WIKIPEDIA

Dinosaur

Dinosaurs are a diverse group of reptiles[note 1] of the clade **Dinosauria**. They first appeared during the Triassic period, between 243 and 233.23 million years ago, although the exact origin and timing of the evolution of dinosaurs is the subject of active research. They became the dominant terrestrial vertebrates after the Triassic–Jurassic extinction event 201.3 million years ago; their dominance continued throughout the Jurassic and Cretaceous periods. The fossil record shows that birds are modern feathered dinosaurs, having evolved from earlier theropods during the Late Jurassic epoch, and are the only dinosaur lineage known to have survived the Cretaceous–Paleogene extinction event approximately 66 million years ago. Dinosaurs can therefore be divided into **avian dinosaurs**, or birds; and the extinct **non-avian dinosaurs**, which are all dinosaurs other than birds.

Dinosaurs are a varied group of animals from taxonomic, morphological and ecological standpoints. Birds, at over 10,700 living species, are among the most diverse group of vertebrates. Using fossil evidence, paleontologists have identified over 900 distinct genera and more than 1,000 different species of non-avian dinosaurs. Dinosaurs are represented on every continent by both extant species (birds) and fossil remains. Through the first half of the 20th century, before birds were recognized as dinosaurs, most of the scientific community believed dinosaurs to have been sluggish and cold-blooded. Most research conducted since the 1970s, however, has indicated that dinosaurs were active animals with elevated metabolisms and numerous adaptations for social interaction. Some were herbivorous, others carnivorous. Evidence suggests that all dinosaurs were egg-laying; and that nest-building was a trait shared by many dinosaurs, both avian and non-avian.

While dinosaurs were ancestrally bipedal, many extinct groups included quadrupedal species, and some were able to shift between these stances. Elaborate display structures such as horns or crests are common to all dinosaur groups, and some extinct groups developed skeletal modifications such as bony armor and spines. While the dinosaurs' modern-day surviving avian lineage (birds) are generally small due to the constraints of flight,

Dinosaurs

Temporal range: (Possible Middle Triassic record)

A compilation of dinosaur skeletons. Clockwise from top left: *Microraptor gui* (a winged theropod), *Apatosaurus louisae* (a giant sauropod), *Edmontosaurus regalis* (a duck-billed ornithopod), *Triceratops horridus* (a horned ceratopsian), *Stegosaurus stenops* (a plated stegosaur), *Pinacosaurus grangeri* (an armored ankylosaur)

Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Clade:	Dracohors
Clade:	Dinosauria Owen, 1842

Major groups

- †Ornithischia
- †Sauropodomorpha
- Theropoda

Possible dinosaurs of uncertain

many prehistoric dinosaurs (non-avian and avian) were large-bodied—the largest sauropod dinosaurs are estimated to have reached lengths of 39.7 meters (130 feet) and heights of 18 m (59 ft) and were the largest land animals of all time. The misconception that non-avian dinosaurs were uniformly gigantic is based in part on preservation bias, as large, sturdy bones are more likely to last until they are fossilized. Many dinosaurs were quite small, some measuring about 50 centimeters (20 inches) in length.

The first dinosaur fossils were recognized in the early 19th century, with the name "dinosaur" (meaning "terrible lizard") being coined by Sir Richard Owen in 1841 to refer to these "great fossil lizards". Since then, mounted fossil dinosaur skeletons have been major attractions at museums worldwide, and dinosaurs have become an enduring part of popular culture. The large sizes of some dinosaurs, as well as their seemingly monstrous and fantastic nature, have ensured their regular appearance in best-selling books and films, such as *Jurassic Park*. Persistent public enthusiasm for the animals has resulted in significant funding for dinosaur science, and new discoveries are regularly covered by the media.

affinity

- †*Alwalkeria*?
- †*Chilesaurus*
- †*Chindesaurus*?
- †*Daemonosaurus*?
- †*Eodromaeus*?
- †*Nhandumirim*
- †*Nyasasaurus*?
- †*Pisanosaurus*?
- †*Tawa*?
- †*Thecospondylus*
- †Guaibasauridae?
- †Herrerasauria?[1][2]
- †Silesauridae? (paraphyletic?)[3][4][5][6]

Birds are avian dinosaurs, and in phylogenetic taxonomy are included in the group Dinosauria.

Contents

Definition

Under phylogenetic nomenclature, dinosaurs are usually defined as the group consisting of the most recent common ancestor (MRCA) of *Triceratops* and modern birds (Neornithes), and all its descendants.[7] It has also been suggested that Dinosauria be defined with respect to the MRCA of *Megalosaurus* and *Iguanodon*, because these were two of the three genera cited by Richard Owen when he recognized the Dinosauria.[8] Both definitions result in the same set of animals being defined as dinosaurs: "Dinosauria = Ornithischia + Saurischia". This definition includes major groups such as ankylosaurians (armored herbivorous quadrupeds), stegosaurians (plated herbivorous quadrupeds), ceratopsians (bipedal or quadrupedal herbivores with neck frills), pachycephalosaurians (bipedal herbivores with thick skulls), ornithopods (bipedal or quadrupedal herbivores including "duck-bills"), theropods (mostly bipedal carnivores and birds), and sauropodomorphs (mostly large herbivorous quadrupeds with long necks and tails).[9]

Birds are now recognized as being the sole surviving lineage of theropod dinosaurs. 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.[10] Birds are classified as belonging to the subgroup Maniraptora, which are coelurosaurs, which are theropods, which are saurischians, which are dinosaurs.[11]

Research by Matthew G. Baron, David B. Norman, and Paul M. Barrett in 2017 suggested a radical revision of dinosaurian systematics. Phylogenetic analysis by Baron *et al.* recovered the Ornithischia as being closer to the Theropoda than the Sauropodomorpha, as opposed to the traditional union of theropods with sauropodomorphs. 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* and *Diplodocus carnegii*, and all of its descendants, to ensure that sauropods and kin remain included as dinosaurs.[12][13]

General description

Triceratops skeleton, Natural History Museum of Los Angeles County

Using one of the above definitions, dinosaurs can be generally described as archosaurs with hind limbs held erect beneath the body.[14] Other prehistoric animals, including pterosaurs, mosasaurs, ichthyosaurs, plesiosaurs, and *Dimetrodon*, while often popularly conceived of as dinosaurs, are not taxonomically classified as dinosaurs.[15] Pterosaurs are distantly related to dinosaurs, being members of the clade Ornithodira. The other groups mentioned are, like dinosaurs and pterosaurs, members of Sauropsida (the reptile and bird clade), except *Dimetrodon* (which is a synapsid). None of them had the erect hind limb posture characteristic of true dinosaurs.[16]

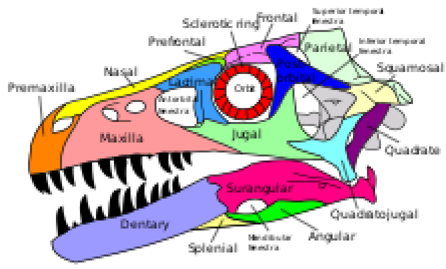
Dinosaurs were the dominant terrestrial vertebrates of the Mesozoic Era, especially the Jurassic and Cretaceous periods. Other groups of animals were restricted in size and niches; mammals, for example, rarely exceeded the size of a domestic cat, and were generally rodent-sized carnivores of small prey.[17] They have always been recognized as an extremely varied group of animals; over 900 non-avian dinosaur genera have been identified with certainty as of 2018, and the total number of genera preserved in the fossil record has been estimated at around 1850, nearly 75% of which remain to be discovered, and 1124 species by 2016.[18][19][20] A 1995 study predicted that about 3,400 dinosaur genera ever existed, including many that would not have been preserved in the fossil record.[21]

In 2016, the estimated number of dinosaur species that existed in the Mesozoic was 1,543–2,468.[22][23] In 2021, the number of modern-day birds (avian dinosaurs) was estimated to be at 10,806 species.[24] Some are herbivorous, others carnivorous, including seed-eaters, fish-eaters, insectivores, and omnivores. 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 epoch.[25] Modern birds inhabit most available habitats, from terrestrial to marine, and there is evidence that some non-avian dinosaurs (such as *Microraptor*) could fly or at least glide, and others, such as spinosaurids, had semiaquatic habits.[26]

Distinguishing anatomical features

While recent discoveries have made it more difficult to present a universally agreed-upon list of their distinguishing features, nearly all dinosaurs discovered so far share certain modifications to the ancestral archosaurian skeleton, or are clearly descendants of older dinosaurs showing these modifications. 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.[27]

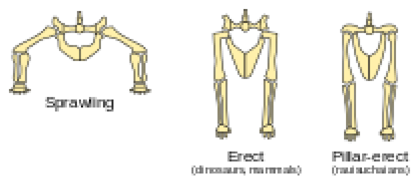
A detailed assessment of archosaur interrelations by Sterling Nesbitt[28] confirmed or found the following twelve unambiguous synapomorphies, some previously known:



Labeled diagram of a typical archosaur skull, the skull of *Dromaeosaurus*

- In the skull, a supratemporal fossa (excavation) is present in front of the supratemporal fenestra, the main opening in the rear skull roof
- Epipophyses, obliquely backward-pointing processes on the rear top corners of the anterior (front) neck vertebrae behind the atlas and axis, the first two neck vertebrae
- Apex of a deltopectoral crest (a projection on which the deltopectoral muscles attach) located at or more than 30% down the length of the humerus (upper arm bone)
- Radius, a lower arm bone, shorter than 80% of humerus length
- Fourth trochanter (projection where the caudofemoralis muscle attaches on the inner rear shaft) on the femur (thigh bone) is a sharp flange
- Fourth trochanter asymmetrical, with distal, lower, margin forming a steeper angle to the shaft
- On the astragalus and calcaneum, upper ankle bones, the proximal articular facet, the top connecting surface, for the fibula occupies less than 30% of the transverse width of the element
- Exoccipitals (bones at the back of the skull) do not meet along the midline on the floor of the endocranial cavity, the inner space of the braincase
- In the pelvis, the proximal articular surfaces of the ischium with the ilium and the pubis are separated by a large concave surface (on the upper side of the ischium a part of the open hip joint is located between the contacts with the pubic bone and the ilium)
- Cnemial crest on the tibia (protruding part of the top surface of the shinbone) arcs anterolaterally (curves to the front and the outer side)
- Distinct proximodistally oriented (vertical) ridge present on the posterior face of the distal end of the tibia (the rear surface of the lower end of the shinbone)
- Concave articular surface for the fibula of the calcaneum (the top surface of the calcaneum, where it touches the fibula) has a hollow profile

Nesbitt found a number of further potential synapomorphies and discounted a number of synapomorphies previously suggested. 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.[7]



Hip joints and hindlimb postures of: (left to right) typical reptiles (sprawling), dinosaurs and mammals (erect), and rauisuchians (pillar-erect)

A variety of other skeletal features are shared by dinosaurs. 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 Infratemporal 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.[29] Additionally, several characteristics once thought to be synapomorphies are now known to have appeared before dinosaurs, or were absent in the earliest dinosaurs and independently evolved by different dinosaur groups. 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*);[7] and a perforate acetabulum, or hip socket, with a hole at the center of its inside surface (closed in *Saturnalia tupiniquim*, for example).[30][31] Another difficulty of determining distinctly dinosaurian features is that early dinosaurs and other archosaurs from the Late Triassic epoch are often poorly known and were similar in many ways; these animals have sometimes been misidentified in the literature.[32]

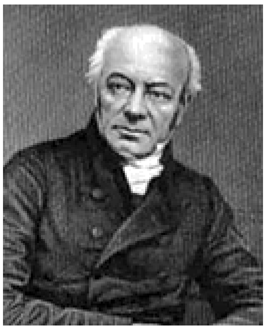
Dinosaurs stand with their hind limbs erect in a manner similar to most modern mammals, but distinct from most other reptiles, whose limbs sprawl out to either side.[33] This posture is due to the development of a laterally facing recess in the pelvis (usually an open socket) and a corresponding inwardly facing distinct head on the femur.[34] Their erect posture enabled early dinosaurs to breathe easily while moving, which likely permitted stamina and activity levels that surpassed those of "sprawling" reptiles.[35] Erect limbs probably also helped support the evolution of large size by reducing bending stresses on limbs.[36] Some non-dinosaurian archosaurs, including rauisuchians, also had erect limbs but achieved this by a "pillar-erect" configuration of the hip joint, where instead of having a projection from the femur insert on a socket on the hip, the upper pelvic bone was rotated to form an overhanging shelf.[36]

History of study

Pre-scientific history

Dinosaur fossils have been known for millennia, although their true nature was not recognized. The Chinese considered them to be dragon bones and documented them as such. For example, *Huayang Guo Zhi* (華陽國志), a gazetteer compiled by Chang Qu (常璩) during the Western Jin Dynasty (265–316), reported the discovery of dragon bones at Wucheng in Sichuan Province.[37] Villagers in central China have long unearthed fossilized "dragon bones" for use in traditional medicines.[38] In Europe, dinosaur fossils were generally believed to be the remains of giants and other biblical creatures.[39]

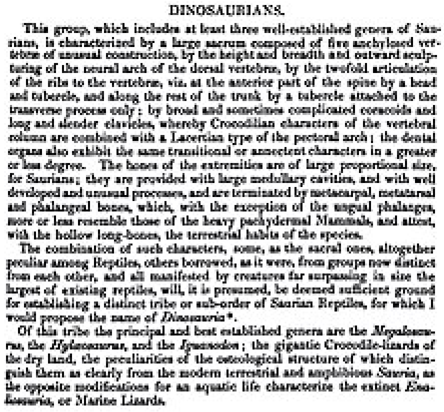
Early dinosaur research


William Buckland

Scholarly descriptions of what would now be recognized as dinosaur bones first appeared in the late 17th century in England. Part of a bone, now known to have been the femur of a *Megalosaurus*,[40] was recovered from a limestone quarry at Cornwell near Chipping Norton, Oxfordshire, in 1676. The fragment was sent to Robert Plot, Professor of Chemistry at the University of Oxford and first curator of the Ashmolean Museum, who published a description in his *The Natural History of Oxford-shire* (1677).[41] He correctly identified the bone as the lower extremity of the femur of a large animal, and recognized that it was too large to belong to any known species. He, therefore, concluded it to be the femur of a huge human, perhaps a Titan or another type of giant featured in legends.[42][43] Edward Lhuyd, a friend of Sir Isaac Newton, published *Lithophylacii Britannici ichnographia* (1699), the first scientific treatment of what would now be recognized as a dinosaur when he described and named a sauropod tooth, "Rutellum impicatum",[44][45] that had been found in Caswell, near Witney, Oxfordshire.[46]

Between 1815 and 1824, the Rev William Buckland, the first Reader of Geology at the University of Oxford, collected more fossilized bones of *Megalosaurus* and became the first person to describe a non-avian dinosaur in a scientific journal.[40][47] The second non-avian dinosaur genus to be identified, *Iguanodon*, was discovered in 1822 by Mary Ann Mantell – the wife of English geologist Gideon Mantell.

Gideon Mantell recognized similarities between his fossils and the bones of modern iguanas. He published his findings in 1825.[48][49]



DINOSAURIANS.

This group, which includes at least three well-established genera of Saurians, is characterized by a large sacrum composed of five anchylosed vertebræ of unusual construction, by the height and breadth and outward sculpturing of the neural arch of the dorsal vertebræ, by the twofold articulation of the ribs to the vertebræ, viz. at the anterior part of the spine by a head and tubercle, and along the rest of the trunk by a tubercle attached to the transverse process only; by broad and sometimes complicated coracoids and long and slender clavicles, whereby Crocodilian characters of the vertebral column are combined with a Lacertian type of the pectoral arch; the dental organs also exhibit the same transitional or annectent characters in a greater or less degree. The bones of the extremities are of large proportional size, for Saurians; they are provided with large medullary cavities, and with well developed and unusual processes, and are terminated by metacarpal, metatarsal and phalangeal bones, which, with the exception of the ungual phalanges, more or less resemble those of the heavy pachydermal Mammals, and attest, with the hollow long-bones, the terrestrial habits of the species.

The combination of such characters, some, as the sacral ones, altogether peculiar among Reptiles, others borrowed, as it were, from groups now distinct from each other, and all manifested by creatures far surpassing in size the largest of existing reptiles, will, it is presumed, be deemed sufficient ground for establishing a distinct tribe or sub-order of Saurian Reptiles, for which I would propose the name of *Dinosauria**.

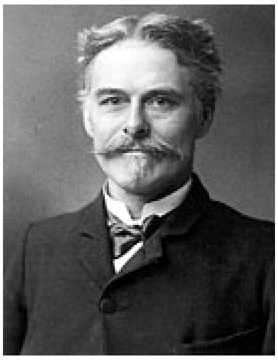
Of this tribe the principal and best established genera are the *Megalosaurus*, the *Hylæosaurus*, and the *Iguanodon*; the gigantic Crocodile-lizards of the dry land, the peculiarities of the osteological structure of which distinguish them as clearly from the modern terrestrial and amphibious *Sauria*, as the opposite modifications for an aquatic life characterize the extinct *Enaliosauria*, or Marine Lizards.

Sir Richard Owen's coining of the word *dinosaur*, at a meeting of the British Association for the Advancement of Science in 1841

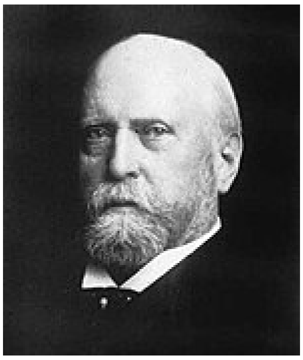
The study of these "great fossil lizards" soon became of great interest to European and American scientists, and in 1841 the English paleontologist Sir Richard Owen coined the term "dinosaur", using it to refer to the "distinct tribe or sub-order of Saurian Reptiles" that were then being recognized in England and around the world.[50][51] The term is derived from Ancient Greek δεινός *(deinos)* 'terrible, potent or fearfully great', and σαῦρος *(sauros)* 'lizard or reptile'.[50][52] Though the taxonomic name has often been interpreted as a reference to dinosaurs' teeth, claws, and other fearsome characteristics, Owen intended it to also evoke their size and majesty.[53] Owen recognized that the remains that had been found so far, *Iguanodon*, *Megalosaurus* and *Hylaeosaurus*, shared a number of distinctive features, and so decided to present them as a distinct taxonomic group. With the backing of Prince Albert, the husband of Queen Victoria, Owen established the Natural History Museum, London, to display the national collection of dinosaur fossils and other biological and geological exhibits.[54]

Discoveries in North America

In 1858, William Parker Foulke discovered the first known American dinosaur, in marl pits in the small town of Haddonfield, New Jersey. (Although fossils had been found before, their nature had not been correctly discerned.) The creature was named *Hadrosaurus foulkii*. It was an extremely important find: *Hadrosaurus* was one of the first nearly complete dinosaur skeletons found (the first was in 1834, in Maidstone, England), and it was clearly a bipedal creature. This was a revolutionary discovery as, until that point, most scientists had believed dinosaurs walked on four feet, like other lizards. Foulke's discoveries sparked a wave of interests in dinosaurs in the United States, known as dinosaur mania.[55]



Edward Drinker Cope



Othniel Charles Marsh

Dinosaur mania was exemplified by the fierce rivalry between Edward Drinker Cope and Othniel Charles Marsh, both of whom raced to be the first to find new dinosaurs in what came to be known as the Bone Wars. This fight between the two scientists lasted for over 30 years, ending in 1897 when Cope died after spending his entire fortune on the dinosaur hunt. Unfortunately, many valuable dinosaur specimens were damaged or destroyed due to the pair's rough methods: for example, their diggers often used dynamite to unearth bones. Modern paleontologists would find such methods crude and unacceptable, since blasting easily destroys fossil and stratigraphic evidence. Despite their unrefined methods, the contributions of Cope and Marsh to paleontology were vast: Marsh unearthed 86 new species of dinosaur and Cope discovered 56, a total of 142 new species. Cope's collection is now at the American Museum of Natural History, while Marsh's is at the Peabody Museum of Natural History at Yale University.[56]

"Dinosaur renaissance" and beyond

The field of dinosaur research has enjoyed a surge in activity that began in the 1970s and is ongoing. This was triggered, in part, by John Ostrom's discovery and 1969 description of *Deinonychus*, an active predator that may have been warm-blooded, in marked contrast to the then-prevailing image of dinosaurs as sluggish and cold-blooded.[57][58][59][60][61][62] Vertebrate paleontology has become a global science. Major new dinosaur discoveries have been made by paleontologists working in previously unexploited regions, including India, South America, Madagascar, Antarctica, and most significantly China (the well-preserved feathered dinosaurs in China have further consolidated the link between dinosaurs and their living descendants, modern birds). The widespread application of cladistics, which rigorously analyzes the relationships between biological organisms, has also proved tremendously useful in classifying dinosaurs. Cladistic analysis, among other modern techniques, helps to compensate for an often incomplete and fragmentary fossil record.[63]


Paleontologist Robert T. Bakker with mounted skeleton of a tyrannosaurid (*Gorgosaurus libratus*)

Soft tissue and DNA


Scipionyx fossil with intestines, Natural History Museum of Milan

One of the best examples of soft-tissue impressions in a fossil dinosaur was discovered in the Pietraroia Plattenkalk in southern Italy. The discovery was reported in 1998, and described the specimen of a small, juvenile coelurosaur, *Scipionyx samniticus*. The fossil includes portions of the intestines, colon, liver, muscles, and windpipe of this dinosaur.[64]

In the March 2005 issue of *Science*, the paleontologist Mary Higby Schweitzer and her team announced the discovery of flexible material resembling actual soft tissue inside a 68-million-year-old *Tyrannosaurus rex* leg bone from the Hell Creek Formation in Montana. After recovery, the tissue was rehydrated by the science team.[65] When the fossilized bone was treated over several weeks to remove mineral content from the fossilized bone-marrow cavity (a process called demineralization), Schweitzer found evidence of intact structures such as blood vessels, bone matrix, and connective tissue (bone fibers). Scrutiny under the microscope further revealed that the putative dinosaur soft tissue had retained fine structures (microstructures) even at the cellular level. The exact nature and composition of this material, and the implications of Schweitzer's discovery, are not yet clear.[65]

In 2009, a team including Schweitzer announced that, using even more careful methodology, they had duplicated their results by finding similar soft tissue in a duck-billed dinosaur, *Brachylophosaurus canadensis*, found in the Judith River Formation of Montana. This included even more detailed tissue, down to preserved bone cells that seem to have visible remnants of nuclei and what seem to be red blood cells. Among other materials found in the bone was collagen, as in the *Tyrannosaurus* bone. The type of collagen an animal has in its bones varies according to its DNA and, in both cases, this collagen was of the same type found in modern chickens and ostriches.[66]

The extraction of ancient DNA from dinosaur fossils has been reported on two separate occasions;[67] upon further inspection and peer review, however, neither of these reports could be confirmed.[68] However, a functional peptide involved in the vision of a theoretical dinosaur has been inferred using analytical phylogenetic reconstruction methods on gene sequences of related modern species such as reptiles and birds.[69] In addition, several proteins, including hemoglobin,[70] have putatively been detected in dinosaur fossils.[71][72]

In 2015, researchers reported finding structures similar to blood cells and collagen fibers, preserved in the bone fossils of six Cretaceous dinosaur specimens, which are approximately 75 million years old.[73][74]

Evolutionary history

Origins and early evolution

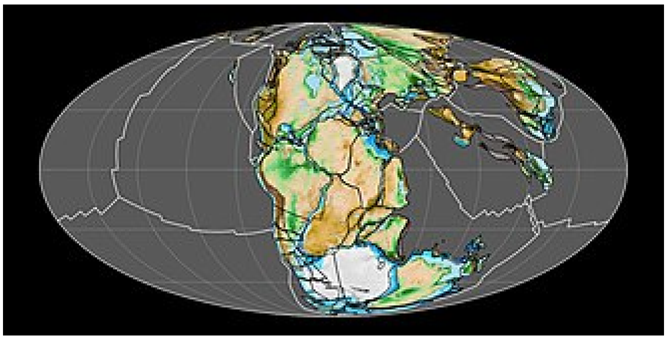
The early dinosaurs *Herrerasaurus* (large), *Eoraptor* (small) and a *Plateosaurus* skull, from the Triassic

Dinosaurs diverged from their archosaur ancestors during the Middle to Late Triassic epochs, roughly 20 million years after the devastating Permian–Triassic extinction event wiped out an estimated 96% of all marine species and 70% of terrestrial vertebrate species approximately 252 million years ago.[75][76] Radiometric dating of the Ischigualasto Formation of Argentina where the early dinosaur genus *Eoraptor* was found date it as 231.4 million years old.[77] *Eoraptor* is thought to resemble the common ancestor of all dinosaurs; if this is true, its traits suggest that the first dinosaurs were small, bipedal predators.[78][79][80] The discovery of primitive, dinosaur-like ornithodirans such as *Lagosuchus* and *Lagerpeton* in Argentina in the Carnian epoch of the Triassic, around 233 million years ago,[81] supports this view; analysis of recovered fossils suggests that these animals were indeed small, bipedal predators. Dinosaurs may have appeared as early as the Anisian epoch of the Triassic, 245 million years ago, as evidenced by remains of the genus *Nyasasaurus* from that period. However, its known fossils are too fragmentary to tell if it was a dinosaur or only a close relative.[82] Paleontologist Max C. Langer *et al.* (2018) determined that *Staurikosaurus* from the Santa Maria Formation dates to 233.23 million years ago, making it older in geologic age than *Eoraptor*.[83]

When dinosaurs appeared, they were not the dominant terrestrial animals. The terrestrial habitats were occupied by various types of archosauromorphs and therapsids, like cynodonts and rhynchosaurs. Their main competitors were the pseudosuchians, such as aetosaurs, ornithosuchids and rauisuchians, which were more successful than the dinosaurs.[84] Most of these other animals became extinct in the Triassic, in one of two events. First, at about 215 million years ago, a variety of basal archosauromorphs, including the protorosaurs, became extinct. This was followed by the Triassic–Jurassic extinction event (about 201 million years ago), that saw the end of most of the other groups of early archosaurs, like aetosaurs, ornithosuchids, phytosaurs, and rauisuchians. Rhynchosaurs and dicynodonts survived (at least in some areas) at least as late as early–mid Norian and late Norian or earliest Rhaetian stages, respectively,[85][86] and the exact date of their extinction is uncertain. These losses left behind a land fauna of crocodylomorphs, dinosaurs, mammals, pterosaurians, and turtles.[7] The first few lines of early dinosaurs diversified through the Carnian and Norian stages of the Triassic, possibly by occupying the niches of the groups that became extinct.[9] Also notably, there was a heightened rate of extinction during the Carnian pluvial event.[87]

Evolution and paleobiogeography

Dinosaur evolution after the Triassic followed changes in vegetation and the location of continents. 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.[88] Gymnosperm plants (particularly conifers), a potential food source, radiated in the Late Triassic. 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.[89] The general homogeneity of dinosaurian faunas continued into the Middle and Late Jurassic, where most localities had predators consisting of ceratosaurians, megalosauroids, and allosauroids, and herbivores consisting of stegosaurian ornithischians and large sauropods. Examples of this include the Morrison Formation of North America and Tendaguru Beds of Tanzania. Dinosaurs in China show some differences, with specialized metriacanthosaurid theropods and unusual, long-necked sauropods like *Mamenchisaurus*.[88] Ankylosaurians and ornithopods were also becoming more common, but primitive sauropodomorphs had become extinct. Conifers and pteridophytes were the most common plants. Sauropods, like earlier sauropodomorphs, 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.[89] Another notable evolutionary event of the Jurassic was the appearance of true birds, descended from maniraptoran coelurosaurians.[11]


The supercontinent Pangaea in the early Mesozoic (around 200 million years ago)

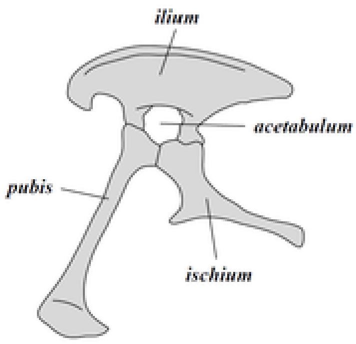
By the Early Cretaceous and the ongoing breakup of Pangaea, dinosaurs were becoming strongly differentiated by landmass. The earliest part of this time saw the spread of ankylosaurians, iguanodontians, and brachiosaurids through Europe, North America, and northern Africa. These were later supplemented 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.[88] The stegosaurians appear to have gone extinct at some point in the late Early Cretaceous or early Late Cretaceous. 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 dental batteries, taken to its extreme in hadrosaurids.[89] Some sauropods also evolved tooth batteries, best exemplified by the rebbachisaurid *Nigersaurus*.[90]

There were three general dinosaur faunas in the Late Cretaceous. 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 supercontinent 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.[88] Flowering plants were greatly radiating,[89] with the first grasses appearing by the end of the Cretaceous.[91] Grinding hadrosaurids and shearing ceratopsians became very diverse across North America and Asia. Theropods were also radiating as herbivores or omnivores, with therizinosaurians and ornithomimosaurians becoming common.[89]

The Cretaceous–Paleogene extinction event, which occurred approximately 66 million years ago at the end of the Cretaceous, caused the extinction of all dinosaur groups except for the neornithine birds. Some other diapsid groups, including crocodilians, dyrosaurs, sebecosuchians, turtles, lizards, snakes, sphenodontians, and choristoderans, also survived the event.[92]

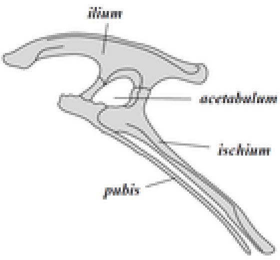
The surviving lineages of neornithine birds, including the ancestors of modern ratites, ducks and chickens, and a variety of waterbirds, diversified rapidly at the beginning of the Paleogene period, entering ecological niches left vacant by the extinction of Mesozoic dinosaur groups such as the arboreal enantiornithines, aquatic hesperornithines, and even the larger terrestrial theropods (in the form of *Gastornis*, eogruiids, bathornithids, ratites, geranoidids, mihirungs, and "terror birds"). It is often stated 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 Era.[93] Terror birds and bathornithids occupied carnivorous guilds alongside predatory mammals,[94][95] and ratites are still fairly successful as mid-sized herbivores; eogruiids similarly lasted from the Eocene to Pliocene, only becoming extinct very recently after over 20 million years of co-existence with many mammal groups.[96]

Classification



Saurischian pelvis structure (left side)

Tyrannosaurus pelvis (showing saurischian structure – left side)



Ornithischian pelvis structure (left side)

Edmontosaurus pelvis (showing ornithischian structure – left side)

Dinosaurs belong to a group known as archosaurs, which also includes modern crocodilians. 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 crocodilians sprawl out to either side.[27]

Collectively, dinosaurs as a clade are divided into two primary branches, Saurischia and Ornithischia. 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. Early saurischians—"lizard-hipped", from the Greek *sauros* (σαῦρος) meaning "lizard" and *ischion* (ἰσχίον) meaning "hip joint"—retained the hip structure of their ancestors, with a pubis bone directed cranially, or forward.[34] This basic form was modified by rotating the pubis backward to varying degrees in several groups (*Herrerasaurus*,[97] therizinosauroids,[98] dromaeosaurids,[99] and birds[11]). Saurischia includes the theropods (exclusively bipedal and with a wide variety of diets) and sauropodomorphs (long-necked herbivores which include advanced, quadrupedal groups).[26][100]

By contrast, ornithischians—"bird-hipped", from the Greek *ornitheios* (ὀρνίθειος) meaning "of a bird" and *ischion* (ἰσχίον) meaning "hip joint"—had a pelvis that superficially resembled a bird's pelvis: the pubic bone was oriented caudally (rear-pointing). Unlike birds, the ornithischian pubis also usually had an additional forward-pointing process. Ornithischia includes a variety of species that were primarily herbivores.

