**Integrated single-nucleus and spatial transcriptomics captures transitional states in soybean nodule maturation**

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Legumes form symbiosis with rhizobium leading to the development of nitrogen-fixing nodules. Nodule development begins with the differentiation of cortex of infected root and involves interplays of both nodules and rhizobia. However, our understanding of cellular heterogeneity and developmental lineage of nodule is still limited. By integrating single-nucleus and spatial transcriptomics, we established a cell atlas of soybean nodules and roots. In central infected zones of nodules, we found that uninfected cells specialize into functionally distinct subgroups during nodule development, and revealed a transitional subtype of infected cells with enriched nodulation-related genes. Further functional analysis revealed the important role of cell-type-specific genes in regulating nodule development and nitrogen fixation.

***References:***

[1] Liu J. et al., 2023, Nat Plants. 9(4):515-524.