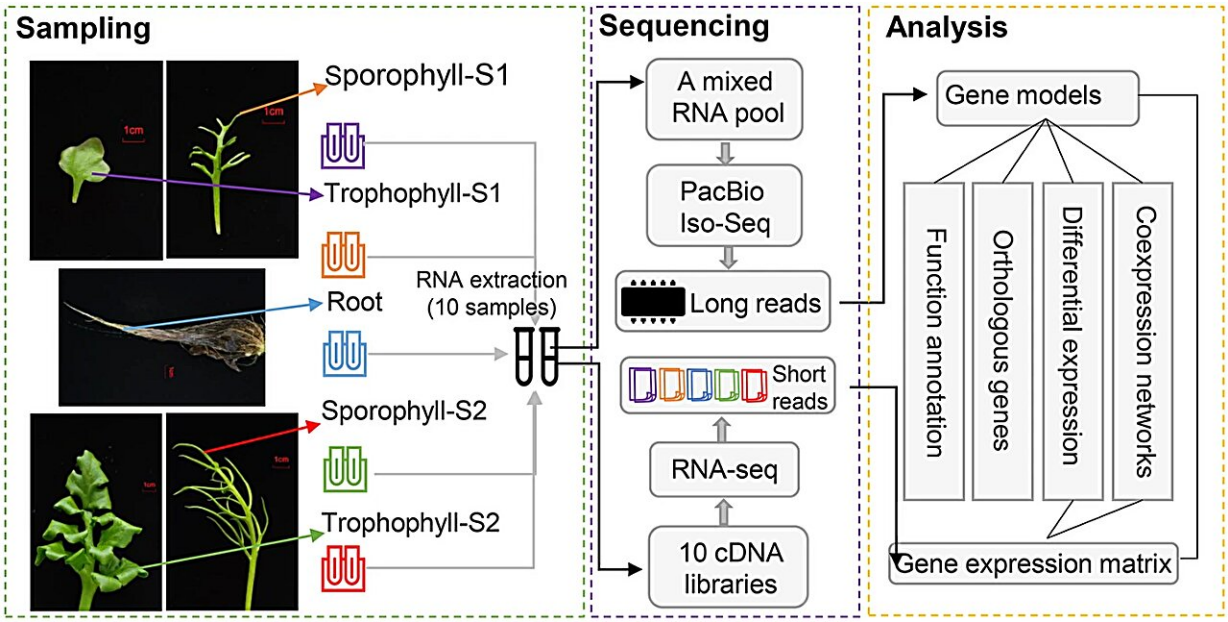
Expansin genes shown to drive heteroblastic leaves in Ceratopteris chingii

December 20 2023, by Zhang Nannan



Flowchart for gene annotation by PacBio full-length sequencing and Illumina RNA-seq for C. chingii. Sampling: photos show 5 tissue samples from different development stages (two biological repeats per developmental stage), of which the root system was shown but the single root sample was collected, and the total RNA of 5 tissue samples was extracted. Sequencing: RNA of each sample was used to build a cDNA library. Analysis: reliable gene models of C. chingii were assembled by combining long with short read sequence data. Credit: *BMC Biology* (2023). DOI: 10.1186/s12915-023-01743-7

Heteroblasty is a developmental trajectory event in which plants undergo

rapid ontogenetic changes in multiple traits, as exemplified by the transition from distinct juvenile to adult leaves. Heteroblastic leaves allow plants to adapt to environmental heterogeneity and serve as a prime example of adaptive evolution.

Previous studies have uncovered some of the underlying differences in heteroblasty in aquatic seed plants, but the mechanism behind sterile-fertile leaf dimorphy remains relatively unexplored in aquatic ferns.

To understand the molecular mechanism regulating the heteroblastic leaves in Ceratopteris chingii, researchers from the Wuhan Botanical Garden of the Chinese Academy of Sciences (CAS), Hubei Ecology Polytechnic College, and Ghent University examined the transcriptome datasets between sporophylls and trophophylls using PacBio full-length sequencing and Illumina RNA-seq.

Comparative analysis revealed differentially expressed genes involved in reproduction and cell wall composition pathways. Of these, expansion genes account for the majority of significantly enriched Gene Ontology terms.

The results were published in *BMC Biology*, titled "Expression divergence of expansin genes drive the heteroblasty in Ceratopteris chingii."

Reconstruction of the expansion gene phylogeny revealed four distinct phylogenetic groups of expansion genes were distinguished in 19 plant species, ranging from green algae to seed plants. Co-expression analysis showed that the expression behaviors were highly divergent both within and between species.

In short, specific regulatory interactions and associated expression patterns of expansion genes played an important role in heteroblastic

leaves of Ceratopteris chingii.

More information: Yue Zhang et al, Expression divergence of expansin genes drive the heteroblasty in Ceratopteris chingii, *BMC Biology* (2023). DOI: 10.1186/s12915-023-01743-7

Provided by Chinese Academy of Sciences