Despite the terms "bird hip" (Ornithischia) and "lizard hip" (Saurischia), birds are not part of Ornithischia. Birds instead belong to Saurischia, the “lizard-hipped” dinosaurs—birds evolved from earlier dinosaurs with "lizard hips".[27]

Taxonomy

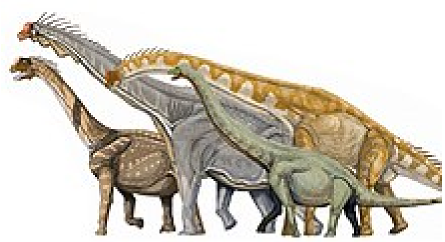
The following is a simplified classification of dinosaur groups based on their evolutionary relationships, and those of the main dinosaur groups Theropoda, Sauropodomorpha and Ornithischia, exemplified by the studies of Molina-Pérez and Larramendi in 2019 for Theropoda and 2020 for Sauropodomorpha,[101][102] and Madzia and colleagues in 2021 for Ornithischia.[103] The dagger (†) is used to signify groups with no living members, descriptions of clades follow Holtz (2007).[104][105] The dagger (†) is used to signify groups with no living members.

- Dinosauria
    - Saurischia
        - †Herrerasauria (early bipedal carnivores)[106]
        - Theropoda (carnivorous)
            - †Coelophysoidea (early theropods; includes *Coelophysis* and close relatives)
            - †Dilophosauridae (larger kink-snouted dinosaurs, previously considered coelophysoids)
            - †Ceratosauria (generally elaborately horned, power carnivores that existed from the Jurassic to Cretaceous periods, originally included Coelophysoidea)
                - †Ceratosauridae (A group of Ceratosaurs, they existed in North and South America and possibly even Africa during the Jurassic and Early Cretaceous)
                - †Abelisauroidea (A group of Ceratosaurs that include the Abelisauridae and the Noasauridae, they were the dominant Carnivores in the Southeren hemisphere at the end of the Cretaceous)[107]
            - Tetanurae (stiff-tailed dinosaurs)
                - †Megalosauroidea (early group of large carnivores including the semiaquatic spinosaurids, possibly basal members of Carnosauria)[108]
                - †Carnosauria (giant meat-eating dinosaurs; *Allosaurus* and close relatives, like *Carcharodontosaurus*)
                - Coelurosauria (feathered theropods, with a range of body sizes and niches)[63]
                    - †?Megaraptora (theropods with large hand claws)
                    - †Compsognathidae (small early coelurosaurs with short forelimbs)
                    - †Tyrannosauroidea (*Tyrannosaurus* and close relatives)
                    - †Ornithomimosauria (ostrich dinosaurs; small-headed, mostly toothless, omnivorous or possible herbivores)
                    - Maniraptora (feathered dinosaurs)

        - †Alvarezsauroidea (small insectivores with reduced forelimbs each bearing one enlarged claw)
        - †Therizinosauria (sloth dinosaurs)
        - †Oviraptorosauria (egg-thief dinosaurs)
        - †Dromaeosauridae (raptor dinosaurs; heavier, shorter legs and longer arms)
        - †Troodontidae (long-legged raptor dinosaurs)
        - †Scansoriopterygidae (small primitive avialans with long third fingers)
        - Avialae (modern birds and extinct relatives)
            - †Archaeopterygidae (small, winged theropods or primitive birds)
            - †Confuciusornithidae (small toothless avialans)
            - †Enantiornithes (primitive tree-dwelling, flying avialans)
            - Pygostylia (advanced flying birds)
                - †Yanornithidae
                - †Songlingornithidae
                - †Hesperornithes (specialized aquatic diving birds)
                - Neornithes (modern, beaked birds and their extinct relatives)

Restoration of six dromaeosaurid theropods: from left to right *Microraptor*, *Velociraptor*, *Austroraptor*, *Dromaeosaurus*, *Utahraptor*, and *Deinonychus*

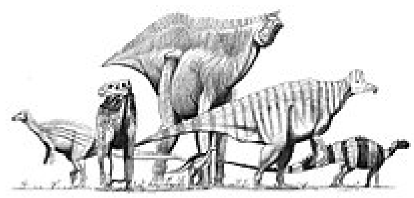
- †Sauropodomorpha (herbivores with small heads, long necks, long tails)
    - †Plateosauridae (primitive, strictly bipedal "prosauropods")
    - †Riojasauridae (large, primitive sauropodomorphs)
    - †Massospondylidae (long-necked, primitive sauropodomorphs)
    - †Sauropoda (very large and heavy; quadrupedal)
        - †Mamenchisauridae (group of Sauropods with very long, thin necks)
        - †Cetiosauridae ("whale reptiles")
        - †Turiasauria (group of Jurassic and Cretaceous sauropods)
        - †Neosauropoda ("new sauropods")



Restoration of four macronarian sauropods: from left to right *Camarasaurus*, *Brachiosaurus*, *Giraffatitan*, and *Euhelopus*

- †Diplodocoidea (skulls and tails elongated; teeth typically narrow and pencil-like)
- †Macronaria (boxy skulls; spoon- or pencil-shaped teeth)
  - †Brachiosauridae (long-necked, long-armed macronarians)
  - †Euhelopodidae (bizarre stocky Macronarians)[109]
  - †Titanosauria (diverse; stocky, with wide hips; most common in the Late Cretaceous of southern continents)
    - †Aeolosaurini
    - †Saltasauroidea
      - †Saltasaurinae
      - †Lognkosauria

- †Ornithischia ("bird-hipped"; diverse bipedal and quadrupedal herbivores)
  - †Heterodontosauridae (small basal ornithopod herbivores/omnivores with prominent canine-like teeth)
  - †Thyreophora (armored dinosaurs; mostly quadrupeds)
    - †Ankylosauria (scutes as primary armor; some had club-like tails)
    - †Stegosauria (spikes and plates as primary armor)



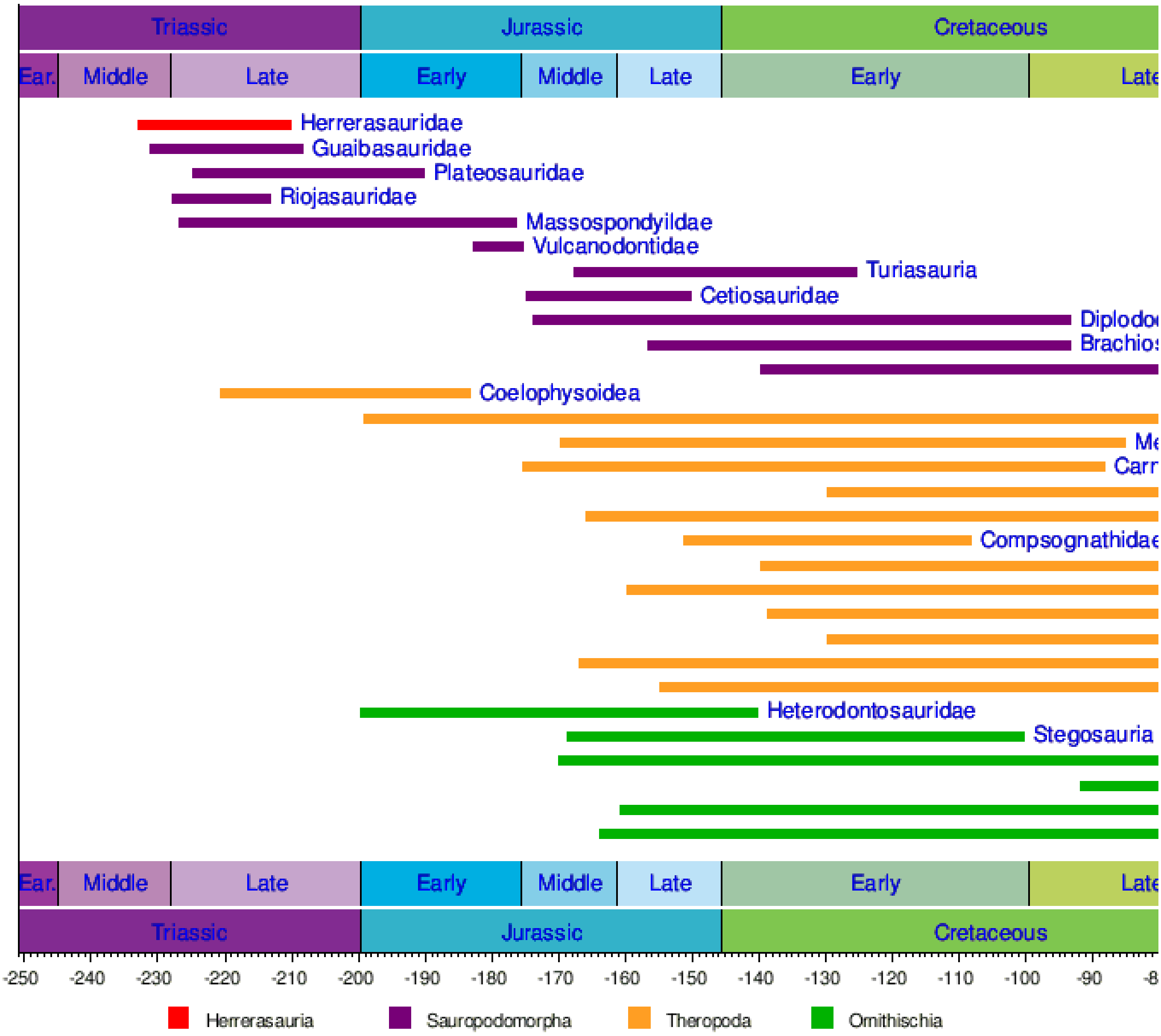
Restoration of six ornithopods; far left: *Camptosaurus*, left: *Iguanodon*, center background: *Shantungosaurus*, center foreground: *Dryosaurus*, right: *Corythosaurus*, far right (large) *Tenontosaurus*.

  - †Neornithischia ("new ornithischians")
    - †Ornithopoda (various sizes; bipeds and quadrupeds; evolved a method of chewing using skull flexibility and numerous teeth)
      - †Elasmaria
      - †Iguanodontia (contains most Ornithopod groups)
        - †Rhabdodontomorpha (A group of Ornithopods which existed from the Early to Late Cretaceous period)[110]
        - †Dryosauridae (A group of small Ornithopods from the Jurassic to Late Cretacoues)
        - †Ankylopollexia (A group that contains most of the Large Ornithopods, ancestrally had a thumb spike)[111]
          - †Camptosauridae
          - †Hadrosauroidea (large quadrupedal herbivores, with teeth merged into dental batteries)
    - †Marginocephalia (characterized by a cranial growth)

- †Pachycephalosauria (bipeds with domed or knobby growth on skulls)
- †Ceratopsia (bipeds and quadrupeds with neck frills; many also had horns)

Timeline of major groups

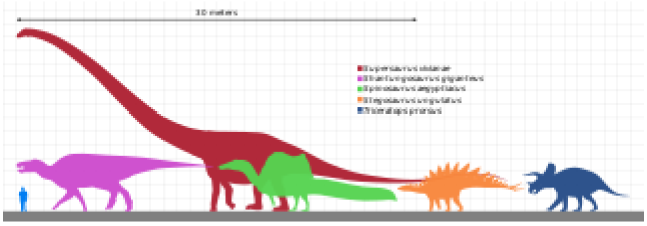
Timeline of major dinosaur groups per Holtz (2007).



Paleobiology

Knowledge about dinosaurs is derived from a variety of fossil and non-fossil records, including fossilized bones, feces, trackways, gastroliths, feathers, impressions of skin, internal organs and other soft tissues.[64][65] Many fields of study contribute to our understanding of dinosaurs, including physics (especially biomechanics), chemistry, biology, and the Earth sciences (of which paleontology is a sub-discipline).[112][113] Two topics of particular interest and study have been dinosaur size and behavior.[114]

Size



Scale diagram comparing the average human to the longest known dinosaurs in five major clades:

- Sauropoda (*Supersaurus vivianae*)
- Ornithopoda (*Shantungosaurus giganteus*)
- Theropoda (*Spinosaurus aegyptiacus*)
- Thyreophora (*Stegosaurus ungulatus*)
- Marginocephalia (*Triceratops prorsus*)

Current evidence suggests that dinosaur average size varied through the Triassic, Early Jurassic, Late Jurassic and Cretaceous.[79] Predatory theropod dinosaurs, which occupied most terrestrial carnivore niches during the Mesozoic, most often fall into the 100 to 1 000 kg (220 to 2 200 lb) category when sorted by estimated weight into categories based on order of magnitude, whereas recent predatory carnivoran mammals peak in the 10 to 100 kg (22 to 220 lb) category.[115] The mode of Mesozoic dinosaur body masses is between 1 to 10 metric tons (1.1 to 11.0 short tons).[116] This contrasts sharply with the average size of Cenozoic mammals, estimated by the National Museum of Natural History as about 2 to 5 kg (4.4 to 11.0 lb).[117]

The sauropods were the largest and heaviest dinosaurs. For much of the dinosaur era, the smallest sauropods were larger than anything else in their habitat, and the largest was an order of magnitude more massive than anything else that has since walked the Earth. Giant prehistoric mammals such as *Paraceratherium* (the largest land mammal ever) were dwarfed by the giant sauropods, and only modern whales approach or surpass them in size.[118] There are several proposed advantages for the large size of sauropods, including protection from predation, reduction of energy use, and longevity, but it may be that the most important advantage was dietary. Large animals are more efficient at digestion than small animals, because food spends more time in their digestive systems. This also permits them to subsist on food with lower nutritive value than smaller animals. Sauropod remains are mostly found in rock formations interpreted as dry or seasonally dry, and the ability to eat large quantities of low-nutrient browse would have been advantageous in such environments.[119]

Largest and smallest

Scientists will probably never be certain of the largest and smallest dinosaurs to have ever existed. This is because only a tiny percentage of animals were ever fossilized and most of these remain buried in the earth. Few of the specimens that are recovered are complete skeletons, and impressions of skin and other soft tissues are rare. Rebuilding a complete skeleton by comparing the size and morphology of bones to those of similar, better-known species is an inexact art, and reconstructing the muscles and other organs of the living animal is, at best, a process of educated guesswork.[120]

Comparative size of *Argentinosaurus* to the average human

The tallest and heaviest dinosaur known from good skeletons is *Giraffatitan brancai* (previously classified as a species of *Brachiosaurus*). Its remains were discovered in Tanzania between 1907 and 1912. Bones from several similar-sized individuals were incorporated into the skeleton now mounted and on display at the Museum für Naturkunde in Berlin;[121] this mount is 12 meters (39 ft) tall and 21.8 to 22.5 meters (72 to 74 ft) long,[122][123] and would have belonged to an animal that weighed between 30 000 and 60 000 kilograms (70 000 and 130 000 lb). The longest complete dinosaur is the 27 meters (89 ft) long *Diplodocus*, which was discovered in Wyoming in the United States and displayed in Pittsburgh's Carnegie Museum of Natural History in 1907.[124] The longest dinosaur known from good fossil material is the *Patagotitan*: the skeleton mount in the American Museum of Natural History in New York is 37 meters (121 ft) long. The Museo Municipal Carmen Funes in Plaza Huincul, Argentina, has an *Argentinosaurus* reconstructed skeleton mount that is 39.7 meters (130 ft) long.[125]

An adult bee hummingbird, the smallest known dinosaur

There were larger dinosaurs, but knowledge of them is based entirely on a small number of fragmentary fossils. Most of the largest herbivorous specimens on record were discovered in the 1970s or later, and include the massive *Argentinosaurus*, which may have weighed 80 000 to 100 000 kilograms (90 to 110 short tons) and reached lengths of 30 to 40 meters (98 to 131 ft); some of the longest were the 33.5-meter (110 ft) long *Diplodocus hallorum*[119] (formerly *Seismosaurus*), the 33-to-34-meter (108 to 112 ft) long *Supersaurus*,[126] and 37-meter (121 ft) long *Patagotitan*; and the tallest, the 18-meter (59 ft) tall *Sauroposeidon*, which could have reached a sixth-floor window. The heaviest and longest dinosaur may have been *Maraapunisaurus*, known only from a now lost partial vertebral neural arch described in 1878. Extrapolating from the illustration of this bone, the animal may have been 58 meters (190 ft) long and weighed 122 400 kg (270 000 lb).[119] However, as no further evidence of sauropods of this size has been found, and the discoverer, Cope, had made typographic errors before, it is likely to have been an extreme overestimation.[127]

The largest carnivorous dinosaur was *Spinosaurus*, reaching a length of 12.6 to 18 meters (41 to 59 ft), and weighing 7 to 20.9 metric tons (7.7 to 23.0 short tons).[128][129] Other large carnivorous theropods included *Giganotosaurus*, *Carcharodontosaurus* and *Tyrannosaurus*.[129] *Therizinosaurus* and *Deinocheirus* were among the tallest of the theropods. The largest ornithischian dinosaur was probably the hadrosaurid *Shantungosaurus giganteus* which measured 16.6 meters (54 ft).[130] The largest individuals may have weighed as much as 16 metric tons (18 short tons).[131]

The smallest dinosaur known is the bee hummingbird,[132] with a length of only 5 centimeters (2.0 in) and mass of around 1.8 g (0.063 oz).[133] The smallest known non-avialan dinosaurs were about the size of pigeons and were those theropods most closely related to birds.[134] For example, *Anchiornis huxleyi* is currently the smallest non-avialan dinosaur described from an adult specimen, with an estimated weight of 110 g (3.9 oz)[135] and a total skeletal length of 34 centimeters (1.12 ft).[134][135] The smallest herbivorous non-avialan dinosaurs included *Microceratus* and *Wannanosaurus*, at about 60 centimeters (2.0 ft) long each.[104][136]

Behavior

Many modern birds are highly social, often found living in flocks. There is general agreement that some behaviors that are common in birds, as well as in crocodiles (closest living relatives of birds), were also common among extinct dinosaur groups. Interpretations of behavior in fossil species are generally based on the pose of skeletons and their habitat, computer simulations of their biomechanics, and comparisons with modern animals in similar ecological niches.[112]

The first potential evidence for herding or flocking as a widespread behavior common to many dinosaur groups in addition to birds was the 1878 discovery of 31 *Iguanodon*, ornithischians that were then thought to have perished together in Bernissart, Belgium, after they fell into a deep, flooded sinkhole and drowned.[137] Other mass-death sites have been discovered subsequently. Those, along with multiple

A nesting ground of the hadrosaur *Maiasaura peeblesorum* was discovered in 1978

trackways, suggest that gregarious behavior was common in many early dinosaur species. Trackways of hundreds or even thousands of herbivores indicate that duck-billed (hadrosaurids) may have moved in great herds, like the American bison or the African Springbok. Sauropod tracks document that these animals traveled in groups composed of several different species, at least in Oxfordshire, England,[138] although there is no evidence for specific herd structures.[139] Congregating into herds may have evolved for defense, for migratory purposes, or to provide protection for young. There is evidence that many types of slow-growing dinosaurs, including various theropods, sauropods, ankylosaurians, ornithopods, and ceratopsians, formed aggregations of immature individuals. One example is a site in Inner Mongolia that has yielded remains of over 20 *Sinornithomimus*, from one to seven years old. This assemblage is interpreted as a social group that was trapped in mud.[140] The interpretation of dinosaurs as gregarious has also extended to depicting carnivorous theropods as pack hunters working together to bring down large prey.[141][142] However, this lifestyle is uncommon among modern birds, crocodiles, and other reptiles, and the taphonomic evidence suggesting mammal-like pack hunting in such theropods as *Deinonychus* and *Allosaurus* can also be interpreted as the results of fatal disputes between feeding animals, as is seen in many modern diapsid predators.[143]

Restoration of two *Centrosaurus apertus* engaged in intra-specific combat

The crests and frills of some dinosaurs, like the marginocephalians, theropods and lambeosaurines, may have been too fragile to be used for active defense, and so they were likely used for sexual or aggressive displays, though little is known about dinosaur mating and territorialism. Head wounds from bites suggest that theropods, at least, engaged in active aggressive confrontations.[144]

From a behavioral standpoint, one of the most valuable dinosaur fossils was discovered in the Gobi Desert in 1971. It included a *Velociraptor* attacking a *Protoceratops*,[145] providing evidence that dinosaurs did indeed attack each other.[146] Additional evidence for attacking live prey is the partially healed tail of an *Edmontosaurus*, a hadrosaurid dinosaur; the tail is damaged in such a way that shows the animal was bitten by a tyrannosaur but survived.[146] Cannibalism amongst some species of dinosaurs was confirmed by tooth marks found in Madagascar in 2003, involving the theropod *Majungasaurus*.[147]

Comparisons between the scleral rings of dinosaurs and modern birds and reptiles have been used to infer daily activity patterns of dinosaurs. Although it has been suggested that most dinosaurs were active during the day, these comparisons have shown that small predatory dinosaurs such as dromaeosaurids, *Juravenator*, and *Megapnosaurus* were likely nocturnal. Large and medium-sized herbivorous and omnivorous dinosaurs such as ceratopsians, sauropodomorphs, hadrosaurids, ornithomimosaurs may have been cathemeral, active during short intervals throughout the day, although the small ornithischian *Agilisaurus* was inferred to be diurnal.[148]

Based on fossil evidence from dinosaurs such as *Oryctodromeus*, some ornithischian species seem to have led a partially fossorial (burrowing) lifestyle.[149] Many modern birds are arboreal (tree climbing), and this was also true of many Mesozoic birds, especially the enantiornithines.[150] While some early bird-like species may have already been arboreal as well (including dromaeosaurids) such as *Microraptor*[151]) most non-avialan dinosaurs seem to have relied on land-based locomotion. A good understanding of how dinosaurs moved on the ground is key to models of dinosaur behavior; the science of biomechanics, pioneered by Robert McNeill Alexander, has provided significant insight in this area. For example, studies of the forces exerted by muscles and gravity on dinosaurs' skeletal structure have investigated how fast dinosaurs could run,[112] whether diplodocids could create sonic booms via whip-like tail snapping,[152] and whether sauropods could float.[153]

Communication


Restoration of a striking and unusual visual display in a *Lambeosaurus magnicristatus*

Modern birds are known to communicate using visual and auditory signals, and the wide diversity of visual display structures among fossil dinosaur groups, such as horns, frills, crests, sails, and feathers, suggests that visual communication has always been important in dinosaur biology.[154] Reconstruction of the plumage color of *Anchiornis*, suggest the importance of color in visual communication in non-avian dinosaurs.[155] The evolution of dinosaur vocalization is less certain. Paleontologist Phil Senter has suggested that non-avian dinosaurs relied mostly on visual displays and possibly non-vocal acoustic sounds like hissing, jaw grinding or clapping, splashing and wing beating (possible in winged maniraptoran dinosaurs). He states they were unlikely to have been capable of vocalizing since their closest relatives, crocodilians and birds, use different means to vocalize, the former via the larynx and the latter through the unique syrinx, suggesting they evolved independently and their common ancestor was mute.[154]

The earliest remains of a syrinx, which has enough mineral content for fossilization, was found in a specimen of the duck-like *Vegavis iaai* dated 69–66 million years ago, and this organ is unlikely to have existed in non-avian dinosaurs. However, in contrast to Senter, other researchers have suggested that dinosaurs could vocalize and that the syrinx-based vocal system of birds evolved from a larynx-based one, rather than the two systems evolving independently.[156] A 2016 study suggests that some dinosaurs produced closed mouth vocalizations like cooing, hooting and booming. These occur in both reptiles and birds and involve inflating the esophagus or tracheal pouches. Such vocalizations evolved independently in extant archosaurs numerous times, following increases in body size.[157] The crests of the Lambeosaurini and nasal chambers of ankylosaurids have been suggested to have functioned in vocal resonance,[158][159] though Senter stated that the presence of resonance chambers in some dinosaurs is not necessarily evidence of vocalization as modern snakes have such chambers which intensify their hisses.[154]

Reproductive biology


Nest of a plover (*Charadrius*)

All dinosaurs laid amniotic eggs. Dinosaur eggs were usually laid in a nest. Most species create somewhat elaborate nests which can be cups, domes, plates, beds scrapes, mounds, or burrows.[160] Some species of modern bird have no nests; the cliff-nesting common guillemot lays its eggs on bare rock, and male emperor penguins keep eggs between their body and feet. Primitive birds and many non-avialan dinosaurs often lay eggs in communal nests, with males primarily incubating the eggs. While modern birds have only one functional oviduct and lay one egg at a time, more primitive birds and dinosaurs had two oviducts, like crocodiles. Some non-avialan dinosaurs, such as *Troodon*, exhibited iterative laying, where the adult might lay a pair of eggs every one or two days, and then ensured simultaneous hatching by delaying brooding until all eggs were laid.[161]

When laying eggs, females grow a special type of bone between the hard outer bone and the marrow of their limbs. This medullary bone, which is rich in calcium, is used to make eggshells. A discovery of features in a *Tyrannosaurus* skeleton provided evidence of medullary bone in extinct dinosaurs and, for the first time, allowed paleontologists to establish the sex of a fossil dinosaur specimen. Further research has found medullary bone in the carnosaur *Allosaurus* and the ornithopod *Tenontosaurus*. Because the line of dinosaurs that includes *Allosaurus* and *Tyrannosaurus* diverged from the line that led to *Tenontosaurus* very early in the evolution of dinosaurs, this suggests that the production of medullary tissue is a general characteristic of all dinosaurs.[162]

Another widespread trait among modern birds (but see below in regards to fossil groups and extant megapodes) is parental care for young after hatching. Jack Horner's 1978 discovery of a *Maiasaura* ("good mother lizard") nesting ground in Montana demonstrated that parental care continued long after birth among ornithopods.[163] A specimen of the oviraptorid *Citipati osmolskae* was discovered in a chicken-like brooding position in 1993,[164] which may indicate that they had begun using an insulating layer of feathers to keep the eggs warm.[165] An embryo of the basal sauropodomorph *Massospondylus* was found without teeth, indicating that some parental care was required to feed the young dinosaurs.[166] Trackways have also confirmed parental behavior among ornithopods from the Isle of Skye in northwestern Scotland.[167]

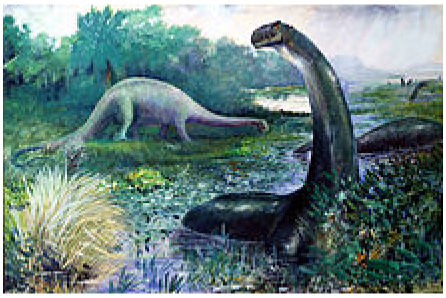
Fossil interpreted as a nesting oviraptorid *Citipati* at the American Museum of Natural History. Smaller fossil far right showing inside one of the eggs.

However, there is ample evidence of precociality or superprecociality among many dinosaur species, particularly theropods. For instance, non-ornithuromorph birds have been abundantly demonstrated to have had slow growth rates, megapode-like egg burying behavior and the ability to fly soon after birth.[168][169][170][171] Both *Tyrannosaurus* and *Troodon* had juveniles with clear superprecociality and likely occupying different ecological niches than the adults.[161] Superprecociality has been inferred for sauropods.[172]

Genital structures are unlikely to fossilize as they lack scales that may allow preservation via pigmentation or residual calcium phosphate salts. In 2021, the best preserved specimen of a dinosaur's cloacal vent exterior was described for *Psittacosaurus*, demonstrating lateral swellings similar to crocodylian musk glands used in social displays by both sexes and pigmented regions which could also reflect a signalling function. However, this specimen on its own does not offer enough information to determine whether this dinosaur had sexual signalling functions; it only supports the possibility. Cloacal visual signalling can occur in either males or females in living birds, making it unlikely to be useful to determine sex for extinct dinosaurs.[173]

Physiology

Because both modern crocodilians and birds have four-chambered hearts (albeit modified in crocodilians), it is likely that this is a trait shared by all archosaurs, including all dinosaurs.[174] While all modern birds have high metabolisms and are endothermic ("warm-blooded"), a vigorous debate has been ongoing since the 1960s regarding how far back in the dinosaur lineage this trait extended. Various researchers have supported dinosaurs as being endothermic, ectothermic ("cold-blooded"), or somewhere in between.[175] An emerging consensus among researchers is that, while different lineages of dinosaurs would have had different metabolisms, most of them had higher metabolic rates than other reptiles but lower than living birds and mammals,[176] which is termed mesothermy by some.[177] Evidence from crocodiles and their extinct relatives suggests that such elevated metabolisms could have developed in the earliest archosaurs, which were the common ancestors of dinosaurs and crocodiles.[178][179]

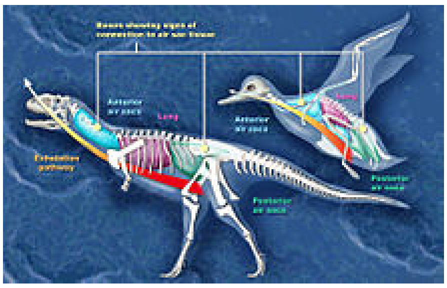


This 1897 restoration of *Brontosaurus* as an aquatic, tail-dragging animal, by Charles R. Knight, typified early views on dinosaur lifestyles.

