

1: Protoceratops | Extinct Animals

Making a full list of animals that lived with dinosaurs is an impossible task: dinosaurs were present on Earth for millions of years, and during this vast period of time countless animals both appeared and became extinct.

Protoceratops skeleton at the Wyoming Dinosaur Center The classical folklorist Adrienne Mayor has proposed that the griffin of mythology is based on dinosaur skeletons found in the Gobi Desert. She noted that griffins were said to inhabit the Scythian steppes that reached from modern Ukraine to central Asia. Mayor draws a connection to Protoceratops , a frilled dinosaur commonly found in the Gobi [1] , sharing features associated with griffins: The scientific study of dinosaurs began in s England. In , Richard Owen coined the term dinosaur, which in his vision were elephantine reptiles. An ambitious promoter of his discoveries and theories, Owen was the driving force for the Crystal Palace dinosaur sculptures , the first large-scale public dinosaur reconstructions These sculptures, which can still be seen today, immortalized a very early stage in the perception of dinosaurs. Despite the well-publicized " Bone Wars " of the late 19th century between the American palaeontologists Edward Drinker Cope and Othniel Charles Marsh , dinosaurs were not yet ingrained in culture. Marsh, although a pioneer of skeletal reconstructions, did not support putting mounted skeletons on display, and derided the Crystal Palace sculptures. As study caught up to the wealth of new material from western North America, and venues for depictions proliferated, dinosaurs gained in popularity. The paintings of Charles R. Knight were the first influential representations of these finds. Knight worked extensively with the American Museum of Natural History and its director, Henry Fairfield Osborn , who wanted to use dinosaurs and other prehistoric animals to promote his museum [11] and his ideas on evolution. Dinosaurs began appearing in films soon after the introduction of cinema, the first being the good-natured animated Gertie the Dinosaur in The Lost World crossed into the movies in , setting heights for special effects and attempts at scientific accuracy. It is unusual, even today, for attempting to portray dinosaurs as something other than monsters in constant combat. Moribund dinosaurs to renaissance[edit] Scene from The Beast from 20, Fathoms Thus, The Beast from 20, Fathoms and Godzilla ; American release portray monstrous dinosaur-like prehistoric reptiles that go on rampages after being awakened by atomic bomb tests. Feathered restoration of Deinonychus antirrhopus. The dinosaur, named Uncle Beazley , becomes too big, so the boy brings him to the Smithsonian Institution in Washington, D. For those wanting more scientific accounts of dinosaurs, there were the first nontechnical dinosaur books. Bakker , contributed to the Dinosaur Renaissance , [25] a revolution in the study of dinosaurs. Jonas consulted with paleontologists Barnum Brown , Edwin H. Colbert and John Ostrom in order to create nine sculptures that were as accurate as possible. After the Fair closed, the dinosaur models toured the country on flatbed trailers as part of a company advertising campaign. Most of the statues are now on display at various museums and parks. From the s to , the statue was located on the National Mall in front of the National Museum of Natural History. Dinosaurs reconsidered[edit] Outdated and modern reconstructions of Iguanodon. The reevaluation of dinosaurs spurred public interest, with the new generation of paleoartists quick to respond. Paul , William Stout , and Bob Walters illustrated the new findings in response to the demand. Dinosaurs , a television sitcom, parodied humans and other television shows. The first of these, Jurassic Park , married advanced CGI [7] with advances in scientific knowledge of dinosaurs. The falling cost of computer-generated effects also has recently allowed the increased production of documentaries for television; the award-winning BBC series Walking with Dinosaurs , the When Dinosaurs Roamed America , the Dinosaur Planet , the Animal Armageddon , and the Planet Dinosaur are notable examples. In April , a proposal was submitted to the Unicode committee to encode three pictures of heads of three dinosaur species considered exemplary as emoji. Paleoartists and illustrators in particular have kept up with research. Popular conceptions of dinosaurs have also been important in stimulating the interest and imagination of young people, and have been responsible for introducing many who would later become paleontologists to the field. In addition, popular depictions have the freedom to be more imaginative and speculative than technical works. Glut , has multiple factors. Dinosaurs were "monsters," yet are safely extinct, allowing for vicarious thrills. They appeal to the imagination, and there are many ways to approach

them intellectually. Finally, they appeal to adults nostalgic for what they enjoyed as children. Children have been particularly drawn to dinosaurs over the years.

2: Summary/Reviews: Dynamics of dinosaurs and other extinct

Prehistoric, Dinosaurs Dinosaur & Fossils Extinct Animals Prehistory Flore Crazy animals Large animals Forward The marsupial lion (Thylacoleo carnifex) is an extinct species of carnivorous marsupial mammal that lived in Australia from the early to the late Pleistocene years ago).

