

Quadrant II – Transcript and Related Materials

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Notes

MESOZOIC ERA

The Mesozoic era began roughly around the time of the end-Permian extinction, which wiped out 96 percent of marine life and 70 percent of all terrestrial species on the planet. The period, which spans from about 252 million years ago to about 66 million years ago, was also known as the age of reptiles or the age of dinosaurs. Life slowly rebounded, eventually giving way to a flourishing diversity of animals, from massive lizards to monstrous dinosaurs.

The Mesozoic era is called the age of reptiles because this is when dinosaurs dominated the Earth. During the Mesozoic, or "Middle Life" era, life diversified rapidly and giant reptiles, dinosaurs and other monstrous beasts roamed the Earth. The ancestors of major plant and animal groups that exist today first appeared during the Mesozoic, but this era is best known as the time of the dinosaurs.

Life and climate

The Triassic period, from 252 million to 200 million years ago, saw the rise of reptiles and the first dinosaurs.

The Jurassic period, from about 200 million to 145 million years ago, ushered in birds and mammals. And the Cretaceous period, from 145 million to 66 million years ago is known for its iconic dinosaurs, such as Triceratops, and pterosaurs. Earth's climate during the Mesozoic Era was generally warm, and there was less difference in temperature between equatorial and polar latitudes than there is today.

The Mesozoic was a time of geologic and biological transition. During this era the continents began to move into their present-day configurations. The Triassic terrestrial environment was dominated by the therapsids, sometimes referred to as "mammal-like reptiles," and the thecodonts, ancestors of dinosaurs and crocodiles, both of which appeared during the Late Triassic.

The first true mammals, which were small, also appeared in the Late Triassic, as did the lizards, turtles, and flying pterosaurs. In the oceans, mollusks—including ammonites, bivalves, and gastropods—became a dominant group. Fishes, sharks, and marine reptiles such as plesiosaurs, nothosaurs, and ichthyosaurs also swam the Mesozoic seas.

MESOZOIC REPTILES

- Turtles
- Crocodiles/Alligators
- Lizards
- Ichthyosaurs(large marine reptiles)
- Pterosaurs(large flying reptiles)
- Dinosaurs

MESOZOIC REPTILES: DINOSAURS AND LOTS MORE

The rise of the dinosaurs was possible thanks to a mass extinction phenomenon which occurred 251 million years ago (Permian-Triassic extinction event). Extinction resulted into wiping out of 96% of marine species and up to 70% of terrestrial species in that time, leaving lots of empty ecological niches to be inherited by new animal species. During the Triassic period (in the early Mesozoic) many different groups of reptiles evolved.

One of these groups was the Dinosauria, which at that moment was far from being the dominant group of terrestrial animals. Some other reptilian groups of that time were the terrestrial rauisuchians (clade Rauisuchia) and fully aquatic

groups like the sauropterygians (superorder Sauropterygia) and the ichthyopterygians (superorder Ichthyopterygia).

A second mass extinction in the late Triassic and the early Jurassic put an end to most of the dominant reptile groups, allowing the yet small dinosaurs to expand and evolve, along with some new groups like the crocodylomorphs (superorder Crocodylomorpha, ancestors of crocodylians), the flying pterosaurs (order Pterosauria).

DINOSAUR CLASSIFICATION

The first dinosaurs evolved around 231 million years ago during the mid-Triassic period. They were small in size and were characterized by their limb's posture, which contrary to most reptiles, grew vertically elevating their body from the ground. That gave them more agility and a more active lifestyle.

Then dinosaurs diverged into two different orders: **the Saurischia and the Ornithischia.**

These two groups were distinguished by the structure of their pelvis;

saurischians conserved a pelvis more closely similar to that of the other reptiles,

while the ornithischians evolved a pelvis superficially similar to that of modern birds.

SAURISCHIA: REPTILE HIPPED

Saurischia meaning "reptile-hipped" from the Greek *sauros* meaning 'lizard' and *ischion* meaning 'hip joint' is one of the two basic divisions of dinosaurs (the other being *Ornithischia*). The saurischians and ornithischians separated as lineages 235 million to 240 million years ago during the Middle Triassic Period (242 million to 227 million years ago).