After non-avian dinosaurs were discovered, paleontologists first posited that they were ectothermic. This was used to imply that the ancient dinosaurs were relatively slow, sluggish organisms, even though many modern reptiles are fast and light-footed despite relying on external sources of heat to regulate their body temperature. The idea of dinosaurs as ectothermic remained a prevalent view until Robert T. Bakker, an early proponent of dinosaur endothermy, published an influential paper on the topic in 1968. Bakker specifically used anatomical and ecological evidence to argue that sauropods, which had hitherto been depicted as sprawling aquatic animals with their tails dragging on the ground, were endotherms that lived vigorous, terrestrial lives. In 1972, Bakker expanded on his arguments based on energy requirements and predator-prey ratios. This was one of the seminal results that led to the Dinosaur renaissance.[58][59][61][180]

One of the greatest contributions to the modern understanding of dinosaur physiology has been paleohistology, the study of microscopic tissue structure in dinosaurs.[181][182] From the 1960s forward, Armand de Ricqlès suggested that the presence of fibrolamellar bone—bony tissue with an irregular, fibrous texture and filled with blood vessels—was indicative of consistently fast growth and therefore endothermy. Fibrolamellar bone was common in both dinosaurs and pterosaurs,[183][184] though not universally present.[185][186] This has led to a significant body of work in reconstructing growth curves and modeling the evolution of growth rates across various dinosaur lineages,[187] which has suggested overall that dinosaurs grew faster than living reptiles.[182] Other lines of evidence suggesting endothermy include the presence of feathers and other types of body coverings in many lineages (see § Feathers); more consistent ratios of the isotope oxygen-18 in bony tissue compared to ectotherms, particularly as latitude and thus air temperature varied, which suggests stable internal temperatures[188][189] (although these ratios can be altered during fossilization[190]); and the discovery of polar dinosaurs, which lived in Australia, Antarctica, and Alaska when these places would have had cool, temperate climates.[191][192][193][194]

In saurischian dinosaurs, higher metabolisms were supported by the evolution of the avian respiratory system, characterized by an extensive system of air sacs that extended the lungs and invaded many of the bones in the skeleton, making them hollow.[195] Such respiratory systems, which may have appeared in the earliest saurischians,[196] would have provided them with more oxygen compared to a mammal of similar size, while also having a larger resting tidal volume and requiring a lower breathing frequency, which would have allowed them to sustain higher activity levels.[118] The rapid airflow would also have been an effective cooling mechanism, which in conjunction with a lower metabolic rate[197] would have prevented large sauropods from overheating. These traits may have enabled sauropods to grow quickly to gigantic sizes.[198][199] Sauropods may also have benefitted from their size—their small surface area to volume ratio meant that they would have been able to thermoregulate more easily, a phenomenon termed gigantothermy.[118][200]



Comparison between the air sacs of an abelisaur and a bird

Like other reptiles, dinosaurs are primarily uricotelic, that is, their kidneys extract nitrogenous wastes from their bloodstream and excrete it as uric acid instead of urea or ammonia via the ureters into the intestine. This would have helped them to conserve water.[176] In most living species, uric acid is excreted along with feces as a semisolid waste.[201][202] However, at least some modern birds (such as hummingbirds) can be facultatively ammonotelic, excreting most of the nitrogenous wastes as ammonia.[203] This material, as well as the output of the intestines, emerges from the cloaca.[204][205] In addition, many species regurgitate pellets,[206] and fossil pellets are known as early as the Jurassic from *Anchiornis*.[207]

The size and shape of the brain can be partly reconstructed based on the surrounding bones. In 1896, Marsh calculated ratios between brain weight and body weight of seven species of dinosaurs, showing that the brain of dinosaurs was proportionally smaller than in today's crocodiles, and that the brain of *Stegosaurus* was smaller than in any living land vertebrate. This contributed to the widespread public notion of dinosaurs as being sluggish and extraordinarily stupid. Harry Jerison, in 1973, showed that proportionally smaller brains are expected at larger body sizes, and that brain size in dinosaurs was not smaller than expected when compared to living reptiles.[208] Later research showed that relative brain size progressively increased during the evolution of theropods, with the highest intelligence – comparable to that of modern birds – calculated for the troodontid *Troodon*.[209]

Origin of birds

The possibility that dinosaurs were the ancestors of birds was first suggested in 1868 by Thomas Henry Huxley.[210] After the work of Gerhard Heilmann in the early 20th century, the theory of birds as dinosaur descendants was abandoned in favor of the idea of them being descendants of generalized thecodonts, with the key piece of evidence being the supposed lack of clavicles in dinosaurs.[211] However, as later discoveries showed, clavicles (or a single fused wishbone, which derived from separate clavicles) were not actually absent;[11] they had been found as early as 1924 in *Oviraptor*, but misidentified as an interclavicle.[212] In the 1970s, Ostrom revived the dinosaur–bird theory,[213] which gained momentum in the coming decades with the advent of cladistic analysis,[214] and a great increase in the discovery of small theropods and early birds.[29] Of particular note have been the fossils of the Yixian Formation, where a variety of theropods and early birds have been found, often with feathers of some type.[63][11] Birds share over a hundred distinct anatomical features with theropod dinosaurs, which are now generally accepted to have been their closest ancient relatives.[215] They are most closely allied with maniraptoran coelurosaurs.[11] A minority of scientists, most notably Alan Feduccia and Larry Martin, have proposed other evolutionary paths, including revised versions of Heilmann's basal archosaur proposal,[216] or that maniraptoran theropods are the ancestors of birds but themselves are not dinosaurs, only convergent with dinosaurs.[217]

Feathers

Feathers are one of the most recognizable characteristics of modern birds, and a trait that was also shared by several non-avian dinosaurs. Based on the current distribution of fossil evidence, it appears that feathers were an ancestral dinosaurian trait, though one that may have been selectively lost in some species.[218] Direct fossil evidence of feathers or feather-like structures has been discovered in a diverse array of species in many non-avian dinosaur groups,[63] both among saurischians and ornithischians. Simple, branched, feather-like structures are known from heterodontosaurids, primitive neornithischians,[219] and theropods,[220] and primitive ceratopsians. Evidence for true, vaned feathers similar to the flight feathers of modern birds has been found only in the theropod subgroup Maniraptora, which includes oviraptorosaurs, troodontids, dromaeosaurids, and birds.[11][221] Feather-like structures known as pycnofibres have also been found in pterosaurs,[222] suggesting the possibility that feather-like filaments may have been common in the bird lineage and evolved before the appearance of dinosaurs themselves.[218] Research into the genetics of American alligators has also revealed that crocodylian scutes do possess feather-keratins during embryonic development, but these keratins are not expressed by the animals before hatching.[223]

Various feathered non-avian dinosaurs, including *Archaeopteryx*, *Anchiornis*, *Microraptor* and *Zhenyuanlong*

Archaeopteryx was the first fossil found that revealed a potential connection between dinosaurs and birds. It is considered a transitional fossil, in that it displays features of both groups. Brought to light just two years after Charles Darwin's seminal *On the Origin of Species* (1859), its discovery spurred the nascent debate between proponents of evolutionary biology and creationism. This early bird is so dinosaur-like that, without a clear impression of feathers in the surrounding rock, at least one specimen was mistaken for the small theropod *Compsognathus*.[224] Since the 1990s, a number of additional feathered dinosaurs have been found, providing even stronger evidence of the close relationship between dinosaurs and modern birds. Most of these specimens were unearthed in the lagerstätte of the Yixian Formation, Liaoning, northeastern China, which was part of an island continent during the Cretaceous. Though feathers have been found in only a few locations, it is possible that non-avian dinosaurs elsewhere in the world were also feathered. The lack of widespread fossil evidence for feathered non-avian dinosaurs may be because delicate features like skin and feathers are seldom preserved by fossilization and thus often absent from the fossil record.[225]

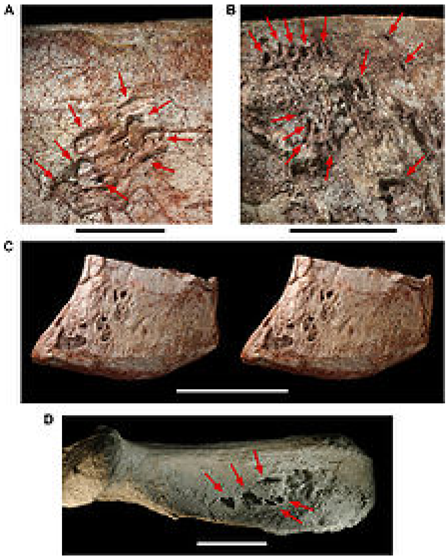
The description of feathered dinosaurs has not been without controversy; perhaps the most vocal critics have been Alan Feduccia and Theagarten Lingham-Soliar, who have proposed that some purported feather-like fossils are the result of the decomposition of collagenous fiber that underlaid the dinosaurs' skin,[226][227][228] and that maniraptoran dinosaurs with vaned feathers were not actually dinosaurs, but convergent with dinosaurs.[217][227] However, their views have for the most part not been accepted by other researchers, to the point that the scientific nature of Feduccia's proposals has been questioned.[229]

Skeleton

Because feathers are often associated with birds, feathered dinosaurs are often touted as the missing link between birds and dinosaurs. However, the multiple skeletal features also shared by the two groups represent another important line of evidence for paleontologists. Areas of the skeleton with important similarities include the neck, pubis, wrist (semi-lunate carpal), arm and pectoral girdle, furcula (wishbone), and breast bone. Comparison of bird and dinosaur skeletons through cladistic analysis strengthens the case for the link.[230]

Soft anatomy

Large meat-eating dinosaurs had a complex system of air sacs similar to those found in modern birds, according to a 2005 investigation led by Patrick M. O'Connor. The lungs of theropod dinosaurs (carnivores that walked on two legs and had bird-like feet) likely pumped air into hollow sacs in their skeletons, as is the case in birds. "What was once formally considered unique to birds was present in some form in the ancestors of birds", O'Connor said.[231][232] In 2008, scientists described *Aerosteon riocoloradensis*, the skeleton of which supplies the strongest evidence to date of a dinosaur with a bird-like breathing system. CT scanning of *Aerosteon's* fossil bones revealed evidence for the existence of air sacs within the animal's body cavity.[195][233]



Pneumatopores on the left ilium of *Aerosteon riocoloradensis*

Behavioral evidence

Fossils of the troodonts *Mei* and *Sinornithoides* demonstrate that some dinosaurs slept with their heads tucked under their arms.[234] This behavior, which may have helped to keep the head warm, is also characteristic of modern birds. Several deinonychosaur and oviraptorosaur specimens have also been found preserved on top of their nests, likely brooding in a bird-like manner.[235] The ratio between egg volume and body mass of adults among these dinosaurs suggest that the eggs were primarily brooded by the male, and that the young were highly precocial, similar to many modern ground-dwelling birds.[236]

Some dinosaurs are known to have used gizzard stones like modern birds. These stones are swallowed by animals to aid digestion and break down food and hard fibers once they enter the stomach. When found in association with fossils, gizzard stones are called gastroliths.[237]

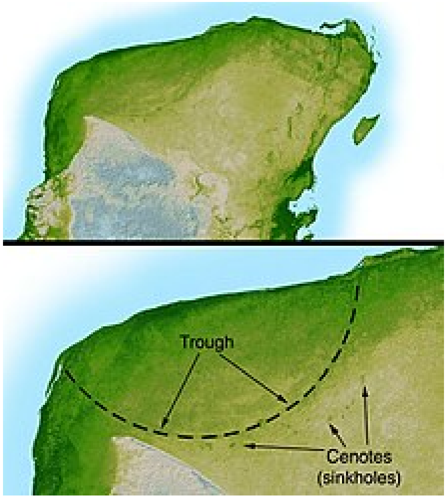
Extinction of major groups

All non-avian dinosaurs and most lineages of birds[238] became extinct in a mass extinction event, called the Cretaceous–Paleogene (K-Pg) extinction event, at the end of the Cretaceous period. Above the Cretaceous–Paleogene boundary, which has been dated to 66.038 ± 0.025 million years ago,[239] fossils of non-avian dinosaurs disappear abruptly; the absence of dinosaur fossils was historically used to assign rocks to the ensuing Cenozoic. The nature of the event that caused this mass extinction has been extensively studied since the 1970s, leading to the development of two mechanisms that are thought to have played major roles: an extraterrestrial impact event in the Yucatán Peninsula, along with flood basalt volcanism in India. However, the specific mechanisms of the extinction event and the extent of its effects on dinosaurs are still areas of ongoing research.[240] Alongside dinosaurs, many other groups of animals became extinct: pterosaurs, marine reptiles such as mosasaurs and plesiosaurs, several groups of mammals, ammonites (nautilus-like mollusks), rudists (reef-building bivalves), and various groups of marine plankton.[241][242] In all, approximately 47% of genera and 76% of species on Earth became extinct during the K-Pg extinction event.[243] The relatively large size of most dinosaurs and the low diversity of small-bodied dinosaur species at the end of the Cretaceous may have contributed to their extinction;[244] the extinction of the bird lineages that did not survive may also have been caused by a dependence on forest habitats or a lack of adaptations to eating seeds for survival.[245][246]

Pre-extinction diversity

Just before the K-Pg extinction event, the number of non-avian dinosaur species that existed globally has been estimated at between 628 and 1078.[247] It remains uncertain whether the diversity of dinosaurs was in gradual decline before the K-Pg extinction event, or whether dinosaurs were actually thriving prior to the extinction. Rock formations from the Maastrichtian epoch, which directly preceded the extinction, have been found to have lower diversity than the preceding Campanian epoch, which led to the prevailing view of a long-term decline in diversity.[241][242][248] However, these comparisons did not account either for varying preservation potential between rock units or for different extents of exploration and excavation.[240] In 1984, Dale Russell carried out an analysis to account for these biases, and found no evidence of a decline;[249] another analysis by David Fastovsky and colleagues in 2004 even showed that dinosaur diversity continually increased until the extinction,[250] but this analysis has been rebutted.[251] Since then, different approaches based on statistics and mathematical models have variously supported either a sudden extinction[240][247][252] or a gradual decline.[253][254] End-Cretaceous trends in diversity may have varied between dinosaur lineages: it has been suggested that sauropods were not in decline, while ornithischians and theropods were in decline.[255][256]

Impact event



The Chicxulub Crater at the tip of the Yucatán Peninsula; the impactor that formed this crater may have caused the dinosaur extinction.

The bolide impact hypothesis, first brought to wide attention in 1980 by Walter Alvarez, Luis Alvarez, and colleagues, attributes the K-Pg extinction event to a bolide (extraterrestrial projectile) impact.[257] Alvarez and colleagues proposed that a sudden increase in iridium levels, recorded around the world in rock deposits at the Cretaceous–Paleogene boundary, was direct evidence of the impact.[258] Shocked quartz, indicative of a strong shockwave emanating from an impact, was also found worldwide.[259] The actual impact site remained elusive until a crater measuring 180 km (110 mi) wide was discovered in the Yucatán Peninsula of southeastern Mexico, and was publicized in a 1991 paper by Alan Hildebrand and colleagues.[260] Now, the bulk of the evidence suggests that a bolide 5 to 15 kilometers (3.1 to 9.3 miles) wide impacted the Yucatán Peninsula 66 million years ago, forming this crater[261] and creating a "kill mechanism" that triggered the extinction event.[262][263][264]

Within hours, the Chicxulub impact would have created immediate effects such as earthquakes,[265] tsunamis,[266] and a global firestorm that likely killed unsheltered animals and started wildfires.[267][268] However, it would also have had longer-term consequences for the environment. Within days, sulphate aerosols released from rocks at the impact site would have contributed to acid rain and ocean acidification.[269][270] Soot aerosols are thought to have spread around the world over the ensuing months and years; they would have cooled the surface of the Earth by reflecting thermal radiation, and greatly slowed photosynthesis by blocking out sunlight, thus creating an impact winter.[240][271][272] (This role was ascribed to sulphate aerosols until experiments demonstrated otherwise.[270]) The cessation of photosynthesis would have led to the collapse of food webs depending on leafy plants, which included all dinosaurs save for grain-eating birds.[246]

Deccan Traps

At the time of the K-Pg extinction, the Deccan Traps flood basalts of India were actively erupting. The eruptions can be separated into three phases around the K-Pg boundary, two prior to the boundary and one after. The second phase, which occurred very close to the boundary, would have extruded 70 to 80% of the volume of these eruptions in intermittent pulses that occurred around 100,000 years apart.[273][274] Greenhouse gases such as carbon dioxide and sulphur dioxide would have been released by this volcanic activity,[275][276] resulting in climate change through temperature perturbations of roughly 3 °C (5.4 °F) but possibly as high as 7 °C (13 °F).[277] Like the Chicxulub impact, the eruptions may also have released sulphate aerosols, which would have caused acid rain and global cooling.[278] However, due to large error margins in the dating of the eruptions, the role of the Deccan Traps in the K-Pg extinction remains unclear.[239][240][279]

Before 2000, arguments that the Deccan Traps eruptions—as opposed to the Chicxulub impact—caused the extinction were usually linked to the view that the extinction was gradual. Prior to the discovery of the Chicxulub crater, the Deccan Traps were used to explain the global iridium layer;[275][280] even after the crater's discovery, the impact was still thought to only have had a regional, not global, effect on the extinction event.[281] In response, Luis Alvarez rejected volcanic activity as an explanation for the iridium layer and the extinction as a whole.[282] Since then, however, most researchers have adopted a more moderate position, which identifies the Chicxulub impact as the primary progenitor of the extinction while also recognizing that the Deccan Traps may also have played a role. Walter Alvarez himself has acknowledged that the Deccan Traps and other ecological factors may have contributed to the extinctions in addition to the Chicxulub impact.[283] Some estimates have placed the start of the second phase in the Deccan Traps eruptions within 50,000 years after the Chicxulub impact.[284] Combined with mathematical modelling of the seismic waves that would have been generated by the impact, this has led to the suggestion that the Chicxulub impact may have triggered these eruptions by increasing the permeability of the mantle plume underlying the Deccan Traps.[285][286]

Whether the Deccan Traps were a major cause of the extinction, on par with the Chicxulub impact, remains uncertain. Proponents consider the climatic impact of the sulphur dioxide released to have been on par with the Chicxulub impact, and also note the role of flood basalt volcanism in other mass extinctions like the Permian-Triassic extinction event.[287][288] They consider the Chicxulub impact to have worsened the ongoing climate change caused by the eruptions.[289] Meanwhile, detractors point out the sudden nature of the extinction and that other pulses in Deccan Traps activity of comparable magnitude did not appear to have caused extinctions. They also contend that the causes of different mass extinctions should be assessed separately.[290] In 2020, Alfio Chiarenza and colleagues suggested that the Deccan Traps may even have had the opposite effect: they suggested that the long-term warming caused by its carbon dioxide emissions may have dampened the impact winter from the Chicxulub impact.[264]

Possible Paleocene survivors

Non-avian dinosaur remains have occasionally been found above the K-Pg boundary. In 2000, Spencer Lucas and colleagues reported the discovery of a single hadrosaur right femur in the San Juan Basin of New Mexico, and described it as evidence of Paleocene dinosaurs. The rock unit in which the bone was discovered has been dated to the early Paleocene epoch, approximately 64.8 million years ago.[291] If the bone was not re-deposited by weathering action, it would provide evidence that some dinosaur populations may have survived at least half a million years into the Cenozoic.[292] Other evidence includes the presence of dinosaur remains in the Hell Creek Formation up to 1.3 m (4.3 ft) above the Cretaceous–Paleogene boundary, representing 40,000 years of elapsed time. This has been used to support the view that the K-Pg extinction was gradual.[293] However, these supposed Paleocene dinosaurs are considered by many other researchers to be reworked, that is, washed out of their original locations and then re-buried in younger sediments.[294][295][296] The age estimates have also been considered unreliable.[297]

Cultural depictions

By human standards, dinosaurs were creatures of fantastic appearance and often enormous size. As such, they have captured the popular imagination and become an enduring part of human culture. The entry of the word "dinosaur" into the common vernacular reflects the animals' cultural importance: in English, "dinosaur" is commonly used to describe anything that is impractically large, obsolete, or bound for extinction.[298]

Outdated *Iguanodon* statues created by Benjamin Waterhouse Hawkins for the Crystal Palace Park in 1853

Public enthusiasm for dinosaurs first developed in Victorian England, where in 1854, three decades after the first scientific descriptions of dinosaur remains, a menagerie of lifelike dinosaur sculptures was unveiled in London's Crystal Palace Park. The Crystal Palace dinosaurs proved so popular that a strong market in smaller replicas soon developed. In subsequent decades, dinosaur exhibits opened at parks and museums around the world, ensuring that successive generations would be introduced to the animals in an immersive and exciting way.[299] The enduring popularity of dinosaurs, in its turn, has resulted in significant public funding for dinosaur science, and has frequently spurred new discoveries. In the United States, for example, the competition between museums for public attention led directly to the Bone Wars of the 1880s and 1890s, during which a pair of feuding paleontologists made enormous scientific contributions.[300]

The battles that may have occurred between *Tyrannosaurus* and *Triceratops* are a recurring theme in popular science and dinosaurs' depiction in culture

The popular preoccupation with dinosaurs has ensured their appearance in literature, film, and other media. Beginning in 1852 with a passing mention in Charles Dickens' *Bleak House*,[301] dinosaurs have been featured in large numbers of fictional works. Jules Verne's 1864 novel *Journey to the Center of the Earth*, Sir Arthur Conan Doyle's 1912 book *The Lost World*, the 1914 animated film Gertie the Dinosaur (featuring the first animated dinosaur), the iconic 1933 film *King Kong*, the 1954 *Godzilla* and its many sequels, the best-selling 1990 novel *Jurassic Park* by Michael Crichton and its 1993 film adaptation are just a few notable examples of dinosaur appearances in fiction. Authors of general-interest non-fiction works about dinosaurs, including some prominent paleontologists, have often sought to use the animals as a way to educate readers about science in general. Dinosaurs are ubiquitous in advertising; numerous companies have referenced dinosaurs in printed or televised advertisements, either in order to sell their own products or in order to characterize their rivals as slow-moving, dim-witted, or obsolete.[302][303]

See also

- Dinosaur diet and feeding
- Evolutionary history of life
- Lists of dinosaur-bearing stratigraphic units
- List of dinosaur genera
- List of bird genera
- List of birds
- List of informally named dinosaurs

Further reading

- University of Southampton (September 29, 2021). "Two New Species of Large Predatory Dinosaur With Crocodile-Like Skulls Discovered on Isle of Wight" (https://scitechdaily.com/t

wo-new-species-of-large-predatory-dinosaur-with-crocodile-like-skulls-discovered-on-isle-of-wight/). *SciTechDaily*.

- Zhou, Zhonghe (October 2004). "The origin and early evolution of birds: discoveries, disputes, and perspectives from fossil evidence" (https://web.archive.org/web/20110721144552/http://www.cisneros-heredia.org/infotrans/usfq/ornitofauna/pdfs/zhou2004.pdf) (PDF). *Naturwissenschaften*. Berlin: Springer Science+Business Media. **91** (10): 455–471. Bibcode:2004NW.....91..455Z (https://ui.adsabs.harvard.edu/abs/2004NW.....91..455Z). doi:10.1007/s00114-004-0570-4 (https://doi.org/10.1007%2Fs00114-004-0570-4). ISSN 0028-1042 (https://www.worldcat.org/issn/0028-1042). PMID 15365634 (https://pubmed.ncbi.nlm.nih.gov/15365634). S2CID 3329625 (https://api.semanticscholar.org/CorpusID:3329625). Archived from the original (http://www.cisneros-heredia.org/infotrans/usfq/ornitofauna/pdfs/zhou2004.pdf) (PDF) on July 21, 2011. Retrieved November 6, 2019.
- Paul, Gregory S. (2002). *Dinosaurs of the Air: The Evolution and Loss of Flight in Dinosaurs and Birds* (https://archive.org/details/dinosaursofairev0000paul). Baltimore; London: Johns Hopkins University Press. ISBN 978-0-8018-6763-7. LCCN 2001000242 (https://lccn.loc.gov/2001000242). OCLC 1088130487 (https://www.worldcat.org/oclc/1088130487)..
- Stewart, Tabori & Chang (1997). *The Humongous Book of Dinosaurs*. New York: Stewart, Tabori & Chang. ISBN 978-1-55670-596-0. LCCN 97000398 (https://lccn.loc.gov/97000398). OCLC 1037269801 (https://www.worldcat.org/oclc/1037269801).
- Sternberg, Charles Mortram (1966) [Original edition published by E. Cloutier, printer to the King, 1946]. *Canadian Dinosaurs*. Geological Series. Vol. 54 (2nd ed.). Ottawa: National Museum of Canada. LCCN gs46000214 (https://lccn.loc.gov/gs46000214). OCLC 1032865683 (https://www.worldcat.org/oclc/1032865683).

Notes

1. Dinosaurs (including birds) are members of the natural group Reptilia. Their biology does not precisely correspond to the antiquated class Reptilia of Linnaean taxonomy, consisting of cold-blooded amniotes without fur or feathers. As Linnean taxonomy was formulated for modern animals prior to the study of evolution and paleontology, it fails to account for extinct animals with intermediate traits between traditional classes.

Bibliography

- Alvarez, Walter (1997). *T. rex and the Crater of Doom* (https://archive.org/details/trexcraterofdoo000alva). Princeton, NJ: Princeton University Press. ISBN 978-0-691-01630-6. LCCN 96049208 (https://lccn.loc.gov/96049208). OCLC 1007846558 (https://www.worldcat.org/oclc/1007846558). Retrieved November 4, 2019.
- Bakker, Robert T. (1986). *The Dinosaur Heresies: New Theories Unlocking the Mystery of the Dinosaurs and Their Extinction* (https://archive.org/details/dinosaurheresies00robe). New York: William Morrow and Company. ISBN 978-0-688-04287-5. LCCN 86012643 (https://lccn.loc.gov/86012643). OCLC 13699558 (https://www.worldcat.org/oclc/13699558). Retrieved November 6, 2019.
- Benton, Michael J. (2005). *Vertebrate Palaeontology* (https://archive.org/details/VertebratePalaeontology) (3rd ed.). Malden, MA: Blackwell Publishing. ISBN 978-0-632-05637-8. LCCN 2003028152 (https://lccn.loc.gov/2003028152). OCLC 53970617 (https://www.worldcat.org/oclc/53970617). Retrieved October 30, 2019.

- Brusatte, Stephen L. (2012). Benton, Michael J. (ed.). *Dinosaur Paleobiology*. Topics in Paleobiology. Foreword by Michael J. Benton. Hoboken, NJ: Wiley-Blackwell. doi:10.1002/9781118274071 (https://doi.org/10.1002%2F9781118274071). ISBN 978-0-470-65658-7. LCCN 2011050466 (https://lccn.loc.gov/2011050466). OCLC 781864955 (https://www.worldcat.org/oclc/781864955).
- Chiappe, Luis M.; Witmer, Lawrence M., eds. (2002). *Mesozoic Birds: Above the Heads of Dinosaurs*. Berkeley: University of California Press. ISBN 978-0-520-20094-4. LCCN 2001044600 (https://lccn.loc.gov/2001044600). OCLC 901747962 (https://www.worldcat.org/oclc/901747962).
- Colbert, Edwin H. (1971) [Originally published, New York: E. P. Dutton, 1968; London: Evans Brothers Ltd, 1969]. *Men and Dinosaurs: The Search in Field and Laboratory* (https://archive.org/details/mendinosaurssear00colb). Harmondsworth: Penguin. ISBN 978-0-14-021288-4. OCLC 16208760 (https://www.worldcat.org/oclc/16208760). Retrieved October 31, 2019.
- Cowen, Richard (2005). *History of Life* (4th ed.). Malden, MA: Blackwell Publishing. ISBN 978-1-4051-1756-2. LCCN 2003027993 (https://lccn.loc.gov/2003027993). OCLC 53970577 (https://www.worldcat.org/oclc/53970577). The 5th edition of the book is available from the Internet Archive (https://archive.org/details/History_of_Life_5th_Edition_by_Richard_Cowen). Retrieved 2019-10-19.
- Currie, Philip J.; Padian, Kevin, eds. (1997). *Encyclopedia of Dinosaurs* (https://archive.org/details/EncyclopediaOfDinosaurs). San Diego, CA: Academic Press. ISBN 978-0-12-226810-6. LCCN 97023430 (https://lccn.loc.gov/97023430). OCLC 436848919 (https://www.worldcat.org/oclc/436848919). Retrieved October 30, 2019.
- Currie, Philip J.; Koppelhus, Eva B.; Shugar, Martin A.; Wright, Joanna L., eds. (2004). *Feathered Dragons: Studies on the Transition from Dinosaurs to Birds*. Life of the Past. Bloomington, IN: Indiana University Press. ISBN 978-0-253-34373-4. LCCN 2003019035 (https://lccn.loc.gov/2003019035). OCLC 52942941 (https://www.worldcat.org/oclc/52942941).
- Curry Rogers, Kristina A.; Wilson, Jeffrey A., eds. (2005). *The Sauropods: Evolution and Paleobiology*. Berkeley: University of California Press. ISBN 978-0-520-24623-2. LCCN 2005010624 (https://lccn.loc.gov/2005010624). OCLC 879179542 (https://www.worldcat.org/oclc/879179542).
- Desmond, Adrian J. (1975). *The Hot-Blooded Dinosaurs: A Revolution in Palaeontology* (https://archive.org/details/hotbloodeddinosa00desm). London: Blond & Briggs. ISBN 978-0-8037-3755-6. LCCN 76359907 (https://lccn.loc.gov/76359907). OL 4933052M (https://openlibrary.org/books/OL4933052M). Retrieved October 30, 2019.
- Dickens, Charles (1853). *Bleak House* (https://archive.org/details/bleakhouse00dick/page/n7). London: Bradbury and Evans. Retrieved November 7, 2019.
- Dodson, Peter; Gingerich, Philip D., eds. (1993). "Functional Morphology and Evolution". *The American Journal of Science and Arts*. A special volume of the American Journal of Science. New Haven, CT: Kline Geology Laboratory, Yale University. 293-A. ISSN 0002-9599 (https://www.worldcat.org/issn/0002-9599). OCLC 27781160 (https://www.worldcat.org/oclc/27781160).
- Dong, Zhiming (1992). *Dinosaurian Faunas of China* (English ed.). Beijing; Berlin; New York: China Ocean Press; Springer-Verlag. ISBN 978-3-540-52084-9. LCCN 92207835 (https://lccn.loc.gov/92207835). OCLC 26522845 (https://www.worldcat.org/oclc/26522845).
- Dyke, Gareth; Kaiser, Gary, eds. (2011). *Living Dinosaurs: The Evolutionary History of Modern Birds*. Chichester; Hoboken, NJ: Wiley-Blackwell. ISBN 978-0-470-65666-2. LCCN 2010043277 (https://lccn.loc.gov/2010043277). OCLC 729724640 (https://www.worldcat.org/oclc/729724640).

- Farlow, James O.; Brett-Surman, M.K., eds. (1997). *The Complete Dinosaur* (https://archive.org/details/isbn_9780253333490). Bloomington, IN: Indiana University Press. ISBN 978-0-253-33349-0. LCCN 97-23698 (https://lccn.loc.gov/97-23698). OCLC 924985811 (https://www.worldcat.org/oclc/924985811). Retrieved October 14, 2019.
- Foster, John R.; Lucas, Spencer G., eds. (2006). "Paleontology and Geology of the Upper Jurassic Morrison Formation" (https://econtent.unm.edu/digital/collection/bulletins/id/803). *Bulletin of the New Mexico Museum of Natural History and Science*. New Mexico Museum of Natural History and Science Bulletin. Albuquerque, NM: New Mexico Museum of Natural History and Science. **36**. ISSN 1524-4156 (https://www.worldcat.org/issn/1524-4156). OCLC 77520577 (https://www.worldcat.org/oclc/77520577). Retrieved October 21, 2019.
- Glut, Donald F. (1997). *Dinosaurs: The Encyclopedia*. Foreword by Michael K. Brett-Surman. Jefferson, NC: McFarland & Company. ISBN 978-0-89950-917-4. LCCN 95047668 (https://lccn.loc.gov/95047668). OCLC 33665881 (https://www.worldcat.org/oclc/33665881).
- Gunther, Robert Theodore, ed. (1968) [First printed in Oxford 1945]. *Life and Letters of Edward Lhwyd* (https://archive.org/details/earlyscienceinox14gunt/page/n3). Early Science in Oxford. Vol. XIV. Preface by Albert Everard Gunther (Reprint ed.). London: Dawsons of Pall Mall. ISBN 978-0-7129-0292-2. LCCN 22005926 (https://lccn.loc.gov/22005926). OCLC 43529321 (https://www.worldcat.org/oclc/43529321). Retrieved November 4, 2019.
- Hansell, Mike (2000). *Bird Nests and Construction Behaviour* (https://archive.org/details/birdnestsconstru0000hans). Pen and ink illustration by Raith Overhill. Cambridge: University of Cambridge Press. ISBN 978-0-521-46038-5. LCCN 99087681 (https://lccn.loc.gov/99087681). OCLC 876286627 (https://www.worldcat.org/oclc/876286627). Retrieved October 30, 2019.
- Heilmann, Gerhard (1926). *The Origin of Birds*. London; New York: H. F. & G. Witherby; D. Appleton & Company. LCCN 27001127 (https://lccn.loc.gov/27001127). OCLC 606021642 (https://www.worldcat.org/oclc/606021642).
- Holmes, Thom (1998). *Fossil Feud: The Rivalry of the First American Dinosaur Hunters* (https://archive.org/details/isbn_9790382391483_c8k9). Parsippany, NJ: Julian Messner. ISBN 978-0-382-39149-1. LCCN 96013610 (https://lccn.loc.gov/96013610). OCLC 34472600 (https://www.worldcat.org/oclc/34472600).
- Holtz, Thomas R. Jr. (2007). *Dinosaurs: The Most Complete, Up-to-Date Encyclopedia for Dinosaur Lovers of All Ages* (https://archive.org/details/dinosaursmostcom00holt). Illustrated by Luis V. Rey. New York: Random House. ISBN 978-0-375-82419-7. LCCN 2006102491 (https://lccn.loc.gov/2006102491). OCLC 77486015 (https://www.worldcat.org/oclc/77486015). Retrieved October 22, 2019.
- Lambert, David; The Diagram Group (1990). *The Dinosaur Data Book: The Definitive, Fully Illustrated Encyclopedia of Dinosaurs* (https://archive.org/details/dinosaurdatabook00lamb). New York: Avon Books. ISBN 978-0-380-75896-8. LCCN 89092487 (https://lccn.loc.gov/89092487). OCLC 21833417 (https://www.worldcat.org/oclc/21833417). Retrieved October 14, 2019.
- Lessem, Don; Glut, Donald F. (1993). *The Dinosaur Society's Dinosaur Encyclopedia* (https://archive.org/details/dinosaursocietys00less). Illustrations by Tracy Lee Ford; scientific advisors, Peter Dodson, et al. New York: Random House. ISBN 978-0-679-41770-5. LCCN 94117716 (https://lccn.loc.gov/94117716). OCLC 30361459 (https://www.worldcat.org/oclc/30361459). Retrieved October 30, 2019.
- Lhuyd, Edward (1699). *Lithophylacii Britannici ichnographia* (http://lhldigital.lindahall.org/cdm/ref/collection/earththeory/id/1913) [*British figured stones*]. London: Ex Officina M.C. Retrieved November 4, 2019.