The Mesozoic Era from to 65 million years ago in the time scale of the Earth is divided in three periods of time: Triassic, Jurassic and Cretaceous. During these periods, dinosaurs were the dominant terrestrial vertebrates in the world. However, this highly diverse clade of reptiles was practically wiped out during the Cretaceous-Paleogene mass extinction, marking the end of the Mesozoic Era. Digital illustration of the spiral of ecological time. By Nicolas Primola Shutterstock. Despite differences in size from the 35 cm tall *Anchiornis huxleyi* to the 25 m long *Amphicoelias fragillimus*, dinosaur species had a lot in common. For example, they all had horns or crests, four straight legs, and they laid eggs in nests. Nevertheless, there is evidence of aquatic dinosaurs, as well as dinosaurs that were able to fly or, at least, glide. The first dinosaurs walked on their two hind legs, similar to birds. Later came quadruped species or species that could walk two or four legs. Most paleontologist that work with dinosaurs state that birds can be considered dinosaurs. Birds are classified under the Maniraptora subgroup, which are Coelurosauria, which belong to order Saurischia, which are also dinosaurs. Contrary to popular belief, dinosaurs cohabited with other animal groups, such as mammals. These were small mammals that lived in reduced ecological niches in a world dominated by big reptiles. With the mass extinction, dinosaurs practically disappeared, but the surviving species evolved into the current birds and other groups of smaller animals. Paleontologists recovering dinosaur skeleton in an excavation. By natural paleontologist Shutterstock. When the volcanic activity in the Cretaceous-Paleogene came to an end, all of these atmospheric factors were affected. Moreover, the presence of larger tetrapods had a significant impact on dinosaurs, as they occupied their ecological niches. Insects were not affected by the environmental changes, therefore providing smaller species with a source of food and increasing their ability to survive. Finally, the emergence of flowers and the reduction of the coniferous plants that dinosaurs depended on added to their inability to adapt and contributed to their eventual disappearance. Another common theory states that a meteorite with a diameter of km collided close to the peninsula of Yucatan, creating the Chicxulub crater. Some scientists believe that this mass extinction could have taken place in only a matter of hours. Deccan Traps, found in India, is one of the largest volcano formations on Earth. The sudden increase in temperatures would have led to the extinction of many species. Although this theory has been discarded by most scientists as the main cause of the disappearance of dinosaurs, many suggest it contributed to their extinction. The bird close to non-avian dinosaurs. Nothing could be further from the truth. With the discovery of *Archaeopteryx* in, a new idea was considered, that this species could be the missing link between dinosaurs and birds. Today there are many fossils that support this theory. Dinosaurs There are many scientific and artistic representations of how we think dinosaurs may have looked, but cinema was the most powerful tool in bringing these extinct animals back to life. The Fallen Kingdom by J. Bayona that realism became fiction. Even though many of the dinosaurs in these films are quite unrealistic, their special effects and designs give viewers the opportunity to imagine what they might have been like in a totally believable way. From the extensive list of species that formed these prehistoric reptiles, I present below a selection of the most characteristic representatives of each taxonomic group, with some of their distinctive qualities. *Dilophosaurus* *Coelophysoidea* You may remember this species from Jurassic Park. In the film it was depicted as quite a small reptile with an extendable cowl like the lizard *Chlamydosaurus kingii* and the ability to spit poison. All three of these features were cinematic inventions. In fact, it was 7 meters long and weighed about kg. It is one of the first theropods of the early Jurassic epoch. Its main characteristic was the two crests on its skull that they used possibly as a display sexual dimorphism. By Herschel Hoffmeyer Shutterstock. They are believed to have been fast running carnivores, probably feeding on smaller lizards. They had an elongated snout with large openings that reduced the weight of their skull. The curvature of their necks allowed for a quick biting movement. By Kostyantyn Ivanyshen Shutterstock. The main characteristic of these animals was the

horn-shaped structure on their skull, behind their nostrils, and two more horn-shaped ridges in front of their eyes. This was one of the few theropods that had armoured skin, in the form of small bony plates. Its tail measured half its total length and its back was lined with vertebral spines. They lived in modern-day United States, Tanzania and Europe and it was one of the first dinosaurs to be discovered. It ran from between the nostrils up to the eyes. It was hollow inside and may have been used to attract females during the mating season. It is a species of Carnosaurus that lived in Asia at the end of the Jurassic era. It was up to 6 meters long and 2 meters high and had very sharp teeth. Remains of this species have always been found close to water, suggesting that they may have inhabited areas near lakes or oceans. The Spinosaurus was the largest of all the carnivorous dinosaurs. It could measure up to 18 meters in length and weighed in excess of 20 tons. They had a skull similar to that of a crocodile and spikes measuring up to 1. Covered and joined together by skin, they would have been used for both thermoregulatory and display purposes. They walked on all fours most of the time and it is believed they spent a lot of time in the water, feeding on fish. They were large up to 9 meters long, bipedal and had strong claws and sturdy legs. They used their long, heavy tail to balance as they moved. Their skull was relatively large and featured two ridges in front of and above the eyes. Despite their large size, these predators were relatively light. Their teeth were serrated, but not very big, and it is believed that they hunted by stalking their prey and striking them hard with their jaws. They were carnivores that fed on small lizards. They had long hind legs, a long tail to maintain their balance, an elongated skull with a pointed nose, small serrated teeth and relatively large eyes. By Linda Bucklin Shutterstock. It was one of the last dinosaurs around before the great extinction, as well as being one of the largest predators to have set foot on our planet. It was bipedal, with strong hind legs, an enormous skull, a long and thick tail for balance. It possessed small but strong front legs, equipped with two clawed toes. Experts are still debating whether they were hunters or scavengers. According to the latest studies, the T-Rex appears to have been covered with feathers like many other dinosaurs. They were more than 3 meters tall and inhabited part of the current United States during the end of the Cretaceous. Their bones were hollow which made them lighter, possibly allowing them to run faster. There have been plenty of remains found of this species, which would suggest that they were not carnivores, and the hypothesis is that they lived in herds. They had no teeth and their snout was more like a beak. They may have been covered with feathers. They measured 1 meter and weighed about 3 kilograms. They had strong hind legs and were fast, highly agile runners. Their front legs were very short and had just one finger, ending in a long claw. Supposedly, these animals were covered with feathers. Their small skull, contained little, sharp teeth. They are believed to have eaten insects and small animals, and that they hunted at night, like the Velociraptor, thanks to their specially adapted eyes. Among the individual bones unearthed of this dinosaur were its enormous, 70 cm long claws. It was estimated to be 8 to 12 meters long and weighed up to 6 tons. Unlike other theropods, the Therizinosaurus stood on two hind legs, with four toes holding its body, instead of three. Originally, they were thought to have fed on eggs because the first specimen was found near a nest. Later studies showed that it was in fact their own nest. They were about two meters long and weighed about 11 kilograms. Besides having a rib cage similar to that of a present-day bird, they also had feathers on their bodies, tails and front legs. According to studies of relatives of this species, we can assume that they had a casque similar to that of the Australian cassowary. By Linda Bucklin Microraptor

Deinonychosauria The discovery of the Microraptor was an important source of information for evolutionary studies between birds and dinosaurs. They lived at the beginning of the Cretaceous in Asia and had long feathers that formed supporting surfaces on all four legs and tail. It measured between 42 and 83 centimetres and weighed no more than 1 kilogram one of the smallest known dinosaurs. They weighed about 15 kilograms and lived in late Cretaceous Asia. On their hind legs they were bipeds, with long legs indicating that they were especially fast they had three claws, one of which was larger, elongated and curved, with which they killed their prey. It is assumed, according to studies of previous species, that they were also covered with feathers.

