



Disentangling the adaptive radiation ('Siluro-Devonian Explosion') of land plants, environmental change and extinction events

Charles H. Wellman

Dept. of Animal & Plant Sciences, University of Sheffield, Alfred Denny Building, Western Bank, Sheffield S10 2TN, UK

Land plants (embryophytes) appear to have originated in the Ordovician and rapidly colonised the exposed land surfaces. However, this initial invasion of the land does not appear to have been associated with major anatomical/morphological innovation. Following this 'slow fuse', that lasted at least 40 million years, the major adaptive radiation of land plants occurred in the Late Silurian to end Devonian. Plant maximum height increased a staggering four orders of magnitude, from a ground-hugging few millimetres to trees dozens of metres tall, with similar below ground impact. This was accompanied by a bewildering exploration of morphospace as all of the major groups of plants (except the flowering plants) appeared. During the time period in which land plants underwent this adaptive radiation the planet witnessed a high degree of environmental turbulence and numerous extinction events (including at least one of sufficient magnitude to be classed as a mass extinction). How did the land plants fare during these turbulent times? In this presentation I will attempt to unravel the rapid evolution of land plants (high species turnover coupled with innovation) and the concomitant environmental changes and extinctions. Was the adaptive radiation of land plants retarded or promoted by these environmental perturbations and extinction events?—or was the adaptive radiation of land plants actually responsible for them?