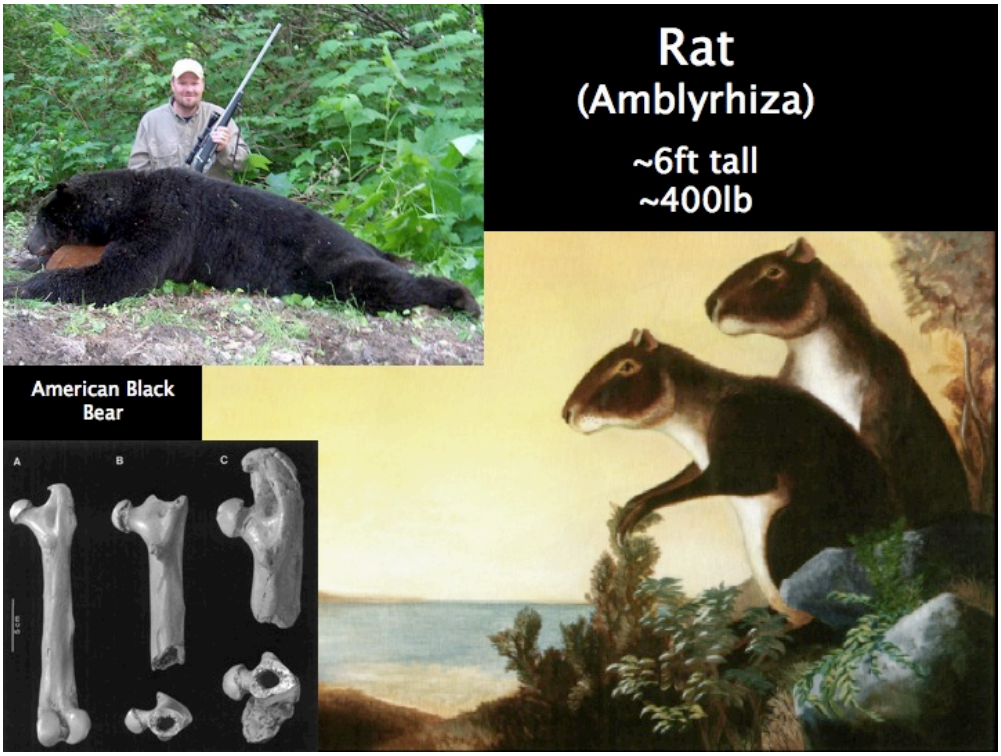


[49] A.W.A. Kellner and W. Langston, Jr., "Cranial remains of Quetzalcoatlus (Pterosauria, Azhdarchidae) from Late Cretaceous sediments of Big Bend National Park, Texas," *Journal of Vertebrate Paleontology* 16:222-231.

[50] Compare to today's largest creatures that can support and propel themselves through the air, the South American Condors with 12ft wingspans and 25lb weight. Aeronautic properties of *Quetzalcoatlus* have raised significant questions concerning the earth's atmosphere during the time that it lived [see O. Levenspiel, "Earth's early atmosphere," *Chemical Innovation* 30(5):47-51 (May 2000); O. Levenspiel, T.J. Fitzgerald, and D. Pettit, "Earth's atmosphere before the age of dinosaurs," 30(12):50-55 (Dec 2000)].

6. Mammals[51]

a) Rat (*Amblyrhiza*) – astonishing scientists,[52] 14 specimens have been found on the islands of Anguilla and St. Martin, estimated to have weighed up to 400lb or more, as large as an American Black Bear.[53]



[51] One reason that giant prehistoric mammals aren't currently well known is because they aren't discussed very much by the scientific community. Evolutionary theory does not do a very good job of explaining why such large animals were the *ancestors* of the smaller animals living today.

[52] "It's unbelievable. These were absolutely humongous rodents. The largest ones may have been the size of a large brown bear. Its size breaks all kinds of ecological rules… there is no precedent for island rodents becoming nearly as big as they did in Anguilla and Saint Martin." (Ross MacPhee, curator of mammals at the American Museum of Natural History in New York City, quoted by Patrick Huyghe, "A Brobdingnagian rodent--giant rodent Amblyrhiza inundata," *Omni*, 1 March 1994)

[53] A.R. Biknevicius, D.A. McFarlane, R.D.E. MacPhee, "Body size in Amblyrhiza inundata (Rodentia: Caviomorpha), an extinct megafaunal rodent from the Anguilla Bank, West Indies: estimates and implications," *American Museum novitates* 3079:1-26 (November 12, 1993); see also Bob Green, "Amblyrhiza Inundata: Giant Fossil Rat," *Anguilla Local News*, February 1996; web article at http://news.ai/news9602.html#amblyrhiza.

b) Guinea Pig (*Phoberomys*) – unearthed in a semi-desert area of NW Venezuela, the guinea pig like rodent was the size of a buffalo, weighing ~1550lb. It was ~10ft long with an additional ~5ft tail and ~9ft tall when reared up on its hind legs.[54] Recently, an even larger rodent (*Josephoartigasia monesi*) in the same family (Dinomyidae) was found in the San José Formation on the coast of Río de la Plata in Uruguay, weighing ~2000+lb.[55]

[54] M.R. Sánchez-Villagra, O. Aguilera, I. Horovitz, "The anatomy of the world's largest extinct rodent," *Science* 301:1708-1710 (19 September 2003); see also Shaoni Bhattacharya, "Buffalo-sized guinea pig revealed," *New Scientist*, 18 September 2003; web article at http://www.newscientist.com/article.ns?id=dn4183.

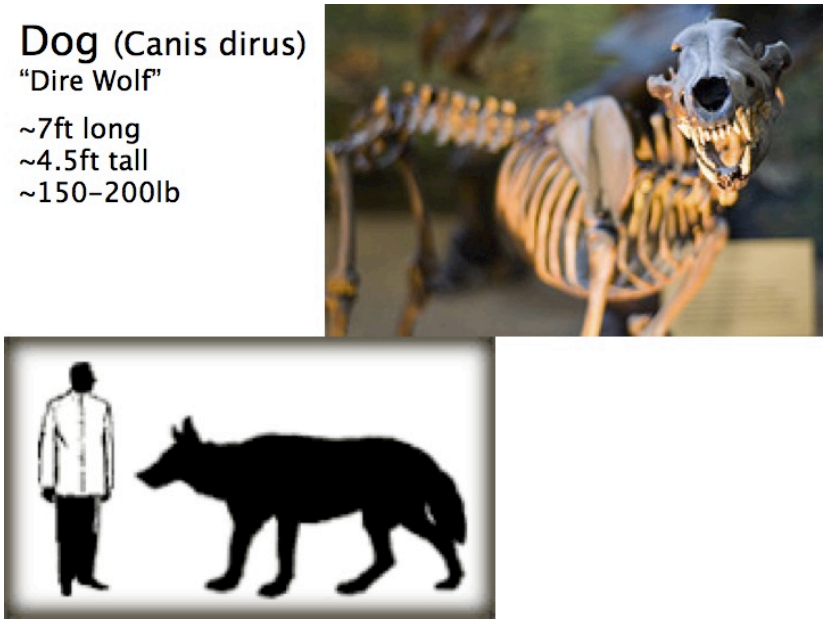
[55] Andres Rinderknecht and R. Ernesto Blanco, "The largest fossil rodent," *Proceedings of the Royal Society B* 275(1637): 923-928 (15 January 2008); see also Virginie Millien, "The largest among the smallest: the body mass of the giant rodent *Josephoartigasia monesi*," *Proceedings of the Royal Society B* 275(1646):1953-1955 (07 September 2008).

c) Armadillo (*Glyptodon*) – first found in Argentina by Richard Owen in 1839, the largest known specimen was ~5ft tall and ~12ft long with tail, larger in size and weight than a Volkswagen Beetle.[56] It had helmet-like head armor and was covered by a protective shell composed of more than 1,000 one inch-thick bony plates.

[56] The largest armadillo was *Doedicurus clavicaudatus* whose tail was surrounded by a flexible sheath of bone with long spikes or knobs on the end [see A.R. Mcneill, R.A. Farina, S.F. Vizcaino, "Tail blow energy and carapace fractures in a large glyptodont (Mammalia, Xenarthra)," *Zoological Journal of the Linnean Society* 126(1):41-49 (May 1999)]. A smaller *Glyptodon* was found in southern Peru in 2005 which was originally referenced to the car [see Reuters, "Ice Age armadillos the size of cars, fossil shows," archived at http://www.abc.net.au/news/newsitems/200505/s1372989.htm].

d) Beaver (*Castoroides*) – fossils range from Florida to Northern Canada. A skeleton displayed in Chicago's Field Museum is over 6ft tall and 8ft long, with an estimated weight of almost 500lb.[57]

e) Dog (*Canis dirus*) – closely resembling (but significantly larger than) the largest living wild canid, the Gray Wolf (*Canis lupus*), "Dire Wolves" averaged ~7ft long, ~4.5ft tall, and weighed ~150-200lb.[58]



[57] A.R. Cahn, "Records and distribution of the fossil beaver, Castoroides ohioensis," *Journal of Mammalogy* 13(3):229-241 (1936); B. Kurtén and E. Anderson, *Pleistocene mammals of North America* (New York: Columbia University Press, 1980).

[58] Gray Wolves, by contrast, range between 80-130lb, so a large modern wolf would be about the same size as a small Dire Wolf [see R.M. Nowak, "North American Quaternary *Canis*," *Monograph of the Museum of Natural History, University of Kansas* 6:1-154 (1979); and B. Kurtén and E. Anderson, *Pleistocene mammals of North America*].

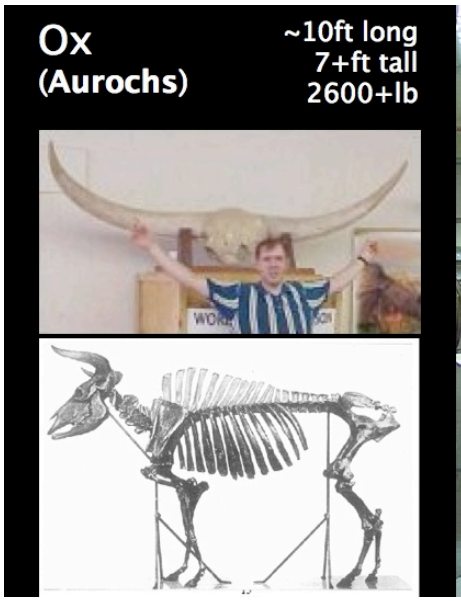
f) Cat (*Smilodon*) – nicknamed "sabertooth" because of their enlarged canines, bones from nearly 2,000 individuals have been recovered from the La Brea tar pits. The largest sabertooth cat was *Smilodon populator*, standing ~4ft at the shoulder, stretching ~7ft long, and weighing 400-600lbs (nearly twice as heavy as living lions), with saberteeth up to 12in long.[59]

g) Pig (*Dinohyus*) – found mostly in western North America, the animal is akin to a modern day overgrown warthog, standing as much as 7ft at the shoulder with a body length spanning 10 or more feet.[60]

[59] Alan Turner and Mauricio Antón, *The Big Cats and Their Fossil Relatives* (New York: Columbia University Press, 1997); L. Radinsky and S. Emerson, "The late, great sabertooths," *Natural History*, Vol. 91, No. 4 (1982).

[60] D.C. Parris and M. Green, **"Dinohyus (mammalia: entelodontidae) in the Sharps Formation, South Dakota**," Journal of Paleontology 43(5): 1277-1279 (September 1969).

h) Ox (*Aurochs*) – also known as *Bos primigenius*, it would tower over modern cattle at 7+ft tall, ~10ft long, and 2600+lbs.[61] It also had longer and thicker horns with a span of up to 3.5ft.[62] Surviving until recent times, the last specimen died in the Jaktorowska Forest in Poland in 1627.



i) Deer (*Megaloceros*) – though found in large numbers in the peat bogs of Ireland (i.e. "Irish elk"), they are found throughout Eurasia and are most closely related to the modern day fallow deer.[63] Some stood over 10ft tall and had enormous antlers ~12ft across, which alone weighed up to 90lb.[64]

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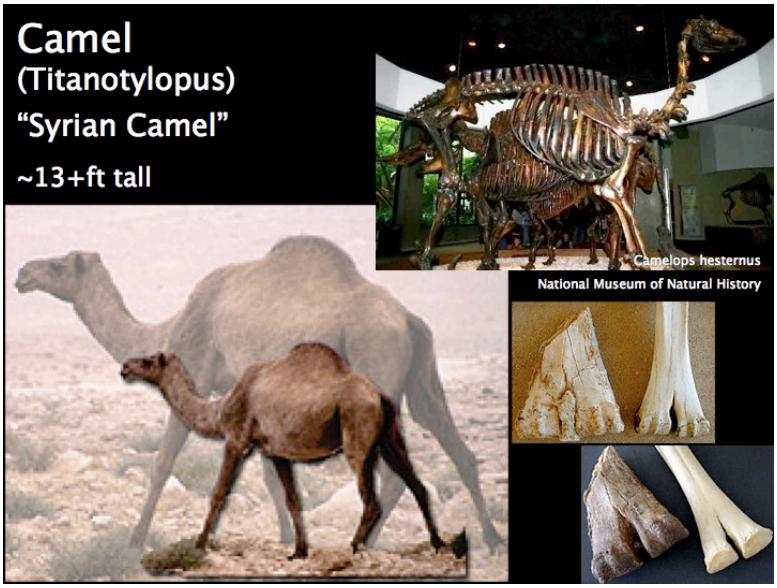
[61] C. Guintard, "On the size of the ure-ox or aurochs (*Bos primigenius* Bojanus, 1827)," in G.C. Weniger, *Archäologie und Biologie des Auerochsen* (Mettmann: Neanderthal Museum, 1999), 7-21.

[62] T. van Vuure, "History, morphology and ecology of the Aurochs (*Bos primigenius*)," *Lutra* 45-1 (2002); archived at http://members.chello.nl/~t.vanvuure/oeros/uk/lutra.pdf.

