

Chapter 36

Evolutionary Aside 36.1--Vessel Evolution

A comparison of xylem anatomy among extant, basal angiosperms reveals much diversity in the structure of early vessels. Although tracheids are believed to have had a single evolutionary origin in the hornworts and were the only water conduit for the first 140 million years of vascular plant evolution, the anatomical evidence supports the conclusion that vessel members evolved from tracheids in five different plant groups. The first clear angiosperm vessels were evident during the mid-Cretaceous.

Why did evolution stumble upon the same cell type multiple times? Much evidence has pointed to the greater volume of water that can move through vessels with their larger radius. It has been argued, that greater rates of water movement supported more rapid growth and the rise of large, tall plants.

Shifts in the levels of auxin and gibberellin (two plant hormones discussed in detail in chapter 40) during differentiation may be enough to result in the differentiation of a vessel versus a tracheid. Details of the differences in mechanisms of cell differentiation leading to tracheid and vessel differentiation are not yet understood in light of evolution.