3: Diplodocus | Extinct Animals

Some of the most famous extinct animals of recent times have been birds--but for every Passenger Pigeon or Dodo, there's a much bigger and much lesser-known casualty like the Elephant Bird or the Eastern Moa (and many other species remain endangered to this day).

Dinosaurs may have been the dominant animals on land, but in the sea and in the air it was a different story. Swimming in the Mesozoic oceans were huge meat-eating reptiles such as Ichthyosaurs, Plesiosaurs and Mosasaurs, each of which were every bit as fearsome as their land-based cousins. While dinosaurs were busy stomping around on the ground, huge flying reptiles called Pterosaurs were soaring above their heads. Pterosaurs such as this pteranodon lived at the same time as dinosaurs. Early crocodile-like animals appeared long before the dinosaurs. Throughout the Mesozoic Era, the air would have been filled with the constant buzz of insects. Insects began to appear on Earth around million years ago, in the Devonian period. Some of these arrived before the dinosaurs, others after, but all were at some point alive at the same time as dinosaurs. Dinosaurs appeared in the mid to late Triassic period. Diplodocus, pictured above, appeared millions of years later, towards the end of the Jurassic period. The Mesozoic Era began around million years ago, and lasted for around million years. This immense period of time is divided into the Triassic, Jurassic and Cretaceous periods. You can find out more about the periods of the Mesozoic Era here: Dinosaurs began to appear between and million years ago, during the mid to late Triassic period. They became the dominant land animals in the Jurassic period, and their reign continued throughout the Cretaceous period. Subsequent studies by geologists have shifted the time back a million years. You can find out more about the extinction of the dinosaurs here: Why did Dinosaurs Become Extinct? Neither were they birds or even ancestors of birds. They evolved quite independently to birds which actually DID evolve from dinosaurs. Pterosaurs appeared during the late Triassic period and existed right up to the end of the Cretaceous period. They had large, leathery wings, which were extended on specially-modified fourth fingers. Their other fingers formed claws which stuck out mid-way along their wings. Dimorphodon Dimorphodon was a pterosaur that lived in the early Jurassic period. Its jaws were full of needle-like teeth. Pterodactylus Pterodactylus was a late Jurassic pterosaur. Pterodactylus was the first pterosaur to be identified as being a flying reptile. Quetzalcoatlus The Quetzalcoatlus, a late-cretaceous pterosaur, was the largest ever flying animal. Its wingspan may have reached 12 meters 39 ft. In fact, at the beginning of the Mesozoic Era, there was only one huge continent, called Pangaea, and one ocean, called Panthalassa. By the end of the Mesozoic Era, the continents were in roughly the positions that they are in today. Throughout this time, various fearsome creatures fought for dominance of the seas. Nothosaurs Nothosaurs were a group of aquatic reptiles that spent much of their time in the water, but were able to haul themselves onto land to rest. Ranging from less than a meter 3ft. Ichthyosaurs Ichthyosaurs lived in the Triassic and Jurassic periods. These large marine predators appeared in the early to mid Triassic period. They thrived throughout the late Triassic and early Jurassic periods. Plesiosaurs Plesiosaurs ruled the sea in the Jurassic period! Plesiosaurs were large marine reptiles with short tails and long necks the necks of some plesiosaurs were over half the length of their entire bodies! Plesiosaurs appeared in the late Triassic period, and began to thrive during the Jurassic period, overtaking Ichthyosaurs as the dominant marine animals. Pliosaurus Pliosaurus were a group of large, short-necked Plesiosaurs. Pliosaurus such as Kronosaurus and Liopleurodon were some of the largest meat-eaters ever to have lived on Earth. In the Cretaceous period plesiosaurs began to decline, and it was the Mosasaurs that took their place. Mosasaurs were fearsome-looking marine predators. They had large heads and jaws full of sharp teeth. Both before and after the dinosaurs arrived, there were many other types of large predatory reptiles running around. Proterosuchus One of the largest land reptiles of the Early Triassic was Proterosuchus, a large, crocodile-like predator. Remains of this ambush hunter have been found in South Africa and China. Tanystropheus Tanystropheus was a 6 meter 20 ft. It was a strange-looking animal, whose neck was over twice its total body length. It probably hunted near water, plunging its long neck under the water to grab passing fish. Archosaurs Archosaurs were a group of reptiles that became the dominant land animals in the early Triassic period. Euparkeria A member of this

