**Title:** An analysis of genomic and phytochemical diversity in *Scutellaria* to identify species with medicinal potential

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*Scutellaria baicalensis* is a medicinal plant whose root extracts have been widely used in Asian medicine for more than 2,000 years. Flavonoids in these extracts possess anti-cancer, antioxidant, antiviral, and neuro-psychologic properties. Because of interest in the medicinal properties of these flavonoids, the reference genome of *S. baicalensis* has been recently completed. Although *S. baicalensis* has been well-studied, the *Scutellaria* genus contains more than 470 other species, the majority of which not analyzed. This study aims to increase knowledge of phytochemical diversity in *Scutellaria*. Targeted metabolite analysis of fresh and dried samples of 40 species was completed using High Performance Liquid Chromatography to quantify 15 flavones. A phylogenetic tree of these species was constructed from chloroplast genomic data. A subset of species were selected for organ-specific metabolite profiling and genome size analyses. A comparison of phytochemical profiles for these species indicates significant diversity in site and identity of flavone accumulation when compared to *S. baicalensis*. Inconsistencies between the proposed organ specific flavonoid biosynthesis pathways for *S. baicalensis* and the organ specific flavonoid profiles of other species indicate shared and unique flavonoid biosynthetic routes among species. Flow cytometry results revealed 7 of the 8 species analyzed have similarly sized genomes as that of *S. baicalensis*. This similarity in genome size can facilitate the use of the reference genome of *S. baicalensis* as a tool to study genetic data collected from other species. Lastly, whole genome sequencing of four selected species was performed to determine the underlying genetic variations that may confer medicinal traits. Results of our comparative metabolite and phylogenetic study provide insight regarding the varying medicinal value of species within the *Scutellaria* genus.

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