- Mayr, Gerald (2009). *Paleogene Fossil Birds* (https://archive.org/details/PaleogeneFossilBirds). Berlin: Springer-Verlag. doi:10.1007/978-3-540-89628-9 (https://doi.org/10.1007%2F978-3-540-89628-9). ISBN 978-3-540-89627-2. LCCN 2008940962 (https://lccn.loc.gov/2008940962). OCLC 916182693 (https://www.worldcat.org/oclc/916182693). Retrieved October 30, 2019.
- Norell, Mark; Gaffney, Eugene S.; Dingus, Lowell (2000) [Originally published as *Discovering Dinosaurs in the American Museum of Natural History*. New York: Knopf, 1995]. *Discovering Dinosaurs: Evolution, Extinction, and the Lessons of Prehistory* (https://archive.org/details/discoveringdinos00nore) (Revised ed.). Berkeley: University of California Press. ISBN 978-0-520-22501-5. LCCN 99053335 (https://lccn.loc.gov/99053335). OCLC 977125867 (https://www.worldcat.org/oclc/977125867). Retrieved October 30, 2019.
- Olshevsky, George (2000). *An Annotated Checklist of Dinosaur Species by Continent*. Mesozoic Meanderings. Vol. 3. Illustrated by Tracy Lee Ford. San Diego, CA: Publications Requiring Research. ISSN 0271-9428 (https://www.worldcat.org/issn/0271-9428). LCCN 00708700 (https://lccn.loc.gov/00708700). OCLC 44433611 (https://www.worldcat.org/oclc/44433611).
- Owen, Richard (1842). "Report on British Fossil Reptiles. Part II" (https://archive.org/details/reportofeleventh42lond/page/n99). *Report of the Eleventh Meeting of the British Association for the Advancement of Science; Held at Plymouth in July 1841* (https://archive.org/details/reportofeleventh42lond). London: John Murray. pp. 60 (https://archive.org/details/reportofeleventh42lond/page/60)–204. ISBN 978-0-8201-1526-9. LCCN 99030427 (https://lccn.loc.gov/99030427). OCLC 1015526268 (https://www.worldcat.org/oclc/1015526268). Retrieved October 13, 2019.
- Padian, Kevin, ed. (1986). *The Origin of Birds and the Evolution of Flight*. Memoirs of the California Academy of Sciences. Vol. 8. San Francisco, CA: California Academy of Sciences. ISBN 978-0-940228-14-6. OCLC 946083441 (https://www.worldcat.org/oclc/946083441). OL 9826926M (https://openlibrary.org/books/OL9826926M).
- Parsons, Keith M. (2001). *Drawing out Leviathan: Dinosaurs and the Science Wars* (https://archive.org/details/drawingoutleviat0000pars). Life in the Past. Bloomington, IN: Indiana University Press. ISBN 978-0-253-33937-9. LCCN 2001016803 (https://lccn.loc.gov/2001016803). OCLC 50174737 (https://www.worldcat.org/oclc/50174737). Retrieved October 30, 2019.
- Paul, Gregory S. (1988). *Predatory Dinosaurs of the World: A Complete Illustrated Guide* (https://archive.org/details/predatorydinosaursoftheworld1988). New York: Simon & Schuster. ISBN 978-0-671-61946-6. LCCN 88023052 (https://lccn.loc.gov/88023052). OCLC 859819093 (https://www.worldcat.org/oclc/859819093). Retrieved October 30, 2019.
- Paul, Gregory S., ed. (2000). *The Scientific American Book of Dinosaurs* (1st ed.). New York: St. Martin's Press. ISBN 978-0-312-26226-6. LCCN 2001269051 (https://lccn.loc.gov/2001269051). OCLC 45256074 (https://www.worldcat.org/oclc/45256074).
- Paul, Gregory S. (2010). *The Princeton Field Guide to Dinosaurs*. Princeton Field Guides. Princeton, NJ: Princeton University Press. ISBN 978-0-691-13720-9. LCCN 2010014916 (https://lccn.loc.gov/2010014916). OCLC 907619291 (https://www.worldcat.org/oclc/907619291).
- Plot, Robert (1677). *The Natural History of Oxford-shire: Being an Essay toward the Natural History of England* (https://archive.org/details/naturalhistoryo00plot/page/n9). *Printed at the Theater in OXFORD, and are to be had there: And in London at Mr. S. Millers, at the Star near the West-end of St. Pauls Church-yard*. Oxford; London. LCCN 11004267 (https://lccn.loc.gov/11004267). OCLC 933062622 (https://www.worldcat.org/oclc/933062622). Retrieved November 13, 2019.

- Randall, Lisa (2015). *Dark Matter and the Dinosaurs: The Astounding Interconnectedness of the Universe*. New York: HarperCollins: Ecco. ISBN 978-0-06-232847-2. LCCN 2016427646 (https://lccn.loc.gov/2016427646). OCLC 962371431 (https://www.worldcat.org/oclc/962371431).
- Rupke, Nicolaas A. (1994). *Richard Owen: Victorian Naturalist* (https://archive.org/details/richardowenvicto00rupk). New Haven: Yale University Press. ISBN 978-0-300-05820-8. LCCN 93005739 (https://lccn.loc.gov/93005739). OCLC 844183804 (https://www.worldcat.org/oclc/844183804). Retrieved November 5, 2019.
- Sarjeant, William A.S., ed. (1995). *Vertebrate Fossils and the Evolution of Scientific Concepts: Writings in Tribute to Beverly Halstead, by Some of His Many Friends*. *Modern Geology*. Amsterdam: Gordon and Breach Publishers. ISBN 978-2-88124-996-9. ISSN 0026-7775 (https://www.worldcat.org/issn/0026-7775). LCCN 00500382 (https://lccn.loc.gov/00500382). OCLC 34672546 (https://www.worldcat.org/oclc/34672546). "Reprint of papers published in a special volume of Modern geology [v. 18 (Halstead memorial volume), 1993], with five additional contributions.--Pref."
- Tanner, Lawrence H.; Spielmann, Justin A.; Lucas, Spencer G., eds. (2013). "The Triassic System: New Developments in Stratigraphy and Paleontology" (https://econtent.unm.edu/digital/collection/bulletins/id/1645/rec/1). *Bulletin of the New Mexico Museum of Natural History and Science*. New Mexico Museum of Natural History and Science Bulletin. Albuquerque, NM: New Mexico Museum of Natural History and Science. **61**. ISSN 1524-4156 (https://www.worldcat.org/issn/1524-4156). OCLC 852432407 (https://www.worldcat.org/oclc/852432407). Retrieved October 21, 2019.
- Weishampel, David B.; Dodson, Peter; Osmólska, Halszka, eds. (2004). *The Dinosauria* (2nd ed.). Berkeley: University of California Press. ISBN 978-0-520-25408-4. LCCN 2004049804 (https://lccn.loc.gov/2004049804). OCLC 154697781 (https://www.worldcat.org/oclc/154697781).

References

1. Matthew G. Baron; Megan E. Williams (2018). "A re-evaluation of the enigmatic dinosauriform Caseosaurus crosbyensis from the Late Triassic of Texas, USA and its implications for early dinosaur evolution". Acta Palaeontologica Polonica. 63. doi:10.4202/app.00372.2017 (https://doi.org/10.4202%2Fapp.00372.2017).
2. Andrea Cau (2018). "The assembly of the avian body plan: a 160-million-year long process" (PDF). Bollettino della Società Paleontologica Italiana. 57 (1): 1–25. doi:10.4435/BSPI.2018.01 (https://doi.org/10.4435%2FBSPI.2018.01).
3. Ferigolo, Jorge; Langer, Max C. (January 1, 2007). "A Late Triassic dinosauriform from south Brazil and the origin of the ornithischian predentary bone" (https://doi.org/10.1080/08912960600845767). *Historical Biology*. **19** (1): 23–33. doi:10.1080/08912960600845767 (https://doi.org/10.1080%2F08912960600845767). ISSN 0891-2963 (https://www.worldcat.org/issn/0891-2963). S2CID 85819339 (https://api.semanticscholar.org/CorpusID:85819339).
4. Langer, Max C.; Ferigolo, Jorge (January 1, 2013). "The Late Triassic dinosauromorph *Sacisaurus agudoensis* (Caturrita Formation; Rio Grande do Sul, Brazil): anatomy and affinities" (https://sp.lyellcollection.org/content/379/1/353). *Geological Society, London, Special Publications*. **379** (1): 353–392. Bibcode:2013GSLSP.379..353L (https://ui.adsabs.harvard.edu/abs/2013GSLSP.379..353L). doi:10.1144/SP379.16 (https://doi.org/10.1144%2FSP379.16). ISSN 0305-8719 (https://www.worldcat.org/issn/0305-8719). S2CID 131414332 (https://api.semanticscholar.org/CorpusID:131414332).

5. Cabreira, S.F.; Kellner, A.W.A.; Dias-da-Silva, S.; da Silva, L.R.; Bronzati, M.; de Almeida Marsola, J.C.; Müller, R.T.; de Souza Bittencourt, J.; Batista, B.J.; Raugust, T.; Carrilho, R.; Brodt, A.; Langer, M.C. (2016). "A Unique Late Triassic Dinosauromorph Assemblage Reveals Dinosaur Ancestral Anatomy and Diet" (https://doi.org/10.1016%2Fj.cub.2016.09.040). *Current Biology*. **26** (22): 3090–3095. doi:10.1016/j.cub.2016.09.040 (https://doi.org/10.1016%2Fj.cub.2016.09.040). PMID 27839975 (https://pubmed.ncbi.nlm.nih.gov/27839975).
6. Müller, Rodrigo Temp; Garcia, Maurício Silva (August 26, 2020). "A paraphyletic 'Silesauridae' as an alternative hypothesis for the initial radiation of ornithischian dinosaurs" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7480155). *Biology Letters*. **16** (8): 20200417. doi:10.1098/rsbl.2020.0417 (https://doi.org/10.1098%2Frsbl.2020.0417). PMC 7480155 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7480155). PMID 32842895 (https://pubmed.ncbi.nlm.nih.gov/32842895).
7. Weishampel, Dodson & Osmólska 2004, pp. 7–19, chpt. 1: "Origin and Relationships of Dinosauria" by Michael J. Benton.
8. Olshevsky 2000
9. Langer, Max C.; Ezcurra, Martin D.; Bittencourt, Jonathas S.; Novas, Fernando E. (February 2010). "The origin and early evolution of dinosaurs". *Biological Reviews*. Cambridge: Cambridge Philosophical Society. **85** (1): 65–66, 82. doi:10.1111/j.1469-185x.2009.00094.x (https://doi.org/10.1111%2Fj.1469-185x.2009.00094.x). ISSN 1464-7931 (https://www.worldcat.org/issn/1464-7931). PMID 19895605 (https://pubmed.ncbi.nlm.nih.gov/19895605). S2CID 34530296 (https://api.semanticscholar.org/CorpusID:34530296).
10. "Using the tree for classification" (https://evolution.berkeley.edu/evolibrary/article/evo_10). *Understanding Evolution*. Berkeley: University of California. Archived (https://web.archive.org/web/20190831003846/https://evolution.berkeley.edu/evolibrary/article/evo_10) from the original on August 31, 2019. Retrieved October 14, 2019.
11. Weishampel, Dodson & Osmólska 2004, pp. 210–231, chpt. 11: "Basal Avialae" by Kevin Padian.
12. Wade, Nicholas (March 22, 2017). "Shaking Up the Dinosaur Family Tree" (https://www.nytimes.com/2017/03/22/science/dinosaur-family-tree.html). *The New York Times*. New York. ISSN 0362-4331 (https://www.worldcat.org/issn/0362-4331). Archived (https://web.archive.org/web/20180407234942/https://www.nytimes.com/2017/03/22/science/dinosaur-family-tree.html) from the original on April 7, 2018. Retrieved October 30, 2019. "A version of this article appears in print on March 28, 2017, on Page D6 of the New York edition with the headline: Shaking Up the Dinosaur Family Tree."
13. Baron, Matthew G.; Norman, David B.; Barrett, Paul M. (2017). "A new hypothesis of dinosaur relationships and early dinosaur evolution". *Nature*. London: Nature Research. **543** (7646): 501–506. Bibcode:2017Natur.543..501B (https://ui.adsabs.harvard.edu/abs/2017Natur.543..501B). doi:10.1038/nature21700 (https://doi.org/10.1038%2Fnature21700). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). PMID 28332513 (https://pubmed.ncbi.nlm.nih.gov/28332513). S2CID 205254710 (https://api.semanticscholar.org/CorpusID:205254710). "This file contains Supplementary Text and Data, Supplementary Tables 1-3 and additional references.": Supplementary Information (https://media.nature.com/original/nature-assets/nature/journal/v543/n7646/extref/nature21700-s1.pdf)
14. Glut 1997, p. 40
15. Chamary, JV (September 30, 2014). "Dinosaurs, Pterosaurs And Other Saurs – Big Differences" (https://www.forbes.com/sites/jvchamary/2014/09/30/dinosaurs/). *Forbes*. Jersey City, NJ. ISSN 0015-6914 (https://www.worldcat.org/issn/0015-6914). Archived (https://web.archive.org/web/20141110172257/https://www.forbes.com/sites/jvchamary/2014/09/30/dinosaurs/) from the original on November 10, 2014. Retrieved October 2, 2018.
16. Lambert & The Diagram Group 1990, p. 288 (https://archive.org/details/dinosaurdatabook00lamb/page/288)

17. Farlow & Brett-Surman 1997, pp. 607–624 (https://archive.org/details/isbn_9780253333490/page/607), chpt. 39: "Major Groups of Non-Dinosaurian Vertebrates of the Mesozoic Era" by Michael Morales.
18. Tennant, Jonathan; Chiarenza, Alfio; Baron, Matthew (2017). "How has our knowledge of dinosaur diversity through geologic time changed through research history?". *Center for Open Science*. doi:10.17605/OSF.IO/NUHQX (https://doi.org/10.17605%2FOSF.IO%2FNUHQX).
19. Starrfelt, Jostein; Liow, Lee Hsiang (2016). "How many dinosaur species were there? Fossil bias and true richness estimated using a Poisson sampling model" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4810813). *Philosophical Transactions of the Royal Society B: Biological Sciences*. **371** (1691): 20150219. doi:10.1098/rstb.2015.0219 (https://doi.org/10.1098%2Frstb.2015.0219). PMC 4810813 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4810813). PMID 26977060 (https://pubmed.ncbi.nlm.nih.gov/26977060).
20. Wang, Steve C.; Dodson, Peter (2006). "Estimating the diversity of dinosaurs" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1564218). *Proc. Natl. Acad. Sci. U.S.A.* Washington, D.C.: National Academy of Sciences. **103** (37): 13601–13605. Bibcode:2006PNAS..10313601W (https://ui.adsabs.harvard.edu/abs/2006PNAS..10313601W). doi:10.1073/pnas.0606028103 (https://doi.org/10.1073%2Fpnas.0606028103). ISSN 0027-8424 (https://www.worldcat.org/issn/0027-8424). PMC 1564218 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1564218). PMID 16954187 (https://pubmed.ncbi.nlm.nih.gov/16954187).
21. Russell, Dale A. (1995). "China and the lost worlds of the dinosaurian era". *Historical Biology*. Milton Park, Oxfordshire: Taylor & Francis. **10** (1): 3–12. doi:10.1080/10292389509380510 (https://doi.org/10.1080%2F10292389509380510). ISSN 0891-2963 (https://www.worldcat.org/issn/0891-2963).
22. Starrfelt, Jostein; Liow, Lee Hsiang (2016). "How many dinosaur species were there? Fossil bias and true richness estimated using a Poisson sampling model" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4810813). *Philosophical Transactions of the Royal Society B*. London: Royal Society. **371** (1691): 20150219. doi:10.1098/rstb.2015.0219 (https://doi.org/10.1098%2Frstb.2015.0219). ISSN 0962-8436 (https://www.worldcat.org/issn/0962-8436). PMC 4810813 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4810813). PMID 26977060 (https://pubmed.ncbi.nlm.nih.gov/26977060).
23. Black, Riley (March 23, 2016). "Most Dinosaur Species Are Still Undiscovered" (https://www.nationalgeographic.com/science/article/most-dinosaur-species-are-still-undiscovered/). *National Geographic News*. Archived (https://web.archive.org/web/20210306214843/https://www.nationalgeographic.com/science/article/most-dinosaur-species-are-still-undiscovered/) from the original on March 6, 2021. Retrieved June 6, 2021.
24. Gill, F.; Donsker, D.; Rasmussen, P. (2021). "Welcome" (https://www.worldbirdnames.org/new/). *IOC World Bird List 11.1*.
25. MacLeod, Norman; Rawson, Peter F.; Forey, Peter L.; et al. (1997). "The Cretaceous–Tertiary biotic transition". *Journal of the Geological Society*. London: Geological Society of London. **154** (2): 265–292. Bibcode:1997JGSoc.154..265M (https://ui.adsabs.harvard.edu/abs/1997JGSoc.154..265M). doi:10.1144/gsjgs.154.2.0265 (https://doi.org/10.1144%2Fgsjgs.154.2.0265). ISSN 0016-7649 (https://www.worldcat.org/issn/0016-7649). S2CID 129654916 (https://api.semanticscholar.org/CorpusID:129654916).
26. Amiot, Romain; Buffetaut, Éric; Lécuyer, Christophe; et al. (2010). "Oxygen isotope evidence for semi-aquatic habits among spinosaurid theropods". *Geology*. Boulder, CO: Geological Society of America. **38** (2): 139–142. Bibcode:2010Geo....38..139A (https://ui.adsabs.harvard.edu/abs/2010Geo....38..139A). doi:10.1130/G30402.1 (https://doi.org/10.1130%2FG30402.1). ISSN 0091-7613 (https://www.worldcat.org/issn/0091-7613).
27. Brusatte 2012, pp. 9–20, 21

28. Nesbitt, Sterling J. (2011). "The Early Evolution of Archosaurs: Relationships and the Origin of Major Clades" (https://digitallibrary.amnh.org/handle/2246/6112). *Bulletin of the American Museum of Natural History*. New York: American Museum of Natural History. **2011** (352): 1–292. doi:10.1206/352.1 (https://doi.org/10.1206%2F352.1). hdl:2246/6112 (https://hdl.handle.net/2246%2F6112). ISSN 0003-0090 (https://www.worldcat.org/issn/0003-0090). S2CID 83493714 (https://api.semanticscholar.org/CorpusID:83493714). Archived (https://web.archive.org/web/20160229033931/http://digitallibrary.amnh.org/bitstream/handle/2246/6112/B352.pdf;jsessionid=C1B603CA5B82D148EE4EEE133B7DCD74?sequence=1) from the original on February 29, 2016. Retrieved October 16, 2019.
29. Paul 2000, pp. 140–168, chpt. 3: "Classification and Evolution of the Dinosaur Groups" by Thomas R. Holtz Jr.
30. Smith, Dave; et al. "Dinosauria: Morphology" (https://ucmp.berkeley.edu/diapsids/dinomm.html). Berkeley: University of California Museum of Paleontology. Retrieved October 16, 2019.
31. Langer, Max C.; Abdala, Fernando; Richter, Martha; Benton, Michael J. (1999). "Un dinosaure sauropodomorphe dans le Trias supérieur (Carnien) du Sud du Brésil" [A sauropodomorph dinosaur from the Upper Triassic (Carman) of southern Brazil]. *Comptes Rendus de l'Académie des Sciences, Série IIA*. Amsterdam: Elsevier on behalf of the French Academy of Sciences. **329** (7): 511–517. Bibcode:1999CRASE.329..511L (https://ui.adsabs.harvard.edu/abs/1999CRASE.329..511L). doi:10.1016/S1251-8050(00)80025-7 (https://doi.org/10.1016%2FS1251-8050%2800%2980025-7). ISSN 1251-8050 (https://www.worldcat.org/issn/1251-8050).
32. Nesbitt, Sterling J.; Irmis, Randall B.; Parker, William G. (2007). "A critical re-evaluation of the Late Triassic dinosaur taxa of North America". *Journal of Systematic Palaeontology*. Milton Park, Oxfordshire: Taylor & Francis on behalf of the Natural History Museum, London. **5** (2): 209–243. doi:10.1017/S1477201907002040 (https://doi.org/10.1017%2FS1477201907002040). ISSN 1477-2019 (https://www.worldcat.org/issn/1477-2019). S2CID 28782207 (https://api.semanticscholar.org/CorpusID:28782207).
33. This was recognized not later than 1909: Celeskey, Matt (2005). "Dr. W. J. Holland and the Sprawling Sauropods" (https://web.archive.org/web/20110612180650/http://www.hmnh.org/library/diplodocus/holland1910.html). *The Hairy Museum of Natural History*. Archived from the original (http://www.hmnh.org/library/diplodocus/holland1910.html) on June 12, 2011. Retrieved October 18, 2019.
    - Holland, William J. (May 1910). "A Review of Some Recent Criticisms of the Restorations of Sauropod Dinosaurs Existing in the Museums of the United States, with Special Reference to that of *Diplodocus Carnegiei* in the Carnegie Museum" (https://archive.org/details/jstor-2455581). *The American Naturalist*. American Society of Naturalists. **44** (521): 259–283. doi:10.1086/279138 (https://doi.org/10.1086%2F279138). ISSN 0003-0147 (https://www.worldcat.org/issn/0003-0147). S2CID 84424110 (https://api.semanticscholar.org/CorpusID:84424110). Retrieved October 18, 2019.
    - The arguments and many of the images are also presented in Desmond 1975.
34. Benton 2005
35. Cowen 2005, pp. 151–175, chpt. 12: "Dinosaurs".
36. Kubo, Tai; Benton, Michael J. (November 2007). "Evolution of hindlimb posture in archosaurs: limb stresses in extinct vertebrates". *Palaeontology*. Hoboken, NJ: Wiley-Blackwell. **50** (6): 1519–1529. doi:10.1111/j.1475-4983.2007.00723.x (https://doi.org/10.1111%2Fj.1475-4983.2007.00723.x). ISSN 0031-0239 (https://www.worldcat.org/issn/0031-0239). S2CID 140698705 (https://api.semanticscholar.org/CorpusID:140698705).
37. Dong 1992

38. "Dinosaur bones 'used as medicine' " (https://news.bbc.co.uk/2/hi/asia-pacific/6276948.stm). *BBC News*. London: BBC. July 6, 2007. Archived (https://web.archive.org/web/20190827184635/https://news.bbc.co.uk/2/hi/asia-pacific/6276948.stm) from the original on August 27, 2019. Retrieved November 4, 2019.
39. Paul 2000, pp. 10–44, chpt. 1: "A Brief History of Dinosaur Paleontology" by Michael J. Benton.
40. Farlow & Brett-Surman 1997, pp. 3–11 (https://archive.org/details/isbn_9780253333490/page/3), chpt. 1: "The Earliest Discoveries" by William A.S. Sarjeant.
41. Plot 1677, pp. 131–139, illus. opp. p. 142, fig. 4
42. Plot 1677, p. [1] (https://archive.org/details/naturalhistoryo00plot/page/131/mode/1up)
43. "Robert Plot" (https://web.archive.org/web/20061001094736/http://www.oum.ox.ac.uk/learning/pdfs/plot.pdf) (PDF). *Learning more*. Oxford: Oxford University Museum of Natural History. 2006. Archived from the original (http://www.oum.ox.ac.uk/learning/pdfs/plot.pdf) (PDF) on October 1, 2006. Retrieved November 14, 2019.
44. Lhuyd 1699, p. 67
45. Delair, Justin B.; Sarjeant, William A.S. (2002). "The earliest discoveries of dinosaurs: the records re-examined". *Proceedings of the Geologists' Association*. Amsterdam: Elsevier on behalf of the Geologists' Association. **113** (3): 185–197. doi:10.1016/S0016-7878(02)80022-0 (https://doi.org/10.1016%2FS0016-7878%2802%2980022-0). ISSN 0016-7878 (https://www.worldcat.org/issn/0016-7878).
46. Gunther 1968
47. Buckland, William (1824). "Notice on the Megalosaurus or great Fossil Lizard of Stonesfield" (https://zenodo.org/record/1448577). *Transactions of the Geological Society of London*. London: Geological Society of London. **1** (2): 390–396. doi:10.1144/transgslb.1.2.390 (https://doi.org/10.1144%2Ftransgslb.1.2.390). ISSN 2042-5295 (https://www.worldcat.org/issn/2042-5295). S2CID 129920045 (https://api.semanticscholar.org/CorpusID:129920045). Archived (https://web.archive.org/web/20191021214509/https://zenodo.org/record/1448577/files/article.pdf) (PDF) from the original on October 21, 2019. Retrieved November 5, 2019.
48. Mantell, Gideon A. (1825). "Notice on the *Iguanodon*, a newly discovered fossil reptile, from the sandstone of Tilgate forest, in Sussex" (https://doi.org/10.1098%2Frstl.1825.0010). *Philosophical Transactions of the Royal Society of London*. London: Royal Society. **115**: 179–186. Bibcode:1825RSPT..115..179M (https://ui.adsabs.harvard.edu/abs/1825RSPT..115..179M). doi:10.1098/rstl.1825.0010 (https://doi.org/10.1098%2Frstl.1825.0010). ISSN 0261-0523 (https://www.worldcat.org/issn/0261-0523). JSTOR 107739 (https://www.jstor.org/stable/107739).
49. Farlow & Brett-Surman 1997, pp. 14 (https://archive.org/details/isbn_9780253333490/page/14), chpt. 2: "European Dinosaur Hunters" by Hans-Dieter Sues.
50. Owen 1842, p.103 (https://archive.org/details/reportofeleventh42lond/page/n141): "The combination of such characters ... will, it is presumed, be deemed sufficient ground for establishing a distinct tribe or sub-order of Saurian Reptiles, for which I would propose the name of *Dinosauria**. (*Gr. *δεινός*, fearfully great; *σαύρος*, a lizard. ...)
51. "Dinosauria" (https://www.merriam-webster.com/dictionary/Dinosauria). *Merriam-Webster Dictionary*. Retrieved November 10, 2019.
52. Crane, George R. (ed.). "Greek Dictionary Headword Search Results" (https://www.perseus.tufts.edu/hopper/resolveform?type=start&lookup=deino%2Fs&lang=greek). *Perseus 4.0*. Medford and Somerville, MA: Tufts University. Retrieved October 13, 2019. Lemma for 'δεινός (https://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.04.0057%3Aentry%3Ddeino%2Fs1)' from Henry George Liddell, Robert Scott, *A Greek-English Lexicon* (1940): 'fearful, terrible'.

53. Farlow & Brett-Surman 1997, pp. ix–xi (https://archive.org/details/isbn_9780253333490/page/n12), Preface, "Dinosaurs: The Terrestrial Superlative" by James O. Farlow and M.K. Brett-Surman.
54. Rupke 1994
55. Prieto-Marquez, Albert; Weishampel, David B.; Horner, John R. (March 2006). "The dinosaur *Hadrosaurus foulkii*, from the Campanian of the East Coast of North America, with a reevaluation of the genus" (https://app.pan.pl/archive/published/app51/app51-077.pdf) (PDF). *Acta Palaeontologica Polonica*. Warsaw: Institute of Paleobiology, Polish Academy of Sciences. **51** (1): 77–98. ISSN 0567-7920 (https://www.worldcat.org/issn/0567-7920). Archived (https://web.archive.org/web/20190622113255/https://app.pan.pl/archive/published/app51/app51-077.pdf) (PDF) from the original on June 22, 2019. Retrieved November 5, 2019.
56. Holmes 1998
57. Bakker 1986
58. Bakker, R.T. (1968). "The Superiority of Dinosaurs". *Discovery: Magazine of the Peabody Museum of Natural History*. **3** (2): 11–22. ISSN 0012-3625 (https://www.worldcat.org/issn/0012-3625). OCLC 297237777 (https://www.worldcat.org/oclc/297237777).
59. Bakker, R.T. (1972). "Anatomical and Ecological Evidence of Endothermy in Dinosaurs". *Nature*. **238** (5359): 81–85. Bibcode:1972Natur.238...81B (https://ui.adsabs.harvard.edu/abs/1972Natur.238...81B). doi:10.1038/238081a0 (https://doi.org/10.1038%2F238081a0). S2CID 4176132 (https://api.semanticscholar.org/CorpusID:4176132).
60. Arbour, Victoria (2018). "Results roll in from the dinosaur renaissance". *Science*. **360** (6389): 611. Bibcode:2018Sci...360..611A (https://ui.adsabs.harvard.edu/abs/2018Sci...360..611A). doi:10.1126/science.aat0451 (https://doi.org/10.1126%2Fscience.aat0451). S2CID 46887409 (https://api.semanticscholar.org/CorpusID:46887409).
61. Taylor, M.P. (2010). "Sauropod dinosaur research: a historical review". *Geological Society, London, Special Publications*. **343** (1): 361–386. Bibcode:2010GSLSP.343..361T (https://ui.adsabs.harvard.edu/abs/2010GSLSP.343..361T). doi:10.1144/SP343.22 (https://doi.org/10.1144%2FSP343.22). S2CID 910635 (https://api.semanticscholar.org/CorpusID:910635).
62. Naish, D. (2009). *The Great Dinosaur Discoveries*. London, UK: A & C Black Publishers Ltd. pp. 89–93. ISBN 978-1-4081-1906-8.
63. St. Fleur, Nicholas (December 8, 2016). "That Thing With Feathers Trapped in Amber? It Was a Dinosaur Tail" (https://www.nytimes.com/2016/12/08/science/dinosaur-feathers-amber.html). Trilobites. *The New York Times*. New York. ISSN 0362-4331 (https://www.worldcat.org/issn/0362-4331). Archived (https://web.archive.org/web/20170831181949/https://www.nytimes.com/2016/12/08/science/dinosaur-feathers-amber.html) from the original on August 31, 2017. Retrieved December 8, 2016.
64. Dal Sasso, Cristiano; Signore, Marco (March 26, 1998). "Exceptional soft-tissue preservation in a theropod dinosaur from Italy". *Nature*. London: Nature Research. **392** (6674): 383–387. Bibcode:1998Natur.392..383D (https://ui.adsabs.harvard.edu/abs/1998Natur.392..383D). doi:10.1038/32884 (https://doi.org/10.1038%2F32884). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). S2CID 4325093 (https://api.semanticscholar.org/CorpusID:4325093).
65. Schweitzer, Mary H.; Wittmeyer, Jennifer L.; Horner, John R.; Toporski, Jan K. (2005). "Soft-Tissue Vessels and Cellular Preservation in *Tyrannosaurus rex*". *Science*. Washington, D.C.: American Association for the Advancement of Science. **307** (5717): 1952–1955. Bibcode:2005Sci...307.1952S (https://ui.adsabs.harvard.edu/abs/2005Sci...307.1952S). doi:10.1126/science.1108397 (https://doi.org/10.1126%2Fscience.1108397). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 15790853 (https://pubmed.ncbi.nlm.nih.gov/15790853). S2CID 30456613 (https://api.semanticscholar.org/CorpusID:30456613).

