

MARCHANTIA

A window into the past

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Credit: Ian Redding / Alamy Stock Photo

The *Arabidopsis* era is slowly fading away. Now is the time to embrace the full complexity of plants important for food security by doing translational research directly on model crops in the field. However, an opposite trend of plant biology has recently emerged through the use of living relatives of ancient plants with simpler genomes that can reveal mechanisms hidden by genetic redundancy. Molecular genetics in these humble non-vascular models, such as liverwort *Marchantia polymorpha* and moss *Physcomitrella patens*, also opens an unprecedented window into key evolutionary innovations. Liverworts diverged from every other land plant more than 450 million years ago, and represent one of the most ancient land plant lineages. Two recent examples highlight the use of *Marchantia* to understand the evolution of interactions between plants and their environment.

The first study, led by Sebastian Schornack in Cambridge, UK, describes how a filamentous oomycete of the *Phytophthora* genus can colonize *Marchantia* photosynthetic layers and cause disease. Despite some atypical aspects, the pathogen develops intracellular infection structures, expresses typical effectors and switches from biotrophic to necrotrophic lifestyles; while the liverwort deals with this microbial invasion by activating a set of common responses, much like a modern plant does.

The second study, headed by Roberto Solano in Madrid, demonstrates that the jasmonate receptor COI1 is functionally conserved in *Marchantia* for wounding and defence responses, a surprising result given that the stress hormone is not synthesized in liverwort. The reason is that COI1 in *Marchantia* binds another signalling molecule, a jasmonate precursor. So, jasmonate perception in modern plants comes from a balancing co-evolution game between a receptor and biosynthesis of its ligand.

If complex crop models allow us to hopefully envisage ourselves in a future with less hunger, simpler models take us back in time to contemplate the ancient origin and fascinating evolutionary history of land plants.

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