group was Euparkeria, a crocodile-like animal that inhabited mid Triassic lakes, rivers and swamps. It may have been able to walk upright on its two longer hind legs, but is thought to have developed this ability independently of the dinosaurs. Pseudosuchia Archosaurs split into two main branches. The other branch was the Pseudosuchia. These early crocodile-like animals dominated the land throughout the Triassic period, even after dinosaurs had appeared. A mass extinction at the end of the Triassic period allowed the dinosaurs to take over from the Pseudosuchians at the start of the Jurassic period. By the late Cretaceous period the Pseudosuchians had evolved into the Crocodylians and since then have changed very little. An interesting fact that stems from all of this is that today, birds are the closest living relatives of the Crocodylians and vice versa. Both of these groups are descended from Archosaurs! For example, a crow is more closely related to an alligator than a sea turtle! It was one of the largest meat-eating reptiles of its day, and likely the apex predator in the North American region in which it lived. Postosuchus grew to around 1. It had a huge skull, jaws filled with sharp teeth, and thick, armored skin. It grew to around 12 m 39 ft in length and weighed up to 8 tonnes 8. Although much bigger than modern day crocodylians, it was very similar in all other regards. The first lizards appeared in the Triassic period, and turtles and snakes appeared in the Cretaceous period; all are still around today. They were the Synapsids. Although many of these looked like lizards or small dinosaurs, one branch, called the Therapsids, would eventually evolve into mammals. Therapsids were actually the dominant land animals in the Permian period, but in the Triassic the early Archosaurs took over. The mammals would have to wait their turn! Thrinaxodon was a dog-sized cynodont that lived in South Africa in the Triassic period. Although Thrinaxodon was still very reptilian, definite mammalian characteristics were beginning to emerge. It had specialised biting, chewing and cutting teeth, and may have had whiskers and fur suggesting that it was warm-blooded. Megazostrodon Megazostrodon is considered by many to be one of the first mammals. It was a small, rat-like animal that appeared in the early Jurassic period. Although covered in fur, it still had a scaly tail. Megazostrodon had a larger brain than earlier Cynodonts, and was possibly nocturnal. Mothers may have produced milk for their young. Didelphodon Didelphodon was a cat-sized mammal that lived in North America during the Late Cretaceous period. It was a short but powerfully-built animal, likely to have been an aquatic predator. Other Animals That Lived With Dinosaurs As we found at the beginning of this page, insects had been on Earth for millions of years before the dinosaurs. Huge dragonflies were buzzing back and forth through the air and beetles were scurrying across the ground long before the Mesozoic Era. Flies appeared in the Triassic period, and more insects appeared as flowering plants evolved in the Jurassic period. The first moths and wasps appeared towards the end of the Jurassic period. Amphibians, like insects, had been around since the Devonian period. Amphibians evolved from fish, and reptiles evolved from amphibians. Amphibians, therefore, represent the origin of all of the large land and water animals. It grew to over 40 cm 16 in. Birds That Lived at the Same Time as Dinosaurs Birds evolved from a branch of dinosaurs called theropods, which also included well-known predators such as T Rex and Spinosaurus. Archaeopteryx Archaeopteryx Archaeopteryx was one of the earliest birds. It lived in what is now Europe in the Late Jurassic period. Although it still had reptilian characteristics such as teeth and a long, bony tail, it had feathers which were formed much like those of a modern bird. Read more about Archaeopteryx here: Archaeopteryx Facts Iberomesornis By the Early Cretaceous, the early birds were becoming even more bird-like, and less reptilian. Iberomesornis was a sparrow-sized animal that was fully-feathered and capable of flapping flight. From a distance it would have looked like a small, modern day songbird. Closer examination would have revealed that it still had claws on its wings and probably a beak full of teeth.

4: Other Extinct Animals | HowStuffWorks

Extinct Animals / Other Extinct Animals How the Quagga, an Extinct Zebra Sub-species, Is Being Revived More than years after the last quagga died, scientists in South Africa are using selective breeding to bring it back.

Rare fossil bird deepens mystery of avian extinctions Most complete North American enantiornithine fossil was aerodynamic equal of modern birds November 13, Summary: Some of the birds that went extinct, the enantiornithines , were actually more common than and out-competed modern bird ancestors. Analysis of a newly described fossil, the most complete known from the Americas, demonstrates, too, that the enantiornithines were as agile and strong in flight as the ancestors of modern birds. Why, then, did enantiornithines die out and modern birds flourish? During the late Cretaceous period, more than 65 million years ago, birds belonging to hundreds of different species flitted around the dinosaurs and through the forests as abundantly as they flit about our woods and fields today. But after the cataclysm that wiped out most of the dinosaurs , only one group of birds remained: Why did only one family survive the mass extinction? Discovered in the Grand Staircase-Escalante area of Utah in by University of California, Berkeley, paleontologist Howard Hutchison, the fossil lay relatively untouched in University of California Museum of Paleontology at Berkeley until doctoral student Jessie Atterholt learned about it in and asked to study it. The wishbone is more V-shaped, like the wishbone of modern birds and unlike the U-shaped wishbone of earlier avians and their dinosaur ancestors. The wishbone or furcula is flexible and stores energy released during the wing stroke. If enantiornithines in the late Cretaceous were just as advanced as modern birds, however, why did they die out with the dinosaurs while the ancestors of modern birds did not? We find their fossils on every continent, all over the world, and their fossils are very, very common, in a lot of areas more common than the group that led to modern birds. And yet modern birds survived the extinction while enantiornithines go extinct. Many enantiornithines have strong recurved claws ideal for perching and perhaps climbing, she said. Hutchison said that he came across the fossil eroding out of the ground in the rugged badlands of the Kaiparowits formation in the Grand Staircase-Escalante National Monument in Garfield County, Utah, just inside the boundary of the recently reduced monument. Having found bird fossils before, he recognized it as a late Cretaceous enantiornithine, and a rare one at that. Most birds from the Americas are from the late Cretaceous million years ago and known only from a single foot bone, often the metatarsus. This fossil was almost complete, missing only its head. The other animals they occur with tell me more about the habitat. This video says about itself: In this lecture we will summarize the Mesozoic birds that lived during the Cretaceous period and highlight the diversity of early birds. The article about enantiornithines continues: Unlike most bird fossils found outside America, in particular those from China, the fossil was not smashed flat. The classic early Cretaceous bird, Archaeopteryx , was flattened in sandstone, which preserved a beautiful panoply of feathers and the skeletal layout. Chinese enantiornithines, mostly from the early Cretaceous, are equally beautiful and smashed flatter than a pancake. We see places where muscles and tendons were attaching, all kinds of interesting stuff to anatomists. I was over the moon. In fact, they looked quite similar to modern birds: The fossilized bird probably had teeth in the front of its beak and claws on its wings as well as feet. Some enantiornithines had prominent tail feathers that may have differed between male and female and been used for sexual display. This fossil bird is also among the largest North American birds from the Cretaceous; most were the size of chickadees or crows. These rough patches are quill knobs, and in modern birds they anchor the wing feathers to the skeleton to help strengthen them for active flight. This is the first discovery of quill knobs in any enantiornithine bird, which tells us that it was a very strong flier. The species name honors Jeffrey Eaton, a paleontologist who for decades has worked on fossils from the Kaiparowits Formation. Eaton first enticed Hutchison to the area in search of turtles, and they were the first to report fossils from the area some 30 years ago. Thousands of such fossils from the rocks of the Kaiparowits Formation, many of them dinosaurs, contributed to the establishment of the Grand Staircase-Escalante National Monument in Alexander endowment to the UCMP.