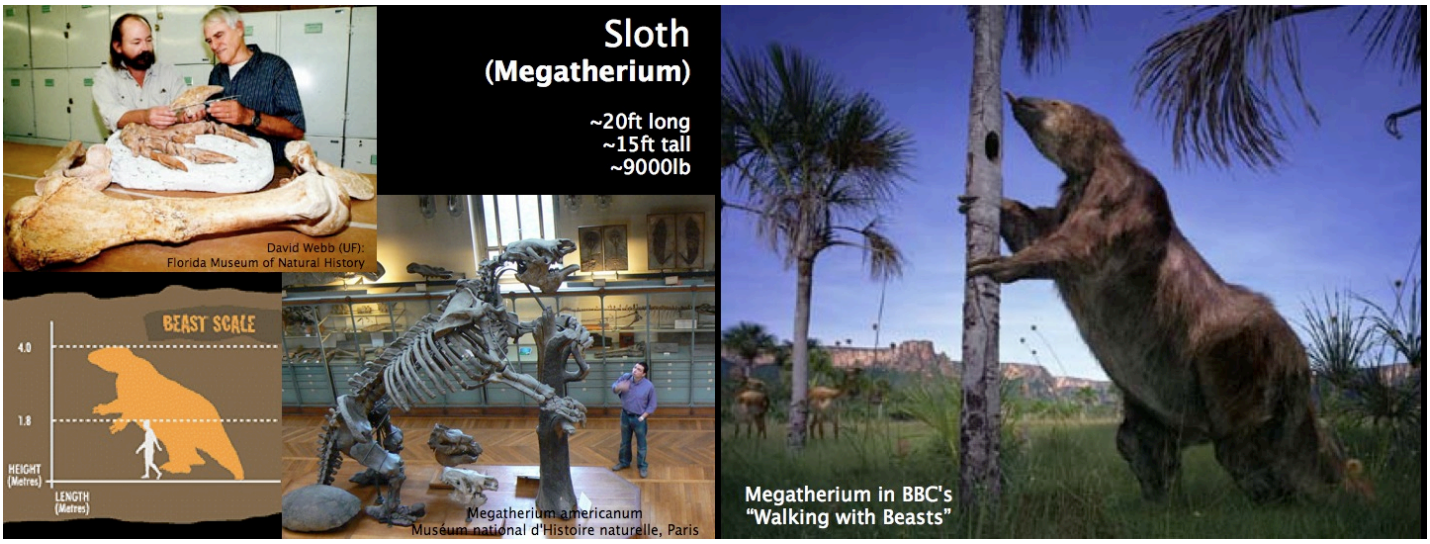
[63] A.M. Lister, et al., "The phylogenetic position of the 'giant deer' Megaloceros giganteus," *Nature* 438:850-853 (8 December 2005); see also Stephen J. Gould, "Origin and function of bizarre structures—antler size and skull size in Irish Elk, Megaloceros-giganteus," Evolution 28:191-220 (1974).

[64] For a recent discovery of a "post-Ice Age" specimen, see James Owen, "Extinct Giant Deer Survived Ice Age, Study Says," *National Geographic News*, 6 October 2004; web article at http://news.nationalgeographic.com/news/2004/10/1006_041006_giant_deer.html.

j) Camel (*Titanotylopus*) – having an average height of ~13ft tall, the ancient camel was twice as tall as today's camels, closer in size to a giraffe or elephant.[65] Recently, a similar specimen, the "Syrian Camel," was found in the Syrian desert, near the village of El Kowm by Swiss researchers from the University of Basel.[66]



k) Sloth (*Megatherium*) – first unearthed in Brazil in 1789, it was named "giant beast" by the famous French naturalist, Georges Cuvier. The largest species, *Megatherium americanum*, was ~20ft long from nose to tip of tail and stood ~15ft tall on its hindlegs, weighing up to 9000lb, with massive claws ~12in in length.[67]



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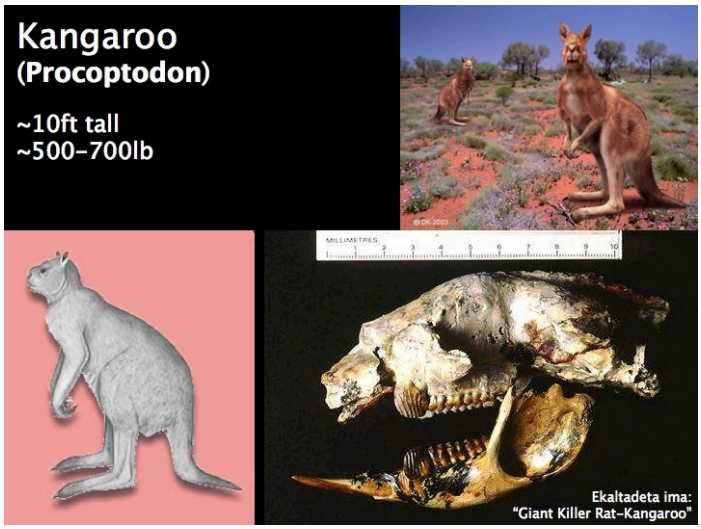
[65] Also known as *Gigantocamelus*, see John Breyer, **"*Titanotylopus* (= *Gigantocamelus*) from the Great Plains Cenozoic,"** Journal of Paleontology 50(5):783-788 (September 1976); see also J.A. Harrison, "Giant camels from the Cenozoic of North America," *Smithsonian Contributions to Paleobiology*, Number 57 (14 June 1985).

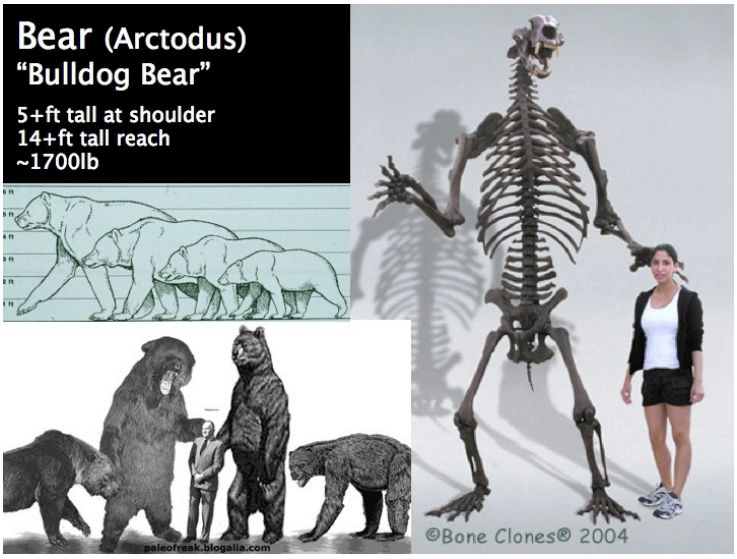
[66] Between 2005 and 2006, more than 40 bone fragments of giant camels were found by the team. Astonished by the size of the animal, the leader of the team, Professor Jean-Marie Le Tensorer remarked, "Can you imagine? The camel's shoulders stood three metres high and it was around four metres tall, as big as a giraffe or an elephant. Nobody knew that such a species had existed." The scientists also found supposedly 100,000-year-old human remains nearby ("Giant camel fossil found in Syria" *BBC News*, 10 October 2006; web article at http://news.bbc.co.uk/2/hi/science/nature/6035113.stm).

[67] B. Kurten and E. Anderson, *Pleistocene Mammals of North America*; see also R.A. Fariña and R.E. Blanco, "*Megatherium*, the stabber," *Proceedings of the Royal Society of London* 263:1725-1729 (1996).

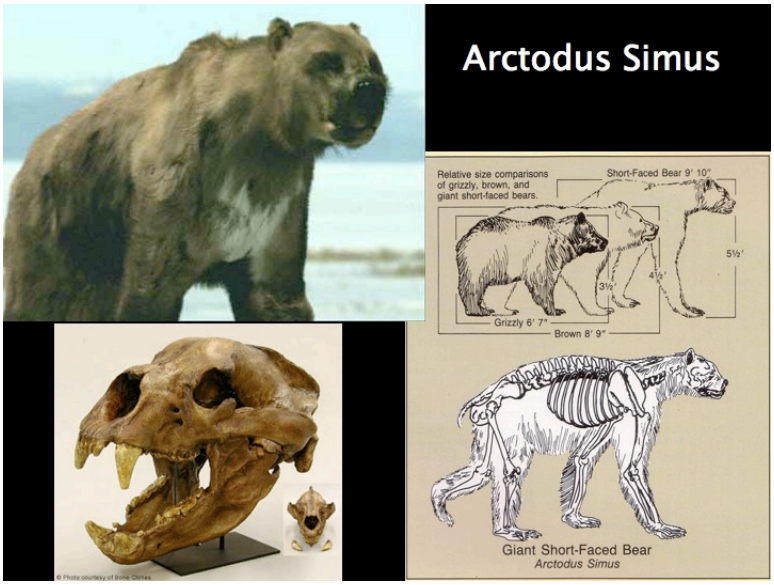
For a recent find by a University of Florida team, led by David Webb, of a giant sloth (*Eremotherium eomigrans*) standing over 17ft tall and weighing over 11,000lb, see G. De Iuliis and C. Cartelle, "A new giant megatheriine ground sloth (Mammalia: Xenarthra: Megatheriidae) from the late Blancan to early Irvingtonian of Florida," *Zoological Journal of the Linnean Society* 127:495-515 (1999); see also UF news release by Cathy Keen, "UF Researchers Find Oldest Bones Of New Giant Ground Sloth Species," *University of Florida News*, 20 June 2000; web article at http://news.ufl.edu/2000/06/20/sloth/.

l) Kangaroo (*Procoptodon*) – found in Australia, *Procoptodon goliah* ("Giant Short-faced Kangaroo") is the largest kangaroo ever found. It stood ~10ft tall and weighed 500-700lb, double the size of the largest modern kangaroo (the Red Kangaroo).[68]





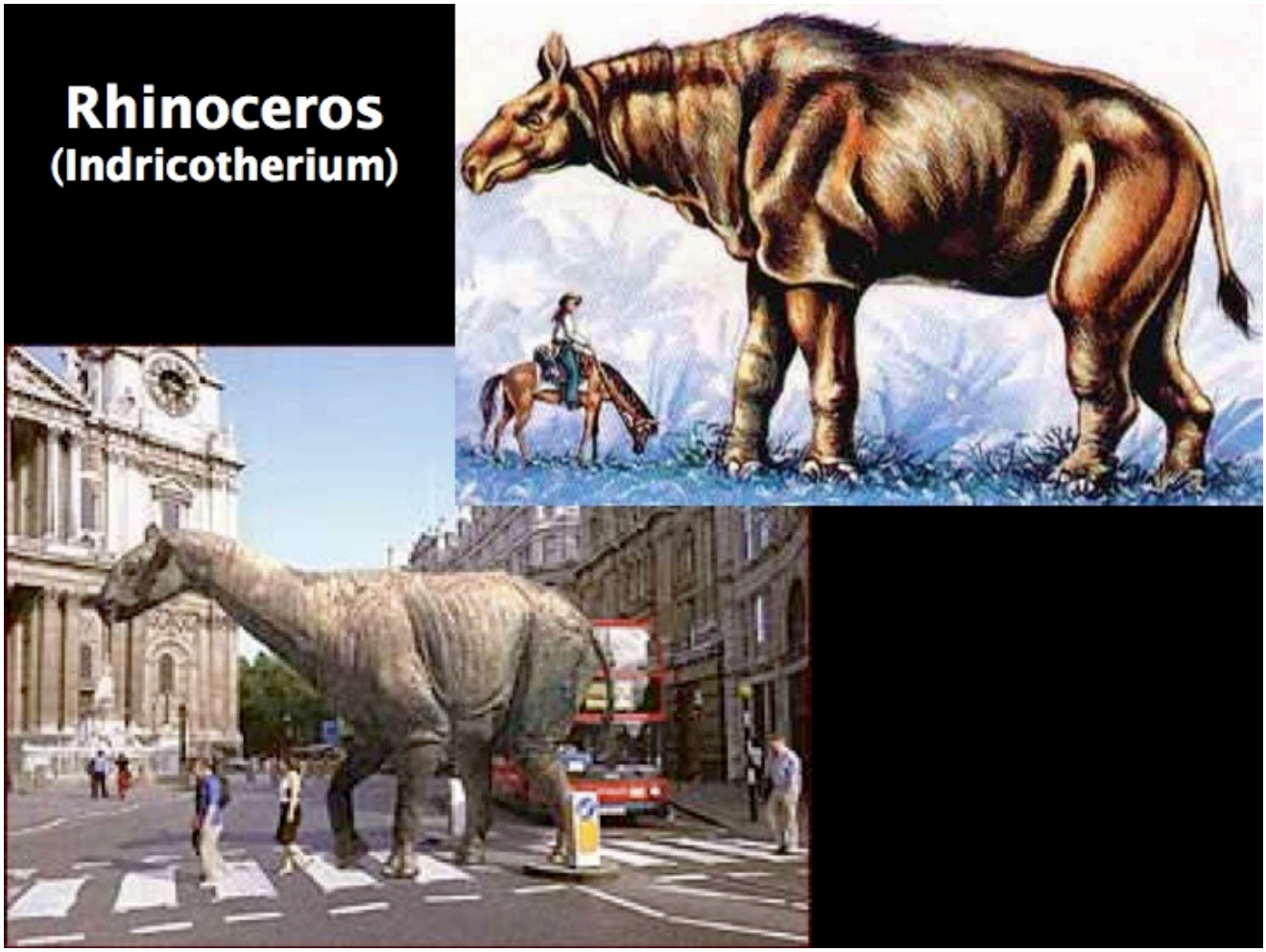
m) Bear (*Arctodus*) – known as the "bulldog bear," the *Arctodus simus yukonensis* stood over 5ft tall at the shoulder, reached over 11ft high when up on its hind legs (with a vertical reach of more than 14ft), and weighed over 1700lb.[69]



[68] K.M. Helgen, R.T. Wells, B.P. Kear, W.R. Gerdtz, and T.F. Flannery, "Ecological and evolutionary significance of sizes of giant extinct kangaroos," *Australian Journal of Zoology* 54(4):293-303 (2006).

