



## The first trees of this world

Middle Devonian (ca. 390 million years ago)

***Calamophyton primaevum*** can be regarded as the earliest tree-sized plant in the fossil record. It can be the ancestor of the conifers, horsetails and lycopods.



## They variety of the conifers

The slow evolution of life is an indisputable scientific principle. However, it seems that all of today's widespread plant tribes were already present at the Carboniferous-Permian boundary and that their common ancestors can be largely dated back to the Devonian. In no other part of the world it is possible to study them better than in the **Dolomites**.



## Ferovalentinia wachtleri: the origin of the Pines

Just like almost every other family of conifers, the modern **Pinoideae**, which are generally referred to as pines, had already experienced an explosive development by the time of the transition from the Carboniferous to the Permian that brought them close to the modern pines in a very short time.



## Wachtleropteris, mother of all cycads

***Wachtleropteris valentinii*** discovered in sediments from Early Permian, represents the most rudimental cycad gymnosperm. The shrubby plant was equipped with leaves that extended upwards on a stem and branched twice, which is not typical for today's cycads, and each of the leaves split into two independent branches.



## The last giant lycopods

It was thought that the giant Lycophyta died out at the beginning of the Permian. Surprisingly in the Dolomites were found also in the Triassic dwarfish trees. They were described by Michael Wachtler as ***Lycopodium dezanchei*** and ***Eocyclotes alexawachtleri***. ***Sigillcampeia***, honouring Edith Campe the first finder, was characterised by its bifurcating stem.

## The Origin of Flowering Plants

In the Northern Hemisphere, from the Devonian (about 395 mio) till the Triassic period (220 my), in addition to the Euramerican landmass, another isolated continent called Angara existed. This area was distinguished by a fasten radiation of angiosperms and insects. Researches initiated by Michael Wachtler will attempt to explain the strange angiosperm-genesis with new theories based on surprising new findings.

### An “Abominable Mystery”

Darwin was extremely distressed by the origin and fast spreading of the flowering plants which increased and developed about 100 million years ago. The flower plants are in complete contrast to his theory about the slow evolution of plants and animals throughout time. Therefore, he speculated a slow and long evolution on an extinct or destroyed landscape or a lost continent. All these theories lead to the famous letter about the “abominable mystery” which Darwin wrote to Joseph Hooker on 22 July 1879.

### Early Permian Angiosperms

The origin of Angiosperms can be dated back in the Angara-landmass being part of today’s Russia about 300 million years ago. The base was a fully developed bisexual flower with ovaries and stamens. The fruits were dispersed by wind, like the samara of an ash or maple, or by water or by animals. Seeds contained in edible fruits possessed just the ability to survive the ingestion of animals also. The spreading of diverse lineages of angiosperms in the Early Permian Angara-Land is therefore equally mysterious or not, as the coeval diffusion of gymnosperms in the Euro-American landmass with several subordinated tribes such as conifers, cycads or ginkgos.

### Coeval insect and flowering plant evolution

If somebody is surprised by the richness of Early Permian angiosperm tribes, he must also be astonished at the diversity of insects in Angara. Present were all of today’s widespread families. Many of them can be regarded as potential pollinators. Only in this way can we explain there the simultaneous appearance of all main insects-groups and ancestors of angiosperms that exist even today.

### The mother of all catastrophes

There is a big scientific question. If almost all flowering plant tribes were available and widespread in Angara-Land in the Early Permian period, why couldn’t they widespread all over the new landmass when Pangaea was assembled to one global continent? The most common hypothesis was that during the diffusion of the two continents a chain reaction of volcanic events happened in the area of Siberia about 252 million years ago. This led to a wide destruction of habitats for angiosperms and they only survived with difficulties in some isolated and remote places. They probably were not able to recover and expand for a long time on a large scale until the Cretaceous period. The angiosperms were the most involved victims in this catastrophe also known as the mother of all catastrophes as it was so severe.