5: Why Did the Dinosaurs Die Out? - HISTORY

I started buying books about dinosaurs and other extinct animals again, and I reached a point where I was able to identify unlabelled photos of museum specimens in free Flickr and Wikimedia Commons images, thereby making them useful for Wikipedia.

Visit Website Did you know? The K-T extinction was not the first such massive die-off in history, nor was it the largest. The Permian-Triassic extinction event, known as the Great Dying, occurred But in the late Mesozoic Era that corresponds with the extinction of the dinosaurs, evidence shows that the planet slowly became cooler. Lower temperatures caused ice to form over the North and South poles and the oceans to become colder. Because the dinosaurs were cold-blooded—meaning they obtained body heat from the sun and the air—they would not have been able to survive in significantly colder climates. Yet some species of cold-blooded animals, such as crocodiles, did manage to survive. Also, climate change would have taken tens of thousands of years, giving the dinosaurs sufficient time to adapt. Once again, the problem with the theory was explaining why dinosaurs died out and other species did not. Also, scientists said that such an event would have left evidence on the surface of the earth—trace amounts of radiation dating back to the Cretaceous Period. Enter Luis Alvarez, a Nobel Prize-winning physicist, inventor and pioneer in the field of radiation and nuclear research. He and his son, noted geologist Walter Alvarez, were conducting research in Italy when they discovered a centimeter-thick layer of iridium-enriched clay at the K-T boundary. Iridium is rare on earth, but more common in space. The Alvarazes published their findings in , postulating that the thin layer of iridium was deposited following the impact of a large meteor, comet or asteroid with the earth. At the time, the Alvarez theory was so far removed from prevailing hypotheses that it was ridiculed. Slowly, though, other scientists began finding iridium evidence at various places around the globe that corroborated the Alvarez theory. There was, however, no smoking gun in the form of an impact site. The Chicxulub Crater, as it was dubbed, was named for a nearby village. Scientists believe the bolide that formed it was roughly 6 miles in diameter, struck the earth at 40, miles per hour and released 2 million times more energy than the most powerful nuclear bomb ever detonated. Miles-high tsunamis would have washed over the continents, drowning many forms of life. Shock waves would have triggered earthquakes and volcanic eruptions. The resulting darkness could have lasted for months, possibly years. Many dinosaurs would have died within weeks. The carnivores who feasted on the herbivores would have died a month or two later. Overall, the loss of biodiversity would have been tremendous. Only small scavenging mammals that could burrow into the ground and eat whatever remained would have survived. The iridium layer plus the Chicxulub Crater were evidence enough to convince many scientists that the bolide impact theory was credible. It explained much of what previous theories could not. Still a Theory Paleontology remains a competitive discipline even though its central mystery appears to have been solved. Agreement over dinosaur extinction is far from unanimous, and fossils continue to be found that add to the body of knowledge about how the dinosaurs lived and died. Only recently have birds been identified as descendants of the dinosaurs, and theories regarding dinosaur intelligence and behavior continue to change. The climate change theory still holds sway over some scientists, who refute that the Chicxulub impact was the sole cause of the extinction. Evidence from the million-year-old lava flows in India hint that a giant, gaseous volcanic plume might have initiated global climate change that threatened the dinosaurs.

6: How many types of dinosaurs existed on Earth? Are they all extinct?

What did extinct animals eat? See how scientists use fossil evidence to answer this question.

They had a relatively large head compared to its body. It had a parrot-like beak and cheek teeth. It had four pairs of fenestrae on their skull. They had powerful jaw muscles capable of producing hefty bites. They had a delicate and large frill and tiny horns. The frill is mostly made of parietal bone and partly of the squamosal. Behavior and Adaptation Fossilized bone beds indicate that they lived in a herd, like other ceratopsians. Sexual dimorphism was quite prominent in Protoceratops. Males were larger than females; and, in fact, the frill size of the males was bigger than females. It has been suggested that the frills were used in attracting mates. Earlier, it was believed that they were nocturnal creatures, but recent studies suggested that they led a cathemeral lifestyle. Since they had short legs; they could not move at a fast speed. However no fossilized footprints have been found to support this hypothesis. Each egg was around 8 inches long suggesting that juveniles could have been 10 to 12 inches in length. They were described as belonging to this genus. Later, it turned out to be Oviraptor eggs. In , a fossilized specimen of a Velociraptor attacking a similar size Protoceratops was found in Mongolia. It is believed they were buried alive by a sudden sandstorm. In , a nest of fifteen juvenile Protoceratops andrewsi was unearthed in Mongolia. Interesting Facts Andrews led team in the expedition not just found Protoceratops remains, but also found remains of Oviraptor, Velociraptor and Psittacosaurus. Mythical beast Griffin, described as a lion-sized quadruped with raptor-like beak and huge claws, is believed to have depicted from this genus. Published on September 21st by admin under Dinosaurs , Reptiles. Article was last reviewed on 15th November Leave a Reply Your email address will not be published.

7: Best places to see fossils of dinosaurs and other extinct species

The other animals they occur with tell me more about the habitat." According to Hutchison, the area where the fossil was found dates from between 77 and 75 million years ago and was probably a major delta, like the Mississippi River delta, tropical and forested with lots of dinosaurs but also crocodiles, alligators, turtles and fish.