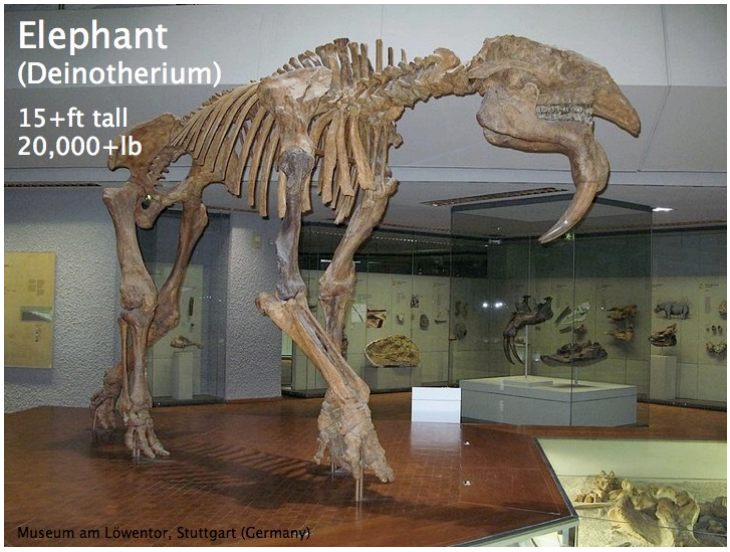
[69] Bjorn Kurtén, "Pleistocene bears of North America. 2. Genus Arctodus, short-faced bears," *Acta Zoologica Fennica* 117:1-60 (1967); see also B. Kurtén and E. Anderson, *Pleistocene mammals of North America* (New York: Columbia Univ. Press, 1980).

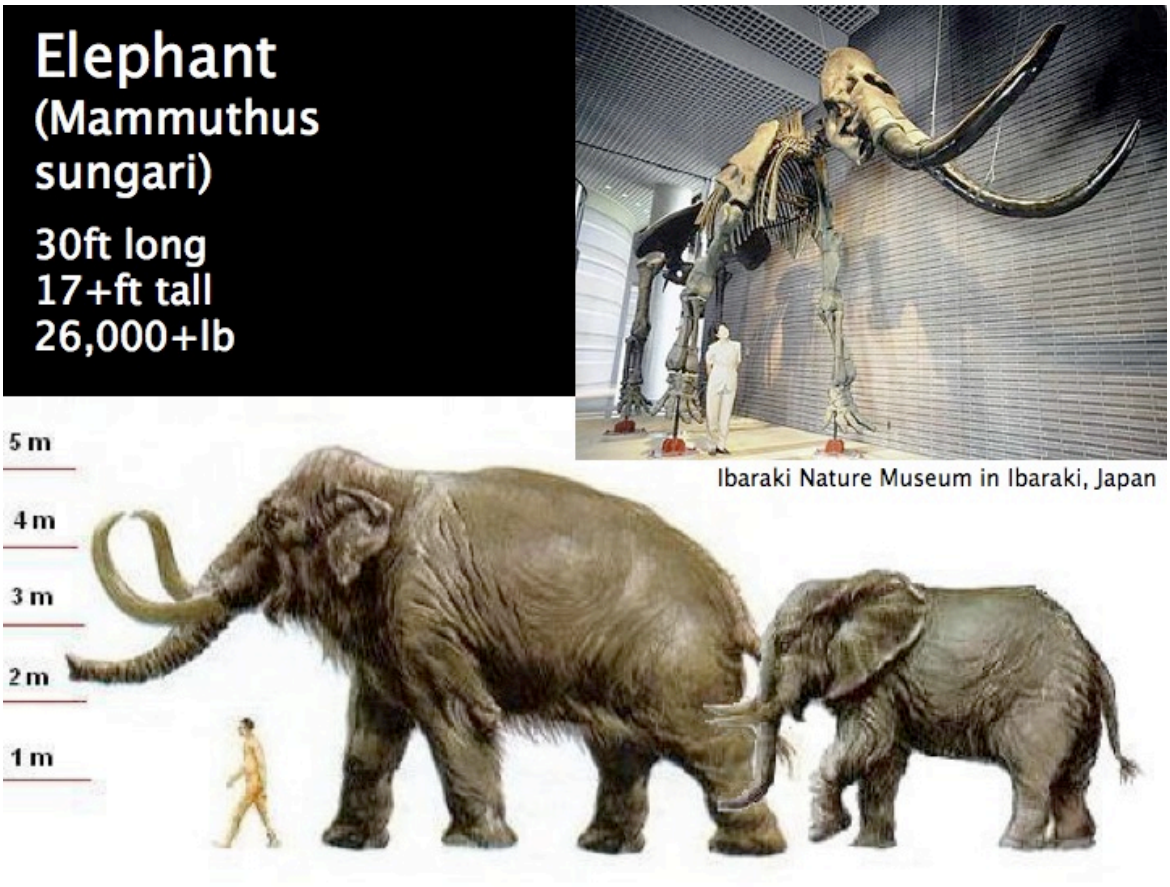
n) Rhinoceros (*Indricotherium*) – also known as *Baluchitherium*, it is believed to be the largest land mammal to have ever lived, standing over 18ft high at the shoulder, with a massive body over 26ft long, and weighing ~35,000lb.[70]



[70] S.G. Lucas and J.C. Sobus, "The systematics of indricotheres," 358-378 in D.R. Prothero and R.M. Schoch, eds., *The Evolution of Perissodactyls* (New York: Oxford University Press, 1989).

o) Elephant (*Mammuthus sungari*) – found in Northern China, the Songhua River Mammoth reached a height of 17ft at the shoulder, stretched over 30ft long, and may have exceeded 12 tonnes in weight.[71] A close relative, *Deinotherium giganteum*, had a body shape and proportions very much like modern elephants, except its tusks arched down and back, rather and up and forward—it stood over 15ft tall, and weighed at least 20,000lb.[72]



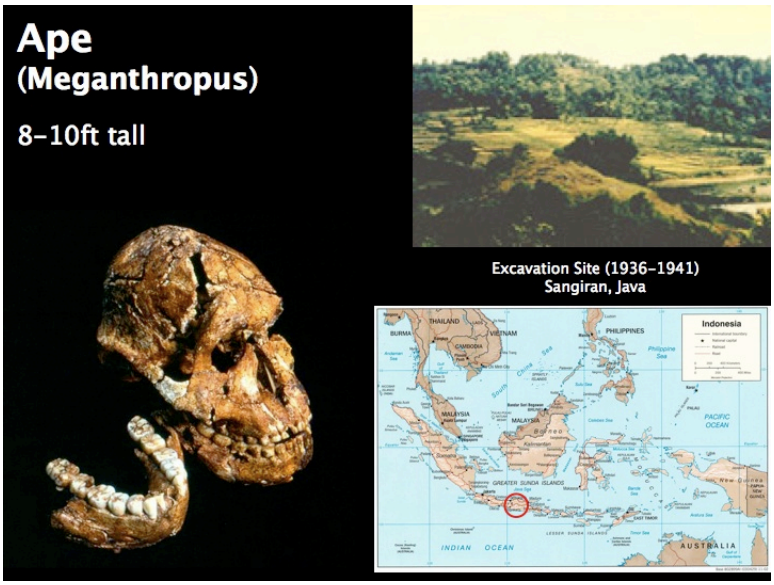


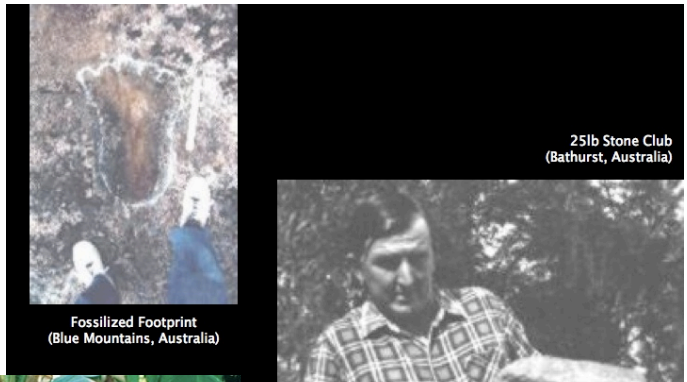
[71] M.Z. Zhou, "Pleistocene mammalian fossils from the northeastern provinces," in *Proboscidea* (Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, 1959), 22-34.

An 11ft long mammoth tusk was also discovered north of Lincoln, Illinois in 2005, now on display at the Illinois State Museum [see Illinois Department of Natural Resources (IDNR), "Recently discovered 11-foot long woolly mammoth tusk on display at the Illinois State Museum," Illinois Department of Natural Resources Press Release (August 14, 2006); available at http://dnr.state.il.us/pubaffairs/2006/August/woolly.htm.].

[72] See J.M. Harris, "Family Deinotheriidae," in J.M. Harris (ed.), *Koobi Fora Research Project*, Vol. 2, (Oxford: Clarendon Press, 1983), 22-39; see also W.J. Sanders, "Proboscideans from the Sinap Formation, Central Turkey," in J. Kappelman, et al. (eds.), *Geology and Paleontology of the Miocene Sinap Formation, Central Turkey* (New York: Columbia University Press, 2003), 202-219.

p) Ape (*Gigantopithecus*) – first found in 1935 by German paleontologist Ralph von Koenigswald while in a Hong Kong apothecary shop, *Gigantopithecus blacki* was ~10ft tall and weighed ~1200lbs, 2 to 3 times larger than the modern gorilla.[73]





[73] G.H.R. Von Koenigswald, "*Gigantopithecus blacki*, a giant fossil hominoid from the pleistocene of southern China," *Anthropological Papers of the American Museum of Natural History* 43:295-325 (1952); see also R.L. Ciochon, D.R. Piperno, and R.G. Thompson, "Opal phytoliths found on the teeth of the extinct ape *Gigantopithecus blacki*: Implications for paleodietary studies," *Proceedings of the National Academy of Science* 87:8120-8124 (1990). For a recent discovery of the co-existence of humans and gigantopithecines, see Jane Christmas, "Giant Ape Lived Along-side Humans," *McMaster University News*, 7 November 2005; web article at http://dailynews.mcmaster.ca/story.cfm?id=3637.

7. Plants
   a) Fern (*Archaeopteris*)
   b) Cycad (*Cycadophyta*)
   c) Cattail (*Typha*)
   d) Horsetail (*Calamites*)
   e) Scale Tree (*Lepidodendron*)

III. *POSSIBLE* MECHANISM FOR GIGANTISM: THE "CANOPY THEORY"[74]

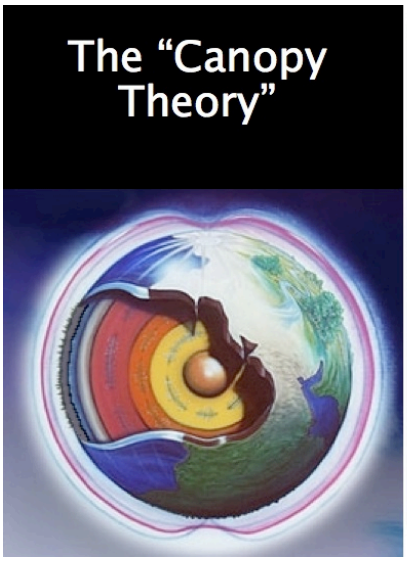
And God said, "Let there be an expanse <u>between the waters</u> to separate water from water." [7] So God made the expanse and separated the water under the expanse from <u>the water above it</u>. And it was so. [8] God called the expanse "sky." And there was evening, and there was morning-- the second day. (NIV Genesis 1:6-8)

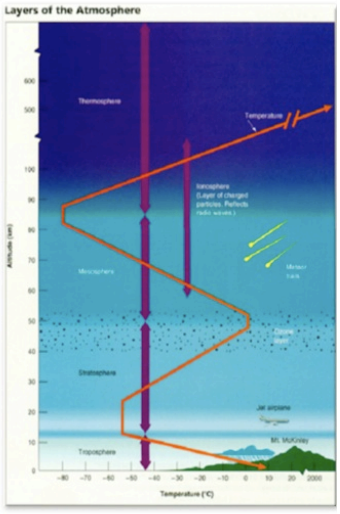
[74] For a classical description of the canopy theory, see Henry M. Morris and John C. Whitcomb, *The Genesis Flood* (Phillipsburg: Presbyterian and Reformed Publishing Company, 1961); an updated version can be found in Joseph C. Dillow, *The Waters Above* (Chicago: Moody Press, 1981). For a technical description, see Larry Vardiman and Karen Bousselot, "Sensitivity studies on vapor canopy temperature profiles," presented at the Fourth International Conference on Creationism (Pittsburgh, PA: 3-8 August 1998); archived at http://www.icr.org/index.php?module=research&action=index&page=researchp_lv_r05.