66. Evershed, Nick (May 1, 2009). "Blood, tissue extracted from duck-billed dinosaur bone" (https://web.archive.org/web/20160215044640/http://archive.cosmosmagazine.com/news/blood-and-gristle-found-cretaceous-era-duck-billed-dinosaur/). *Cosmos Online*. Adelaide: Cosmos Media Pty Ltd. ISSN 1832-522X (https://www.worldcat.org/issn/1832-522X). Archived from the original (http://archive.cosmosmagazine.com/news/blood-and-gristle-found-cretaceous-era-duck-billed-dinosaur/) on February 15, 2016. Retrieved October 2, 2013.
67. Schweitzer, Mary H.; Wenxia, Zheng; Cleland, Timothy P.; et al. (January 2013). "Molecular analyses of dinosaur osteocytes support the presence of endogenous molecules". *Bone*. Amsterdam: Elsevier. **52** (1): 414–423. doi:10.1016/j.bone.2012.10.010 (https://doi.org/10.1016%2Fj.bone.2012.10.010). ISSN 8756-3282 (https://www.worldcat.org/issn/8756-3282). PMID 23085295 (https://pubmed.ncbi.nlm.nih.gov/23085295).
68. Wang, Hai-Lin; Yan, Zi-Ying; Jin, Dong-Yan (1997). "Reanalysis of Published DNA Sequence Amplified from Cretaceous Dinosaur Egg Fossil" (https://academic.oup.com/mbe/article-pdf/14/5/589/11165687/14wang.pdf) (PDF). *Molecular Biology and Evolution*. Oxford: Oxford University Press on behalf of the Society for Molecular Biology and Evolution. **14** (5): 589–591. doi:10.1093/oxfordjournals.molbev.a025796 (https://doi.org/10.1093%2Foxfordjournals.molbev.a025796). ISSN 0737-4038 (https://www.worldcat.org/issn/0737-4038). PMID 9159936 (https://pubmed.ncbi.nlm.nih.gov/9159936). Archived (https://web.archive.org/web/20180730173327/https://watermark.silverchair.com/14wang.pdf?token=AQECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAAAa8wggGrBgkqhkiG9w0BBwagggGcMIIBmAIBADCCAZEGCSqGSIb3DQEHATAeBglghkgBZQMEAS4wEQQMSDsasGBED6AJ_p7wAgEQgIIBYpdd-NDfK468LC8jSolQpa89RHEIljNjkCIKUOrEBYpuwiZXHzIpE2yewcCiIn6NMZa9VCcjrsPnehA3VbHCBGSsYkh0qthtGC-G7-tJ-1kSXHXNOaeuco8LAXaaoyHn1apk82cf1WF3mtL84-jXCEg42b1uk-oaornDF_ari1euQ_-vd51FMnNCQ9s44V6rqKaCkYThTgWSjUKb-ZyXdD1QDEXJGrXs5oig1jIFmlYT0GpgZ70_uoxcgJOX_tbu5Y3zDErDonF5T4nxDkA-k735YSdE-ih45Olu7zbmRkL6imND8Up8hP5tM-B7Z4BBBbckEobvrFndvE5GrSplaccjxrP618YbSc70VpCDOllZ342jgi_okXOipLK7LoE6JdVgIWswooP9oCzB_PkbqFx_K_b51KKDPLc_DKSxMb2ftltv-ppMhxZkDQabD3aVPAaRdWKPxWwDw3MJ0nobA3PCZg) (PDF) from the original on July 30, 2018. Retrieved November 7, 2019.
69. Chang, Belinda S. W.; Jönsson, Karolina; Kazmi, Manija A.; et al. (2002). "Recreating a Functional Ancestral Archosaur Visual Pigment". *Molecular Biology and Evolution*. Oxford: Oxford University Press on behalf of the Society for Molecular Biology and Evolution. **19** (9): 1483–1489. doi:10.1093/oxfordjournals.molbev.a004211 (https://doi.org/10.1093%2Foxfordjournals.molbev.a004211). ISSN 0737-4038 (https://www.worldcat.org/issn/0737-4038). PMID 12200476 (https://pubmed.ncbi.nlm.nih.gov/12200476).
70. Schweitzer, Mary H.; Marshall, Mark; Carron, Keith; et al. (1997). "Heme compounds in dinosaur trabecular bone" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC21042). *Proc. Natl. Acad. Sci. U.S.A*. Washington, D.C.: National Academy of Sciences. **94** (12): 6291–6296. Bibcode:1997PNAS...94.6291S (https://ui.adsabs.harvard.edu/abs/1997PNAS...94.6291S). doi:10.1073/pnas.94.12.6291 (https://doi.org/10.1073%2Fpnas.94.12.6291). ISSN 0027-8424 (https://www.worldcat.org/issn/0027-8424). PMC 21042 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC21042). PMID 9177210 (https://pubmed.ncbi.nlm.nih.gov/9177210).
71. Embery, Graham; Milner, Angela C.; Waddington, Rachel J.; et al. (2003). "Identification of Proteinaceous Material in the Bone of the Dinosaur *Iguanodon*". *Connective Tissue Research*. Milton Park, Oxfordshire: Taylor & Francis. **44** (1): 41–46. doi:10.1080/03008200390152070 (https://doi.org/10.1080%2F03008200390152070). ISSN 1607-8438 (https://www.worldcat.org/issn/1607-8438). PMID 12952172 (https://pubmed.ncbi.nlm.nih.gov/12952172). S2CID 2249126 (https://api.semanticscholar.org/CorpusID:2249126).

72. Peterson, Joseph E.; Lenczewski, Melissa E.; Scherer, Reed P. (2010). Stepanova, Anna (ed.). "Influence of Microbial Biofilms on the Preservation of Primary Soft Tissue in Fossil and Extant Archosaurs" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2953520). *PLOS ONE*. San Francisco, CA: PLOS. **5** (10): e13334. Bibcode:2010PLoSO...513334P (https://ui.adsabs.harvard.edu/abs/2010PLoSO...513334P). doi:10.1371/journal.pone.0013334 (https://doi.org/10.1371%2Fjournal.pone.0013334). ISSN 1932-6203 (https://www.worldcat.org/issn/1932-6203). PMC 2953520 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2953520). PMID 20967227 (https://pubmed.ncbi.nlm.nih.gov/20967227).
73. Bertazzo, Sergio; Maidment, Susannah C.R.; Kallepitis, Charalambos; et al. (2015). "Fibres and cellular structures preserved in 75-million-year-old dinosaur specimens" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4468865). *Nature Communications*. London: Nature Research. **6**: 7352. Bibcode:2015NatCo...6.7352B (https://ui.adsabs.harvard.edu/abs/2015NatCo...6.7352B). doi:10.1038/ncomms8352 (https://doi.org/10.1038%2Fncomms8352). ISSN 2041-1723 (https://www.worldcat.org/issn/2041-1723). PMC 4468865 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4468865). PMID 26056764 (https://pubmed.ncbi.nlm.nih.gov/26056764).
74. Mortillaro, Nicole (June 9, 2015). "Scientists discover 75-million-year-old dinosaur blood and tissue" (https://globalnews.ca/news/2044421/scientists-discover-75-million-year-old-dinosaur-blood-and-tissue/). *Global News*. Toronto: Corus Entertainment. Archived (https://web.archive.org/web/20190611144652/https://globalnews.ca/news/2044421/scientists-discover-75-million-year-old-dinosaur-blood-and-tissue/) from the original on June 11, 2019. Retrieved November 7, 2019.
75. Kump, Lee R.; Pavlov, Alexander; Arthur, Michael A. (2005). "Massive release of hydrogen sulfide to the surface ocean and atmosphere during intervals of oceanic anoxia". *Geology*. Boulder, CO: Geological Society of America. **33** (5): 397–400. Bibcode:2005Geo....33..397K (https://ui.adsabs.harvard.edu/abs/2005Geo....33..397K). doi:10.1130/G21295.1 (https://doi.org/10.1130%2FG21295.1). ISSN 0091-7613 (https://www.worldcat.org/issn/0091-7613). S2CID 34821866 (https://api.semanticscholar.org/CorpusID:34821866).
76. Tanner, Lawrence H.; Lucas, Spencer G.; Chapman, Mary G. (March 2004). "Assessing the record and causes of Late Triassic extinctions" (https://web.archive.org/web/20071025225841/http://nmnaturalhistory.org/pdf_files/TJB.pdf) (PDF). *Earth-Science Reviews*. Amsterdam: Elsevier. **65** (1–2): 103–139. Bibcode:2004ESRv...65..103T (https://ui.adsabs.harvard.edu/abs/2004ESRv...65..103T). doi:10.1016/S0012-8252(03)00082-5 (https://doi.org/10.1016%2FS0012-8252%2803%2900082-5). ISSN 0012-8252 (https://www.worldcat.org/issn/0012-8252). Archived from the original (http://nmnaturalhistory.org/pdf_files/TJB.pdf) (PDF) on October 25, 2007. Retrieved October 22, 2007.
77. Alcober, Oscar A.; Martinez, Ricardo N. (2010). "A new herrerasaurid (Dinosauria, Saurischia) from the Upper Triassic Ischigualasto Formation of northwestern Argentina" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3088398). *ZooKeys*. Sofia: Pensoft Publishers (63): 55–81. doi:10.3897/zookeys.63.550 (https://doi.org/10.3897%2Fzookeys.63.550). ISSN 1313-2989 (https://www.worldcat.org/issn/1313-2989). PMC 3088398 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3088398). PMID 21594020 (https://pubmed.ncbi.nlm.nih.gov/21594020).
78. Nesbitt, Sterling J; Sues, Hans-Dieter (2021). "The osteology of the early-diverging dinosaur *Daemonosaurus chauliodus* (Archosauria: Dinosauria) from the Coelophysis Quarry (Triassic: Rhaetian) of New Mexico and its relationships to other early dinosaurs". *Zoological Journal of the Linnean Society*. **191** (1): 150–179. doi:10.1093/zoolinnean/zlaa080 (https://doi.org/10.1093%2Fzoolinnean%2Fzlaa080).

79. Sereno, Paul C. (1999). "The Evolution of Dinosaurs" (https://www.researchgate.net/publication/12917068). *Science*. Washington, D.C.: American Association for the Advancement of Science. **284** (5423): 2137–2147. doi:10.1126/science.284.5423.2137 (https://doi.org/10.1126%2Fscience.284.5423.2137). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 10381873 (https://pubmed.ncbi.nlm.nih.gov/10381873). Archived (https://web.archive.org/web/20180105180335/https://www.researchgate.net/profile/Paul_Sereno/publication/12917068_The_Evolution_of_Dinosaurs/links/56b0c66d08ae8e372151f17e/The-Evolution-of-Dinosaurs.pdf) (PDF) from the original on January 5, 2018. Retrieved November 8, 2019.
80. Sereno, Paul C.; Forster, Catherine A.; Rogers, Raymond R.; Monetta, Alfredo M. (1993). "Primitive dinosaur skeleton from Argentina and the early evolution of Dinosauria". *Nature*. London: Nature Research. **361** (6407): 64–66. Bibcode:1993Natur.361...64S (https://ui.adsabs.harvard.edu/abs/1993Natur.361...64S). doi:10.1038/361064a0 (https://doi.org/10.1038%2F361064a0). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). S2CID 4270484 (https://api.semanticscholar.org/CorpusID:4270484).
81. Marsicano, C.A.; Irmis, R.B.; Mancuso, A.C.; Mundil, R.; Chemale, F. (2016). "The precise temporal calibration of dinosaur origins" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4725541). *Proceedings of the National Academy of Sciences*. **113** (3): 509–513. Bibcode:2016PNAS..113..509M (https://ui.adsabs.harvard.edu/abs/2016PNAS..113..509M). doi:10.1073/pnas.1512541112 (https://doi.org/10.1073%2Fpnas.1512541112). PMC 4725541 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4725541). PMID 26644579 (https://pubmed.ncbi.nlm.nih.gov/26644579).
82. Nesbitt, Sterling J.; Barrett, Paul M.; Werning, Sarah; et al. (2012). "The oldest dinosaur? A Middle Triassic dinosauriform from Tanzania" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3565515). *Biology Letters*. London: Royal Society. **9** (1): 20120949. doi:10.1098/rsbl.2012.0949 (https://doi.org/10.1098%2Frsbl.2012.0949). ISSN 1744-9561 (https://www.worldcat.org/issn/1744-9561). PMC 3565515 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3565515). PMID 23221875 (https://pubmed.ncbi.nlm.nih.gov/23221875).
83. Langer, Max C.; Ramezani, Jahandar; Da Rosa, Átila A.S. (May 2018). "U-Pb age constraints on dinosaur rise from south Brazil". *Gondwana Research*. Amsterdam: Elsevier. **57**: 133–140. Bibcode:2018GondR..57..133L (https://ui.adsabs.harvard.edu/abs/2018GondR..57..133L). doi:10.1016/j.gr.2018.01.005 (https://doi.org/10.1016%2Fj.gr.2018.01.005). ISSN 1342-937X (https://www.worldcat.org/issn/1342-937X).
84. Brusatte, Stephen L.; Benton, Michael J.; Ruta, Marcello; Lloyd, Graeme T. (2008). "Superiority, Competition, and Opportunism in the Evolutionary Radiation of Dinosaurs" (https://www.pure.ed.ac.uk/ws/files/8232088/PDF_Brusatteetal2008SuperiorityCompetition.pdf) (PDF). *Science*. Washington, D.C.: American Association for the Advancement of Science. **321** (5895): 1485–1488. Bibcode:2008Sci...321.1485B (https://ui.adsabs.harvard.edu/abs/2008Sci...321.1485B). doi:10.1126/science.1161833 (https://doi.org/10.1126%2Fscience.1161833). hdl:20.500.11820/00556baf-6575-44d9-af39-bdd0b072ad2b (https://hdl.handle.net/20.500.11820%2F00556baf-6575-44d9-af39-bdd0b072ad2b). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 18787166 (https://pubmed.ncbi.nlm.nih.gov/18787166). S2CID 13393888 (https://api.semanticscholar.org/CorpusID:13393888). Retrieved October 22, 2019.
85. Tanner, Spielmann & Lucas 2013, pp. 562–566 (https://econtent.unm.edu/digital/collection/bulletins/id/1688), "The first Norian (Revueltian) rhynchosaur: Bull Canyon Formation, New Mexico, U.S.A." by Justin A. Spielmann, Spencer G. Lucas and Adrian P. Hunt.

86. Sulej, Tomasz; Niedźwiedzki, Grzegorz (2019). "An elephant-sized Late Triassic synapsid with erect limbs" (https://doi.org/10.1126%2Fscience.aal4853). *Science*. Washington, D.C.: American Association for the Advancement of Science. **363** (6422): 78–80. Bibcode:2019Sci...363...78S (https://ui.adsabs.harvard.edu/abs/2019Sci...363...78S). doi:10.1126/science.aal4853 (https://doi.org/10.1126%2Fscience.aal4853). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 30467179 (https://pubmed.ncbi.nlm.nih.gov/30467179). S2CID 53716186 (https://api.semanticscholar.org/CorpusID:53716186).
87. "Fossil tracks in the Alps help explain dinosaur evolution" (https://www.economist.com/science-and-technology/2018/04/19/fossil-tracks-in-the-alps-help-explain-dinosaur-evolution). Science and Technology. *The Economist*. London. April 19, 2018. ISSN 0013-0613 (https://www.worldcat.org/issn/0013-0613). Retrieved May 24, 2018.
88. Weishampel, Dodson & Osmólska 2004, pp. 627–642, chpt. 27: "Mesozoic Biogeography of Dinosauria" by Thomas R. Holtz Jr., Ralph E. Chapman, and Matthew C. Lamanna.
89. Weishampel, Dodson & Osmólska 2004, pp. 614–626, chpt. 26: "Dinosaur Paleoecology" by David E. Fastovsky and Joshua B. Smith.
90. Sereno, Paul C.; Wilson, Jeffrey A.; Witmer, Lawrence M.; et al. (2007). Kemp, Tom (ed.). "Structural Extremes in a Cretaceous Dinosaur" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2077925). *PLOS ONE*. San Francisco, CA: PLOS. **2** (11): e1230. Bibcode:2007PLoSO...2.1230S (https://ui.adsabs.harvard.edu/abs/2007PLoSO...2.1230S). doi:10.1371/journal.pone.0001230 (https://doi.org/10.1371%2Fjournal.pone.0001230). ISSN 1932-6203 (https://www.worldcat.org/issn/1932-6203). PMC 2077925 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2077925). PMID 18030355 (https://pubmed.ncbi.nlm.nih.gov/18030355).
91. Prasad, Vandana; Strömberg, Caroline A. E.; Alimohammadian, Habib; et al. (2005). "Dinosaur Coprolites and the Early Evolution of Grasses and Grazers". *Science*. Washington, D.C.: American Association for the Advancement of Science. **310** (5751): 1170–1180. Bibcode:2005Sci...310.1177P (https://ui.adsabs.harvard.edu/abs/2005Sci...310.1177P). doi:10.1126/science.1118806 (https://doi.org/10.1126%2Fscience.1118806). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 16293759 (https://pubmed.ncbi.nlm.nih.gov/16293759). S2CID 1816461 (https://api.semanticscholar.org/CorpusID:1816461).
92. Weishampel, Dodson & Osmólska 2004, pp. 672–684, chpt. 30: "Dinosaur Extinction" by J. David Archibald and David E. Fastovsky.
93. Dyke & Kaiser 2011, chpt. 14: "Bird Evolution Across the K–Pg Boundary and the Basal Neornithine Diversification" by Bent E. K. Lindow. doi:10.1002/9781119990475.ch14 (https://doi.org/10.1002%2F9781119990475.ch14)
94. Cracraft, Joel (1968). "A Review of the Bathornithidae (Aves, Gruiformes), with Remarks on the Relationships of the Suborder Cariamae" (https://digitallibrary.amnh.org/bitstream/handle/2246/2536//v2/dspace/ingest/pdfSource/nov/N2326.pdf?sequence=1&isAllowed=y) (PDF). *American Museum Novitates*. New York: American Museum of Natural History (2326): 1–46. hdl:2246/2536 (https://hdl.handle.net/2246%2F2536). ISSN 0003-0082 (https://www.worldcat.org/issn/0003-0082). Retrieved October 22, 2019.
95. Alvarenga, Herculano; Jones, Washington W.; Rinderknecht, Andrés (May 2010). "The youngest record of phorusrhacid birds (Aves, Phorusrhacidae) from the late Pleistocene of Uruguay" (https://www.researchgate.net/publication/233512584). *Neues Jahrbuch für Geologie und Paläontologie*. Stuttgart: E. Schweizerbart. **256** (2): 229–234. doi:10.1127/0077-7749/2010/0052 (https://doi.org/10.1127%2F0077-7749%2F2010%2F0052). ISSN 0077-7749 (https://www.worldcat.org/issn/0077-7749). Retrieved October 22, 2019.
96. Mayr 2009
97. Paul 1988, pp. 248–250 (https://archive.org/details/predatorydinosaursoftheworld1988/page/n245)

98. Weishampel, Dodson & Osmólska 2004, pp. 151–164, chpt. 7: "Therizinosauroidea" by James M. Clark, Teresa Maryańska, and Rinchen Barsbold.
99. Weishampel, Dodson & Osmólska 2004, pp. 196–210, chpt. 10: "Dromaeosauridae" by Peter J. Makovicky and Mark A. Norell.
100. Taylor, Michael P.; Wedel, Mathew J. (2013). "Why sauropods had long necks; and why giraffes have short necks" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3628838). *PeerJ*. Corte Madera, CA; London. **1**: e36. doi:10.7717/peerj.36 (https://doi.org/10.7717%2Fpeerj.36). ISSN 2167-8359 (https://www.worldcat.org/issn/2167-8359). PMC 3628838 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3628838). PMID 23638372 (https://pubmed.ncbi.nlm.nih.gov/23638372).
101. Molina-Pérez, R.; Larramendi, A. (2020). *Dinosaur Facts and Figures. The Sauropods and Other Sauropodomorphs*. Princeton University Press. pp. 14–15. ISBN 978-0-691-19069-3.
102. Molina-Pérez, R.; Larramendi, A. (2019). *Dinosaur Facts and Figures. The Theropods and Other Dinosauriformes*. Princeton University Press. pp. 14–15. ISBN 978-0-691-18031-1.
103. Madzia, D.; Arbour, V.M.; Boyd, C.A.; Farke, A.A.; Cruzado-Caballero, P.; Evans, D.C. (2021). "The phylogenetic nomenclature of ornithischian dinosaurs" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8667728). *PeerJ*. **9**: e12362. doi:10.7717/peerj.12362 (https://doi.org/10.7717%2Fpeerj.12362). PMC 8667728 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8667728). PMID 34966571 (https://pubmed.ncbi.nlm.nih.gov/34966571).
104. Holtz 2007
105. Holtz, T.R. jr (2011). "Winter 2010 Appendix" (http://www.geol.umd.edu/~tholtz/dinoappendix/HoltzappendixWinter2010.pdf) (PDF). Dinosaurs: The Most Complete, Up-to-Date Encyclopedia for Dinosaur Lovers of All Ages.
106. Novas, Fernando E.; Agnolin, Federico L.; Ezcurra, Martín D.; Temp Müller, Rodrigo; Martinelli, Agustín G.; Langer, Max C. (October 2021). "Review of the fossil record of early dinosaurs from South America, and its phylogenetic implications" (https://linkinghub.elsevier.com/retrieve/pii/S0895981121001887). *Journal of South American Earth Sciences*. **110**: 103341. Bibcode:2021JSAES.11003341N (https://ui.adsabs.harvard.edu/abs/2021JSAES.11003341N). doi:10.1016/j.jsames.2021.103341 (https://doi.org/10.1016%2Fj.jsames.2021.103341).
107. Tortosa, Thierry; Buffetaut, Eric; Vialle, Nicolas; Dutour, Yves; Turini, Eric; Cheylan, Gilles (January 1, 2014). "A new abelisaurid dinosaur from the Late Cretaceous of southern France: Palaeobiogeographical implications" (https://www.sciencedirect.com/science/article/pii/S075339691300089X). *Annales de Paléontologie*. **100** (1): 63–86. doi:10.1016/j.annpal.2013.10.003 (https://doi.org/10.1016%2Fj.annpal.2013.10.003). ISSN 0753-3969 (https://www.worldcat.org/issn/0753-3969).
108. Rauhut, Oliver W. M.; Pol, Diego (December 2019). "Probable basal allosauroid from the early Middle Jurassic Cañadón Asfalto Formation of Argentina highlights phylogenetic uncertainty in tetanuran theropod dinosaurs" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6906444). *Scientific Reports*. **9** (1): 18826. Bibcode:2019NatSR...918826R (https://ui.adsabs.harvard.edu/abs/2019NatSR...918826R). doi:10.1038/s41598-019-53672-7 (https://doi.org/10.1038%2Fs41598-019-53672-7). ISSN 2045-2322 (https://www.worldcat.org/issn/2045-2322). PMC 6906444 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6906444). PMID 31827108 (https://pubmed.ncbi.nlm.nih.gov/31827108).
109. D'Emic, Michael D. (November 2012). "The early evolution of titanosauriform sauropod dinosaurs: TITANOSAURIFORM PHYLOGENY" (https://academic.oup.com/zoolinnean/article-lookup/doi/10.1111/j.1096-3642.2012.00853.x). *Zoological Journal of the Linnean Society*. **166** (3): 624–671. doi:10.1111/j.1096-3642.2012.00853.x (https://doi.org/10.1111%2Fj.1096-3642.2012.00853.x).

110. Dieudonné, Paul-Emile; Tortosa, Thierry; Torcida Fernández-Baldor, Fidel; Canudo, José Ignacio; Díaz-Martínez, Ignacio (June 22, 2016). Farke, Andrew A. (ed.). "An Unexpected Early Rhabdodontid from Europe (Lower Cretaceous of Salas de los Infantes, Burgos Province, Spain) and a Re-Examination of Basal Iguanodontian Relationships" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4917257). *PLOS ONE*. **11** (6): e0156251. Bibcode:2016PLoSO..1156251D (https://ui.adsabs.harvard.edu/abs/2016PLoSO..1156251D). doi:10.1371/journal.pone.0156251 (https://doi.org/10.1371%2Fjournal.pone.0156251). ISSN 1932-6203 (https://www.worldcat.org/issn/1932-6203). PMC 4917257 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4917257). PMID 27333279 (https://pubmed.ncbi.nlm.nih.gov/27333279).
111. Sereno, Paul C. (June 25, 1999). "The Evolution of Dinosaurs" (https://www.science.org/doi/10.1126/science.284.5423.2137). *Science*. **284** (5423): 2137–2147. doi:10.1126/science.284.5423.2137 (https://doi.org/10.1126%2Fscience.284.5423.2137). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 10381873 (https://pubmed.ncbi.nlm.nih.gov/10381873).
112. Alexander, R. McNeill (2006). "Dinosaur biomechanics" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1634776). *Proceedings of the Royal Society B*. London: Royal Society. **273** (1596): 1849–1855. doi:10.1098/rspb.2006.3532 (https://doi.org/10.1098%2Frspb.2006.3532). ISSN 0962-8452 (https://www.worldcat.org/issn/0962-8452). PMC 1634776 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1634776). PMID 16822743 (https://pubmed.ncbi.nlm.nih.gov/16822743).
113. Farlow, James O.; Dodson, Peter; Chinsamy, Anusuya (November 1995). "Dinosaur Biology". *Annual Review of Ecology and Systematics*. Palo Alto, CA: Annual Reviews. **26**: 445–471. doi:10.1146/annurev.es.26.110195.002305 (https://doi.org/10.1146%2Fannurev.es.26.110195.002305). ISSN 1545-2069 (https://www.worldcat.org/issn/1545-2069).
114. Weishampel, Dodson & Osmólska 2004
115. Dodson & Gingerich 1993, pp. 167–199 (http://earth.geology.yale.edu/~ajs/1993/11.1993.06Farlow.pdf), "On the rareness of big, fierce animals: speculations about the body sizes, population densities, and geographic ranges of predatory mammals and large carnivorous dinosaurs" by James O. Farlow.
116. Peczkis, Jan (1995). "Implications of body-mass estimates for dinosaurs". *Journal of Vertebrate Paleontology*. Milton Park, Oxfordshire: Taylor & Francis for the Society of Vertebrate Paleontology. **14** (4): 520–533. doi:10.1080/02724634.1995.10011575 (https://doi.org/10.1080%2F02724634.1995.10011575). ISSN 0272-4634 (https://www.worldcat.org/issn/0272-4634). JSTOR 4523591 (https://www.jstor.org/stable/4523591).
117. "Dinosaur Evolution" (https://web.archive.org/web/20071111204903/http://paleobiology.si.edu/dinosaurs/info/everything/evo_1.html). *Department of Paleobiology*. Dinosaurs. Washington, D.C.: National Museum of Natural History. 2007. Archived from the original (http://paleobiology.si.edu/dinosaurs/info/everything/evo_1.html) on November 11, 2007. Retrieved November 21, 2007.
118. Sander, P. Martin; Christian, Andreas; Clauss, Marcus; et al. (February 2011). "Biology of the sauropod dinosaurs: the evolution of gigantism" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3045712). *Biological Reviews*. Cambridge: Cambridge Philosophical Society. **86** (1): 117–155. doi:10.1111/j.1469-185X.2010.00137.x (https://doi.org/10.1111%2Fj.1469-185X.2010.00137.x). ISSN 1464-7931 (https://www.worldcat.org/issn/1464-7931). PMC 3045712 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3045712). PMID 21251189 (https://pubmed.ncbi.nlm.nih.gov/21251189).
119. Foster & Lucas 2006, pp. 131–138 (https://econtent.unm.edu/digital/collection/bulletins/id/790), "Biggest of the big: a critical re-evaluation of the mega-sauropod *Amphicoelias fragillimus* Cope, 1878" by Kenneth Carpenter.
120. Paul 2010

121. Colbert 1971
122. Mazzetta, Gerardo V.; Christiansenb, Per; Fariñaa, Richard A. (2004). "Giants and Bizarres: Body Size of Some Southern South American Cretaceous Dinosaurs" (http://www.miketaylor.org.uk/tmp/papers/Mazzetta-et-al_04_SA-dino-body-size.pdf) (PDF). *Historical Biology*. Milton Park, Oxfordshire: Taylor & Francis. **16** (2–4): 71–83. CiteSeerX 10.1.1.694.1650 (https://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.694.1650). doi:10.1080/08912960410001715132 (https://doi.org/10.1080%2F08912960410001715132). ISSN 0891-2963 (https://www.worldcat.org/issn/0891-2963). S2CID 56028251 (https://api.semanticscholar.org/CorpusID:56028251).
123. Janensch, Werner (1950). Translation by Gerhard Maier. "Die Skelettrekonstruktion von *Brachiosaurus brancai*" (https://paleoglot.org/files/Janensch1950b.pdf) [The Skeleton Reconstruction of Brachiosaurus brancai] (PDF). *Palaeontographica*. Stuttgart: E. Schweizerbart. Suplement VII (1. Reihe, Teil 3, Lieferung 2): 97–103. OCLC 45923346 (https://www.worldcat.org/oclc/45923346). Archived (https://web.archive.org/web/20170711052046/https://paleoglot.org/files/Janensch1950b.pdf) (PDF) from the original on July 11, 2017. Retrieved October 24, 2019.
124. Lucas, Spencer G.; Herne, Matthew C.; Hecket, Andrew B.; et al. (2004). *Reappraisal of* Seismosaurus*, a Late Jurassic Sauropod Dinosaur From New Mexico* (https://gsa.confex.com/gsa/2004AM/finalprogram/abstract_77727.htm). 2004 Denver Annual Meeting (November 7–10, 2004) (https://gsa.confex.com/gsa/2004AM/webprogram/start.html). Vol. 36. Boulder, CO: Geological Society of America. p. 422. OCLC 62334058 (https://www.worldcat.org/oclc/62334058). Paper No. 181-4. Archived (https://web.archive.org/web/20191008110318/https://gsa.confex.com/gsa/2004AM/finalprogram/abstract_77727.htm) from the original on October 8, 2019. Retrieved October 25, 2019.
125. Sellers, William Irvin.; Margetts, Lee; Coria, Rodolfo Aníbal; Manning, Phillip Lars (2013). Carrier, David (ed.). "March of the Titans: The Locomotor Capabilities of Sauropod Dinosaurs" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3864407). *PLOS ONE*. San Francisco, CA: PLOS. **8** (10): e78733. Bibcode:2013PLoSO...878733S (https://ui.adsabs.harvard.edu/abs/2013PLoSO...878733S). doi:10.1371/journal.pone.0078733 (https://doi.org/10.1371%2Fjournal.pone.0078733). ISSN 1932-6203 (https://www.worldcat.org/issn/1932-6203). PMC 3864407 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3864407). PMID 24348896 (https://pubmed.ncbi.nlm.nih.gov/24348896).
126. Lovelace, David M.; Hartman, Scott A.; Wahl, William R. (October–December 2007). "Morphology of a specimen of *Supersaurus* (Dinosauria, Sauropoda) from the Morrison Formation of Wyoming, and a re-evaluation of diplodocid phylogeny" (https://archive.org/details/biostor-248729). *Arquivos do Museu Nacional*. Rio de Janeiro: National Museum of Brazil; Federal University of Rio de Janeiro. **65** (4): 527–544. CiteSeerX 10.1.1.603.7472 (https://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.603.7472). ISSN 0365-4508 (https://www.worldcat.org/issn/0365-4508). Retrieved October 26, 2019.
127. Woodruff, D. Cary; Foster, John R. (2014). "The fragile legacy of Amphicoelias fragillimus (Dinosauria: Sauropoda; Morrison Formation – Latest Jurassic)" (https://vjs.pgi.gov.pl/article/view/26620). *Volumina Jurassica*. **12** (2): 211–220. doi:10.5604/17313708.1130144 (https://doi.org/10.5604%2F17313708.1130144) (inactive February 28, 2022).

