

Devonian Fact File

Club-moss

Like the horsetails, these mighty plants used to form giant trees, but are now sadly relegated to being small moss-like plants. Unlike the horsetails, they actually have ‘true’ leaves, stems and roots with a primitive but effective vascular system branching through the support tissues to feed all of the plant. Most modern forms are simple plants that display dichotomous branching, but the Devonian trees were very diverse in their forms. At that time, being big was an advantage – you could tower over the other plants around you and gain as much sunlight as you wanted. Being small meant having to survive in the gloom of the forest floor.

Advances in reproduction

As well as showing an increased complexity in their vascular system and body forms, the club-mosses were also experimenting with more advanced forms of reproduction. Like many of these simple early plants, they had two different forms – the sporophyte (spore-making plant) and the gametophyte (gamete-making plant). In club-mosses, the sporophyte was the dominant form with the gametophyte being reduced to a small green disc, very unlike the giant trees it came from. But the club-mosses took all of this a little bit further.

Usually spores are neither male or female; they just germinate and produce a simple green disc that in turn produces both male and female gametes to make a new sporophyte plant. Some club-mosses carried on this tradition by producing unisex spores in the strobili carried at the end of their branches. These strobili were in themselves quite complex – they were made from specialised leaves bunched together at the end of a stem, with the spore-producing organs tucked between the leaves. Not only did this protect the spores from being eaten or drying out, but the parent could continue to feed them during their development – each leaf in the strobilus had a strand of vascular tissue going to it. A further development was the thick waxy coating around each spore that prevented it from drying out when shed from the parent plant.

Other club-mosses began to develop both male and female spores. They still looked identical, but each type of spore could only develop into a male or female gametophyte. This meant that male gametes needed to get from one tiny disc to another in order to fuse with the female gamete and make a new sporophyte. This is beginning to look like pollination! It is possible that the plants waited until rain was likely before shedding their spores; gametophytes grew quickly, and the falling raindrops would have helped to splash male gametes into the air and (hopefully) onto a female gametophyte nearby.

Once a male gamete had found itself on a female gametophyte, it would swim over the surface towards the special ‘cups’ which held and protected the female gamete. The two would meet and fuse and produce a zygote. This would begin to grow into a new sporophyte plant – helped on its way by the gametophyte. In yet another advance, this small disc would hang around, photosynthesising and feeding the growing sporophyte until it became established enough to feed itself.