Thomas Sumner Jan 31, 2017: Drilling through hundreds of meters of rock, investigators have finally reached the "footprint" left by the accused. The asteroid impact that caused a massive global extinction event can be found on the coast of Mexico. They are giving fresh scrutiny to telltale fingerprints left by the fateful event so long ago. Mountains formed in mere minutes. In North America, a towering tsunami buried plants and animals alike under thick piles of rubble. Lofted debris darkened skies around the world. The planet chilled and stayed that way for years. But the asteroid may not have acted alone. Life may already have been in trouble. Growing evidence points to a supervolcanic accomplice. Eruptions in what is now India spewed out molten rock and caustic gases. These may have acidified the oceans. All of this could have destabilized ecosystems long before and after the asteroid hit. As more clues have emerged, some seem to conflict. He is a geoscientist at the Berkeley Geochronology Center in California. It is visible in the layers of rock that mark the boundary between the Cretaceous and Paleogene periods. Fossils that were once abundant no longer appear in rocks after that time. Studies of fossils found or not found across the boundary between these two periods abbreviated the K-Pg boundary show that some three out of every four plant and animal species went extinct at about the same time. This included everything from the ferocious Tyrannosaurus rex to microscopic plankton. Everything living on Earth today traces its ancestry to the few lucky survivors. A lighter-colored rock layer rich in iridium marks the boundary between the Cretaceous and Paleogene periods. This layer can be found in rocks around the world. Some have suggested global plagues struck. Or maybe a supernova fried the planet. In 1980, a team of researchers including father-son duo Luis and Walter Alvarez reported discovering lots of iridium in places worldwide. That element appeared along the K-Pg boundary. The finding marked the first hard evidence for a killer-asteroid impact. Piles of impact debris led crater hunters to the Caribbean. It circled the coastal Mexican town of Chicxulub Puerto. The crater actually had been discovered in the late 1950s by oil company scientists. Word of that find, however, did not reach crater hunters for years. Based in part on the gaping size of the depression, scientists estimated the size of the impact. They figured it must have released 10 billion times as much energy as the nuclear bomb dropped on Hiroshima, Japan, in 1945. Questions have remained, though, about how the impact might have caused so much death and destruction worldwide. It was the darkness that followed. Inescapable night The ground shook. Powerful gusts roiled the atmosphere. Debris rained from the sky. Soot and dust, spewed by the impact and resulting wildfires, filled the sky. That soot and dust then began to spread like a giant sunlight-blocking shade over the entire planet. How long did the darkness last? Some scientists had estimated that it was anywhere from a few months to years. But a new computer model is giving researchers a better sense of what happened. It simulated the length and severity of the global cooldown. And it must have been truly dramatic, reports Clay Tabor. As a paleoclimatologist, he studies ancient climates. And he and his colleagues have reconstructed a sort of digital crime scene. The simulation begins by estimating the climate before the smash-up. The researchers determined what that climate might be from geologic evidence of ancient plants and levels of atmospheric carbon dioxide. Then comes the soot. A high-end estimate of soot totals some 70 billion metric tons about 77 billion U. That number is based on the size and global fallout of the impact. What is a computer model? Global temperatures plummeted 16 degrees Celsius 30 degrees Fahrenheit. Arctic ice spread southward. Tabor shared this dramatic scenario in September in Denver, Colo. The temperature nosedived in the Pacific Ocean, around the equator. Meanwhile, coastal Antarctica barely cooled. Inland areas generally fared worse than coastal ones. Those divides could help explain why some species and ecosystems weathered the impact while others died off, Tabor says. Six years after the impact, sunshine returned to levels typical of conditions before the impact. Two years after that, land temperatures warmed to levels higher than had been typical before the impact. Then, all of the carbon flung into the air by the impact took effect. It acted like an insulating blanket over the planet.

And the globe ultimately warmed several degrees more. Evidence of the chilling darkness is in the rock record. Local sea surface temperatures modified lipid fat molecules in the membranes of ancient microbes. The fossilized remains of those lipids provide a temperature record, reports Johan Vellekoop. He is a geologist at the University of Leuven in Belgium. Fossilized lipids in what is now New Jersey suggest that temperatures there plummeted 3 degrees C about 5 degrees F following the impact. Vellekoop and colleagues shared their estimates in the June *Geology*. Similar abrupt temperature drops plus darkened skies killed plants and other species that nourish the rest of the food web, Vellekoop says. Some unfortunate critters, though, died too soon to witness it. Story continues below image. Dinosaurs ruled Earth until 66 million years ago. Erosion has uncovered dinosaur bones. And there he has found something surprising – signs of a tsunami. What is a tsunami? Evidence of the supersized tsunami generated by the Chicxulub impact had previously been found only around the Gulf of Mexico. It had never been seen this far north or so far inland. But the symptoms of tsunami devastation were clear, DePalma says. The rushing water dumped sediment onto the landscape. The debris originated from the nearby Western Interior Seaway. The sediment contained iridium and glassy debris that formed from rock vaporized by the impact. It also contained fossils of sea species such as snaillike ammonites. They had been carried from the seaway. At the geological society meeting last year, DePalma pulled up slides of fish fossils found inside the tsunami deposits. You look for carbon and soot in the lungs. In this case, fish have gills, so we checked those out. That means the fish were alive and swimming when the asteroid hit. The fish had been alive up until the moment the tsunami pushed across the landscape. It crushed the fish under debris. A fossil vertebra a bone that makes up part of the spine pokes through rocks in the Hell Creek Formation. Scientists have found evidence in this region that a massive tsunami killed off many organisms 66 million years ago. Just under the fish-filled tsunami deposits was another amazing find: In no way was it on the decline. Their downfall may have come at least partly from deep within the Earth. Death from below Long before the Chicxulub impact, a different disaster was underway on the other side of the planet.