128. Dal Sasso, Cristiano; Maganuco, Simone; Buffetaut, Éric; et al. (2005). "New information on the skull of the enigmatic theropod *Spinosaurus*, with remarks on its sizes and affinities" (https://web.archive.org/web/20110429015542/http://reocities.com/Athens/bridge/4602/spinoskull.pdf) (PDF). *Journal of Vertebrate Paleontology*. Milton Park, Oxfordshire: Taylor & Francis for the Society of Vertebrate Paleontology. **25** (4): 888–896. doi:10.1671/0272-4634(2005)025[0888:NIOTSO]2.0.CO;2 (https://doi.org/10.1671%2F0272-4634%282005%29025%5B0888%3ANIOTSO%5D2.0.CO%3B2). ISSN 0272-4634 (https://www.worldcat.org/issn/0272-4634). Archived from the original (http://www.reocities.com/Athens/bridge/4602/spinoskull.pdf) (PDF) on April 29, 2011. Retrieved May 5, 2011.
129. Therrien, François; Henderson, Donald M. (2007). "My theropod is bigger than yours ... or not: estimating body size from skull length in theropods". *Journal of Vertebrate Paleontology*. Milton Park, Oxfordshire: Taylor & Francis for the Society of Vertebrate Paleontology. **27** (1): 108–115. doi:10.1671/0272-4634(2007)27[108:MTIBTY]2.0.CO;2 (https://doi.org/10.1671%2F0272-4634%282007%2927%5B108%3AMTIBTY%5D2.0.CO%3B2). ISSN 0272-4634 (https://www.worldcat.org/issn/0272-4634).
130. Zhao, Xijin; Li, Dunjing; Han, Gang; et al. (2007). "Zhuchengosaurus maximus from Shandong Province". *Acta Geoscientia Sinica*. Beijing: Chinese Academy of Geological Sciences. **28** (2): 111–122. ISSN 1006-3021 (https://www.worldcat.org/issn/1006-3021).
131. Weishampel, Dodson & Osmólska 2004, pp. 438–463, chpt. 20: "Hadrosauridae" by John R. Horner David B. Weishampel, and Catherine A. Forster.
132. Norell, Gaffney & Dingus 2000
133. "Bee Hummingbird (*Mellisuga helenae*)" (https://www.birds.com/species/a-b/bee-hummingbird/). *Birds.com*. Paley Media. Archived (https://web.archive.org/web/20150403005328/https://www.birds.com/species/a-b/bee-hummingbird/) from the original on April 3, 2015. Retrieved October 27, 2019.
134. Zhang, Fucheng; Zhou, Zhonghe; Xu, Xing; et al. (2008). "A bizarre Jurassic maniraptoran from China with elongate ribbon-like feathers". *Nature*. London: Nature Research. **455** (7216): 1105–1108. Bibcode:2008Natur.455.1105Z (https://ui.adsabs.harvard.edu/abs/2008Natur.455.1105Z). doi:10.1038/nature07447 (https://doi.org/10.1038%2Fnature07447). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). PMID 18948955 (https://pubmed.ncbi.nlm.nih.gov/18948955). S2CID 4362560 (https://api.semanticscholar.org/CorpusID:4362560).
135. Xu, Xing; Zhao, Qi; Norell, Mark; et al. (February 2008). "A new feathered maniraptoran dinosaur fossil that fills a morphological gap in avian origin" (https://doi.org/10.1007%2Fs11434-009-0009-6). *Chinese Science Bulletin*. Amsterdam: Elsevier on behalf of Science in China Press. **54** (3): 430–435. doi:10.1007/s11434-009-0009-6 (https://doi.org/10.1007%2Fs11434-009-0009-6). ISSN 1001-6538 (https://www.worldcat.org/issn/1001-6538). S2CID 53445386 (https://api.semanticscholar.org/CorpusID:53445386).
136. Butler, Richard J.; Zhao, Qi (February 2009). "The small-bodied ornithischian dinosaurs *Micropachycephalosaurus hongtuyanensis* and *Wannanosaurus yansiensis* from the Late Cretaceous of China". *Cretaceous Research*. Amsterdam: Elsevier. **30** (1): 63–77. doi:10.1016/j.cretres.2008.03.002 (https://doi.org/10.1016%2Fj.cretres.2008.03.002). ISSN 0195-6671 (https://www.worldcat.org/issn/0195-6671).
137. Yans, Johan; Dejax, Jean; Pons, Denise; et al. (January–February 2005). "Implications paléontologiques et géodynamiques de la datation palynologique des sédiments à faciès wealdien de Bernissart (bassin de Mons, Belgique)" [Palaeontological and geodynamical implications of the palynological dating of the wealden facies sediments of Bernissart (Mons Basin, Belgium)]. *Comptes Rendus Palevol* (in French). Amsterdam: Elsevier of behalf of the French Academy of Sciences. **4** (1–2): 135–150. doi:10.1016/j.crpv.2004.12.003 (https://doi.org/10.1016%2Fj.crpv.2004.12.003). ISSN 1631-0683 (https://www.worldcat.org/issn/1631-0683).

138. Day, Julia J.; Upchurch, Paul; Norman, David B.; et al. (2002). "Sauropod Trackways, Evolution, and Behavior". *Science*. Washington, D.C.: American Association for the Advancement of Science. **296** (5573): 1659. doi:10.1126/science.1070167 (https://doi.org/10.1126%2Fscience.1070167). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 12040187 (https://pubmed.ncbi.nlm.nih.gov/12040187). S2CID 36530770 (https://api.semanticscholar.org/CorpusID:36530770).
139. Curry Rogers & Wilson 2005, pp. 252–284, chpt. 9: "Steps in Understanding Sauropod Biology: The Importance of Sauropods Tracks" by Joanna L. Wright.
140. Varricchio, David J.; Sereno, Paul C.; Zhao, Xijin; et al. (2008). "Mud-trapped herd captures evidence of distinctive dinosaur sociality" (https://www.app.pan.pl/archive/published/app53/APP53-567.pdf) (PDF). *Acta Palaeontologica Polonica*. Warsaw: Institute of Paleobiology, Polish Academy of Sciences. **53** (4): 567–578. doi:10.4202/app.2008.0402 (https://doi.org/10.4202%2Fapp.2008.0402). ISSN 0567-7920 (https://www.worldcat.org/issn/0567-7920). S2CID 21736244 (https://api.semanticscholar.org/CorpusID:21736244). Archived (https://web.archive.org/web/20190330032513/https://www.app.pan.pl/archive/published/app53/APP53-567.pdf) (PDF) from the original on March 30, 2019. Retrieved May 6, 2011.
141. Lessem & Glut 1993, pp. 19–20 (https://archive.org/details/dinosaursocietys00less/page/19), "Allosaurus"
142. Maxwell, W. Desmond; Ostrom, John H. (1995). "Taphonomy and paleobiological implications of *Tenontosaurus–Deinonychus* associations". *Journal of Vertebrate Paleontology*. Milton Park, Oxfordshire: Taylor & Francis for the Society of Vertebrate Paleontology. **15** (4): 707–712. doi:10.1080/02724634.1995.10011256 (https://doi.org/10.1080%2F02724634.1995.10011256). ISSN 0272-4634 (https://www.worldcat.org/issn/0272-4634).
143. Roach, Brian T.; Brinkman, Daniel L. (April 2007). "A Reevaluation of Cooperative Pack Hunting and Gregariousness in *Deinonychus antirrhopus* and Other Nonavian Theropod Dinosaurs". *Bulletin of the Peabody Museum of Natural History*. New Haven, CT: Peabody Museum of Natural History. **48** (1): 103–138. doi:10.3374/0079-032X(2007)48[103:AROCPH]2.0.CO;2 (https://doi.org/10.3374%2F0079-032X%282007%2948%5B103%3AAROCPH%5D2.0.CO%3B2). ISSN 0079-032X (https://www.worldcat.org/issn/0079-032X).
144. Tanke, Darren H. (1998). "Head-biting behavior in theropod dinosaurs: paleopathological evidence" (https://web.archive.org/web/20080227134632/http://www.mnhn.ul.pt/geologia/gaia/12.pdf) (PDF). *Gaia: Revista de Geociências*. Lisbon: National Museum of Natural History and Science (15): 167–184. doi:10.7939/R34T6FJ1P (https://doi.org/10.7939%2FR34T6FJ1P). ISSN 0871-5424 (https://www.worldcat.org/issn/0871-5424). Archived from the original (http://www.mnhn.ul.pt/geologia/gaia/12.pdf) (PDF) on February 27, 2008.
145. "The Fighting Dinosaurs" (https://web.archive.org/web/20120118062252/http://www.amnh.org/exhibitions/fightingdinos/ex-fd.html). New York: American Museum of Natural History. Archived from the original (http://www.amnh.org/exhibitions/fightingdinos/ex-fd.html) on January 18, 2012. Retrieved December 5, 2007.
146. Carpenter, Kenneth (1998). "Evidence of predatory behavior by theropod dinosaurs" (http://www.arca.museus.ul.pt/ArcaSite/obj/gaia/MNHNL-0000778-MG-DOC-web.PDF) (PDF). *Gaia: Revista de Geociências*. Lisbon: National Museum of Natural History and Science. **15**: 135–144. ISSN 0871-5424 (https://www.worldcat.org/issn/0871-5424).

147. Rogers, Raymond R.; Krause, David W.; Curry Rogers, Kristina (2007). "Cannibalism in the Madagascan dinosaur *Majungatholus atopus*". *Nature*. London: Nature Research. **422** (6931): 515–518. Bibcode:2003Natur.422..515R (https://ui.adsabs.harvard.edu/abs/2003Natur.422..515R). doi:10.1038/nature01532 (https://doi.org/10.1038%2Fnature01532). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). PMID 12673249 (https://pubmed.ncbi.nlm.nih.gov/12673249). S2CID 4389583 (https://api.semanticscholar.org/CorpusID:4389583).
148. Schmitz, Lars; Motani, Ryosuke (2011). "Nocturnality in Dinosaurs Inferred from Scleral Ring and Orbit Morphology". *Science*. Washington, D.C.: American Association for the Advancement of Science. **332** (6030): 705–708. Bibcode:2011Sci...332..705S (https://ui.adsabs.harvard.edu/abs/2011Sci...332..705S). doi:10.1126/science.1200043 (https://doi.org/10.1126%2Fscience.1200043). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 21493820 (https://pubmed.ncbi.nlm.nih.gov/21493820). S2CID 33253407 (https://api.semanticscholar.org/CorpusID:33253407).
149. Varricchio, David J.; Martin, Anthony J.; Katsura, Yoshihiro (2007). "First trace and body fossil evidence of a burrowing, denning dinosaur" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2176205). *Proceedings of the Royal Society B*. London: Royal Society. **274** (1616): 1361–1368. doi:10.1098/rspb.2006.0443 (https://doi.org/10.1098%2Frspb.2006.0443). ISSN 0962-8452 (https://www.worldcat.org/issn/0962-8452). PMC 2176205 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2176205). PMID 17374596 (https://pubmed.ncbi.nlm.nih.gov/17374596).
150. Chiappe & Witmer 2002
151. Chatterjee, Sankar; Templin, R. Jack (2007). "Biplane wing planform and flight performance of the feathered dinosaur *Microraptor gui*" (https://www.pnas.org/content/pnas/104/5/1576.full.pdf) (PDF). *Proc. Natl. Acad. Sci. U.S.A*. Washington, D.C.: National Academy of Sciences. **104** (5): 1576–1580. Bibcode:2007PNAS..104.1576C (https://ui.adsabs.harvard.edu/abs/2007PNAS..104.1576C). doi:10.1073/pnas.0609975104 (https://doi.org/10.1073%2Fpnas.0609975104). ISSN 0027-8424 (https://www.worldcat.org/issn/0027-8424). PMC 1780066 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1780066). PMID 17242354 (https://pubmed.ncbi.nlm.nih.gov/17242354). Archived (https://web.archive.org/web/20190818174156/https://www.pnas.org/content/pnas/104/5/1576.full.pdf) (PDF) from the original on August 18, 2019. Retrieved October 29, 2019.
152. Goriely, Alain; McMillen, Tyler (2002). "Shape of a Cracking Whip". *Physical Review Letters*. Ridge, NY: American Physical Society. **88** (24): 244301. Bibcode:2002PhRvL..88x4301G (https://ui.adsabs.harvard.edu/abs/2002PhRvL..88x4301G). doi:10.1103/PhysRevLett.88.244301 (https://doi.org/10.1103%2FPhysRevLett.88.244301). ISSN 0031-9007 (https://www.worldcat.org/issn/0031-9007). PMID 12059302 (https://pubmed.ncbi.nlm.nih.gov/12059302).
153. Henderson, Donald M. (2003). "Effects of stomach stones on the buoyancy and equilibrium of a floating crocodilian: a computational analysis". *Canadian Journal of Zoology*. Ottawa: NRC Research Press. **81** (8): 1346–1357. doi:10.1139/z03-122 (https://doi.org/10.1139%2Fz03-122). ISSN 0008-4301 (https://www.worldcat.org/issn/0008-4301).
154. Senter, Phil (2008). "Voices of the past: a review of Paleozoic and Mesozoic animal sounds" (https://doi.org/10.1080%2F08912960903033327). *Historical Biology*. Milton Park, Oxfordshire: Taylor & Francis. **20** (4): 255–287. doi:10.1080/08912960903033327 (https://doi.org/10.1080%2F08912960903033327). ISSN 0891-2963 (https://www.worldcat.org/issn/0891-2963). S2CID 84473967 (https://api.semanticscholar.org/CorpusID:84473967).

155. Li, Quanguo; Gao, Ke-Qin; Vinther, Jakob; et al. (2010). "Plumage Color Patterns of an Extinct Dinosaur" (https://doc.rero.ch/record/210394/files/PAL_E4402.pdf) (PDF). *Science*. Washington, D.C.: American Association for the Advancement of Science. **327** (5971): 1369–1372. Bibcode:2010Sci...327.1369L (https://ui.adsabs.harvard.edu/abs/2010Sci...327.1369L). doi:10.1126/science.1186290 (https://doi.org/10.1126%2Fscience.1186290). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 20133521 (https://pubmed.ncbi.nlm.nih.gov/20133521). S2CID 206525132 (https://api.semanticscholar.org/CorpusID:206525132). Archived (https://web.archive.org/web/20190330023836/https://doc.rero.ch/record/210394/files/PAL_E4402.pdf) (PDF) from the original on March 30, 2019. Retrieved November 7, 2019.

156. Clarke, Julia A.; Chatterjee, Sankar; Zhiheng, Li; et al. (2016). "Fossil evidence of the avian vocal organ from the Mesozoic". *Nature*. London: Nature Research. **538** (7626): 502–505. Bibcode:2016Natur.538..502C (https://ui.adsabs.harvard.edu/abs/2016Natur.538..502C). doi:10.1038/nature19852 (https://doi.org/10.1038%2Fnature19852). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). PMID 27732575 (https://pubmed.ncbi.nlm.nih.gov/27732575). S2CID 4389926 (https://api.semanticscholar.org/CorpusID:4389926).

157. Riede, Tobias; Eliason, Chad M.; Miller, Edward H.; et al. (2016). "Coos, booms, and hoots: the evolution of closed-mouth vocal behavior in birds". *Evolution*. Hoboken, NJ: John Wiley & Sons for the Society for the Study of Evolution. **70** (8): 1734–1746. doi:10.1111/evo.12988 (https://doi.org/10.1111%2Fevo.12988). ISSN 0014-3820 (https://www.worldcat.org/issn/0014-3820). PMID 27345722 (https://pubmed.ncbi.nlm.nih.gov/27345722). S2CID 11986423 (https://api.semanticscholar.org/CorpusID:11986423).

158. Weishampel, David B. (Spring 1981). "Acoustic Analysis of Vocalization of Lambeosaurine Dinosaurs (Reptilia: Ornithischia)" (https://web.archive.org/web/20141006113229/http://www.hopkinsmedicine.org/FAE/DBWpdf/R3_1981aWeishampel.pdf) (PDF). *Paleobiology*. Bethesda, MD: Paleontological Society. **7** (2): 252–261. doi:10.1017/S0094837300004036 (https://doi.org/10.1017%2FS0094837300004036). ISSN 0094-8373 (https://www.worldcat.org/issn/0094-8373). JSTOR 2400478 (https://www.jstor.org/stable/2400478). Archived from the original (http://www.hopkinsmedicine.org/FAE/DBWpdf/R3_1981aWeishampel.pdf) (PDF) on October 6, 2014. Retrieved October 30, 2019.

159. Miyashita, Tetsuto; Arbour, Victoria M.; Witmer, Lawrence M.; et al. (December 2011). "The internal cranial morphology of an armoured dinosaur *Euoplocephalus* corroborated by X-ray computed tomographic reconstruction" (https://web.archive.org/web/20150924062640/http://www.oucom.ohiou.edu/dbms-witmer/Downloads/2011_Miyashita_et_al._Euoplocephalus_head_anatomy.pdf) (PDF). *Journal of Anatomy*. Hoboken, NJ: John Wiley & Sons. **219** (6): 661–675. doi:10.1111/j.1469-7580.2011.01427.x (https://doi.org/10.1111%2Fj.1469-7580.2011.01427.x). ISSN 1469-7580 (https://www.worldcat.org/issn/1469-7580). PMC 3237876 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3237876). PMID 21954840 (https://pubmed.ncbi.nlm.nih.gov/21954840). Archived from the original (http://www.oucom.ohiou.edu/dbms-witmer/Downloads/2011_Miyashita_et_al._Euoplocephalus_head_anatomy.pdf) (PDF) on September 24, 2015. Retrieved October 30, 2019.

160. Hansell 2000

161. Varricchio, David J.; Horner, John R.; Jackson, Frankie D. (2002). "Embryos and eggs for the Cretaceous theropod dinosaur *Troodon formosus*". *Journal of Vertebrate Paleontology*. Milton Park, Oxfordshire: Taylor & Francis for the Society of Vertebrate Paleontology. **22** (3): 564–576. doi:10.1671/0272-4634(2002)022[0564:EAEFTC]2.0.CO;2 (https://doi.org/10.1671%2F0272-4634%282002%29022%5B0564%3AEAEFTC%5D2.0.CO%3B2). ISSN 0272-4634 (https://www.worldcat.org/issn/0272-4634).

162. Lee, Andrew H.; Werning, Sarah (2008). "Sexual maturity in growing dinosaurs does not fit reptilian growth models" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2206579). *Proc. Natl. Acad. Sci. U.S.A*. Washington, D.C.: National Academy of Sciences. **105** (2): 582–587. Bibcode:2008PNAS..105..582L (https://ui.adsabs.harvard.edu/abs/2008PNAS..105..582L). doi:10.1073/pnas.0708903105 (https://doi.org/10.1073%2Fpnas.0708903105). ISSN 0027-8424 (https://www.worldcat.org/issn/0027-8424). PMC 2206579 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2206579). PMID 18195356 (https://pubmed.ncbi.nlm.nih.gov/18195356).
163. Horner, John R.; Makela, Robert (1979). "Nest of juveniles provides evidence of family structure among dinosaurs". *Nature*. London: Nature Research. **282** (5736): 296–298. Bibcode:1979Natur.282..296H (https://ui.adsabs.harvard.edu/abs/1979Natur.282..296H). doi:10.1038/282296a0 (https://doi.org/10.1038%2F282296a0). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). S2CID 4370793 (https://api.semanticscholar.org/CorpusID:4370793).
164. "Discovering Dinosaur Behavior: 1960–present view" (https://web.archive.org/web/20131213042521/http://www.britannica.com/dinosaurs/dinosaurs/BRa.html). *Encyclopædia Britannica*. Chicago, IL: Encyclopædia Britannica, Inc. Archived from the original (http://www.britannica.com/dinosaurs/dinosaurs/BRa.html) on December 13, 2013. Retrieved October 30, 2019.
165. Currie et al. 2004, pp. 234–250 (http://thomas-hopp.com/pdf/DinoBrooding.pdf), chpt. 11: "Dinosaur Brooding Behavior and the Origin of Flight Feathers" by Thomas P. Hopp and Mark J. Orsen.
166. Reisz, Robert R.; Scott, Diane; Sues, Hans-Dieter; et al. (2005). "Embryos of an Early Jurassic Prosauropod Dinosaur and Their Evolutionary Significance" (https://repository.si.edu/bitstream/handle/10088/7530/paleo_REISZ_ET_AL.2005.pdf) (PDF). *Science*. Washington, D.C.: American Association for the Advancement of Science. **309** (5735): 761–764. Bibcode:2005Sci...309..761R (https://ui.adsabs.harvard.edu/abs/2005Sci...309..761R). doi:10.1126/science.1114942 (https://doi.org/10.1126%2Fscience.1114942). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 16051793 (https://pubmed.ncbi.nlm.nih.gov/16051793). S2CID 37548361 (https://api.semanticscholar.org/CorpusID:37548361).
167. Clark, Neil D. L.; Booth, Paul; Booth, Claire L.; et al. (2004). "Dinosaur footprints from the Duntulm Formation (Bathonian, Jurassic) of the Isle of Skye" (http://eprints.gla.ac.uk/4496/1/4496.pdf) (PDF). *Scottish Journal of Geology*. London: Geological Society of London. **40** (1): 13–21. doi:10.1144/sjg40010013 (https://doi.org/10.1144%2Fsjg40010013). ISSN 0036-9276 (https://www.worldcat.org/issn/0036-9276). S2CID 128544813 (https://api.semanticscholar.org/CorpusID:128544813). Archived (https://web.archive.org/web/20130722081936/http://eprints.gla.ac.uk/4496/1/4496.pdf) (PDF) from the original on July 22, 2013. Retrieved December 12, 2019.
168. Zhou, Zhonghe; Zhang, Fucheng (2004). "A Precocial Avian Embryo from the Lower Cretaceous of China". *Science*. Washington, D.C.: American Association for the Advancement of Science. **306** (5696): 653. doi:10.1126/science.1100000 (https://doi.org/10.1126%2Fscience.1100000). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 15499011 (https://pubmed.ncbi.nlm.nih.gov/15499011). S2CID 34504916 (https://api.semanticscholar.org/CorpusID:34504916).
169. Naish, Darren (May 15, 2012). "A drowned nesting colony of Late Cretaceous birds" (https://blogs.scientificamerican.com/tetrapod-zoology/drowned-cretaceous-bird-colony/). *Science*. Scientific American. **306** (5696): 653. doi:10.1126/science.1100000 (https://doi.org/10.1126%2Fscience.1100000). PMID 15499011 (https://pubmed.ncbi.nlm.nih.gov/15499011). S2CID 34504916 (https://api.semanticscholar.org/CorpusID:34504916). Archived (https://web.archive.org/web/20180925031243/https://blogs.scientificamerican.com/tetrapod-zoology/drowned-cretaceous-bird-colony/) from the original on September 25, 2018. Retrieved November 16, 2019.

170. Fernández, Mariela S.; García, Rodolfo A.; Fiorelli, Lucas; et al. (2013). "A Large Accumulation of Avian Eggs from the Late Cretaceous of Patagonia (Argentina) Reveals a Novel Nesting Strategy in Mesozoic Birds" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3629076). *PLOS ONE*. San Francisco, CA: PLOS. **8** (4): e61030. Bibcode:2013PLoSO...861030F (https://ui.adsabs.harvard.edu/abs/2013PLoSO...861030F). doi:10.1371/journal.pone.0061030 (https://doi.org/10.1371%2Fjournal.pone.0061030). ISSN 1932-6203 (https://www.worldcat.org/issn/1932-6203). PMC 3629076 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3629076). PMID 23613776 (https://pubmed.ncbi.nlm.nih.gov/23613776).
171. Deeming, Denis Charles; Mayr, Gerald (May 2018). "Pelvis morphology suggests that early Mesozoic birds were too heavy to contact incubate their eggs" (http://eprints.lincoln.ac.uk/id/eprint/31436/13/31436%2031291%20Deeming_et_al-2018-Journal_of_Evolutionary_Biology.pdf) (PDF). *Journal of Evolutionary Biology*. Hoboken, NJ: Wiley-Blackwell on behalf of the European Society for Evolutionary Biology. **31** (5): 701–709. doi:10.1111/jeb.13256 (https://doi.org/10.1111%2Fjeb.13256). ISSN 1010-061X (https://www.worldcat.org/issn/1010-061X). PMID 29485191 (https://pubmed.ncbi.nlm.nih.gov/29485191). S2CID 3588317 (https://api.semanticscholar.org/CorpusID:3588317).
172. Myers, Timothy S.; Fiorillo, Anthony R. (2009). "Evidence for gregarious behavior and age segregation in sauropod dinosaurs". *Palaeogeography, Palaeoclimatology, Palaeoecology*. Amsterdam: Elsevier. **274** (1–2): 96–104. Bibcode:2009PPP...274...96M (https://ui.adsabs.harvard.edu/abs/2009PPP...274...96M). doi:10.1016/j.palaeo.2009.01.002 (https://doi.org/10.1016%2Fj.palaeo.2009.01.002). ISSN 0031-0182 (https://www.worldcat.org/issn/0031-0182).
173. Vinther, Jakob; Nicholls, Robert; Kelly, Diane A. (February 22, 2021). "A cloacal opening in a non-avian dinosaur" (https://www.cell.com/current-biology/fulltext/S0960-9822(20)31891-1?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0960982220318911%3Fshowall%3Dtrue). *Current Biology*. Elsevier. **31** (4): R1–R3. doi:10.1016/j.cub.2020.12.039 (https://doi.org/10.1016%2Fj.cub.2020.12.039). PMID 33472049 (https://pubmed.ncbi.nlm.nih.gov/33472049). S2CID 231644183 (https://api.semanticscholar.org/CorpusID:231644183).
174. Weishampel, Dodson & Osmólska 2004, pp. 643–659, chpt. 28: "Physiology of Nonavian Dinosaurs" by Anusuya Chinsamy and Willem J. Hillenius.
175. Pontzer, H.; Allen, V.; Hutchinson, J.R. (2009). "Biomechanics of running indicates endothermy in bipedal dinosaurs" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2772121). *PLOS ONE*. **4** (11): e7783. Bibcode:2009PLoSO...4.7783P (https://ui.adsabs.harvard.edu/abs/2009PLoSO...4.7783P). doi:10.1371/journal.pone.0007783 (https://doi.org/10.1371%2Fjournal.pone.0007783). ISSN 1932-6203 (https://www.worldcat.org/issn/1932-6203). PMC 2772121 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2772121). PMID 19911059 (https://pubmed.ncbi.nlm.nih.gov/19911059).
176. Benson, R.B.J. (2018). "Dinosaur Macroevolution and Macroecology". *Annual Review of Ecology, Evolution, and Systematics*. **49**: 379–408. doi:10.1146/annurev-ecolsys-110617-062231 (https://doi.org/10.1146%2Fannurev-ecolsys-110617-062231). S2CID 92837486 (https://api.semanticscholar.org/CorpusID:92837486).
177. Grady, J.M.; Enquist, B.J.; Dettweiler-Robinson, E.; Wright, N.A.; Smith, F.A. (2014). "Evidence for mesothermy in dinosaurs". *Science*. **344** (6189): 1268–1272. Bibcode:2014Sci...344.1268G (https://ui.adsabs.harvard.edu/abs/2014Sci...344.1268G). doi:10.1126/science.1253143 (https://doi.org/10.1126%2Fscience.1253143). PMID 24926017 (https://pubmed.ncbi.nlm.nih.gov/24926017). S2CID 9806780 (https://api.semanticscholar.org/CorpusID:9806780).

178. Legendre, L.J.; Guénard, G.; Botha-Brink, J.; Cubo, J. (2016). "Palaeohistological Evidence for Ancestral High Metabolic Rate in Archosaurs". *Systematic Biology*. **65** (6): 989–996. doi:10.1093/sysbio/syw033 (https://doi.org/10.1093%2Fsysbio%2Fsyw033). PMID 27073251 (https://pubmed.ncbi.nlm.nih.gov/27073251).
179. Seymour, R.S.; Bennett-Stamper, C.L.; Johnston, S.D.; Carrier, D.R.; Grigg, G.C. (2004). "Evidence for endothermic ancestors of crocodiles at the stem of archosaur evolution". *Physiological and Biochemical Zoology*. **77** (6): 1051–1067. doi:10.1093/sysbio/syw033 (https://doi.org/10.1093%2Fsysbio%2Fsyw033). PMID 27073251 (https://pubmed.ncbi.nlm.nih.gov/27073251).
180. Parsons 2001, pp. 22–48, "The Heresies of Dr. Bakker".
181. Erickson, G.M. (2014). "On dinosaur growth". *Annual Review of Earth and Planetary Sciences*. **42** (1): 675–697. Bibcode:2014AREPS..42..675E (https://ui.adsabs.harvard.edu/abs/2014AREPS..42..675E). doi:10.1146/annurev-earth-060313-054858 (https://doi.org/10.1146%2Fannurev-earth-060313-054858).
182. Bailleul, A.M.; O'Connor, J.; Schweitzer, M.H. (2019). "Dinosaur paleohistology: review, trends and new avenues of investigation" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6768056). *PeerJ*. **7**: e7764. doi:10.7717/peerj.7764 (https://doi.org/10.7717%2Fpeerj.7764). PMC 6768056 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6768056). PMID 31579624 (https://pubmed.ncbi.nlm.nih.gov/31579624).
183. De Ricqlès, A. (1974). "Evolution of endothermy: histological evidence" (http://www.stuartsumida.com/BIOL622/Ricqles1974.pdf) (PDF). *Evolutionary Theory*. **1** (2): 51–80.
184. De Ricqlès, A. (1980). "Tissue structures of dinosaur bone, functional significance and possible relation to dinosaur physiology". In Thomas, R.D.K.; Olson, E.C. (eds.). *A Cold Look at the Warm-Blooded Dinosaurs*. New York: American Association for the Advancement of Science. pp. 103–139.
185. Padian, K.; Horner, J.R.; de Ricqlès, A. (2004). "Growth in small dinosaurs and pterosaurs: the evolution of archosaurian growth strategies". *Journal of Vertebrate Paleontology*. **24** (3): 555–571. doi:10.1671/0272-4634(2004)024[0555:GISDAP]2.0.CO;2 (https://doi.org/10.1671%2F0272-4634%282004%29024%5B0555%3AGISDAP%5D2.0.CO%3B2).
186. de Souza, G.A.; Bento Soares, M.; Souza Brum, A.; Zucolotto, M.; Sayão, J.M.; Carlos Weinschütz, L.; Kellner, A.W.A. (2020). "Osteohistology and growth dynamics of the Brazilian noasaurid *Vespersaurus paranaensis* Langer et al., 2019 (Theropoda: Abelisauroidea)" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7500327). *PeerJ*. **8**: e9771. doi:10.7717/peerj.9771 (https://doi.org/10.7717%2Fpeerj.9771). PMC 7500327 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7500327). PMID 32983636 (https://pubmed.ncbi.nlm.nih.gov/32983636). S2CID 221906765 (https://api.semanticscholar.org/CorpusID:221906765).

