One stone two birds: improving methods for measuring mesophyll conductance and photosynthesis isotope discrimination equation

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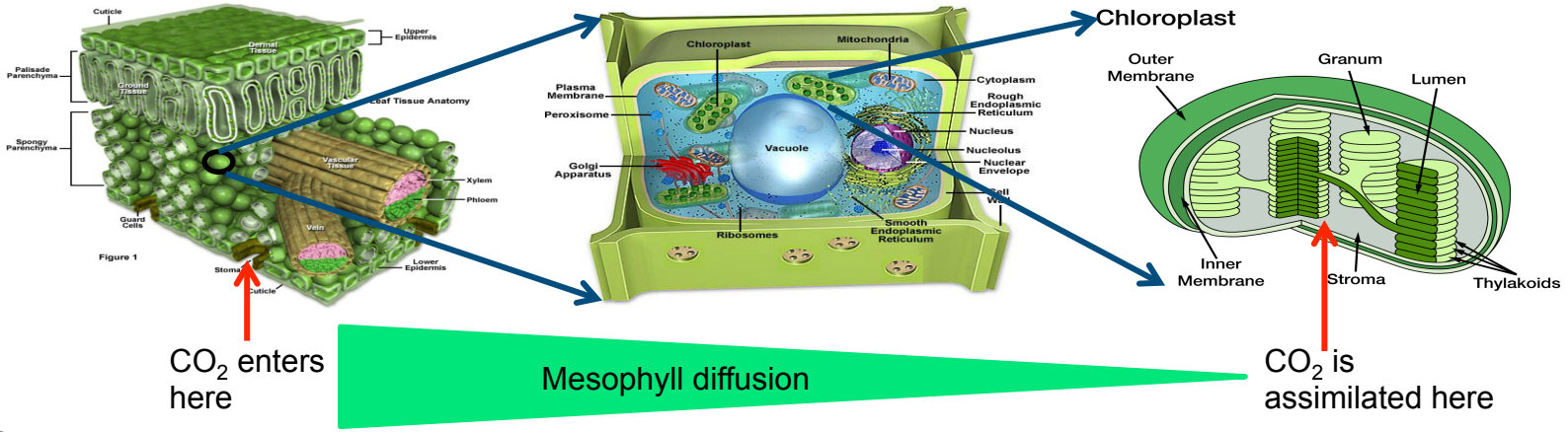

Objective

- **Improve key methods for measuring mesophyll conductance and the equation for predicting photosynthesis carbon isotope discrimination**

New Science

- **Deficiencies in the chlorophyll fluorescence-based and carbon isotope-based methods for measuring mesophyll conductance are identified and effective solutions are developed. In addition, a new photosynthesis carbon isotope discrimination equation that considers multiple sources of CO_2 for carboxylation has been derived**

Significance

- **Mesophyll conductance is crucial for understanding and predicting responses of photosynthesis to the increase in atmospheric CO_2 concentrations. Our improvement of key methods for measuring mesophyll conductance will improve photosynthesis and carbon cycle modeling**
- **Photosynthesis carbon isotope discrimination is the foundation for the terrestrial carbon isotope ecology. Our improvement of the photosynthesis carbon isotope discrimination equation will facilitate the application of carbon isotopes in studying ecological processes**

Gu, L. and Y. Sun (2013) Artifactual responses of mesophyll conductance to CO_2 and irradiance estimated with the variable J and online isotope discrimination methods. Plant Cell and Environment doi: 10.1111/pce.12232