8: When Did Dinosaurs Go Extinct and What Caused Them To Die Out

Largest Theropod Dinosaurs in comparison with an elephant. Find this Pin and more on Dinosaurs and other Extinct Creatures by Frances Flegel. Popular large theropods, including Tyrannosaurus Rex and Spinosaurus, compared to an elephant for size.

When Did Dinosaurs Go Extinct? Tyrannosaurus was one of the very last dinosaurs to have walked the Earth. It lived up to around 66 million years ago. Dinosaurs became extinct approximately 66 million years ago. A more exact figure can be found further down the page. In fact, the Cretaceous–Paleogene Extinction Event as it is now known wiped out approximately three quarters of all plant and animal species! It is traditionally used as an abbreviation for the Cretaceous Period. Triceratops was another dinosaur that became extinct in the K-Pg Extinction Event. You can find out more about when dinosaurs were alive here: Geology is the scientific study of rocks. Therefore, periods of time identified by rock layers form the geological time scale. The more recent the time period, the higher the corresponding rock layer is found. Therefore, rocks formed during the Cretaceous Period appear above those formed during the older Triassic Period. The layers of rock in which fossils are found give us an idea as to how old the fossil is. For example, Tyrannosaurus Rex fossils appear in Upper Cretaceous rock formations, letting us know that it was one of the very last dinosaurs. The rock layers also provide us with many clues as to when dinosaurs went extinct – and also what caused them to go extinct – Death from Space: The Asteroid That Killed the Dinosaurs A meteorite strike is the most probable explanation for the extinction of the dinosaurs. The most likely explanation for the extinction of the dinosaurs is that the Earth was struck by a large asteroid. Estimated to have been around 10 km in diameter. Adding to the likelihood of the asteroid impact explanation, a crater that corresponds both with the size and the time of the Cretaceous–Paleogene extinction event has been located. Such an impact, as well as causing a devastating explosion, would also have sent up a thick dust cloud. This would have hidden the sun for months, if not years. Plants would have been unable to grow, affecting whole food chains from the bottom up. Temperatures would have plummeted, causing further problems for species unable to adapt. Clues in the Rocks Fossils are all that is left of the dinosaurs. Between the Cretaceous and Paleogene geological time periods, there is a thin band of rock called the Cretaceous–Paleogene Boundary. It corresponds to the period in time after which no more dinosaur fossils were found. Within this layer of rock there is a high amount of a metal called iridium. In fact, in the Cretaceous–Paleogene boundary there is 30 times more iridium than is usually found. Other places where large amounts of iridium are found are at the centre of the Earth – and in asteroids. This provides more evidence that 66 million years ago, the time the dinosaurs went extinct, Earth was hit by a huge asteroid. Radiometric dating, in which the age of rock can be told by examining its radioactive qualities, shows that the Cretaceous–Paleogene boundary was formed 66 million years ago, plus or minus 11,000 years. It is impossible to know exactly what caused the extinction of the dinosaurs. It may have been a combination of factors. Other possible explanations – or contributing factors – include: Climate change caused by volcanic activity in an area known as the Deccan Traps in India. This may even have been caused by an asteroid strike. But it has actually been suggested. Read more at Wikipedia. The width of the Cretaceous–Paleogene boundary suggests that it was formed over a relatively short period of time – possibly less than 10,000 years. Again, this is more evidence for a sudden, catastrophic event such as an asteroid strike. Not all of them! It is now generally accepted that birds are the direct descendants of the dinosaurs. Many scientists now consider birds to actually be dinosaurs. Because, if you happen to look out of your window, you may be able to see dinosaurs that are very much alive and kicking! When Did Dinosaurs Go Extinct: Conclusion Dinosaurs became extinct around 66 million years ago. Around this time a thin layer of rock known as the Cretaceous–Paleogene boundary was formed. It appears between rock layers formed during the Cretaceous and the Paleogene Periods. The presence of iridium, a metal that is found in asteroids, in the Cretaceous–Paleogene boundary suggests that Earth was struck by a large asteroid around this time. Due to the narrowness of the Cretaceous–Paleogene boundary, scientists estimate that the Cretaceous–Paleogene extinction event had a relatively short duration of under 10,000 years. Not all of the

dinosaurs became extinct; birds are now thought to be direct ancestors of dinosaurs. Some scientists even consider birds to be dinosaurs. Become a dinosaur expert; read our complete guide to dinosaurs and the Mesozoic Era: Discover common and not-so-common dinosaurs here: List of Dinosaurs with Pictures and Facts.

9: List Of Animals That Lived With Dinosaurs: Information And Pictures

The problem was the ship rats and other animals they brought with them, which spread across the island, eating dodo eggs and the bird's food. The last confirmed sightings came in the s.