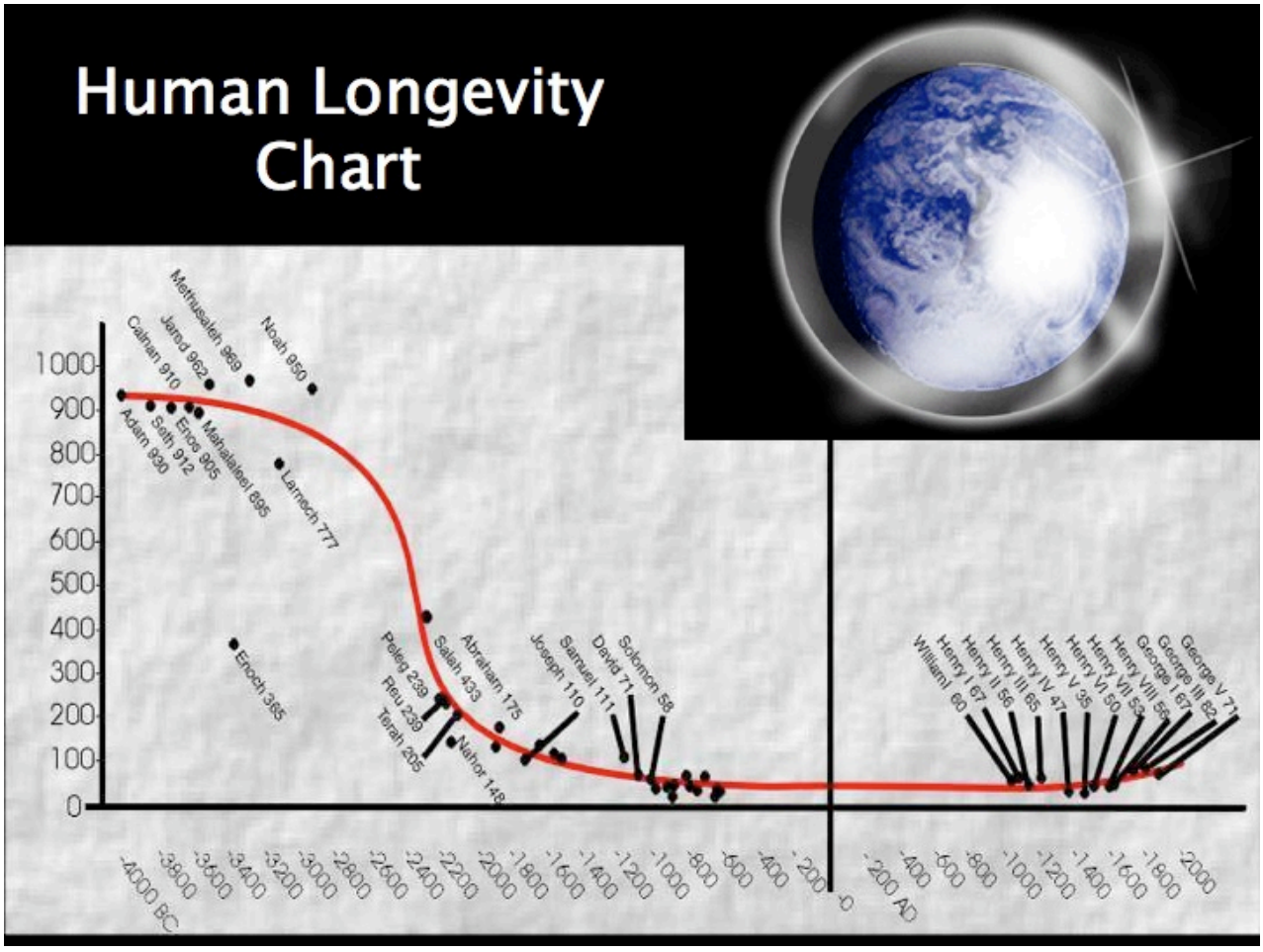
A. Primary Aspects of the "Canopy Theory"

1. Solar Protection

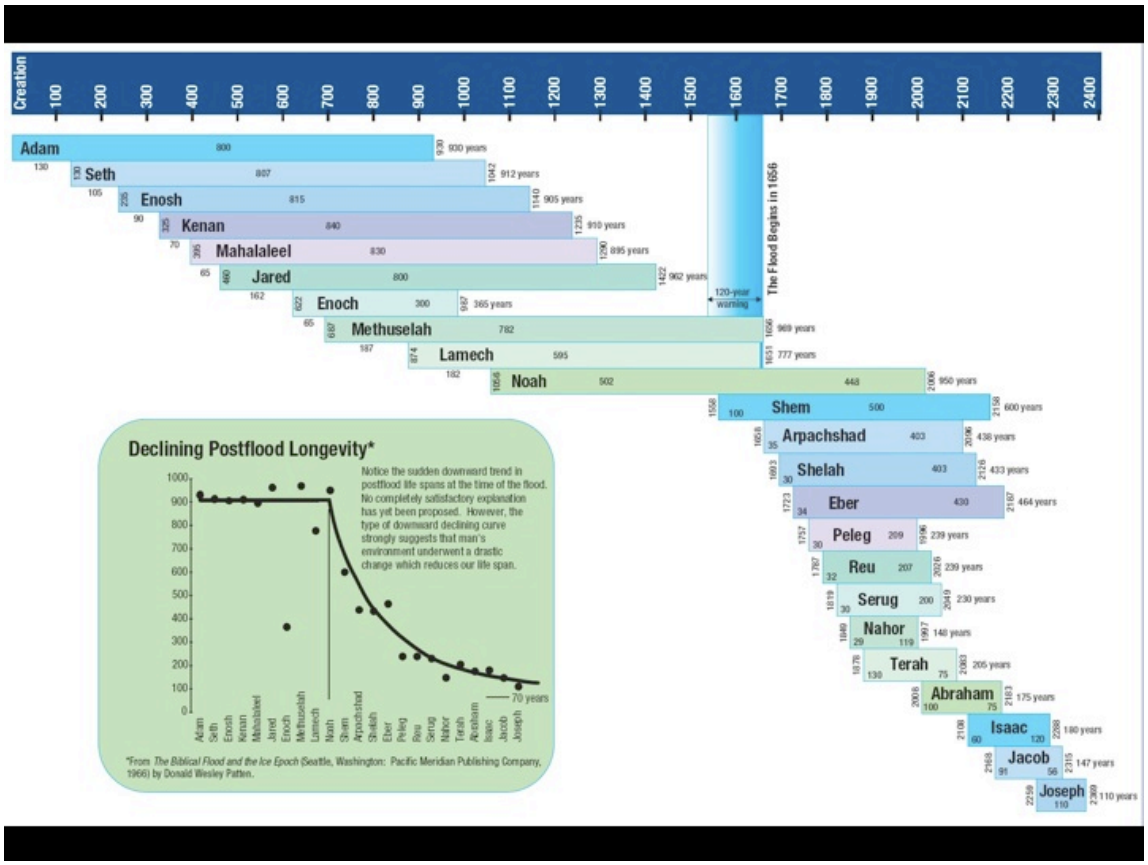
a) Surrounding the earth was "a vast blanket of invisible water vapor... productive of a marvelous greenhouse effect which maintained mild temperatures from pole to pole, thus preventing air-mass circulation and the resultant rainfall (Genesis 2:5). It would certainly have had the further effect of efficiently filtering harmful radiation from space, markedly reducing the rate of somatic mutations in living cells, and, as a consequence, drastically decreasing the rate of aging and death."[75]







[75] Henry M. Morris (ed.), *Scientific Creationism*, 2nd ed. (Green Forest: Master Books, 1985), 211. For an alternative explanation of human longevity before the Flood based simply on genetic superiority, see Carl Wieland, "Living for 900 years," *Creation Ex Nihilo* 20(4):10-13 (September 1998); archived at http://www.creationontheweb.com/content/view/805/.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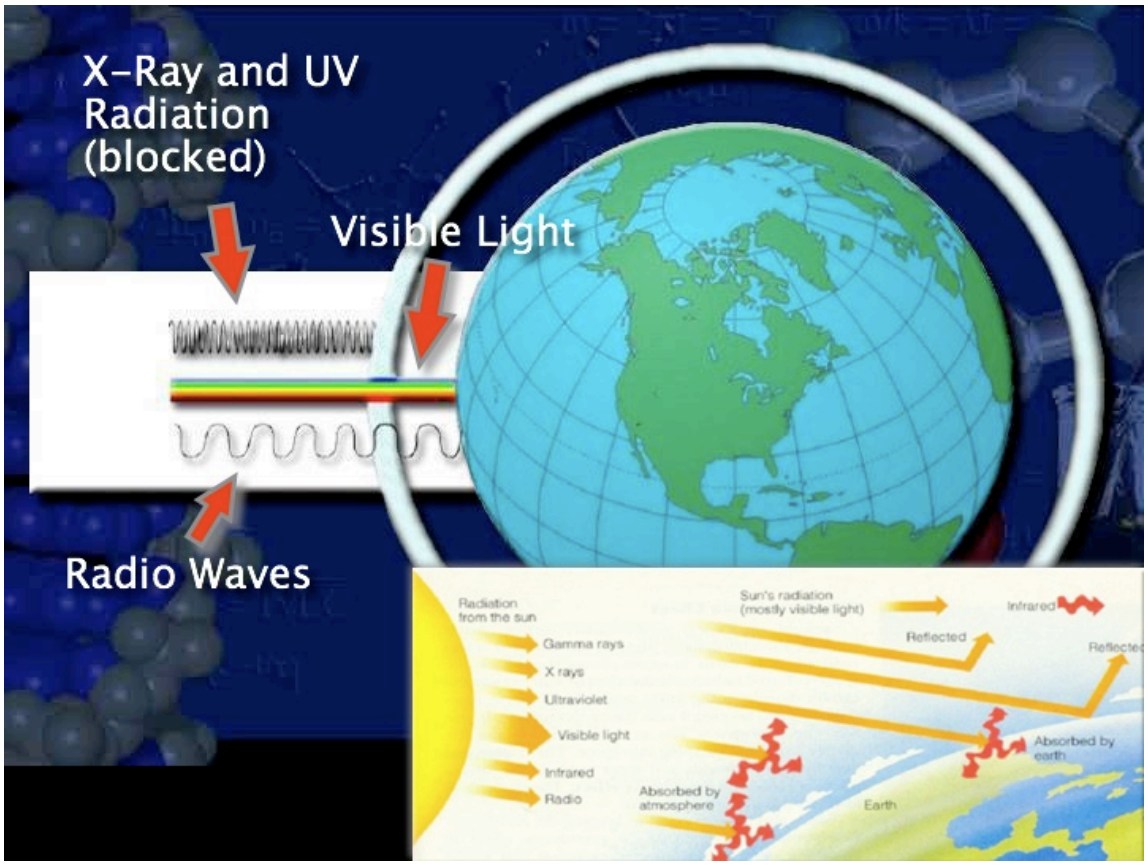
Seth
Enosh
Kenan
Mahalaleel
Jared
Enoch
Methuselah
Lamech
Noah
Shem
Arpachshad
Shelah
Eber
Peleg
Reu
Serug
Nahor
Terah
Abraham
Isaac
Jacob
Joseph
The Flood Begins in 1656
120-year warning
Declining Postflood Longevity*
Notice the sudden downward trend in postflood life spans at the time of the flood. No completely satisfactory explanation has yet been proposed. However, the type of downward declining curve strongly suggests that man's environment underwent a drastic change which reduces our life span.
*From The Biblical Flood and the Ice Epoch (Seattle, Washington: Pacific Meridian Publishing Company, 1966) by Donald Wesley Patten.


X-Ray and UV Radiation (blocked)
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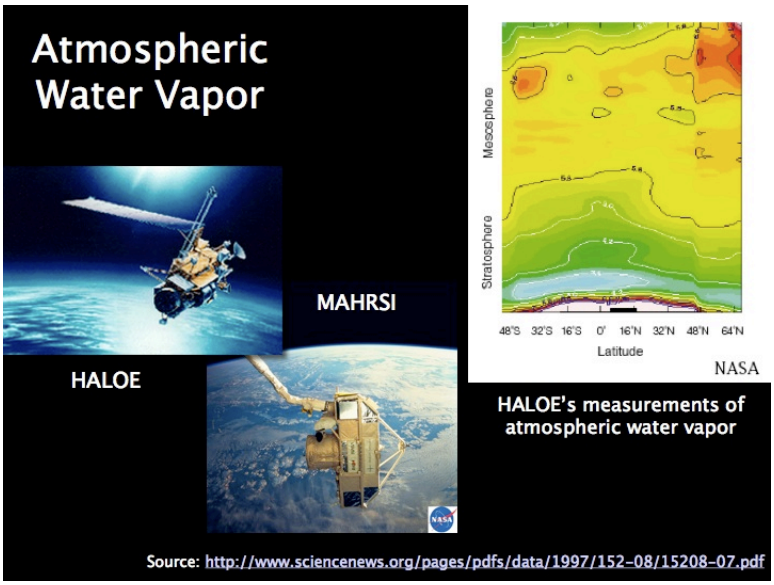
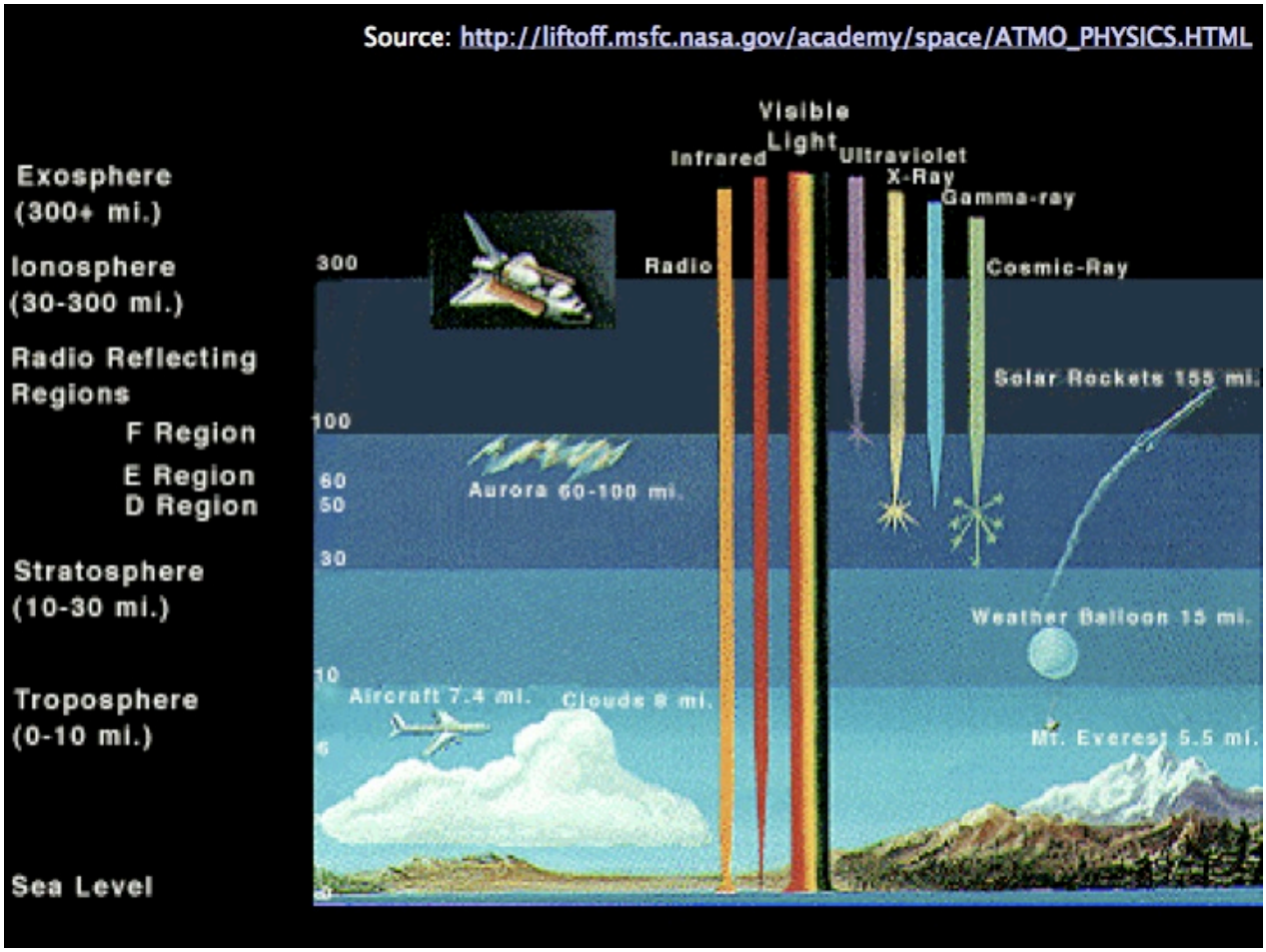
Radio Waves
Radiation from the sun
Gamma rays
X rays
Ultraviolet
Visible light
Infrared
Radio
Sun's radiation (mostly visible light)
Infrared
Reflected
Absorbed by atmosphere
Absorbed by earth
Earth

b) NASA satellites, originally created to measure ozone depletion, have confirmed far more hydroxyl (OH) in the hydrosphere than current models predict.[76] Because radiation from the sun breaks down water (H_2O) in Earth's upper atmosphere into hydroxyl and hydrogen, a large amount of water might have previously existed.