187. For examples of this work conducted on different dinosaur lineages, see

- Erickson, G.M.; Tumanova, T.A. (2000). "Growth curve of *Psittacosaurus mongoliensis* Osborn (Ceratopsia: Psittacosauridae) inferred from long bone histology". *Zoological Journal of the Linnean Society*. **130** (4): 551–566. doi:10.1111/j.1096-3642.2000.tb02201.x (https://doi.org/10.1111%2Fj.1096-3642.2000.tb02201.x).
- Erickson, G.; Rogers, K.; Yerby, S. (2001). "Dinosaurian growth patterns and rapid avian growth rates". *Nature*. **412** (429–433): 429–433. Bibcode:2001Natur.412..429E (https://ui.adsabs.harvard.edu/abs/2001Natur.412..429E). doi:10.1038/35086558 (https://doi.org/10.1038%2F35086558). PMID 11473315 (https://pubmed.ncbi.nlm.nih.gov/11473315). S2CID 4319534 (https://api.semanticscholar.org/CorpusID:4319534).
- Erickson, G.; Makovicky, P.; Currie, P.; Norell, M.A.; Yerby, S.A.; Brochu, C.A. (2004). "Gigantism and comparative life-history parameters of tyrannosaurid dinosaurs". *Nature*. **430** (7001): 772–775. Bibcode:2004Natur.430..772E (https://ui.adsabs.harvard.edu/abs/2004Natur.430..772E). doi:10.1038/nature02699 (https://doi.org/10.1038%2Fnature02699). PMID 15306807 (https://pubmed.ncbi.nlm.nih.gov/15306807). S2CID 4404887 (https://api.semanticscholar.org/CorpusID:4404887).
- Lehman, T.M.; Woodward, H.N. (2008). "Modeling growth rates for sauropod dinosaurs". *Paleobiology*. **34** (2): 264–281. doi:10.1666/0094-8373(2008)034[0264:MGRFSD]2.0.CO;2 (https://doi.org/10.1666%2F0094-8373%282008%29034%5B0264%3AMGRFSD%5D2.0.CO%3B2).
- Horner, J.R.; de Ricqles, A.; Padian, K.; Scheetz, R.D. (2009). "Comparative long bone histology and growth of the "hypsilophodontid" dinosaurs *Orodromeus makelai*, *Dryosaurus altus*, and *Tenontosaurus tillettii* (Ornithischia: Euornithopoda)". *Journal of Vertebrate Paleontology*. **29** (3): 734–747. doi:10.1671/039.029.0312 (https://doi.org/10.1671%2F039.029.0312). S2CID 86277619 (https://api.semanticscholar.org/CorpusID:86277619).
- Woodward, H.; Freedman Fowler, E.; Farlow, J.; Horner, J. (2015). "*Maiasaura*, a model organism for extinct vertebrate population biology: A large sample statistical assessment of growth dynamics and survivorship". *Paleobiology*. **41** (4): 503–527. doi:10.1017/pab.2015.19 (https://doi.org/10.1017%2Fpab.2015.19). S2CID 85902880 (https://api.semanticscholar.org/CorpusID:85902880).

188. Amiot, R.; Lécuyer, C.; Buffetaut, E.; Escarguel, G.; Fluteau, F.; Martineau, F. (2006). "Oxygen isotopes from biogenic apatites suggest widespread endothermy in Cretaceous dinosaurs". *Earth and Planetary Science Letters*. **246** (1–2): 41–54. Bibcode:2006E&PSL.246...41A (https://ui.adsabs.harvard.edu/abs/2006E&PSL.246...41A). doi:10.1016/j.epsl.2006.04.018 (https://doi.org/10.1016%2Fj.epsl.2006.04.018).
189. Amiot, R.; Wang, X.; Lécuyer, C.; Buffetaut, E.; Boudad, L.; Cavin, L.; Ding, Z.; Fluteau, F.; Kellner, A.W.A.; Tong, H.; Zhang, F. (2010). "Oxygen and carbon isotope compositions of middle Cretaceous vertebrates from North Africa and Brazil: ecological and environmental significance". *Palaeogeography, Palaeoclimatology, Palaeoecology*. **297** (2): 439–451. Bibcode:2010PPP...297..439A (https://ui.adsabs.harvard.edu/abs/2010PPP...297..439A). doi:10.1016/j.palaeo.2010.08.027 (https://doi.org/10.1016%2Fj.palaeo.2010.08.027).
190. Kolodny, Y.; Luz, B.; Sander, M.; Clemens, W.A. (1996). "Dinosaur bones: fossils or pseudomorphs? The pitfalls of physiology reconstruction from apatitic fossils". *Palaeogeography, Palaeoclimatology, Palaeoecology*. **126** (1–2): 161–171. Bibcode:1996PPP...126..161K (https://ui.adsabs.harvard.edu/abs/1996PPP...126..161K). doi:10.1016/S0031-0182(96)00112-5 (https://doi.org/10.1016%2FS0031-0182%2896%2900112-5).

191. Paul, G.S. (1988). "Physiological, migratorial, climatological, geophysical, survival, and evolutionary implications of Cretaceous polar dinosaurs". *Journal of Paleontology*. **62** (4): 640–652. JSTOR 1305468 (https://www.jstor.org/stable/1305468).
192. Clemens, W.A.; Nelms, L.G. (1993). "Paleoecological implications of Alaskan terrestrial vertebrate fauna in latest Cretaceous time at high paleolatitudes". *Geology*. **21** (6): 503–506. Bibcode:1993Geo....21..503C (https://ui.adsabs.harvard.edu/abs/1993Geo....21..503C). doi:10.1130/0091-7613(1993)021<0503:PIOATV>2.3.CO;2 (https://doi.org/10.1130%2F0091-7613%281993%29021%3C0503%3APIOATV%3E2.3.CO%3B2).
193. Rich, T.H.; Vickers-Rich, P.; Gangloff, R.A. (2002). "Polar dinosaurs". *Science*. **295** (5557): 979–980. doi:10.1126/science.1068920 (https://doi.org/10.1126%2Fscience.1068920). PMID 11834803 (https://pubmed.ncbi.nlm.nih.gov/11834803). S2CID 28065814 (https://api.semanticscholar.org/CorpusID:28065814).
194. Buffetaut, E. (2004). "Polar dinosaurs and the question of dinosaur extinction: a brief review". *Palaeogeography, Palaeoclimatology, Palaeoecology*. **214** (3): 225–231. doi:10.1016/j.palaeo.2004.02.050 (https://doi.org/10.1016%2Fj.palaeo.2004.02.050).
195. Sereno, Paul C.; Martinez, Ricardo N.; Wilson, Jeffrey A.; et al. (September 2008). Kemp, Tom (ed.). "Evidence for Avian Intrathoracic Air Sacs in a New Predatory Dinosaur from Argentina" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2553519). *PLOS ONE*. San Francisco, CA: PLOS. **3** (9): e3303. Bibcode:2008PLoSO...3.3303S (https://ui.adsabs.harvard.edu/abs/2008PLoSO...3.3303S). doi:10.1371/journal.pone.0003303 (https://doi.org/10.1371%2Fjournal.pone.0003303). ISSN 1932-6203 (https://www.worldcat.org/issn/1932-6203). PMC 2553519 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2553519). PMID 18825273 (https://pubmed.ncbi.nlm.nih.gov/18825273).
196. O'Connor, P.M. (2009). "Evolution of archosaurian body plans: skeletal adaptations of an air-sac-based breathing apparatus in birds and other archosaurs". *Journal of Experimental Zoology Part A: Ecological Genetics and Physiology*. **311** (8): 629–646. doi:10.1002/jez.548 (https://doi.org/10.1002%2Fjez.548). PMID 19492308 (https://pubmed.ncbi.nlm.nih.gov/19492308).
197. Eagle, R.A.; Tütken, T.; Martin, T.S.; Tripati, A.K.; Fricke, H.C.; Connely, M.; Cifelli, R.L.; Eiler, J.M. (2011). "Dinosaur body temperatures determined from isotopic (^{13}C-^{18}O) ordering in fossil biominerals". *Science*. **333** (6041): 443–445. Bibcode:2011Sci...333..443E (https://ui.adsabs.harvard.edu/abs/2011Sci...333..443E). doi:10.1126/science.1206196 (https://doi.org/10.1126%2Fscience.1206196). PMID 21700837 (https://pubmed.ncbi.nlm.nih.gov/21700837). S2CID 206534244 (https://api.semanticscholar.org/CorpusID:206534244).
198. Wedel, M.J. (2003). "Vertebral pneumaticity, air sacs, and the physiology of sauropod dinosaurs". *Paleobiology*. **29** (2): 243–255. doi:10.1666/0094-8373(2003)029<0243:VPASAT>2.0.CO;22 (https://doi.org/10.1666%2F0094-8373%282003%29029%3C0243%3AVPASAT%3E2.0.CO%3B22) (inactive February 28, 2022).
199. Perry, S.F.; Christian, A.; Breuer, T.; Pajor, N.; Codd, J.R. (2009). "Implications of an avian-style respiratory system for gigantism in sauropod dinosaurs". *Journal of Experimental Zoology Part A: Ecological Genetics and Physiology*. **311** (8): 600–610. doi:10.1002/jez.517 (https://doi.org/10.1002%2Fjez.517). PMID 19189317 (https://pubmed.ncbi.nlm.nih.gov/19189317).
200. Alexander, R.M. (1998). "All-time giants: the largest animals and their problems" (https://www.palass.org/publications/palaeontology-journal/archive/41/6/article_pp1231-1245). *Palaeontology*. **41**: 1231–1245.

201. Tsahar, E.; Martínez del Rio, C.; Izhaki, I.; Arad, Z. (2005). "Can birds be ammonotelic? Nitrogen balance and excretion in two frugivores" (https://jeb.biologists.org/content/jexbio/208/6/1025.full.pdf) (PDF). *The Journal of Experimental Biology*. **208** (6): 1025–1034. doi:10.1242/jeb.01495 (https://doi.org/10.1242%2Fjeb.01495). ISSN 0022-0949 (https://www.worldcat.org/issn/0022-0949). PMID 15767304 (https://pubmed.ncbi.nlm.nih.gov/15767304). S2CID 18540594 (https://api.semanticscholar.org/CorpusID:18540594). Archived (https://web.archive.org/web/20191017110333/https://jeb.biologists.org/content/jexbio/208/6/1025.full.pdf) (PDF) from the original on October 17, 2019. Retrieved October 31, 2019.
202. Skadhauge, E.; Erlwanger, K.H.; Ruziwa, S.D.; Dantzer, V.; Elbrønd, V.S.; Chamunorwa, J.P. (2003). "Does the ostrich (*Struthio camelus*) coprodeum have the electrophysiological properties and microstructure of other birds?". *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology*. **134** (4): 749–755. doi:10.1016/S1095-6433(03)00006-0 (https://doi.org/10.1016%2FS1095-6433%2803%2900006-0). ISSN 1095-6433 (https://www.worldcat.org/issn/1095-6433). PMID 12814783 (https://pubmed.ncbi.nlm.nih.gov/12814783).
203. Preest, M.R.; Beuchat, C.A. (1997). "Ammonia excretion by hummingbirds". *Nature*. **386** (6625): 561–562. Bibcode:1997Natur.386..561P (https://ui.adsabs.harvard.edu/abs/1997Natur.386..561P). doi:10.1038/386561a0 (https://doi.org/10.1038%2F386561a0). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). S2CID 4372695 (https://api.semanticscholar.org/CorpusID:4372695).
204. Mora, J.; Martuscelli, J.; Ortiz Pineda, J.; Soberon, G. (1965). "The Regulation of Urea-Biosynthesis Enzymes in Vertebrates" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1206904). *Biochemical Journal*. **96** (1): 28–35. doi:10.1042/bj0960028 (https://doi.org/10.1042%2Fbj0960028). ISSN 0264-6021 (https://www.worldcat.org/issn/0264-6021). PMC 1206904 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1206904). PMID 14343146 (https://pubmed.ncbi.nlm.nih.gov/14343146).
205. Packard, G.C. (1966). "The Influence of Ambient Temperature and Aridity on Modes of Reproduction and Excretion of Amniote Vertebrates". *The American Naturalist*. **100** (916): 667–682. doi:10.1086/282459 (https://doi.org/10.1086%2F282459). ISSN 0003-0147 (https://www.worldcat.org/issn/0003-0147). JSTOR 2459303 (https://www.jstor.org/stable/2459303). S2CID 85424175 (https://api.semanticscholar.org/CorpusID:85424175).
206. Balgooyen, T.G. (1971). "Pellet Regurgitation by Captive Sparrow Hawks (*Falco sparverius*)" (https://web.archive.org/web/20190404001957/https://sora.unm.edu/sites/default/files/journals/condor/v073n03/p0382-p0385.pdf) (PDF). *Condor*. **73** (3): 382–385. doi:10.2307/1365774 (https://doi.org/10.2307%2F1365774). JSTOR 1365774 (https://www.jstor.org/stable/1365774). Archived from the original (https://sora.unm.edu/sites/default/files/journals/condor/v073n03/p0382-p0385.pdf) (PDF) on April 4, 2019. Retrieved October 30, 2019.
207. Xu, X.; Li, F.; Wang, Y.; Sullivan, C.; Zhang, F.; Zhang, X.; Sullivan, C.; Wang, X.; Zheng, X. (2018). "Exceptional dinosaur fossils reveal early origin of avian-style digestion" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6155034). *Scientific Reports*. **8** (1): 14217. Bibcode:2018NatSR...814217Z (https://ui.adsabs.harvard.edu/abs/2018NatSR...814217Z). doi:10.1038/s41598-018-32202-x (https://doi.org/10.1038%2Fs41598-018-32202-x). ISSN 2045-2322 (https://www.worldcat.org/issn/2045-2322). PMC 6155034 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6155034). PMID 30242170 (https://pubmed.ncbi.nlm.nih.gov/30242170).
208. Russell, Dale A. (1997). "Intelligence". In Kevin Padian; Philip J. Currie (eds.). *Encyclopedia of dinosaurs*. San Diego: Academic Press. pp. 370–372. ISBN 978-0-12-226810-6.
209. Brusatte 2012, p. 83

210. Huxley, Thomas H. (1868). "On the Animals which are most nearly intermediate between Birds and Reptiles" (https://archive.org/details/cbarchive_51934_ontheanimalswhicharemostnearly1840/page/n1). *The Annals and Magazine of Natural History*. London: Taylor & Francis. **4** (2): 66–75. Retrieved October 31, 2019.
211. Heilmann 1926
212. Osborn, Henry Fairfield (1924). "Three new Theropoda, *Protoceratops* zone, central Mongolia" (https://digitallibrary.amnh.org/dspace/bitstream/2246/3223/1/N0144.pdf) (PDF). *American Museum Novitates*. New York: American Museum of Natural History (144): 1–12. ISSN 0003-0082 (https://www.worldcat.org/issn/0003-0082).
213. Ostrom, John H. (1973). "The ancestry of birds". *Nature*. London: Nature Research. **242** (5393): 136. Bibcode:1973NPhS..242..136O (https://ui.adsabs.harvard.edu/abs/1973NPhS..242..136O). doi:10.1038/242136a0 (https://doi.org/10.1038%2F242136a0). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). S2CID 29873831 (https://api.semanticscholar.org/CorpusID:29873831).
214. Padian 1986, pp. 1–55 (https://archive.org/details/cbarchive_48104_saurischianmonophylyandtheorig1868), "Saurischian Monophyly and the Origin of Birds" by Jacques Gauthier.
215. Mayr, Gerald; Pohl, Burkhard; Peters, D. Stefan (2005). "A Well-Preserved *Archaeopteryx* Specimen with Theropod Features". *Science*. Washington, D.C.: American Association for the Advancement of Science. **310** (5753): 1483–1486. Bibcode:2005Sci...310.1483M (https://ui.adsabs.harvard.edu/abs/2005Sci...310.1483M). doi:10.1126/science.1120331 (https://doi.org/10.1126%2Fscience.1120331). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 16322455 (https://pubmed.ncbi.nlm.nih.gov/16322455). S2CID 28611454 (https://api.semanticscholar.org/CorpusID:28611454).
216. Martin, Larry D. (2006). "A basal archosaurian origin for birds". *Acta Zoologica Sinica*. **50** (6): 977–990. ISSN 1674-5507 (https://www.worldcat.org/issn/1674-5507).
217. Feduccia, Alan (October 1, 2002). "Birds are Dinosaurs: Simple Answer to a Complex Problem" (https://academic.oup.com/auk/article/119/4/1187/5562157). *The Auk*. Washington, D.C.: American Ornithologists' Union. **119** (4): 1187–1201. doi:10.1642/0004-8038(2002)119[1187:BADSAT]2.0.CO;2 (https://doi.org/10.1642%2F0004-8038%282002%29119%5B1187%3ABADSAT%5D2.0.CO%3B2). ISSN 0004-8038 (https://www.worldcat.org/issn/0004-8038). JSTOR 4090252 (https://www.jstor.org/stable/4090252). Retrieved November 3, 2019.
218. Switek, Brian (July 2, 2012). "Rise of the fuzzy dinosaurs" (https://www.nature.com/articles/nature.2012.10933). News. *Nature*. London: Nature Research. doi:10.1038/nature.2012.10933 (https://doi.org/10.1038%2Fnature.2012.10933). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). S2CID 123219913 (https://api.semanticscholar.org/CorpusID:123219913). Retrieved January 1, 2019.
219. Godefroit, P.; Sinitsa, S.M.; Dhouailly, D.; Bolotsky, Y.L.; Sizov, A.V.; McNamara, M.E.; Benton, M.J.; Spagna, P. (2014). "A Jurassic ornithischian dinosaur from Siberia with both feathers and scales" (https://web.archive.org/web/20190209232112/http://palaeo.gly.bris.ac.uk/Benton/reprints/2014Kulinda.pdf) (PDF). *Science*. **345** (6195): 451–455. Bibcode:2014Sci...345..451G (https://ui.adsabs.harvard.edu/abs/2014Sci...345..451G). doi:10.1126/science.1253351 (https://doi.org/10.1126%2Fscience.1253351). hdl:1983/a7ae6dfb-55bf-4ca4-bd8b-a5ea5f323103 (https://hdl.handle.net/1983%2Fa7ae6dfb-55bf-4ca4-bd8b-a5ea5f323103). PMID 25061209 (https://pubmed.ncbi.nlm.nih.gov/25061209). S2CID 206556907 (https://api.semanticscholar.org/CorpusID:206556907). Archived from the original (http://palaeo.gly.bris.ac.uk/Benton/reprints/2014Kulinda.pdf) (PDF) on February 9, 2019. Retrieved July 27, 2016.

220. Xu, Xing; Norell, Mark A.; Kuang, Xuewen; et al. (2004). "Basal tyrannosauroids from China and evidence for protofeathers in tyrannosauroids". *Nature*. London: Nature Research. **431** (7009): 680–684. Bibcode:2004Natur.431..680X (https://ui.adsabs.harvard.edu/abs/2004Natur.431..680X). doi:10.1038/nature02855 (https://doi.org/10.1038%2Fnature02855). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). PMID 15470426 (https://pubmed.ncbi.nlm.nih.gov/15470426). S2CID 4381777 (https://api.semanticscholar.org/CorpusID:4381777).
221. Göhlich, Ursula B.; Chiappe, Luis M. (2006). "A new carnivorous dinosaur from the Late Jurassic Solnhofen archipelago" (https://web.archive.org/web/20190426005126/https://doc.rero.ch/record/232914/files/PAL_E4515.pdf) (PDF). *Nature*. London: Nature Research. **440** (7082): 329–332. Bibcode:2006Natur.440..329G (https://ui.adsabs.harvard.edu/abs/2006Natur.440..329G). doi:10.1038/nature04579 (https://doi.org/10.1038%2Fnature04579). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). PMID 16541071 (https://pubmed.ncbi.nlm.nih.gov/16541071). S2CID 4427002 (https://api.semanticscholar.org/CorpusID:4427002). Archived from the original (https://doc.rero.ch/record/232914/files/PAL_E4515.pdf) (PDF) on April 26, 2019. Retrieved November 1, 2019.
222. Kellner, Alexander W. A.; Wang, Xiaolin; Tischlinger, Helmut; et al. (2010). "The soft tissue of *Jeholopterus* (Pterosauria, Anurognathidae, Batrachognathinae) and the structure of the pterosaur wing membrane" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2842671). *Proceedings of the Royal Society B*. London: Royal Society. **277** (1679): 321–329. doi:10.1098/rspb.2009.0846 (https://doi.org/10.1098%2Frspb.2009.0846). ISSN 0962-8452 (https://www.worldcat.org/issn/0962-8452). PMC 2842671 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2842671). PMID 19656798 (https://pubmed.ncbi.nlm.nih.gov/19656798).
223. Alibardi, Lorenzo; Knapp, Loren W.; Sawyer, Roger H. (2006). "Beta-keratin localization in developing alligator scales and feathers in relation to the development and evolution of feathers". *Journal of Submicroscopic Cytology and Pathology*. Siena: Nuova Immagine Editrice. **38** (2–3): 175–192. ISSN 1122-9497 (https://www.worldcat.org/issn/1122-9497). PMID 17784647 (https://pubmed.ncbi.nlm.nih.gov/17784647).
224. Wellnhofer, Peter (1988). "A New Specimen of *Archaeopteryx*". *Science*. Washington, D.C.: American Association for the Advancement of Science. **240** (4860): 1790–1792. Bibcode:1988Sci...240.1790W (https://ui.adsabs.harvard.edu/abs/1988Sci...240.1790W). doi:10.1126/science.240.4860.1790 (https://doi.org/10.1126%2Fscience.240.4860.1790). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). JSTOR 1701652 (https://www.jstor.org/stable/1701652). PMID 17842432 (https://pubmed.ncbi.nlm.nih.gov/17842432). S2CID 32015255 (https://api.semanticscholar.org/CorpusID:32015255).
    - —— (1988). "Ein neuer Exemplar von *Archaeopteryx*". *Archaeopteryx*. **6**: 1–30.
225. Schweitzer, Mary H.; Watt, J.A.; Avci, R.; et al. (1999). "Beta-keratin specific immunological reactivity in feather-like structures of the Cretaceous Alvarezsaurid, *Shuvuuia deserti*". *Journal of Experimental Zoology Part B*. Hoboken, NJ: Wiley-Blackwell. **285** (2): 146–157. doi:10.1002/(SICI)1097-010X(19990815)285:2<146::AID-JEZ7>3.0.CO;2-A (https://doi.org/10.1002%2F%28SICI%291097-010X%2819990815%29285%3A2%3C146%3A%3AAID-JEZ7%3E3.0.CO%3B2-A). ISSN 1552-5007 (https://www.worldcat.org/issn/1552-5007). PMID 10440726 (https://pubmed.ncbi.nlm.nih.gov/10440726).
226. Lingham-Soliar, Theagarten (December 2003). "The dinosaurian origin of feathers: perspectives from dolphin (Cetacea) collagen fibers". *Naturwissenschaften*. Berlin: Springer Science+Business Media. **90** (12): 563–567. Bibcode:2003NW.....90..563L (https://ui.adsabs.harvard.edu/abs/2003NW.....90..563L). doi:10.1007/s00114-003-0483-7 (https://doi.org/10.1007%2Fs00114-003-0483-7). ISSN 0028-1042 (https://www.worldcat.org/issn/0028-1042). PMID 14676953 (https://pubmed.ncbi.nlm.nih.gov/14676953). S2CID 43677545 (https://api.semanticscholar.org/CorpusID:43677545).

227. Feduccia, Alan; Lingham-Soliar, Theagarten; Hinchliffe, J. Richard (November 2005). "Do feathered dinosaurs exist? Testing the hypothesis on neontological and paleontological evidence". *Journal of Morphology*. Hoboken, NJ: John Wiley & Sons. **266** (2): 125–166. doi:10.1002/jmor.10382 (https://doi.org/10.1002%2Fjmor.10382). ISSN 0362-2525 (https://www.worldcat.org/issn/0362-2525). PMID 16217748 (https://pubmed.ncbi.nlm.nih.gov/16217748). S2CID 15079072 (https://api.semanticscholar.org/CorpusID:15079072).
228. Lingham-Soliar, Theagarten; Feduccia, Alan; Wang, Xiaolin (2007). "A new Chinese specimen indicates that 'protofeathers' in the Early Cretaceous theropod dinosaur *Sinosauropteryx* are degraded collagen fibres" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2270928). *Proceedings of the Royal Society B*. London: Royal Society. **274** (1620): 1823–1829. doi:10.1098/rspb.2007.0352 (https://doi.org/10.1098%2Frspb.2007.0352). ISSN 0962-8452 (https://www.worldcat.org/issn/0962-8452). PMC 2270928 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2270928). PMID 17521978 (https://pubmed.ncbi.nlm.nih.gov/17521978).
229. Prum, Richard O. (2003). "Are Current Critiques Of The Theropod Origin Of Birds Science? Rebuttal To Feduccia 2002" (https://doi.org/10.1642%2F0004-8038%282003%29120%5B0550%3AACCOTT%5D2.0.CO%3B2). *The Auk*. Washington, D.C.: American Ornithologists' Union. **120** (2): 550–561. doi:10.1642/0004-8038(2003)120[0550:ACCOTT]2.0.CO;2 (https://doi.org/10.1642%2F0004-8038%282003%29120%5B0550%3AACCOTT%5D2.0.CO%3B2). ISSN 0004-8038 (https://www.worldcat.org/issn/0004-8038). JSTOR 4090212 (https://www.jstor.org/stable/4090212).
230. "*Archaeopteryx*: An Early Bird" (https://ucmp.berkeley.edu/diapsids/birds/archaeopteryx.html). Berkeley: University of California Museum of Paleontology. Retrieved October 30, 2019.
231. O'Connor, Patrick M.; Claessens, Leon P. A. M. (2005). "Basic avian pulmonary design and flow-through ventilation in non-avian theropod dinosaurs". *Nature*. London: Nature Research. **436** (7048): 253–256. Bibcode:2005Natur.436..253O (https://ui.adsabs.harvard.edu/abs/2005Natur.436..253O). doi:10.1038/nature03716 (https://doi.org/10.1038%2Fnature03716). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). PMID 16015329 (https://pubmed.ncbi.nlm.nih.gov/16015329). S2CID 4390587 (https://api.semanticscholar.org/CorpusID:4390587).
232. Gibson, Andrea (July 13, 2005). "Study: Predatory Dinosaurs had Bird-Like Pulmonary System" (https://www.ohio.edu/research/communications/dinosaur_study.cfm). *Research Communications*. Athens, OH: Ohio University. Retrieved November 18, 2019.
233. "Meat-eating dinosaur from Argentina had bird-like breathing system" (https://news.umich.edu/meat-eating-dinosaur-from-argentina-had-bird-like-breathing-system/). *University of Michigan News*. Ann Arbor, MI: Office of the Vice President for Communications; Regents of the University of Michigan. October 2, 2008. Retrieved November 2, 2019.
234. Xu, Xing; Norell, Mark A. (2004). "A new troodontid dinosaur from China with avian-like sleeping posture". *Nature*. London: Nature Research. **431** (7010): 838–841. Bibcode:2004Natur.431..838X (https://ui.adsabs.harvard.edu/abs/2004Natur.431..838X). doi:10.1038/nature02898 (https://doi.org/10.1038%2Fnature02898). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). PMID 15483610 (https://pubmed.ncbi.nlm.nih.gov/15483610). S2CID 4362745 (https://api.semanticscholar.org/CorpusID:4362745).
235. Norell, Mark A.; Clark, James M.; Chiappe, Luis M.; et al. (1995). "A nesting dinosaur". *Nature*. London: Nature Research. **378** (6559): 774–776. Bibcode:1995Natur.378..774N (https://ui.adsabs.harvard.edu/abs/1995Natur.378..774N). doi:10.1038/378774a0 (https://doi.org/10.1038%2F378774a0). ISSN 0028-0836 (https://www.worldcat.org/issn/0028-0836). S2CID 4245228 (https://api.semanticscholar.org/CorpusID:4245228).

236. Varricchio, David J.; Moore, Jason R.; Erickson, Gregory M.; et al. (2008). "Avian Paternal Care Had Dinosaur Origin" (https://doi.org/10.1126%2Fscience.1163245). *Science*. Washington, D.C.: American Association for the Advancement of Science. **322** (5909): 1826–1828. Bibcode:2008Sci...322.1826V (https://ui.adsabs.harvard.edu/abs/2008Sci...322.1826V). doi:10.1126/science.1163245 (https://doi.org/10.1126%2Fscience.1163245). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 19095938 (https://pubmed.ncbi.nlm.nih.gov/19095938). S2CID 8718747 (https://api.semanticscholar.org/CorpusID:8718747).
237. Wings, Oliver (2007). "A review of gastrolith function with implications for fossil vertebrates and a revised classification" (https://www.app.pan.pl/archive/published/app52/app52-001.pdf) (PDF). *Palaeontologica Polonica*. Warsaw: Institute of Paleobiology, Polish Academy of Sciences. **52** (1): 1–16. ISSN 0567-7920 (https://www.worldcat.org/issn/0567-7920). Retrieved November 2, 2019.
238. Longrich, N.R.; Tokaryk, T.; Field, D.J. (2011). "Mass extinction of birds at the Cretaceous–Paleogene (K–Pg) boundary" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3174646). *Proceedings of the National Academy of Sciences*. **108** (37): 15253–15257. Bibcode:2011PNAS..10815253L (https://ui.adsabs.harvard.edu/abs/2011PNAS..10815253L). doi:10.1073/pnas.1110395108 (https://doi.org/10.1073%2Fpnas.1110395108). PMC 3174646 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3174646). PMID 21914849 (https://pubmed.ncbi.nlm.nih.gov/21914849).
239. Renne, P.R.; Deino, A.L.; Hilgen, F.J.; Kuiper, K.F.; Mark, D.F.; Mitchell, W.S.; Morgan, L.E.; Mundil, R.; Smit, J. (2013). "Time scales of critical events around the Cretaceous-Paleogene boundary". *Science*. **339** (6120): 684–687. Bibcode:2013Sci...339..684R (https://ui.adsabs.harvard.edu/abs/2013Sci...339..684R). doi:10.1126/science.1230492 (https://doi.org/10.1126%2Fscience.1230492). PMID 23393261 (https://pubmed.ncbi.nlm.nih.gov/23393261). S2CID 6112274 (https://api.semanticscholar.org/CorpusID:6112274).
240. Brusatte, S.L.; Butler, R.J.; Barrett, P.M.; Carrano, M.T.; Evans, D.C.; Lloyd, G.T.; Mannion, P.D.; Norell, M.A.; Peppe, D.J.; Upchurch, P.; Williamson, T.E. (2015). "The extinction of the dinosaurs". *Biological Reviews*. **90** (2): 628–642. doi:10.1111/brv.12128 (https://doi.org/10.1111%2Fbrv.12128). PMID 25065505 (https://pubmed.ncbi.nlm.nih.gov/25065505). S2CID 115134484 (https://api.semanticscholar.org/CorpusID:115134484).
241. MacLeod, N.; Rawson, P.F.; Forey, P.L.; et al. (1997). "The Cretaceous–Tertiary biotic transition". *Journal of the Geological Society*. **154** (2): 265–292. Bibcode:1997JGSoc.154..265M (https://ui.adsabs.harvard.edu/abs/1997JGSoc.154..265M). doi:10.1144/gsjgs.154.2.0265 (https://doi.org/10.1144%2Fgsjgs.154.2.0265). ISSN 0016-7649 (https://www.worldcat.org/issn/0016-7649). S2CID 129654916 (https://api.semanticscholar.org/CorpusID:129654916).
242. Archibald, J.D.; Clemens, W.A. (1982). "Late Cretaceous Extinctions". *American Scientist*. **70** (4): 377–385. Bibcode:1982AmSci..70..377A (https://ui.adsabs.harvard.edu/abs/1982AmSci..70..377A). JSTOR 27851545 (https://www.jstor.org/stable/27851545).
243. Jablonski, D. (1991). "Extinctions: a paleontological perspective". *Science*. **253** (5021): 754–757. Bibcode:1991Sci...253..754J (https://ui.adsabs.harvard.edu/abs/1991Sci...253..754J). doi:10.1126/science.253.5021.754 (https://doi.org/10.1126%2Fscience.253.5021.754). PMID 17835491 (https://pubmed.ncbi.nlm.nih.gov/17835491).