The other groups mentioned are, like dinosaurs and pterosaurs, members of Sauropsida the reptile and bird clade , with the exception of Dimetrodon which is a synapsid. Definition Triceratops skeleton, Natural History Museum of Los Angeles County Under phylogenetic nomenclature , dinosaurs are usually defined as the group consisting of the most recent common ancestor MRCA of Triceratops and Neornithes , and all its descendants. In traditional taxonomy, birds were considered a separate class that had evolved from dinosaurs, a distinct superorder. However, a majority of contemporary paleontologists concerned with dinosaurs reject the traditional style of classification in favor of phylogenetic taxonomy; this approach requires that, for a group to be natural, all descendants of members of the group must be included in the group as well. Birds are thus considered to be dinosaurs and dinosaurs are, therefore, not extinct. Norman, and Paul M. Barrett in suggested a radical revision of dinosaurian systematics. Phylogenetic analysis by Baron et al. They resurrected the clade Ornithoscelida to refer to the group containing Ornithischia and Theropoda. Dinosauria itself was re-defined as the last common ancestor of Triceratops horridus , Passer domesticus , Diplodocus carnegii , and all of its descendants, to ensure that sauropods and kin remain included as dinosaurs. Using one of the above definitions, dinosaurs can be generally described as archosaurs with hind limbs held erect beneath the body. Other groups of animals were restricted in size and niches; mammals, for example, rarely exceeded the size of a domestic cat, and were generally rodent-sized carnivores of small prey. While dinosaurs were ancestrally bipedal as are all modern birds , some prehistoric species were quadrupeds, and others, such as Anchisaurus and Iguanodon , could walk just as easily on two or four legs. Cranial modifications like horns and crests are common dinosaurian traits, and some extinct species had bony armor. Although known for large size, many Mesozoic dinosaurs were human-sized or smaller, and modern birds are generally small in size. Dinosaurs today inhabit every continent, and fossils show that they had achieved global distribution by at least the early Jurassic period. Although some later groups of dinosaurs featured further modified versions of these traits, they are considered typical for Dinosauria; the earliest dinosaurs had them and passed them on to their descendants. Such modifications, originating in the most recent common ancestor of a certain taxonomic group, are called the synapomorphies of such a group. Some of these are also present in silesaurids , which Nesbitt recovered as a sister group to Dinosauria, including a large anterior trochanter, metatarsals II and IV of subequal length, reduced contact between ischium and pubis, the presence of a cnemial crest on the tibia and of an ascending process on the astragalus, and many others. However, because they are either common to other groups of archosaurs or were not present in all early dinosaurs, these features are not considered to be synapomorphies. For example, as diapsids , dinosaurs ancestrally had two pairs of temporal fenestrae openings in the skull behind the eyes , and as members of the diapsid group Archosauria, had additional openings in the snout and lower jaw. These include an elongated scapula , or shoulder blade; a sacrum composed of three or more fused vertebrae three are found in some other archosaurs, but only two are found in Herrerasaurus ; [19] and a perforate acetabulum , or hip socket, with a hole at the center of its inside surface closed in Saturnalia , for example. Dinosaurs may have appeared as early as million years ago, as evidenced by remains of the genus Nyasaurus from that period, though known fossils of these animals are too fragmentary to tell if they are dinosaurs or very close dinosaurian relatives. The terrestrial habitats were occupied by various types of archosauromorphs and therapsids , like cynodonts and rhynchosaurs. Their main competitors were the pseudosuchia , such as aetosaurs , ornithosuchids and raiisuchians , which were more successful than the dinosaurs. Rhynchosaurs and dicynodonts survived at least in some areas at least as late as early-mid Norian and early Rhaetian , respectively, [50] [51] and the exact date of their extinction is uncertain. These losses left behind a land fauna of crocodylomorphs , dinosaurs, mammals , pterosaurians , and turtles. In the late Triassic and early Jurassic, the continents were connected as the single landmass Pangaea , and there was a worldwide dinosaur fauna mostly composed of coelophysoid carnivores and early sauropodomorph herbivores. Early

sauropodomorphs did not have sophisticated mechanisms for processing food in the mouth, and so must have employed other means of breaking down food farther along the digestive tract. Dinosaurs in China show some differences, with specialized sinraptorid theropods and unusual, long-necked sauropods like Mamenchisaurus. Conifers and pteridophytes were the most common plants. Sauropods, like the earlier prosauropods, were not oral processors, but ornithischians were evolving various means of dealing with food in the mouth, including potential cheek-like organs to keep food in the mouth, and jaw motions to grind food. The earliest part of this time saw the spread of ankylosaurians, iguanodontians, and brachiosaurids through Europe, North America, and northern Africa. These were later supplemented or replaced in Africa by large spinosaurid and carcharodontosaurid theropods, and rebbachisaurid and titanosaurian sauropods, also found in South America. In Asia, maniraptoran coelurosaurians like dromaeosaurids, troodontids, and oviraptorosaurians became the common theropods, and ankylosaurids and early ceratopsians like Psittacosaurus became important herbivores. Meanwhile, Australia was home to a fauna of basal ankylosaurians, hypsilophodonts, and iguanodontians. A major change in the early Cretaceous, which would be amplified in the late Cretaceous, was the evolution of flowering plants. At the same time, several groups of dinosaurian herbivores evolved more sophisticated ways to orally process food. Ceratopsians developed a method of slicing with teeth stacked on each other in batteries, and iguanodontians refined a method of grinding with tooth batteries, taken to its extreme in hadrosaurids. In the northern continents of North America and Asia, the major theropods were tyrannosaurids and various types of smaller maniraptoran theropods, with a predominantly ornithischian herbivore assemblage of hadrosaurids, ceratopsians, ankylosaurids, and pachycephalosaurians. In the southern continents that had made up the now-splitting Gondwana, abelisaurids were the common theropods, and titanosaurian sauropods the common herbivores. Finally, in Europe, dromaeosaurids, rhabdodontid iguanodontians, nodosaurid ankylosaurians, and titanosaurian sauropods were prevalent. Theropods were also radiating as herbivores or omnivores, with therizinosaurians and ornithomimosaurians becoming common. Some other diapsid groups, such as crocodylians, sebecosuchians, turtles, lizards, snakes, sphenodontians, and choristoderans, also survived the event. It is often cited that mammals out-competed the neornithines for dominance of most terrestrial niches but many of these groups co-existed with rich mammalian faunas for most of the Cenozoic. Dinosaur classification Dinosaurs belong to a group known as archosaurs, which also includes modern crocodylians. Within the archosaur group, dinosaurs are differentiated most noticeably by their gait. Dinosaur legs extend directly beneath the body, whereas the legs of lizards and crocodylians sprawl out to either side. Saurischia includes those taxa sharing a more recent common ancestor with birds than with Ornithischia, while Ornithischia includes all taxa sharing a more recent common ancestor with Triceratops than with Saurischia. Anatomically, these two groups can be distinguished most noticeably by their pelvic structure. Saurischia includes the theropods exclusively bipedal and with a wide variety of diets and sauropodomorphs long-necked herbivores which include advanced, quadrupedal groups. Unlike birds, the ornithischian pubis also usually had an additional forward-pointing process. Ornithischia includes a variety of species which were primarily herbivores.

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