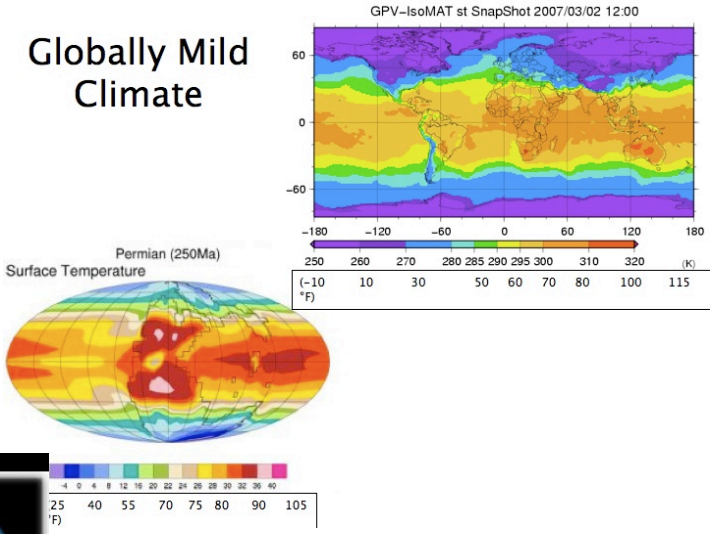


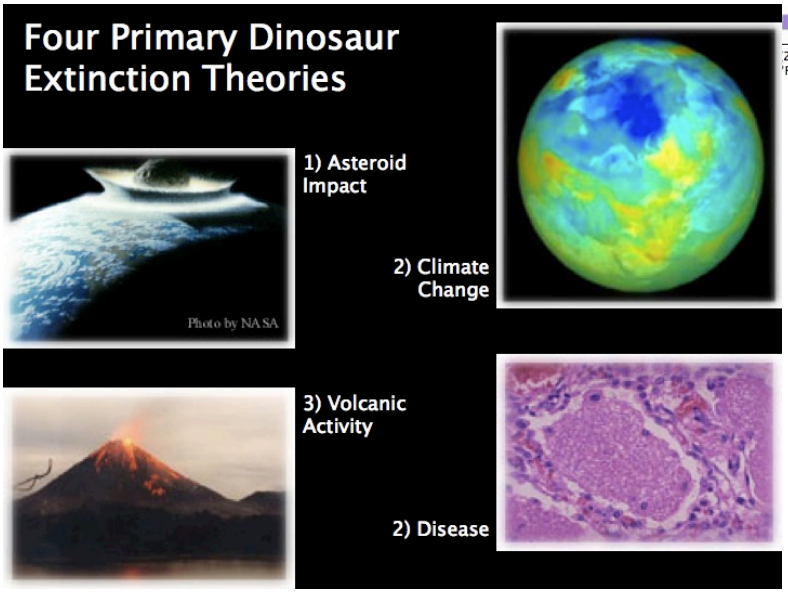


[76] Two satellites, MAHRSI (Middle Atmosphere High Resolution Spectrograph Investigation) and HALOE (Halogen Occultation Experiment), sent back the startling data—"Earth's upper atmosphere, a region drier than the Sahara Desert, harbors unexpected amounts of water vapor, according to data from a pair of satellites. The discovery could bolster a controversial theory that thousands of house-size comets are hitting the atmosphere each day." [Richard Monastersky, "Reservoir of water hides high above Earth," *Science News* 152(8):117 (23 August 1997)] However, the theory of a constant influx of mini-comets has been strongly criticized as unworkable (see Robert Matthews, "Not a snowball's chance..." *New Scientist* 12 July 1997, pp. 26-27).

2. Globally Mild Climate

   a) It is universally assumed among the scientific community that the earth had a generally warm, tropical environment, with a fairly uniform temperature distribution, from the Carboniferous through the Miocene Period (~360-20 Ma),[77] because of the abundance of tropical plants distributed worldwide in the fossil record.[78]





Temperature drops at various times are used as one of the primary evidences for the "climate change" theory of dinosaur

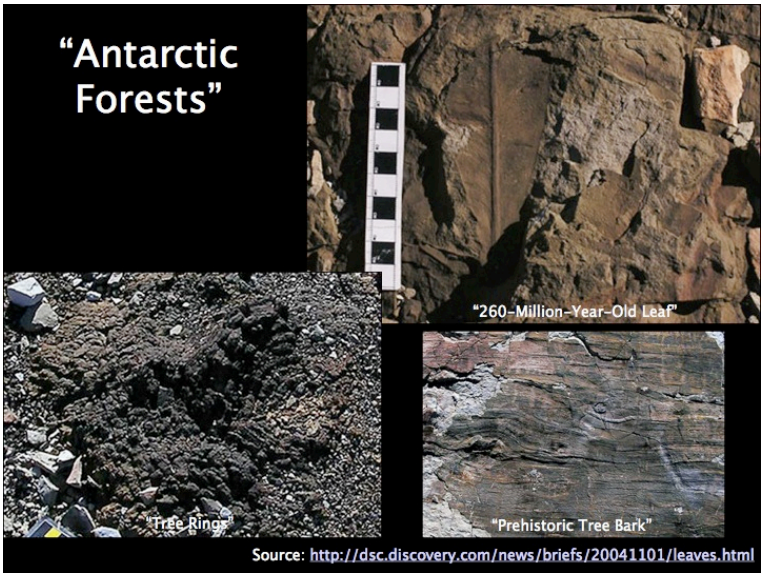
[77] "At the peak of the dinosaur era, there were no polar ice caps, and sea levels are estimated to have been from 100 to 250 metres (330 to 820 feet) higher than they are today. The planet's temperature was also much more uniform, with only 25 degrees Celsius separating average polar temperatures from those at the equator. On average, atmospheric temperatures were also much warmer; the poles, for example, were 50 °C warmer than today." (Wikipedia Online Encyclopedia, "Dinosaur," available from http://en.wikipedia.org/wiki/Dinosaur)

[78] Creationists would line up the "pre-Miocene warmness" with the environment after creation and up to the Flood. Since the Miocene, worldwide temperatures have remained diversified. The warm, moist climate recorded in the pre-Miocene deposits can be challenging for scientists to explain. For example: "According to computer models of climate, North Dakota and other continental interiors also had relatively harsh winters in the geologic past, even during periods like the early Eocene, about 50 million years ago, when global temperatures were the highest in the past 65 million years. But while the computers insist on harsh winters, Eocene fossils from continental interiors tell a different story: winters mild enough for crocodiles to roam through Wyoming and tree ferns to shade Montana." [Richard A. Kerr, "Fossils tell of mild winters in an ancient hothouse," *Science* 261:682 (1993)]

"The 65-million-year-old bones of at least three dinosaur species and two prehistoric reptiles have been recovered from a site in the Alaskan tundra by a team of researchers from the University of California at Berkeley and the University of Alaska at Fairbanks. Although the magnetic orientation of rock in the area indicates that the site, near Prudhoe Bay, was at least as far north when the dinosaurs lived as it is today (70°N latitude), fossils and other geologic evidence suggest that the site was a coastal swamp with a subtropical to temperate climate. 'Temperature rarely, if ever, dropped below freezing,' says William Clemens, the Berkeley paleontologist who led the expedition. 'Such a mild climate was possible in spite of annual periods of darkness because the earth's climate was much more "equable"—or uniform—in those days,' explains Fairbanks paleontologist Carol Allison." (Jennie Dusheck, "Arctic dinosaurs raise questions," *Science News*, 31 August 1985, archived at http://www.thefreelibrary.com/Arctic+dinosaurs+raise+questions-a03911436.)

extinction.[79]

b) It is well known that the Arctic and Antarctic have yielded an abundance of warm-climate fauna and flora, such as mammoths, woolly rhinos, musk ox, antelope, deer, bear, horse and more than 50 other species.[80]



(1) Peter Barrett, one of the first to look for fossils in Antarctica, discovered an amphibian jaw belonging to a creature that could only have survived in a warm, damp environment.[81] Various paleontologists have followed his lead, and almost 14,000ft up Mt. Kirkpatrick in Antarctica (400 miles from the Pole) pterosaurs, carnivorous theropods, herbivorous sauropods, and many other creatures have been found,[82] which has sparked great controversy in the scientific community.[83]

(2) In 1998, fossilized remains of a tropical to subtropical *champsosaur*, an extinct subtropical crocodilian, as well as turtles have been unearthed on Axel Heiberg

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[79] There are four primary theories for dinosaur extinction (in order of adherents): 1) Asteroid impact, 2) Climate change, 3) Volcanic activity, and 4) Disease. There are an abundance of others, including combinations of theories (e.g. Susan Couch, "101 Crazy Theories About Dinosaur Extinction," web article at http://palaeo.gly.bris.ac.uk/Communication/Couch/101Theories.html).

[80] B.T. Huber, "Tropical paradise at the Cretaceous poles?" *Science* 282:2199-2200 (1998); see also Michael J. Oard, "Polar dinosaurs and the Genesis Flood," *Creation Research Society Quarterly* 32(1):47-56 (1995).

[81] P.J. Barrett, R.J. Baillie, and E.H. Colbert, "Triassic Amphibian from Antarctica," *Science* 161:460-462 (2 August 1968).

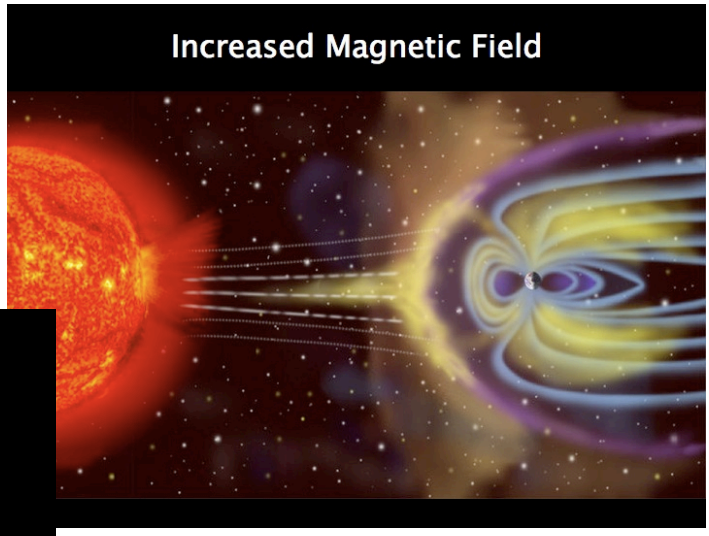
[82] W.R. Hammer, W.J. Hickerson, and R.W. Slaughter, "A dinosaur assemblage from the Transantarctic Mountains," Antarctic Journal of the U.S. 29(5):31-32 (1994); see also E.H. Colbert, "Triassic vertebrates in the Transantarctic Mountains," in M.D. Turner and J.F. Splettstoesser (eds.), Geology of the central Transantarctic Mountains, Antarctic Research Series, Vol. 36 (Washington, D.C.: American Geophysical Union, 1982). Dr. Duane Gish asks the pertinent question, "How could animals like dinosaurs, flying reptiles, and turtles survive alongside ferns and conifers in areas with very low temperature and months of darkness?" [*Evolution: The Fossils Stills Say No!* (El Cajon: Institute for Creation Research, 1995), 127]

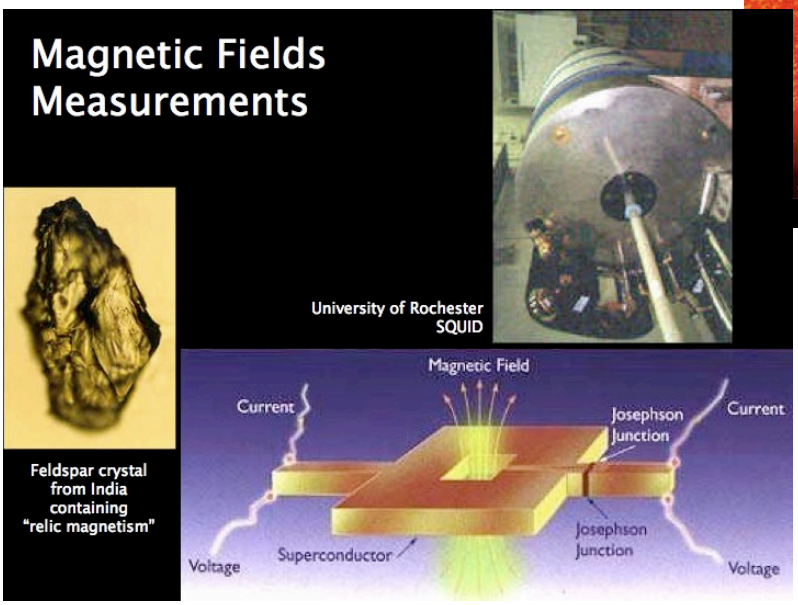
[83] "The discovery of thousands of well-preserved leaves in Antarctica has sparked a debate among geologists over whether the polar region, rather than being blanketed by a massive sheet of ice for millions of years enjoyed a near-temperate climate as recently as three million years ago." (Chris Raymond, "Discovery of leaves in Antarctica sparks debate over whether region had near-temperate climate," *Chronicle of Higher Education*, March 1991, p. A9); see also Larry O'Hanlon, "Antarctic Forests Reveal Ancient Trees, *Discovery News*, 5 November 2004; web article at http://dsc.discovery.com/news/briefs/20041101/leaves.html.

