The Expression and Regulation of AqBANQUO Genes in Aquilegia

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Angiosperms have gone through multiple radiations throughout their evolutionary history, resulting in their great diversity. Certain gene classes (A, B and C) have been shown to function in overlapping domains to determine floral organ identity, forming the ABC model, which has been established for the most studied system Arabidopsis thaliana. According to this model, B genes determine stamen and petal identity. Prior research has shown that B genes are in a negative feedback mechanism with BANQUO genes in Arabidopsis thaliana. BANQUO genes are connected to chlorophyll production and thus are expressed differently based on the organ. While Arabidopsis thaliana only has one whorl of petals, other angiosperms such as Aquilegia have developed multiple whorls of petaloid organs. This project used Aquilegia to examine whether the feedback mechanism between B class genes and BANQUO genes is evolutionary conserved in flowers with multiple petaloid organs. The expression of the BANQUO homolog was tested in sepals, petals and leaves of the plants, the latter because of their large amount of chlorophyll. The virus induced gene silencing (VIGS) technique was performed by a supervisor for safety purposes to silence one of the B class genes- PISTILLATA (PI)- and a pigment gene- Anthocyanin synthase. Samples were gathered from silenced plants and wild type Aquilegia. RNA was isolated from the samples, DNA-sing was done and then complementary DNA was made and run in a Quantitative Real Time PCR. The BANQUO expression suggested that the role of the genes in chlorophyll production was evolutionarily conserved in Aquilegia plants, but the negative feedback mechanism was not.

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