How to Survive on Land?

Life on Earth most likely originated around 4.3 billion years ago. It took more than a billion additional years for simple oxygen-producing organisms to appear. Around 540 million years ago, the seas were already inhabited by early marine animals with hard body structures, including trilobites and graptolites. Only afterwards did the first plants colonise the land.

At that time, the area of present-day Central Bohemia lay in the Southern Hemisphere and formed part of a shallow seabed. Volcanic activity created islands both large and small. During the Palaeozoic Era, one such small island, whose remains can still be found near Svatý Jan pod Skalou in the Bohemian Karst, was home to *Cooksonia barrandei*, a remarkable plant and an ancestor of vascular plants. The waters surrounding the island teemed with trilobites such as *Miraspis mira* and graptolites, which formed floating or sessile colonies. Their remains can still be found today as fossils.

Distribution of continents on Earth 432 million years ago (Devonian Period, Palaeozoic Era)

Timeline

Formation of the Earth	4.5 billion years ago
Probable origin of life on Earth	4.3 billion years ago
Stromatolites = layered structures of cyanobacteria and bacteria with mineral deposits	3.48 billion years ago
Origin of more complex eukaryotic cells	1.9 billion years ago
Estimated origin of multicellular organisms	1.56 billion years ago
First trilobites	540 million years ago
Probable transition of plants onto land	500 million years ago
Cooksonia barrandei	432 million years ago
Age of reptiles (dinosaurs)	240 million years ago

Cooksonia barrandei

Discovered near Loděnice close to Beroun.

It was originally found by Joachim Barrande, who believed it to be an alga. The fossil then remained in a museum collection for almost 150 years until it was rediscovered in 2011 by palaeontologist Vojtěch Turek.

One of the oldest known macroscopic remains of a terrestrial plant, dating back 432 million years (Silurian Period, Palaeozoic Era).

This is the largest preserved specimen of this plant ever discovered. It measures 7.5 cm in height, while most comparable finds from around the world are no more than 2 cm tall.

Reproduced by spores.

Characteristically branched dichotomously (dividing into two equal branches).

Distantly resembles living hornworts, a group of bryophytes.

Sporangia were always positioned at the tips of the branches and occurred in greater numbers on a single plant, unlike the single capsule typical of bryophytes.

The plant was named after the Australian palaeobotanist Isabel Cookson (1893–1973) and its discoverer Joachim Barrande (1799–1883).

The plant was large enough to carry out photosynthesis independently and transport water and nutrients throughout its body.

Stomata on the stem enabled gas exchange and controlled water loss, an adaptation to life on land.

It probably lived in symbiosis with microscopic fungi in a mutually beneficial relationship known as mycorrhiza, which enabled the exchange of water and nutrients. Mycorrhiza was likely one of the key adaptations that allowed plants to colonise the land.