Island at 79°N in the Queen Elizabeth Islands of north-eastern Canada.[84] Though perplexing to evolutionists, such findings fit well within a young earth model.[85]

3. Increased Magnetic Field

   a) Based on its present decline in the strength (almost 10% in the last 150 years), the earth's magnetic field before the Flood would have been far stronger, which would have acted as a shield for cosmic radiation.[86]





b)Recently, scientists have developed a highly sensitive technique for measuring "relic magnetism."[87] Based on supposedly 100-million-year-old rock samples from India, scientists estimate that the Earth's magnetic field was at that time *three times stronger* than it is today.[88]

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[84] J.A. Tarduno, et al., "Evidence for extreme climatic warmth from late Cretaceous Arctic vertebrates," *Science* 282:2241-2244 (1998); see also Michael J. Oard, "A tropical reptile in the 'Cretaceous' arctic," *Creation Ex Nihilo Technical Journal* 14(2):9 (August 2000); archived at http://www.creationontheweb.com/content/view/1658/#r5.

[85] What is so difficult for evolutionary scientists is that the 7.5ft long champsosaur is *cold-blooded* (an ectotherm). Furthermore, it cannot migrate or hibernate during winter, as is thought possible for some polar dinosaurs and turtles. Uniformitarians therefore consider the champsosaur an ideal climatic indicator. The presence of this animal would require a temperature range of 25ºC to 35ºC, and thus the climate must have been tropical to subtropical. However, the area's present annual mean temperature is –20ºC, with the lowest daily temperature during the coldest month around –45°C. Since geologists believe the paleolatitude of Axel Heiberg Island was only a little less than that of today, slow continental drift is of no help in understanding the contradiction. Thus, scientists have turned to alternative climate models which have also proved difficult—"The presence of reptiles at Arctic latitudes offers challenges for efforts to model Cretaceous climates. The high polar temperatures implied here exacerbate the problems of simulating warm polar conditions without also raising equatorial temperatures to unreasonably high values." (Tarduno, et al., 2243)

[86] See Thomas G. Barnes, *Origin and Destiny of the Earth's Magnetic Field*, 2nd ed. (El Cajon: Institute for Creation Research, 1983); and D. Russell Humphreys, "The earth's magnetic field is still losing energy," *Creation Research Society Quarterly* 39(1):3-13 (June 2002); archived at http://www.creationresearch.org/crsq/articles/39/39_1/GeoMag.htm.

[87] Scientists at the University of Rochester used a superconducting quantum interference device (SQUID), which is normally employed in computer chip design and is extremely sensitive to the tiniest magnetic fields. Previously, "paleointensity" (i.e. study of the Earth's ancient magnetic field) was measured by heating a piece of igneous rock and cooling it in a chamber that is shielded from any outside magnetic field. In this way, the magnetism in the rock's particles can be "drained." Scientists then increase the magnetic field and measure how much magnetism the particles in the rock can hold. However, because of contamination, scientists have not regarded this technique as being particularly accurate until the development and use of the SQUID.

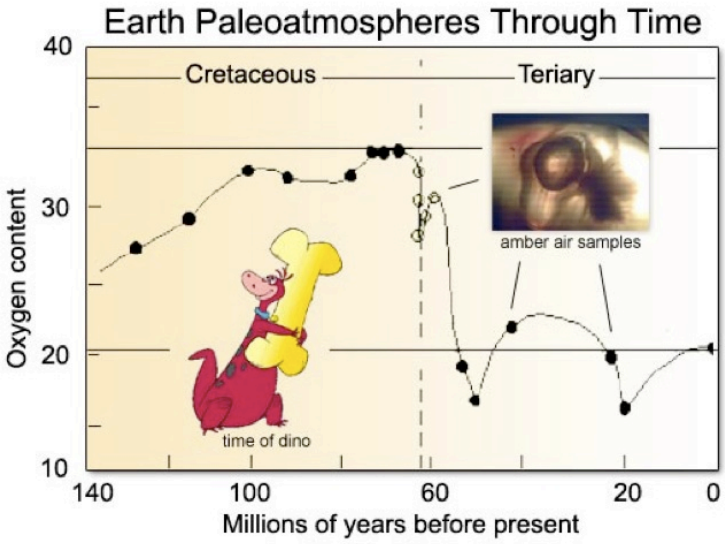
[88] J.A. Tarduno, R.D. Cottrell, and A.V. Smirnov, "High geomagnetic intensity during the mid-Cretaceous from thellier analyses of single plagioclase crystals," *Science*: 291:1779-1783 (2 March 2001). For a summary of the research, see David Whitehouse, "Rocks reveal amazing dino lights," *BBC News Online*, 2 March 2001; web article at http://news.bbc.co.uk/1/hi/sci/tech/1196652.stm.

4. Increased Oxygen Level

   a) Prehistoric amber bubbles

      (1) In the late 80s, USGS scientists used a gas quadrupole mass spectrometer (QMS)[89] to analyze 300 samples of air bubbles trapped in ancient amber. The fossilized resin was from Cretaceous, Tertiary, and recent-age amber from 16 world sites, the oldest amber supposedly being about 130 Ma.

      (2) Analyses of the bubbles show that the earth's atmosphere contained 50% more oxygen than it does now (~35% vs. 21%).[90] Some have criticized these findings,[91] but from a creationist standpoint these findings are still relevant, since we believe those bubbles to be ~4400 years old.



Source: http://minerals.cr.usgs.gov/gips/0amber.htm

[89] For an explanation of the QMS, see the USGS website at http://minerals.cr.usgs.gov/gips/4process.htm#SCROLL4.

[90] Robert A. Berner and Gary P. Landis, "Chemical analysis of gaseous bubble inclusions in amber: The composition of ancient air," *American Journal of Science* 287:757-762 (1987); R.A. Berner and G.P. Landis, "Gas bubbles in fossil amber as possible indicators of the major gas composition of ancient air," *Science* 239:1406-1409 (18 March 1988); see also Gary Landis "Air bubbles, amber, and dinosaurs," at http://minerals.cr.usgs.gov/gips/na/0amber.htm, in *Understanding Our Planet Through Chemistry*, web book at http://minerals.cr.usgs.gov/gips/na/aii-indx.htm.

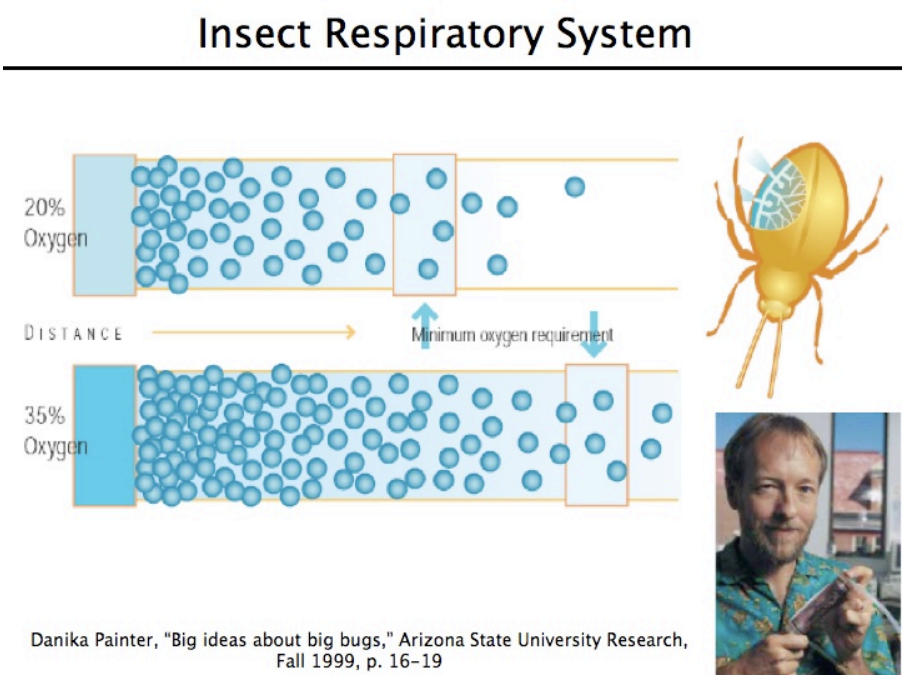
[91] Critics argue that amber is permeable to gases and therefore cannot contain air for millions of years [see H.B. Hopfenberg et al., "Is the air in amber ancient?" *Science* 241:717-718 (5 August 1988); Richard Monastersky, "Oxygen-extinction theory draws counterfire: claim that dinosaurs died due to drop in atmosphere's oxygen concentration criticized," *Science News*, 6 November 1993].

b) Prehistoric insect respiration

(1) It has long been debated how giant prehistoric insects such as *Meganeura* could have existed on this earth, since the way oxygen is diffused through an insect's body (via its tracheal breathing system) puts an upper limit on its body size.

(2) It was originally proposed by Harlé & Harlé (1911) that the atmosphere at one time contained more oxygen than the present 21 percent.[92] This theory was dismissed by fellow scientists, but has recently found increasing approval.[93]

(3) A recent study by Jon F. Harrison (Arizona State University) and his colleagues on insect respiratory systems has confirmed the necessity of higher oxygen levels to sustain prehistoric insect size.[94]



[92] É Harlé and A. Harlé, "Le vol de grands reptiles et insects disparus semble indiquer une pression atmosphérique levée," *Bull. Soc. Geol. Fr. 4 Ser.* 11:118-121 (1911).

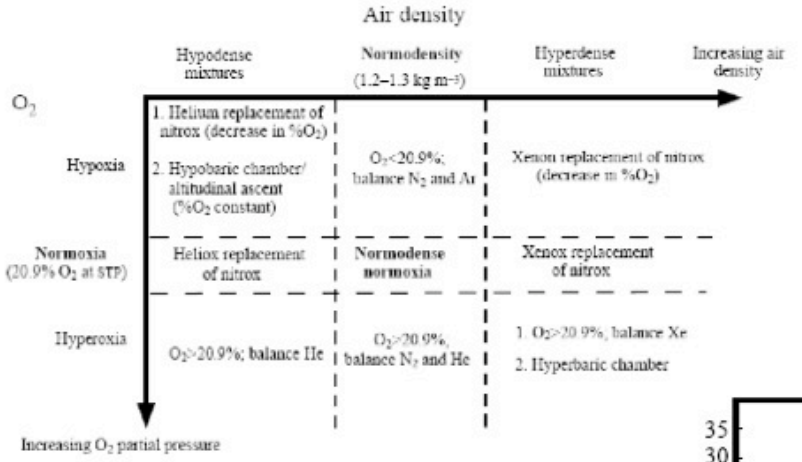
[93] See J.B. Graham, N.M. Aguilar, R. Dudley, C. Gans, "Implications of the late Palaeozoic oxygen pulse for physiology and evolution," *Nature* 375:117-120 (11 May 1995); Robert Dudley, "Atmospheric oxygen, giant paleozoic insects and the evolution of aerial locomotor performance," *Journal of Experimental Biology* 201:1043-1050 (1998); archived at http://jeb.biologists.org/cgi/reprint/201/8/1043.pdf; and G. Chapelle and L.S. Peck, "Polar gigantism dictated by oxygen availability," *Nature* 399:114-115 (13 May 1999).

[94] J.F. Harrison, et al., "Does atmospheric oxygen level limit maximal insect size?" *Geological Society of America Earth System Processes 2* (Calgary, Alberta, 8-11 August 2005); Danika Painter, "Big Ideas About Big Bugs," ASU Research News, 24 July 2003, web article at http://researchmag.asu.edu/stories/bugs.html; and "Giant Insects Might Reign If Only There Was More Oxygen in the Air," *Science Daily*, 12 October 2006; web article at http://www.sciencedaily.com/releases/2006/10/061012093716.htm.

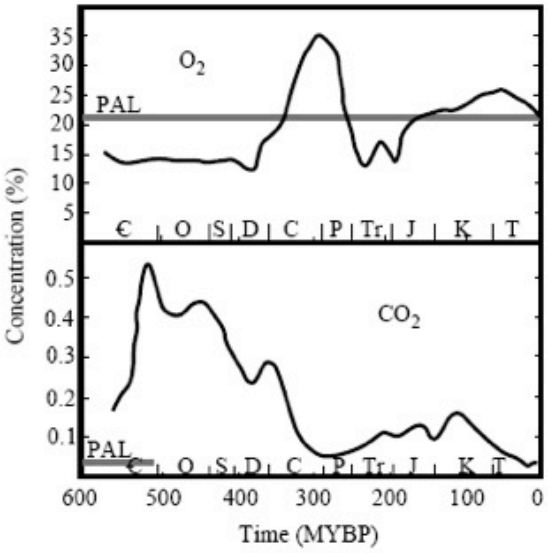
In contrast to animals, which breath with lungs, insects breathe with a network of tiny tubes called tracheae. Air enters these tubes through holes along the insect's abdomen, and then diffuses down the blind-ended tracheae. The distance oxygen can travel down the tracheae is dependant upon its concentration in the air. Thus, if atmospheric oxygen is doubled, it will make it twice as far. If an insect has a longer trachea (as do prehistoric insects), then one should expect the insect will need higher oxygen levels to breathe.

