

SUMMER 2022 – SC EPSCOR / INBRE RET PROJECT DESCRIPTION FORM

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Research Subject Area	flower development; organ size control in plants

A. Briefly describe overall research program at your laboratory.

My lab studies how flowers are formed from a small number of undifferentiated floral stem cells. These stem cells give rise to organ primordia in defined positions that become specified as sepals, petals, stamens, or carpels. Each of these organs has a characteristic size, morphology and function. We are interested in understanding the molecular mechanism that bring about these distinct organ types. Our current work involves identification of downstream targets of two transcription factors: AINTEGUMENTA (ANT) and AINTEGUMENTA-LIKE6 (AIL6) that are key regulators of floral organ initiation, growth, identity specification and patterning. The identified targets of ANT and AIL6 include genes that are components of several growth regulatory pathways which will be the focus of this project.

B. Briefly describe specific project(s) for your teacher:

The teacher will contribute to the project by helping us identify the cis-regulatory elements important for the regulation of growth genes by ANT and AIL6. The teacher will investigate how mutations in putative ANT and AIL6 binding sites affect the expression of growth regulating genes using transcriptional reporter constructs in which the wild type or mutated promoter is cloned upstream of the GUS reporter gene in transgenic Arabidopsis plants. In addition, the project will involve using Crisp-Cas gene editing of putative cis-acting elements in Arabidopsis to determine the in vivo effects of these mutations on the expression of growth regulatory genes. The teacher will help clone guide RNAs (gRNAs) into the Crisp-Cas plasmids and transform these into Arabidopsis plants. GUS reporter lines, wild-type Arabidopsis and mutants disrupted in organ size and/or floral organ identity can be provided to the teacher for inclusion in lesson plans on gene expression, genetics and/or plant biology.

C. Will any other people (post docs, grad students, undergraduate students, colleagues, etc.) be involved directly with your teacher?

Mentoring will be carried out primarily by myself. The teacher will also interact with a graduate student working on this project.

D. Will you require any advanced reading/preparation for the teacher? If yes, please briefly describe.

Review papers on flower development and organ growth regulation in plants will be provided ahead of time.