

The Oldest Seed

At the end of the Palaeozoic Era, two continents, Laurussia and Gondwana, collided near the Equator. This collision formed the vast supercontinent Pangaea. Where the continents collided, a long and extensive mountain range arose, including the Bohemian Massif. The territory of today's Czech Republic still lay close to the Equator, and the climate there remained very warm. However, because of the large continental landmass, conditions also became much drier.

These new climatic conditions gradually became unsuitable for moisture-loving spore plants, which until then had dominated the forests of the Palaeozoic. Horsetails and lycophytes were slowly replaced by more resilient plants that adopted a different reproductive strategy. One of the greatest milestones in plant evolution was the development of the true seed, which contains not only the embryo of a future plant, but also a supply of nutrients for its initial growth. Unlike spores, seeds can survive much longer in dry conditions.

The oldest known seeds date from the Late Devonian Period of the Palaeozoic Era, approximately 365 million years ago.

These early seeds were still “naked”, meaning they were not enclosed within fruits. Plants producing this type of seed are known as gymnosperms. They include cycads, the green survivors of the age of dinosaurs. Unlike the dinosaurs themselves, these plants endured thanks to their large and resilient seeds and can still be found today in the warmest regions of our planet.

Distribution of continents on Earth 270 million years ago (Permian Period, Palaeozoic Era)

Timeline

Beginning of the Palaeozoic Era – Cambrian	538 million years ago
Ordovician	485 million years ago
Silurian	443 million years ago
Devonian	419 million years ago
Carboniferous	358 million years ago
<i>Lepidodendron</i>	353 million years ago
Permian	298 million years ago
Cycad <i>Bjuvia simplex</i> / <i>Paleocycas</i>	272 million years ago

Largest mass extinction in geological history	250 million years ago
Beginning of the Mesozoic Era – Triassic	251 million years ago
Asteroid impact in present-day Mexico	66 million years ago
Beginning of the Tertiary – Palaeocene	66 million years ago
Beginning of the Quaternary – Pleistocene	2.6 million years ago

Bjuvia simplex

Dioecious cycad-like plants, with male and female reproductive organs borne on separate individuals.

Reached heights of up to 15 metres.

The trunk consisted of a thick pith surrounded by vascular bundles and bark.

The roots contained nodules with cyanobacteria, which produced toxic substances, fixed atmospheric nitrogen and supplied it to the plant. An adaptation later also seen in Mesozoic cycads.

Leaves exceeded one metre in length and resembled those of modern banana plants.

The leaves are known as megaphylls, with a more complex structure and branching veins, unlike the simple microphylls of lycophytes.

Fossilised leaves are often found with signs of feeding damage caused by insects and other herbivores (e.g. reptiles).

Once pollen reached the female ovule, motile sperm cells equipped with numerous flagella swam towards the ovule, enabling fertilisation and seed formation.

These sperm cells are among the largest male gametes known in plants and animals.

- they may reach up to 0.5 mm in size and can even be seen with the naked eye
- approximately 40,000 flagella arranged in a spiral enable movement

After fertilisation, the ovule develops into a seed, which protects the embryo from drying out and supplies it with nutrients.