Harrison tested this by varying oxygen levels and insect sizes (grasshoppers and dragonflies) and by measuring their subsequent activity (jumping and flying), which is dependent upon oxygen reaching their muscles. He found that larger insects, which have larger trachea, needed more oxygen to continue their activity. Moreover, the smaller insects with shorter trachea were able to continue normal activity at lower oxygen levels. Thus, large prehistoric insects with large trachea must have had higher levels of oxygen in the atmosphere in order for oxygen to reach their muscles. If the oxygen levels were at present rates, the large prehistoric insects would not have been able to move or get off the ground.

This research is part of a broader "oxygen pulse theory" first put forth by Graham et al. (1995), which is summarized as follows, "The findings indicate that there was a 'pulse' in the concentration of environmental oxygen during the Paleozoic era. In other words, there was much more oxygen in the atmosphere 300 million years ago than there is today. During this period, the oxygen concentration in the air reached 35 percent, almost double the present level of 21 percent. Oxygen concentration stayed high for about 100 million years, then dropped precipitously to about 15 percent." (Painter, "Big Ideas About Big Bugs")



"Oxygen Pulse Theory"



Robert Dudley, "Atmospheric oxygen, giant paleozoic insects and the evolution of aerial locomotor performance," The Journal of Experimental Biology 201:1043-1050 (1998)

c) Dinosaur gigantism – along with a higher plant productivity due to a raised CO_2 level,[95] many have proposed a higher oxygen content in the Earth's atmosphere to explain dinosaur (specifically, sauropod) gigantism.[96]

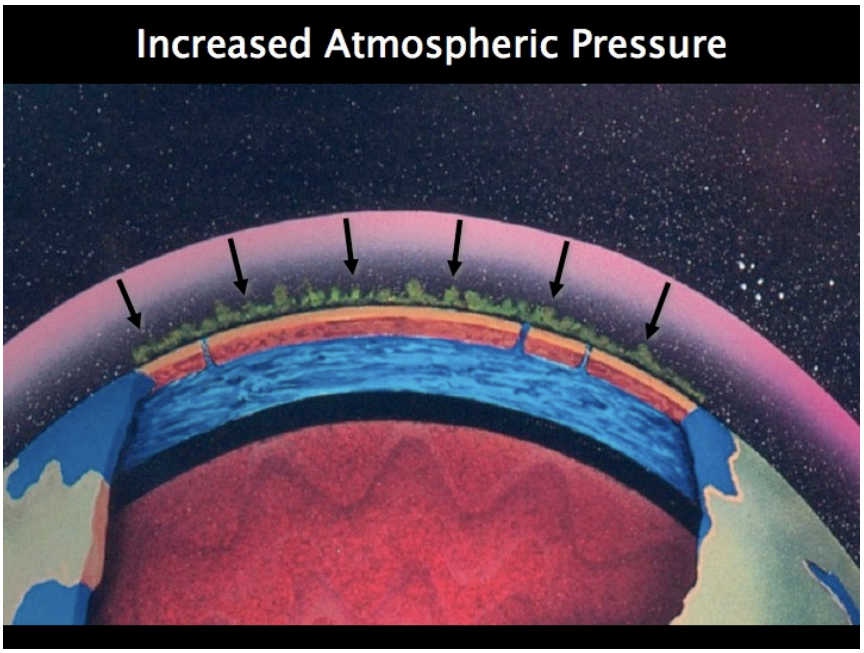
[95] 6 to 12 times the modern concentration of ~.03%, see G.P. Burness, J. Diamond, and T. Flannery, "Dinosaurs, dragons, and dwarfs: The evolution of maximal body size," *Proceedings of the National Academy of Sciences USA* 98:14518-14523 (2001); and J.B. Graham, et al., "The late Paleozoic atmosphere and the ecological and evolutionary physiology of tetrapods," in *Amniote Origins: Completing the Transition to Land*, S.S. Sumida and K.L.M. Martin eds. (Academic Press, 1996).

[96] Richard Hengst (Chair of Biology at Purdue Univ) and others have demonstrated that a large long-necked sauropod such as the *Tithonian Apatosaurus* (which had small nostrils and no diaphragm) required an oxygen content in the atmosphere of about 35% to function at any level above a very slow walk (slower than the rates deducted from trackways), because they could not ventilate their lungs as easily as birds or mammals. [See R.A. Hengst, R.A., J.K. Rigby, G.P. Landis, and R.E. Sloan, "Biological Consequences of Mesozoic Atmospheres: Respiratory Adaptations and Functional Range of Apatosaurus," in G. Keller and N. McLeod, eds., *Cretaceous-Tertiary Mass Extinctions Biotic and Environmental Changes* (New York: W. W. Norton & Co., 1996), Chapter 13.

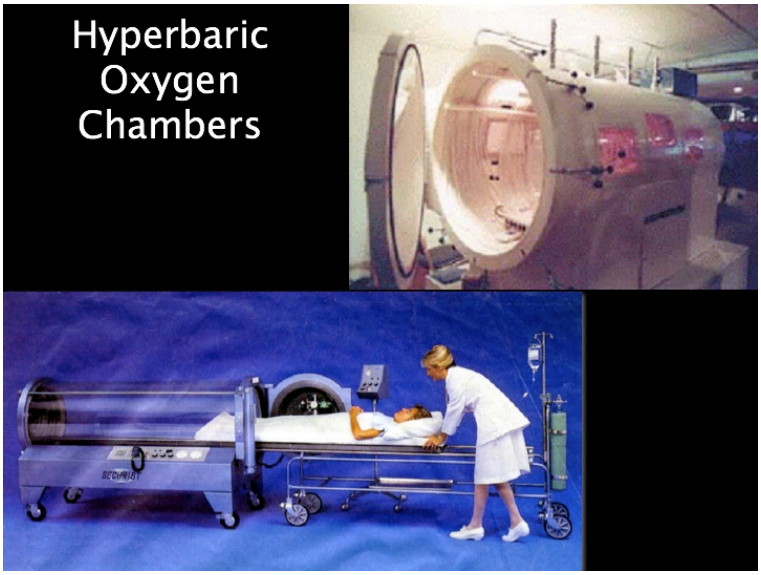
This is also seen in the "Pele hypothesis" [first proposed by G.P. Landis, et al., "Pele Hypothesis: Ancient Atmospheres and Geologic-geochemical Controls on Evolution, Survival, and Extinction," in *Cretaceous-Tertiary Mass Extinctions Biotic and Environmental Changes*, Chapter 20]: "Dinosaurs required 40 breaths to fully replace the air in their lungs. Mammals and Birds only require 7 breaths to completely replace the air in their lungs. Large Dinosaurs thus required elevated levels of O_2 in the air to diversify." [Robert E. Sloan, "Plate Techtonics and the Radiations/Extinctions of Dinosaurs, the Pele Hypothesis," *DinoFest International: Proceeding of a Symposium sponsored by Arizona State University*, March 1998, pp. 533-539.]

5. Increased Atmospheric Pressure

a) Canopy theorists have also postulated that this vapor layer (along with the increased oxygen level[97]) would have increased the atmospheric pressure on the surface of the early earth, again contributing to a healthier environment.



b) For some time medical hyperbaric chambers have been used to hasten healing of skin injuries and various other ailments.[98] While many hospitals contain chambers, professional sports teams and celebrities have increasingly been experimenting with sleeping in enhanced oxygen and high pressure, or "hyperbaric oxygen therapy" (HBOT).[99] Around the world, evidence is mounting that these chambers can reduce infection, heal diseases, decrease stress, and

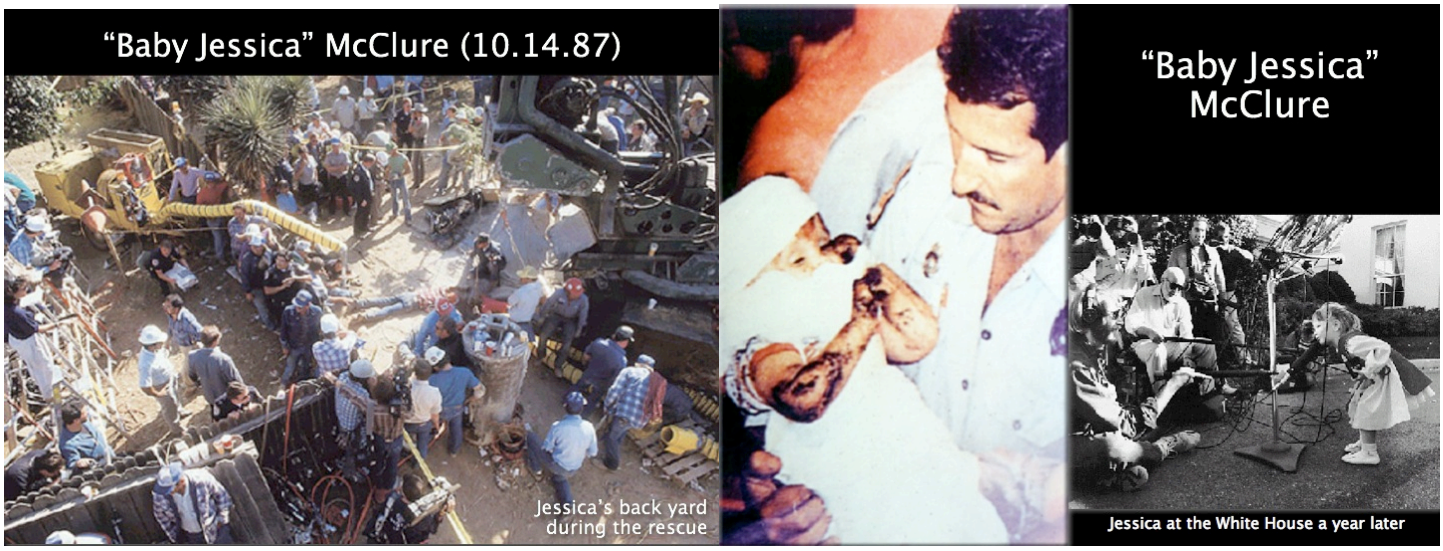


[97] "One implication [of higher O_2 levels] is that the atmospheric pressure of the Earth would have been much greater during the Cretaceous era, when the bubbles formed in the resin. A dense atmosphere could also explain how the ungainly pterosaur, with its stubby body and wing span of up to 11 meters, could have stayed airborne." [Ian Anderson, "Dinosaurs breathed air rich in oxygen," *New Scientist* 116:25 (5 November 1987)] This article simply summaries and comments on the research by Berner and Landis.

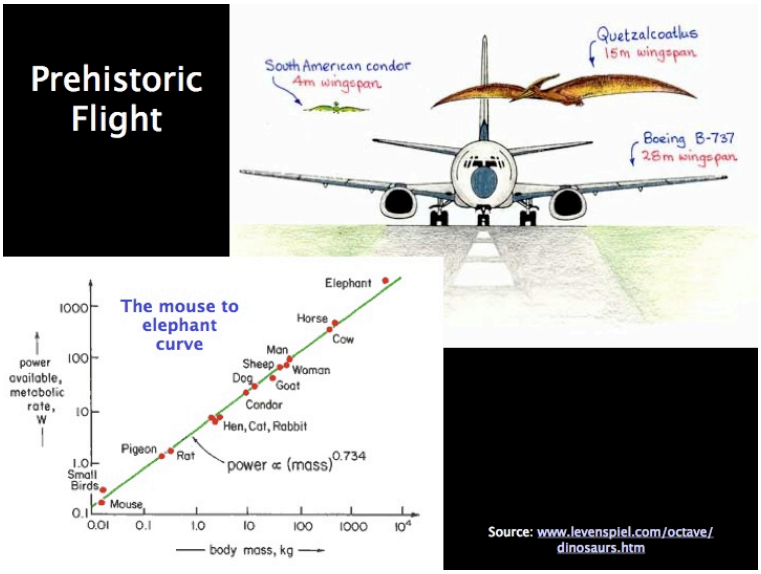
[98] See Mike Bennett (University of New South Wales, Sydney, Australia), "HBO Evidence: The Database of Randomised Controlled Trials In Hyperbaric Medicine," available at http://www.hboevidence.com/; see also Wikipedia Online Encyclopedia, "Hyperbaric Oxygen Therapy," available at http://en.wikipedia.org/wiki/Hyperbaric_Oxygen_Therapy.

[99] For a brief history and overview of how HBOT works, see Michael Neumeister, "Hyperbaric Oxygen Therapy," *Emedicine from WedMD*, web article at http://www.emedicine.com/plastic/topic526.htm.

enhance stamina—a classic example of which demonstrated with "Baby Jessica" McClure.[100]



c) Prehistoric flight – physiological, biological, and aeronautical properties of ancient fliers, such as the *Quetzalcoatlus*, make flight impossible in the present atmosphere, yet few have endeavored to address the issue.[101]



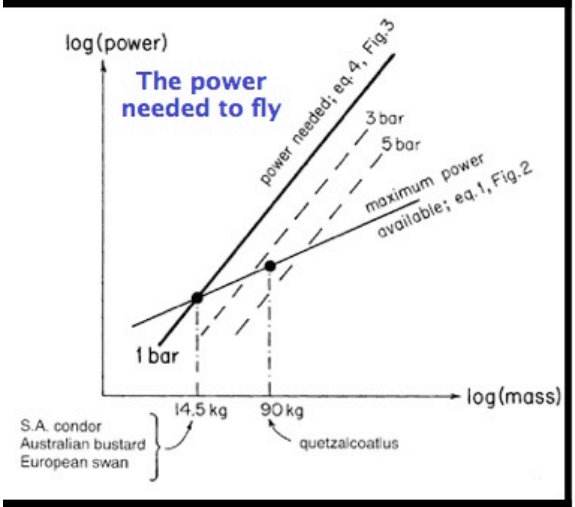
[100] At the age of 19 months, "Baby Jessica" fell into an 8-inch-wide well in Midland, Texas on October 14, 1987. Rescuers worked for 58½ hours to free her, but because of her awkward position in the well which led to a severe lack of blood circulation, gross amputations were feared. Paramedics whisked her to Midland Memorial Hospital where she was placed in the hospital's hyperbaric oxygen unit, which supplied 100% pressurized oxygen for 90 minutes, and her leg and foot were saved. (See "Use of Hyperbaric Oxygen in Texas Well Rescue," *New York Times*, 10 November 1987.)