244. Longrich, N.R.; Bhullar, B.-A. S.; Gauthier, J.A. (2012). "Mass extinction of lizards and snakes at the Cretaceous–Paleogene boundary" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3535637). *Proceedings of the National Academy of Sciences*. **109** (52): 21396–21401. Bibcode:2012PNAS..10921396L (https://ui.adsabs.harvard.edu/abs/2012PNAS..10921396L). doi:10.1073/pnas.1211526110 (https://doi.org/10.1073%2Fpnas.1211526110). ISSN 0027-8424 (https://www.worldcat.org/issn/0027-8424). PMC 3535637 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3535637). PMID 23236177 (https://pubmed.ncbi.nlm.nih.gov/23236177).
245. Field, D.J.; Bercovici, A.; Berv, J.S.; Dunn, R.; Fastovsky, D.E.; Lyson, T.R.; Vajda, V.; Gauthier, J.A. (2018). "Early evolution of modern birds structured by global forest collapse at the end-Cretaceous mass extinction". *Current Biology*. **28** (11): 1825–1831. doi:10.1016/j.cub.2018.04.062 (https://doi.org/10.1016%2Fj.cub.2018.04.062). PMID 29804807 (https://pubmed.ncbi.nlm.nih.gov/29804807). S2CID 44075214 (https://api.semanticscholar.org/CorpusID:44075214).
246. Larson, D.W.; Brown, C.M.; Evans, D.C. (2016). "Dental disparity and ecological stability in bird-like dinosaurs prior to the end-Cretaceous mass extinction". *Current Biology*. **26** (10): 1325–1333. doi:10.1016/j.cub.2016.03.039 (https://doi.org/10.1016%2Fj.cub.2016.03.039). PMID 27112293 (https://pubmed.ncbi.nlm.nih.gov/27112293). S2CID 3937001 (https://api.semanticscholar.org/CorpusID:3937001).
247. Le Loeuff, J. (2012). "Paleobiogeography and biodiversity of Late Maastrichtian dinosaurs: how many dinosaur species went extinct at the Cretaceous-Tertiary boundary?". *Bulletin de la Société Géologique de France*. **183** (6): 547–559. doi:10.2113/gssgfbull.183.6.547 (https://doi.org/10.2113%2Fgssgfbull.183.6.547). ISSN 0037-9409 (https://www.worldcat.org/issn/0037-9409).
248. Carpenter, K. (1983). "Evidence suggesting gradual extinction of latest Cretaceous dinosaurs". *Naturwissenschaften*. **70** (12): 611–612. Bibcode:1983NW.....70..611C (https://ui.adsabs.harvard.edu/abs/1983NW.....70..611C). doi:10.1007/BF00377404 (https://doi.org/10.1007%2FBF00377404). S2CID 20078285 (https://api.semanticscholar.org/CorpusID:20078285).
249. Russell, D.A. (1984). "The gradual decline of the dinosaurs—fact or fallacy?". *Nature*. **307** (5949): 360–361. Bibcode:1984Natur.307..360R (https://ui.adsabs.harvard.edu/abs/1984Natur.307..360R). doi:10.1038/307360a0 (https://doi.org/10.1038%2F307360a0). S2CID 4269426 (https://api.semanticscholar.org/CorpusID:4269426).
250. Fastovsky, D.E.; Huang, Y.; Hsu, J.; Martin-McNaughton, J.; Sheehan, P.M.; Weishampel, D.B. (2004). "Shape of Mesozoic dinosaur richness". *Geology*. **32** (10): 877–880. Bibcode:2004Geo....32..877F (https://ui.adsabs.harvard.edu/abs/2004Geo....32..877F). doi:10.1130/G20695.1 (https://doi.org/10.1130%2FG20695.1).
251. Sullivan, R.M. (2006). "The shape of Mesozoic dinosaur richness: a reassessment" (https://books.google.com/books?id=rCDYCQAAQBAJ&pg=PA403). In Lucas, S.G.; Sullivan, R.M. (eds.). *Late Cretaceous vertebrates from the Western Interior*. New Mexico Museum of Natural History and Science Bulletin. Vol. 35. pp. 403–405.
252. Chiarenza, A.A.; Mannion, P.D.; Lunt, D.J.; Farnsworth, A.; Jones, L.A.; Kelland, S.J.; Allison, P.A. (2019). "Ecological niche modelling does not support climatically-driven dinosaur diversity decline before the Cretaceous/Paleogene mass extinction" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6403247). *Nature Communications*. **10** (1): 1–14. Bibcode:2019NatCo..10.1091C (https://ui.adsabs.harvard.edu/abs/2019NatCo..10.1091C). doi:10.1038/s41467-019-08997-2 (https://doi.org/10.1038%2Fs41467-019-08997-2). PMC 6403247 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6403247). PMID 30842410 (https://pubmed.ncbi.nlm.nih.gov/30842410).

253. Lloyd, G.T. (2012). "A refined modelling approach to assess the influence of sampling on palaeobiodiversity curves: new support for declining Cretaceous dinosaur richness" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3259943). *Biology Letters*. **8** (1): 123–126. doi:10.1098/rsbl.2011.0210 (https://doi.org/10.1098%2Frsbl.2011.0210). PMC 3259943 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3259943). PMID 21508029 (https://pubmed.ncbi.nlm.nih.gov/21508029). S2CID 1376734 (https://api.semanticscholar.org/CorpusID:1376734).
254. Sakamoto, M.; Benton, M.J.; Venditti, C. (2016). "Dinosaurs in decline tens of millions of years before their final extinction" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4983840). *Proceedings of the National Academy of Sciences*. **113** (18): 5036–5040. Bibcode:2016PNAS..113.5036S (https://ui.adsabs.harvard.edu/abs/2016PNAS..113.5036S). doi:10.1073/pnas.1521478113 (https://doi.org/10.1073%2Fpnas.1521478113). PMC 4983840 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4983840). PMID 27092007 (https://pubmed.ncbi.nlm.nih.gov/27092007).
255. Barrett, P.M.; McGowan, A.J.; Page, V. (2009). "Dinosaur diversity and the rock record" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2686664). *Proceedings of the Royal Society B: Biological Sciences*. **276** (1667): 2667–2674. doi:10.1098/rspb.2009.0352 (https://doi.org/10.1098%2Frspb.2009.0352). PMC 2686664 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2686664). PMID 19403535 (https://pubmed.ncbi.nlm.nih.gov/19403535).
256. Upchurch, P.; Mannion, P.D.; Benson, R.B.; Butler, R.J.; Carrano, M.T. (2011). "Geological and anthropogenic controls on the sampling of the terrestrial fossil record: a case study from the Dinosauria". *Geological Society, London, Special Publications*. **358** (1): 209–240. Bibcode:2011GSLSP.358..209U (https://ui.adsabs.harvard.edu/abs/2011GSLSP.358..209U). doi:10.1144/SP358.14 (https://doi.org/10.1144%2FSP358.14). S2CID 130777837 (https://api.semanticscholar.org/CorpusID:130777837).
257. Randall 2015
258. Alvarez, L.W.; Alvarez, W.; Asaro, F.; Michel, H.V. (1980). "Extraterrestrial Cause for the Cretaceous-Tertiary Extinction" (https://web.archive.org/web/20100708202457/http://chaos.swarthmore.edu/courses/soc26/bak-sneppan/13_alverez.pdf) (PDF). *Science*. **208** (4448): 1095–1108. Bibcode:1980Sci...208.1095A (https://ui.adsabs.harvard.edu/abs/1980Sci...208.1095A). CiteSeerX 10.1.1.126.8496 (https://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.126.8496). doi:10.1126/science.208.4448.1095 (https://doi.org/10.1126%2Fscience.208.4448.1095). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 17783054 (https://pubmed.ncbi.nlm.nih.gov/17783054). S2CID 16017767 (https://api.semanticscholar.org/CorpusID:16017767). Archived from the original (http://chaos.swarthmore.edu/courses/soc26/bak-sneppan/13_alverez.pdf) (PDF) on July 8, 2010. Retrieved October 30, 2019.
259. Bohor, B.F.; Modreski, P.J.; Foord, E.E. (1987). "Shocked quartz in the Cretaceous-Tertiary boundary clays: Evidence for a global distribution" (https://zenodo.org/record/1230978). *Science*. **236** (4802): 705–709. Bibcode:1987Sci...236..705B (https://ui.adsabs.harvard.edu/abs/1987Sci...236..705B). doi:10.1126/science.236.4802.705 (https://doi.org/10.1126%2Fscience.236.4802.705). PMID 17748309 (https://pubmed.ncbi.nlm.nih.gov/17748309). S2CID 31383614 (https://api.semanticscholar.org/CorpusID:31383614).
260. Hildebrand, A.R.; Penfield, G.T.; Kring, D.A.; Pilkington, M.; Camargo, Z.A.; Jacobsen, S.B.; Boynton, W.V. (1991). "Chicxulub crater: a possible Cretaceous/Tertiary boundary impact crater on the Yucatan Peninsula, Mexico". *Geology*. **19** (9): 867–871. Bibcode:1991Geo....19..867H (https://ui.adsabs.harvard.edu/abs/1991Geo....19..867H). doi:10.1130/0091-7613(1991)019<0867:CCAPCT>2.3.CO;2 (https://doi.org/10.1130%2F0091-7613%281991%29019%3C0867%3ACCAPCT%3E2.3.CO%3B2).

261. Pope, K.O.; Ocampo, A.C.; Kinsland, G.L.; et al. (1996). "Surface expression of the Chicxulub crater". *Geology*. Boulder, CO: Geological Society of America. **24** (6): 527–530. Bibcode:1996Geo....24..527P (https://ui.adsabs.harvard.edu/abs/1996Geo....24..527P). doi:10.1130/0091-7613(1996)024<0527:SEOTCC>2.3.CO;2 (https://doi.org/10.1130%2F0091-7613%281996%29024%3C0527%3ASEOTCC%3E2.3.CO%3B2). ISSN 0091-7613 (https://www.worldcat.org/issn/0091-7613). PMID 11539331 (https://pubmed.ncbi.nlm.nih.gov/11539331).

262. Schulte, P.; Alegret, L.; Arenillas, I.; Arz, J.A.; Barton, P.J.; Bown, P.R.; Bralower, T.J.; Christeson, G.L.; Claeys, P.; Cockell, C.S.; Collins, G.S.; Deutsch, A.; Goldin, T.J.; Goto, K.; Grajales-Nishimura, J.M.; Grieve, R.A.F.; Gulick, S.P.S.; Johnson, K.R.; Kiessling, W.; Koeberl, C.; Kring, D.A.; MacLeod, K.G.; Matsui, T.; Melosh, J.; Montanari, A.; Morgan, J.V.; Neal, C.R.; Nichols, D.J.; Norris, R.D.; Pierazzo, E.; Ravizza, G.; Rebolledo-Vieyra, M.; Uwe Reimold, W.; Robin, E.; Salge, T.; Speijer, R.P.; Sweet, A.R.; Urrutia-Fucugauchi, J.; Vajda, V.; Whalen, M.T.; Willumsen, P.S. (2010). "The Chicxulub asteroid impact and mass extinction at the Cretaceous-Paleogene boundary" (https://lirias.kuleuven.be/handle/123456789/264213). *Science*. **327** (5970): 1214–1218. Bibcode:2010Sci...327.1214S (https://ui.adsabs.harvard.edu/abs/2010Sci...327.1214S). doi:10.1126/science.1177265 (https://doi.org/10.1126%2Fscience.1177265). PMID 20203042 (https://pubmed.ncbi.nlm.nih.gov/20203042). S2CID 2659741 (https://api.semanticscholar.org/CorpusID:2659741).

263. Kring, D. A. (2007). "The Chicxulub impact event and its environmental consequences at the Cretaceous–Tertiary boundary". *Palaeogeography, Palaeoclimatology, Palaeoecology*. **255** (1–2): 4–21. doi:10.1016/j.palaeo.2007.02.037 (https://doi.org/10.1016%2Fj.palaeo.2007.02.037).

264. Chiarenza, A.A.; Farnsworth, A.; Mannion, P.D.; Lunt, D.J.; Valdes, P.J.; Morgan, J.V.; Allison, P.A. (2020). "Asteroid impact, not volcanism, caused the end-Cretaceous dinosaur extinction" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7382232). *Proceedings of the National Academy of Sciences*. **117** (29): 17084–17093. Bibcode:2020PNAS..11717084C (https://ui.adsabs.harvard.edu/abs/2020PNAS..11717084C). doi:10.1073/pnas.2006087117 (https://doi.org/10.1073%2Fpnas.2006087117). PMC 7382232 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7382232). PMID 32601204 (https://pubmed.ncbi.nlm.nih.gov/32601204).

265. Ivanov, B.A. (2005). "Numerical Modeling of the Largest Terrestrial Meteorite Craters". *Solar System Research*. **39** (5): 381–409. Bibcode:2005SoSyR..39..381I (https://ui.adsabs.harvard.edu/abs/2005SoSyR..39..381I). doi:10.1007/s11208-005-0051-0 (https://doi.org/10.1007%2Fs11208-005-0051-0). S2CID 120305483 (https://api.semanticscholar.org/CorpusID:120305483).

266. Matsui, T.; Imamura, F.; Tajika, E.; Nakano, Y.; Fujisawa, Y. (2002). "Generation and propagation of a tsunami from the Cretaceous-Tertiary impact event". *Geological Society of America Special Papers*. **356**: 69–78. doi:10.1130/0-8137-2356-6.69 (https://doi.org/10.1130%2F0-8137-2356-6.69). ISBN 9780813723563.

267. Robertson, D.S.; McKenna, M.C.; Toon, O.B.; et al. (2004). "Survival in the first hours of the Cenozoic" (https://web.archive.org/web/20120918141759/http://webh01.ua.ac.be/funmorph/raoul/macroevolutie/Robertson2004.pdf) (PDF). *Geological Society of America Bulletin*. **116** (5–6): 760–768. Bibcode:2004GSAB..116..760R (https://ui.adsabs.harvard.edu/abs/2004GSAB..116..760R). doi:10.1130/B25402.1 (https://doi.org/10.1130%2FB25402.1). ISSN 0016-7606 (https://www.worldcat.org/issn/0016-7606). Archived from the original (http://webh01.ua.ac.be/funmorph/raoul/macroevolutie/Robertson2004.pdf) (PDF) on September 18, 2012. Retrieved June 15, 2011.

268. Robertson, D.S.; Lewis, W.M.; Sheehan, P.M.; Toon, O.B. (2013). "K-Pg extinction: Reevaluation of the heat-fire hypothesis". *Journal of Geophysical Research: Biogeosciences*. **118** (1): 329–336. Bibcode:2013JGRG..118..329R (https://ui.adsabs.harvard.edu/abs/2013JGRG..118..329R). doi:10.1002/jgrg.20018 (https://doi.org/10.1002%2Fjgrg.20018). S2CID 17015462 (https://api.semanticscholar.org/CorpusID:17015462).
269. Pope, K.O.; Baines, K.H.; Ocampo, A.C.; Ivanov, B.A. (1997). "Energy, volatile production, and climatic effects of the Chicxulub Cretaceous/Tertiary impact". *Journal of Geophysical Research: Planets*. **102** (E9): 21645–21664. Bibcode:1997JGR...10221645P (https://ui.adsabs.harvard.edu/abs/1997JGR...10221645P). doi:10.1029/97JE01743 (https://doi.org/10.1029%2F97JE01743). PMID 11541145 (https://pubmed.ncbi.nlm.nih.gov/11541145).
270. Ohno, S.; Kadono, T.; Kurosawa, K.; Hamura, T.; Sakaiya, T.; Shigemori, K.; Hironaka, Y.; Sano, T.; Watari, T.; Otani, K.; Matsui, T.; Sugita, S. (2014). "Production of sulphate-rich vapour during the Chicxulub impact and implications for ocean acidification". *Nature Geoscience*. **7** (4): 279–282. Bibcode:2014NatGe...7..279O (https://ui.adsabs.harvard.edu/abs/2014NatGe...7..279O). doi:10.1038/ngeo2095 (https://doi.org/10.1038%2Fngeo2095).
271. Kaiho, K.; Oshima, N.; Adachi, K.; Adachi, Y.; Mizukami, T.; Fujibayashi, M.; Saito, R. (2016). "Global climate change driven by soot at the K-Pg boundary as the cause of the mass extinction" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4944614). *Scientific Reports*. **6** (1): 1–13. Bibcode:2016NatSR...628427K (https://ui.adsabs.harvard.edu/abs/2016NatSR...628427K). doi:10.1038/srep28427 (https://doi.org/10.1038%2Fsrep28427). PMC 4944614 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4944614). PMID 27414998 (https://pubmed.ncbi.nlm.nih.gov/27414998).
272. Lyons, S.L.; Karp, A.T.; Bralower, T.J.; Grice, K.; Schaefer, B.; Gulick, S.P.; Morgan, J.V.; Freeman, K.H. (2020). "Organic matter from the Chicxulub crater exacerbated the K–Pg impact winter" (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7568312). *Proceedings of the National Academy of Sciences*. **117** (41): 25327–25334. Bibcode:2020PNAS..11725327L (https://ui.adsabs.harvard.edu/abs/2020PNAS..11725327L). doi:10.1073/pnas.2004596117 (https://doi.org/10.1073%2Fpnas.2004596117). PMC 7568312 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7568312). PMID 32989138 (https://pubmed.ncbi.nlm.nih.gov/32989138).
273. Chenet, A.L.; Courtillot, V.; Fluteau, F.; Gérard, M.; Quidelleur, X.; Khadri, S.F.R.; Subbarao, K.V.; Thordarson, T. (2009). "Determination of rapid Deccan eruptions across the Cretaceous-Tertiary boundary using paleomagnetic secular variation: 2. Constraints from analysis of eight new sections and synthesis for a 3500-m-thick composite section". *Journal of Geophysical Research: Solid Earth*. **114** (B6): B06103. Bibcode:2009JGRB..114.6103C (https://ui.adsabs.harvard.edu/abs/2009JGRB..114.6103C). doi:10.1029/2008JB005644 (https://doi.org/10.1029%2F2008JB005644).
274. Schoene, B.; Eddy, M.P.; Samperton, K.M.; Keller, C.B.; Keller, G.; Adatte, T.; Khadri, S.F. (2019). "U-Pb constraints on pulsed eruption of the Deccan Traps across the end-Cretaceous mass extinction". *Science*. **363** (6429): 862–866. Bibcode:2019Sci...363..862S (https://ui.adsabs.harvard.edu/abs/2019Sci...363..862S). doi:10.1126/science.aau2422 (https://doi.org/10.1126%2Fscience.aau2422). OSTI 1497969 (https://www.osti.gov/biblio/1497969). PMID 30792300 (https://pubmed.ncbi.nlm.nih.gov/30792300). S2CID 67876950 (https://api.semanticscholar.org/CorpusID:67876950).
275. McLean, D.M. (1985). "Deccan Traps mantle degassing in the terminal Cretaceous marine extinctions". *Cretaceous Research*. **6** (3): 235–259. doi:10.1016/0195-6671(85)90048-5 (https://doi.org/10.1016%2F0195-6671%2885%2990048-5).
276. Self, S.; Widdowson, M.; Thordarson, T.; Jay, A.E. (2006). "Volatile fluxes during flood basalt eruptions and potential effects on the global environment: A Deccan perspective". *Earth and Planetary Science Letters*. **248** (1–2): 518–532. Bibcode:2006E&PSL.248..518S (https://ui.adsabs.harvard.edu/abs/2006E&PSL.248..518S). doi:10.1016/j.epsl.2006.05.041 (https://doi.org/10.1016%2Fj.epsl.2006.05.041).

277. Tobin, T.S.; Bitz, C.M.; Archer, D. (2017). "Modeling climatic effects of carbon dioxide emissions from Deccan Traps volcanic eruptions around the Cretaceous–Paleogene boundary". *Palaeogeography, Palaeoclimatology, Palaeoecology*. **478**: 139–148. Bibcode:2017PPP...478..139T (https://ui.adsabs.harvard.edu/abs/2017PPP...478..139T). doi:10.1016/j.palaeo.2016.05.028 (https://doi.org/10.1016%2Fj.palaeo.2016.05.028).
278. Schmidt, A.; Skeffington, R.A.; Thordarson, T.; Self, S.; Forster, P.M.; Rap, A.; Ridgwell, A.; Fowler, D.; Wilson, M.; Mann, G.W.; Wignall, P.B.; Carslaw, K.S. (2016). "Selective environmental stress from sulphur emitted by continental flood basalt eruptions" (http://eprints.whiterose.ac.uk/92239/1/Schmidt_et_al_NGS_accepted.pdf) (PDF). *Nature Geoscience*. **9** (1): 77–82. Bibcode:2016NatGe...9...77S (https://ui.adsabs.harvard.edu/abs/2016NatGe...9...77S). doi:10.1038/ngeo2588 (https://doi.org/10.1038%2Fngeo2588).
279. Hofman, C.; Féraud, G.; Courtillot, V. (2000). "^{40}Ar/^{39}Ar dating of mineral separates and whole rocks from the Western Ghats lava pile: further constraints on duration and age of the Deccan traps". *Earth and Planetary Science Letters*. **180** (1–2): 13–27. Bibcode:2000E&PSL.180...13H (https://ui.adsabs.harvard.edu/abs/2000E&PSL.180...13H). doi:10.1016/S0012-821X(00)00159-X (https://doi.org/10.1016%2FS0012-821X%2800%2900159-X). ISSN 0012-821X (https://www.worldcat.org/issn/0012-821X).
280. Sahni, A. (1988). "Cretaceous-Tertiary boundary events: Mass extinctions, iridium enrichment and Deccan volcanism". *Current Science*. **57** (10): 513–519. JSTOR 24090754 (https://www.jstor.org/stable/24090754).
281. Glasby, G.P.; Kunzendorf, H. (1996). "Multiple factors in the origin of the Cretaceous/Tertiary boundary: the role of environmental stress and Deccan Trap volcanism". *Geologische Rundschau*. **85** (2): 191–210. Bibcode:1996GeoRu..85..191G (https://ui.adsabs.harvard.edu/abs/1996GeoRu..85..191G). doi:10.1007/BF02422228 (https://doi.org/10.1007%2FBF02422228). PMID 11543126 (https://pubmed.ncbi.nlm.nih.gov/11543126). S2CID 19155384 (https://api.semanticscholar.org/CorpusID:19155384).
282. Alvarez, L.W. (1987). Mass Extinctions Caused by Large Bolide Impacts (https://www.osti.gov/servlets/purl/875729) (Report). Lawrence Berkeley Laboratory. p. 39. LBL-22786. Retrieved January 27, 2021.
283. Alvarez 1997, pp. 130–146 (https://archive.org/details/trexcraterofdoo000alva/page/130), chpt. 7: "The World after Chicxulub".
284. Renne, P.R.; Sprain, C.J.; Richards, M.A.; Self, S.; Vanderkluysen, L.; Pande, K. (2015). "State shift in Deccan volcanism at the Cretaceous-Paleogene boundary, possibly induced by impact". *Science*. **350** (6256): 76–78. Bibcode:2015Sci...350...76R (https://ui.adsabs.harvard.edu/abs/2015Sci...350...76R). doi:10.1126/science.aac7549 (https://doi.org/10.1126%2Fscience.aac7549). PMID 26430116 (https://pubmed.ncbi.nlm.nih.gov/26430116). S2CID 30612906 (https://api.semanticscholar.org/CorpusID:30612906).
285. Richards, M.A.; Alvarez, W.; Self, S.; Karlstrom, L.; Renne, P.R.; Manga, M.; Sprain, C.J.; Smit, J.; Vanderkluysen, L.; Gibson, S.A. (2015). "Triggering of the largest Deccan eruptions by the Chicxulub impact" (https://escholarship.org/uc/item/86f3521g). *Geological Society of America Bulletin*. **127** (11–12): 1507–1520. Bibcode:2015GSAB..127.1507R (https://ui.adsabs.harvard.edu/abs/2015GSAB..127.1507R). doi:10.1130/B31167.1 (https://doi.org/10.1130%2FB31167.1).
286. Khazins, V.; Shuvalov, V. (2019). "Chicxulub Impact as a Trigger of One of Deccan Volcanism Phases: Threshold of Seismic Energy Density". In Kocharyan, G.; Lyakhov, A. (eds.). *Trigger Effects in Geosystems*. Springer Proceedings in Earth and Environmental Sciences. Cham: Springer. pp. 523–530. doi:10.1007/978-3-030-31970-0_55 (https://doi.org/10.1007%2F978-3-030-31970-0_55). ISBN 978-3-030-31969-4. S2CID 210277965 (https://api.semanticscholar.org/CorpusID:210277965).

287. Archibald, J.D.; Clemens, W.A.; Padian, K.; Rowe, T.; Macleod, N.; Barrett, P.M.; Gale, A.; Holroyd, P.; Sues, H.-D.; Arens, N.C.; Horner, J.R.; Wilson, G.P.; Goodwin, M.B.; Brochu, C.A.; Lofgren, D.L.; Hurlbert, S.H.; Hartman, J.H.; Eberth, D.A.; Wignall, P.B.; Currie, P.J.; Weil, A.; Prasad, G.V.R.; Dingus, L.; Courtillot, V.; Milner, A.; Milner, A.; Bajpai, S.; Ward, D.J.; Sahni, A. (2010). "Cretaceous extinctions: multiple causes". *Science*. **328** (5981): 973, author reply 975–6. doi:10.1126/science.328.5981.973-a (https://doi.org/10.1126%2Fscience.328.5981.973-a). PMID 20489004 (https://pubmed.ncbi.nlm.nih.gov/20489004).

288. Courtillot, V.; Fluteau, F. (2010). "Cretaceous extinctions: the volcanic hypothesis". *Science*. **328** (5981): 973–974. doi:10.1126/science.328.5981.973-b (https://doi.org/10.1126%2Fscience.328.5981.973-b). PMID 20489003 (https://pubmed.ncbi.nlm.nih.gov/20489003).

289. Keller, G. (2014). "Deccan volcanism, the Chicxulub impact, and the end-Cretaceous mass extinction: Coincidence? Cause and effect". *Geological Society of America Special Papers*. **505**: 57–89. doi:10.1130/2014.2505(03) (https://doi.org/10.1130%2F2014.2505%2803%29). ISBN 9780813725055.

290. Schulte, P.; Alegret, L.; Arenillas, I.; Arz, J.A.; Barton, P.J.; Bown, P.R.; Bralower, T.J.; Christeson, G.L.; Claeys, P.; Cockell, C.S.; Collins, G.S.; Deutsch, A.; Goldin, T.J.; Goto, K.; Grajales-Nishimura, J.M.; Grieve, R.A.F.; Gulick, S.P.S.; Johnson, K.R.; Kiessling, W.; Koeberl, C.; Kring, D.A.; MacLeod, K.G.; Matsui, T.; Melosh, J.; Montanari, A.; Morgan, J.V.; Neal, C.R.; Nichols, D.J.; Norris, R.D.; Pierazzo, E.; Ravizza, G.; Rebolledo-Vieyra, M.; Uwe Reimold, W.; Robin, E.; Salge, T.; Speijer, R.P.; Sweet, A.R.; Urrutia-Fucugauchi, J.; Vajda, V.; Whalen, M.T.; Willumsen, P.S. (2010). "Response—Cretaceous extinctions". *Science*. **328** (5981): 975–976. doi:10.1126/science.328.5981.975 (https://doi.org/10.1126%2Fscience.328.5981.975).

291. Fassett, J.E.; Heaman, L.M.; Simonetti, A. (2011). "Direct U–Pb dating of Cretaceous and Paleocene dinosaur bones, San Juan Basin, New Mexico". *Geology*. **39** (2): 159–162. Bibcode:2011Geo....39..159F (https://ui.adsabs.harvard.edu/abs/2011Geo....39..159F). doi:10.1130/G31466.1 (https://doi.org/10.1130%2FG31466.1). ISSN 0091-7613 (https://www.worldcat.org/issn/0091-7613).

292. Fassett, J.E.; Heaman, L.M.; Simonetti, A. (2009). "New geochronologic and stratigraphic evidence confirms the Paleocene age of the dinosaur-bearing Ojo Alamo Sandstone and Animas Formation in the San Juan Basin, New Mexico and Colorado" (https://palaeo-electronica.org/2009_1/149/index.html). *Palaeontologia Electronica*. **12** (1): 3A.

293. Sloan, R.E.; Rigby, J.K. Jr.; Van Valen, L.M.; et al. (1986). "Gradual Dinosaur Extinction and Simultaneous Ungulate Radiation in the Hell Creek Formation". *Science*. **232** (4750): 629–633. Bibcode:1986Sci...232..629S (https://ui.adsabs.harvard.edu/abs/1986Sci...232..629S). doi:10.1126/science.232.4750.629 (https://doi.org/10.1126%2Fscience.232.4750.629). ISSN 0036-8075 (https://www.worldcat.org/issn/0036-8075). PMID 17781415 (https://pubmed.ncbi.nlm.nih.gov/17781415). S2CID 31638639 (https://api.semanticscholar.org/CorpusID:31638639).

294. Lucas, S.G.; Sullivan, R.M.; Cather, S.M.; Jasinski, S.E.; Fowler, D.W.; Heckert, A.B.; Spielmann, J.A.; Hunt, A.P. (2009). "No definitive evidence of Paleocene dinosaurs in the San Juan Basin". *Palaeontologia Electronica*. **12** (2): 8A.

295. Renne, P.R.; Goodwin, M.B. (2012). "Direct U-Pb dating of Cretaceous and Paleocene dinosaur bones, San Juan Basin, New Mexico: COMMENT". *Geology*. **40** (4): e259. Bibcode:2012Geo....40E.259R (https://ui.adsabs.harvard.edu/abs/2012Geo....40E.259R). doi:10.1130/G32521C.1 (https://doi.org/10.1130%2FG32521C.1).

296. Lofgren, D.L.; Hotton, C.L.; Runkel, A.C. (1990). "Reworking of Cretaceous dinosaurs into Paleocene channel, deposits, upper Hell Creek Formation, Montana". *Geology*. **18** (9): 874–877. Bibcode:1990Geo....18..874L (https://ui.adsabs.harvard.edu/abs/1990Geo....18..874L). doi:10.1130/0091-7613(1990)018<0874:ROCDIP>2.3.CO;2 (https://doi.org/10.1130%2F0091-7613%281990%29018%3C0874%3AROCDIP%3E2.3.CO%3B2).

297. Koenig, A.E.; Lucas, S.G.; Neymark, L.A.; Heckert, A.B.; Sullivan, R.M.; Jasinski, S.E.; Fowler, D.W. (2012). "Direct U-Pb dating of Cretaceous and Paleocene dinosaur bones, San Juan Basin, New Mexico: COMMENT". *Geology*. **40** (4): e262. Bibcode:2012Geo....40E.262K (https://ui.adsabs.harvard.edu/abs/2012Geo....40E.262K). doi:10.1130/G32154C.1 (https://doi.org/10.1130%2FG32154C.1).
298. "Dinosaur" (https://www.merriam-webster.com/dictionary/Dinosaur). *Merriam-Webster Dictionary*. Retrieved November 7, 2019.
299. Sarjeant 1995, pp. 255–284, chpt. 15: "The Dinosaurs and Dinomania over 150 Years" by Hugh S. Torrens.
300. Currie & Padian 1997, pp. 347–350, "History of Dinosaur Discoveries: First Golden Period" by Brent H. Breithaupt.
301. Dickens 1853, p. 1 (https://archive.org/details/bleakhouse00dick/page/n37), chpt. I: "*London. Michaelmas Term lately over, and the Lord Chancellor sitting in Lincoln's Inn Hall. Implacable November weather. As much mud in the streets, as if the waters had but newly retired from the face of the earth, and it would not be wonderful to meet a Megalosaurus, forty feet long or so, waddling like an elephantine lizard up Holborn Hill.*"
302. Farlow & Brett-Surman 1997, pp. 675–697 (https://archive.org/details/isbn_9780253333490/page/675), chpt. 43: "Dinosaurs and the Media" by Donald F. Glut and M.K. Brett-Surman.
303. Lee, Newton; Madej, Krystina (2012). "Early Animation: Gags and Situations". *Disney Stories*: 17–24. doi:10.1007/978-1-4614-2101-6_3 (https://doi.org/10.1007%2F978-1-4614-2101-6_3). ISBN 978-1-4614-2100-9.

Retrieved from "https://en.wikipedia.org/w/index.php?title=Dinosaur&oldid=1084821990"

This page was last edited on 26 April 2022, at 20:20 (UTC).

Text is available under the Creative Commons Attribution-ShareAlike License 3.0; additional terms may apply. By using this site, you agree to the Terms of Use and Privacy Policy. Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.