The first dinosaurs were small and bipedal; only later they evolve immense size and a variety of adaptations for feeding and other functions. For reasons that are not well understood, the fossil record of saurischians in the Late Triassic (227 million to 206 million years ago) is much better than that of the ornithischians, though both groups were simultaneously beginning to diversify.

The two main groups of saurischians are the theropods and the sauropodomorphs.

Sauropodomorpha (“reptile-shaped feet”)

The sauropodomorphs are better known as the “long-necked dinosaurs”. That’s because they adapted to feed on the highest strata of vegetation. Most species became large quadrupeds, with pillar-like legs similar to those of elephants and long necks to reach the leaves of the highest trees. Later species reached tremendous sizes, which could grow up to 60 metres long.

Theropoda (“beast feet”)

All theropods are bipedal and most of the Mesozoic species were carnivorous, with sharp replaceable teeth adapted to predation. Theropods present a saurischian pelvis but later on, birds evolved a hip structure more similar to that found in ornithischian dinosaurs. Birds from these groups evolved at the end of the Jurassic period. Theropods are the only dinosaurian group that includes living species, because modern birds are included in the suborder Theropoda.

ORNITHISCHIA: BIRD HIPPED

Ornithopoda (“bird feet”): Ornithopods were the most diverse group of Ornithischia, characterized by their three-toed feet similar to that of birds. They were herbivores that could combine bipedal and quadruped walking. Ornithopods acquired many different adaptations; some groups had duck-like bills to feed on aquatic vegetation, others developed specialized hands with a sharp thumb and an opposable little finger to grasp the plants they fed on.

Marginocephalia (“fringed heads”): The so-called marginocephalians were a group of herbivorous dinosaurs related to the ornithopods characterized by a great cranial ossification. These can be divided into two separated groups:

Pachycephalosaurians (thick-headed reptiles)

Ceratopsians (horned faces)

Thyreophora (“shield bearers”): This basal group of ornithischians was exclusively composed of quadruped herbivores characterized by the presence of heavy osteoderms (bony deposits forming scales, plates, or other structures based in the dermis) that constituted their main defence.

This group can be divided into:

Stegosaurians

Anchylosaurians

Stegosaurians (“roofed reptiles”) were big herbivorous dinosaurs characterized by having two rows of dorsal osteoderms from the neck to the tail, which served as protection and helped them in their thermoregulation.

Anchylosaurians (“fused reptiles”) developed heavy bony armours that covered most of the body.

What animals went extinct?

- All Dinosaurs
- All pterosaurs
- All ichthyosaurs
- Many terrestrial plants
- Many marine animals

What organisms survived?

- Mammals
- Birds
- Many plants(ferns were the most successful plant for a while)
- Trees with flowers
- Small lizards/crocodiles/alligators
- Fish, squids, sharks, etc

What caused extinction?

Meteorite impact theory- 66 million years ago, 10-15 km wide meteorite struck the Earth near what is now Mexico.

Meteorite impact evidence

In the geologic record, it is marked by a thin layer of sediment which can be found throughout the world in marine and terrestrial rocks. The layer shows unusually high levels of the metal iridium, which is more common in asteroids than in the Earth's crust. Other contributing factors to the

extinction may have been the Deccan Traps and other volcanic eruptions, climate change, sea level change.

Dinosaurs of India

Rajasaurus

Rajasaurus is a genus of carnivorous abelisaurid theropod dinosaur from the Late Cretaceous of India. The bones were excavated from the Lameta Formation in the Gujarat state of Western India, probably inhabiting what is now the Narmada River Valley. The dinosaur likely measured 6.6 metres and had a single horn on the forehead which was probably used for display and head-butting.

Dravidosaurus

Dravidosaurus (meaning "Dravidanadu lizard", Dravidanadu being a region in the southern part of India where the remains were discovered). Dravidosaurus lived in the Late Cretaceous period (100.5–66 Ma). The remains were discovered in marine deposits near Ariyalur in the state of Tamil Nadu in South India.