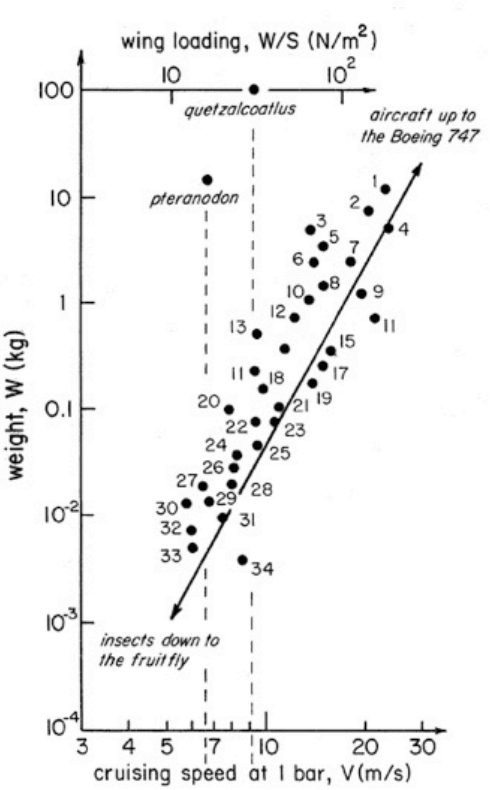
[101] Octave Levenspiel, Emeritus Professor of Chemical Engineering at Oregon State University, has theorized that "the giant flying creatures of the dinosaur age could only fly if the atmospheric pressure was much higher than it is now: at least 3.7–5.0 bar." [O. Levenspiel, T.J. Fitzgerald, and D. Pettit, "Earth's atmosphere before the age of dinosaurs," 30(12):50-55 (December 2000); archived at http://journals.iranscience.net:800/Default/pubs.acs.org/isubscribe/journals/cinnov/30/i12/html/12learn.html.]

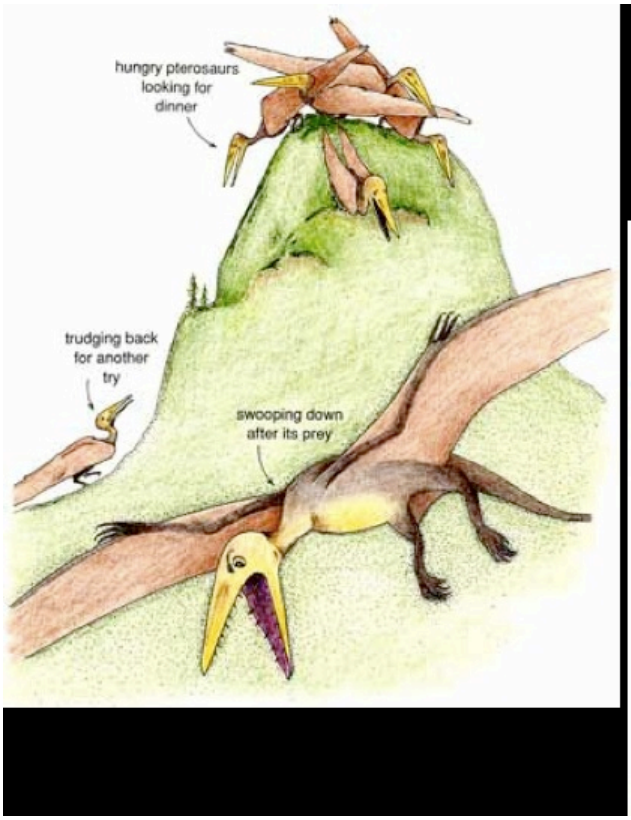
"Today's South American condors, with their 12-foot wingspans and 25-pound weight, are the largest creatures that can support and propel themselves through the air according to basic aerodynamic principles… The pterosaur quetzalcoatlus had a wingspan of more than 45 feet—half that of a Boeing 737—and weighed more than 150 pounds. Either it couldn't fly—but it did—or the atmosphere had to be much denser at the time." [Octave Levenspiel, "Earth's early atmosphere," *Chemical Innovation* 30(5):47-51 (May 2000); available at http://www.levenspiel.com/octave/dinosaurs.htm.]

Levenspiel addresses the alternative explanation for Quetzalcoatlus flight (that they were gliders during South America's strong "westerlies") and concludes, "All these difficulties lead to improbable scenarios. To have survived and thrived for millions of years, these flyers had to be fast, efficient, and well adapted to their environment." (Ibid.)

Aeronautical Principles

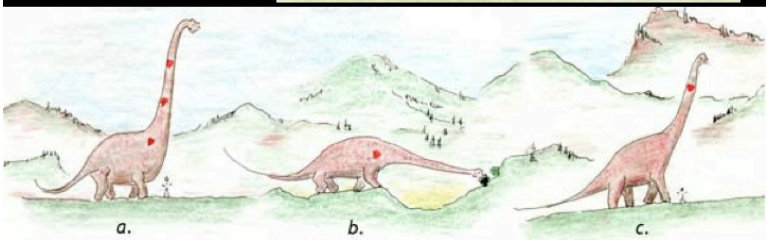






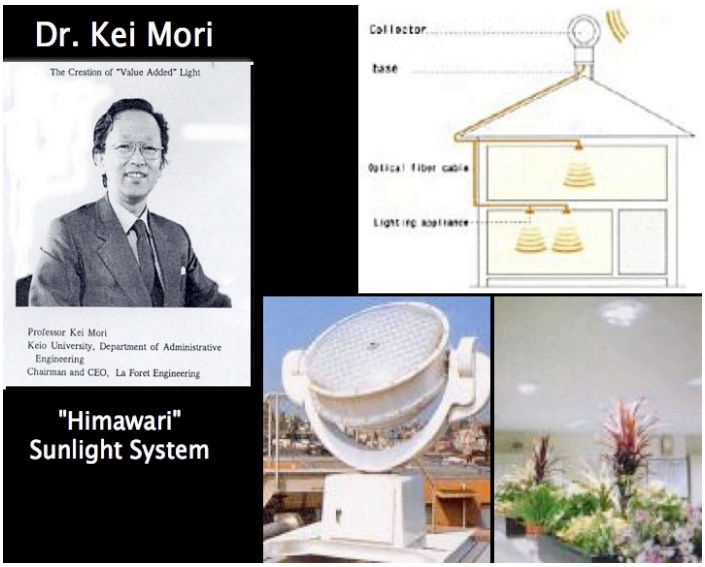
Alternative Explanations

d) Prehistoric blood pumping – scientists are increasingly recognizing that the size and distance between the heart and brain of many dinosaurs makes pumping blood between the two impossible in the present atmosphere.[102]



6. Experimental Support

a) Particularly interesting experiments were conducted by the late Dr. Kei Mori (d. 1990) of Keio University in Tokyo. Dr. Mori raised plants under special light that filtered out IR and UV radiation. His unique process of fiberoptic sunlight collection and transmission, called "Himawari Sunlighting," is now marketed worldwide.[103] At first Mori feared the filtered light would be detrimental. But after extensive experiments he claimed it could promote healing, and "because the ultraviolet is blocked, this sunlight does not fade fabrics or damage skin."[104]

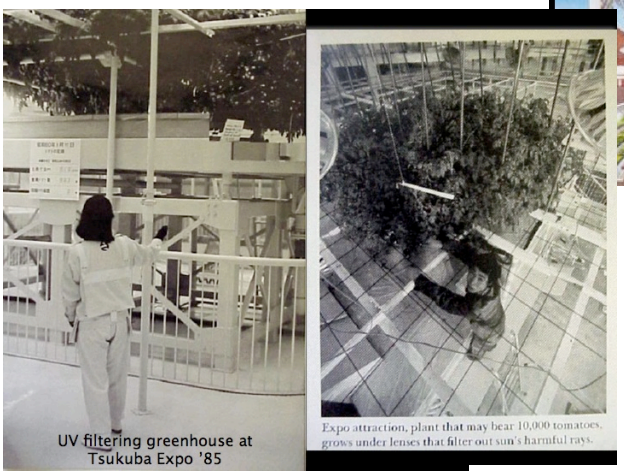


[102] For example, an Apatosaurus (i.e. Brontosaurus) would have to pump blood 25ft or more up its neck to the brain. Alternative explanations include: 1) it had a giant 5 ton heart pumping at extremely high pressures (no evidence of which exists); 2) it had multiple hearts up its neck (as many as 8); 3) its neck was horizontal and never raised above ~10ft (though other sauropods do); or 4) its heart was directly under its chin (which would necessarily involve the presence of many other organs in the same vicinity). [See Levenspiel, "Earth's early atmosphere".]

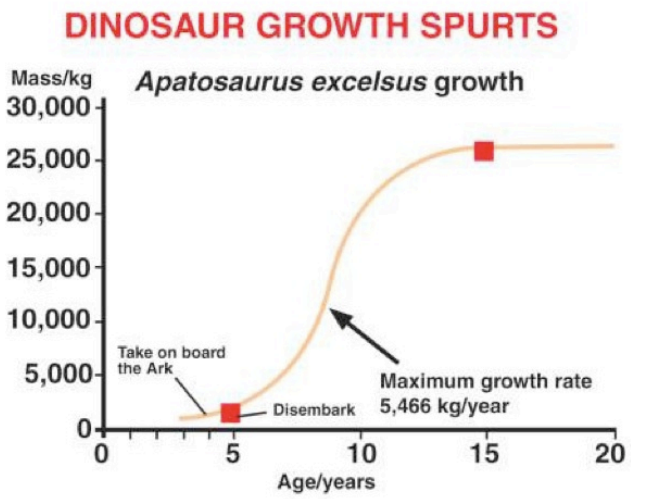
[103] Dr. Mori was a secular professor in the Department of Science and Engineering at Keio University who was interested in technological innovation, and thus his experiments were never intended to promote YEC—"He intended to enable all the living things on the earth to enjoy much more favor of the sun. Nowadays, there is an acute demand on the technological developments to harmonize the economy with the environment. His invention of HIMAWARI promises many answers to those problems as energy saving, natural alternative energy, global-warming and disposal of wastes and effluents." ("Sunlight Collecting System 'HIMAWARI'," Laforet Engineering Co., 2002; at http://www.himawari-net.co.jp/e_page-index01.html.) He named the sunlight collecting system "Himawari" after the "sunflower" in Japanese. The system "transmits sunlight through optical fiber wherever it is needed, cutting off most of the ultraviolet and infrared rays. 'HIMAWARI' supplies value-added sunlight in buildings and makes indoor-sunbathing possible." (Ibid.)

[104] Elaine Gilmore, "Sunflower over Tokyo," *Popular Science*, May 1988, p. 75.

b) One long-lived tomato plant was grown in a special nutrient-rich solution to be exhibited at the Tsukuba Expo '85 in Japan. Under piped sunlight and a controlled atmosphere ("hydroponic culture system"), this tomato tree grew over 30ft high and yielded more than 13,000 ripe tomatoes during the six months of the Expo.[105] Mori's environment of filtered sunlight, enhanced carbon dioxide, and nutrient-rich liquids could be similar to the conditions on the original earth.



7. Reptilian Development – Most reptiles have the potential of growing throughout their lives. Unlike other animals, reptiles have no "cutoff" mechanism whereby it stops growing in size. So, even if reptiles lived only half as long as pre-flood men, we would expect gigantic reptiles before the flood, which in fact is the case.[106]



Cf. Gregory M. Erickson, et al., "Dinosaurian growth patterns and rapid avian growth rates," Nature 412:429–433 (26 July 2001)

[105] Koichibara Hiroshi, "Tomatomation; Japan's high-tech food factories," *UNESCO Courier*, March 1987; archived at http://findarticles.com/p/articles/mi_m1310/is_1987_March/ai_4793139; "The system produces some 130 heads of lettuce and other green vegetables per day (some 47,000 per year) on a floor space of no more than 66 square metres. Grown from seed, the lettuce is big enough for harvesting in only five weeks, 3.5 times faster than plants cultivated using conventional methods." (Ibid.)

[106] Some dinosaur bones show evidence that they formed rapidly, like those of birds and mammals, rather than slowly like reptiles [see Gregory M. Erickson, et al., "Dinosaurian growth patterns and rapid avian growth rates," *Nature* 412:429-433 (26 July 2001); Gregory M. Erickson, et al., "Gigantism and comparative life-history parameters of Tyrannosaurid dinosaurs," *Nature* 430:772-775 (12 August 2004); and E. Stokstad, "Dinosaurs under the knife," *Science* 306(5698):962-965 (5 November 2004)], but the evidence is not conclusive nor universally applicable. For example, the 2002 Dinosaur Display at the British Museum of Natural History stated: "Dinosaurs may have had no maximum size and carried on growing slowly throughout their lives. Some fossil bones have growth rings, like trees, but not clearly enough to show how long the dinosaurs lived."

B. Strengths

1. Explanation of a mechanism for plant and animal gigantism
2. Explanation of Genesis 1:6-8 – Waters above the "expanse/firmament"
3. Explanation of Genesis 2:5-6 – Possible absence of rain before the Flood
4. Explanation of Genesis 7:11 – Floodgates of the heavens opening
5. Explanation of Genesis 8:1 – Wind after the Flood
6. Explanation of Genesis 9:13-15 – Clouds and rainbow after the Flood

C. Weaknesses

1. Physically improbable[107]
2. Not observable/testable
3. Lack of Biblical references

[107] See Walt Brown's discussion of the 7 primary problems facing the canopy theory: pressure, heat, light, nucleation, greenhouse, support, and ultraviolet rays ("Scientific Arguments Opposing a Canopy," *In the Beginning*, 261-263; archived at http://www.creationscience.com/onlinebook/FAQ33.html.)