

## **Devonian Fact File**

### **Horsetails**

Horsetails are very old and very strange plants; there has never been anything quite like them. During the Devonian, they reached massive sizes and appeared to be very common. Since then, they have all but disappeared, leaving only a few species to hang on in marshes and stream edges.

### **A body adapted for life on land**

Considering that they are one of the earliest land plants, horsetails are already quite well adapted to a life on land. They had a stem that was ridged and reinforced with silica to give it support (the Romans used to use horsetails to clean their dishes!). If above ground, this stem was green and could photosynthesise; if below ground, it developed small hairs to anchor it into the soil and was called a rhizome. Both the stem and the root had hollow spaces inside them to allow gasses to travel through the plant; it also had a very early and basic vascular system of xylem tracheids and phloem cells to transport water and food to all of the tissues. The stem was segmented, and at each joint there was a whorl of leaves and branches. The leaves had been reduced to a simple 'collar' round the stem, while the branches looked like smaller versions of the main stem. This may have been a simple adaptation to prevent water being lost through the leaves.

### **Horsetail reproduction**

The horsetails had evolved a complex system for reproduction that involved alternating two different plants. The plant that grew to such enormous sizes was called the 'sporophyte' generation as it gave rise to spores. These were contained in structures on a specialised branch called a 'strobilus' or cone. Horsetails either grew these at the end of normal branches, or had entire 'reproductive' branches that grew only when the plant wanted to reproduce. The spores were scattered from the strobilus by the wind, and were carried for great distances. If they landed somewhere wet, then the spore germinated and began to grow into a tiny free-living green plant that looked completely different from its parent. This was called the 'gametophyte' generation.

The spores were essentially tiny clones of the parent plant; they had the same genes. However, the gametophyte existed so that the genes of the horsetail could be shuffled around to give new combinations that might be better. On this tiny gametophyte, two types of structures grew; one contained female gametes, held in tiny cups to keep them safe and moist, while the other contained male gametes. These each had many tails to help them move. The plant waited for rain and then released all of the male gametes. They then swam over the surface of the gametophyte towards the female cells, where they fused and produced embryonic horsetails. These embryos grew up to become the more familiar bottlebrush horsetail plants, producing spores themselves and starting the cycle again.

So the horsetails had begun to develop vascular tissue but they still relied on water for their reproduction; they could not live far from water without dying out.