

# Land Plants First Appeared about 500 Million Years Ago

The establishment of plant life on land is one of the most significant evolutionary episodes in Earth history. Although the megafossil record provides unequivocal evidence of plant life on land, the early fossil record is too sparse and biased by the nonuniformity of the rock record to directly inform the timing and sequence of character acquisition in the assembly of plant body plans.

Researchers from the UK and China have been working together to establish a timescale of early land plant evolution that integrates over the contested topological relationships among bryophytes and tracheophytes.

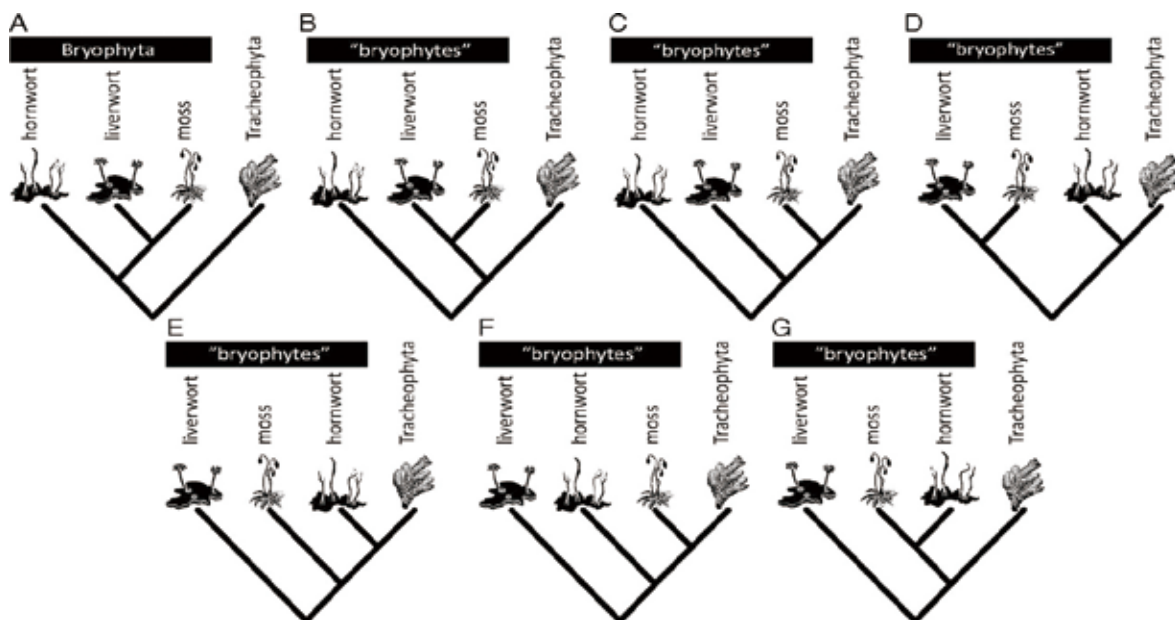
Recently, a team led by Harald Schneider at the Xishuangbanna Tropical Botanical Garden reported in the *Proceedings of the National Academy of Sciences of the United States of America* that land plants first appeared about 500 million years ago, during the Cambrian period (occurring from 570 million to

500 million years ago), when the development of multicellular animal species took off.

The researchers integrated genomic data together with fossil presence and absence evidence in a previously not-achieved robust analysis of the relationships and divergence times of early land plants. They constructed 37 fossil calibrations with minimum and soft maximum constraints, following best practice.

They found that topology and dataset size have minimal impact on age estimates, but slightly more variance in clade age estimates occurred when using alternative calibration strategies.

They concluded that embryophytes emerged within a middle Cambrian to Early Ordovician (beginning 488.3 million years ago and ending 443.7 million years ago) interval and, regardless of topology, all four major lineages of land plants had diverged by the late Silurian (443.7 to 416.0 million years ago).



The seven alternative hypotheses considered in the dating analyses. (A) Monophyletic bryophytes; (B) liverwort–moss sister clade to tracheophytes; (C) mosses, liverworts, and hornworts as successive sister lineages to tracheophytes; (D) a moss–liverwort sister clade to other embryophytes; (E) hornworts, mosses, and liverworts as successive sister lineages to tracheophytes; (F) mosses, hornworts, and liverworts as successive sister lineages to tracheophytes; and (G) a moss–hornwort sister clade to tracheophytes.