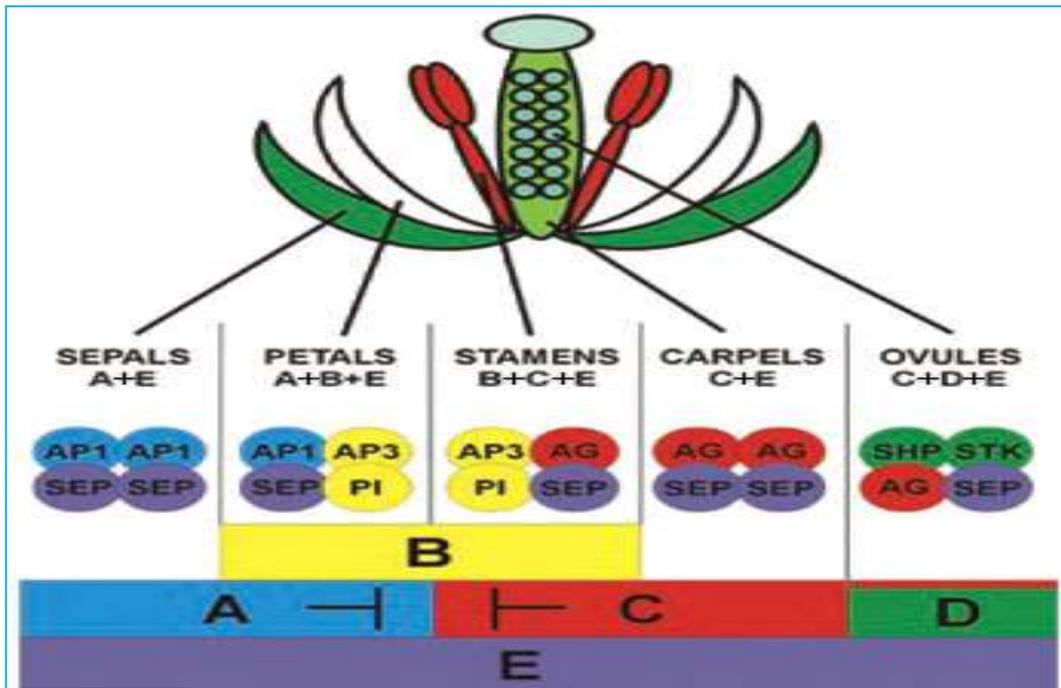


# ABCE Model of floral development

- The ABCDE model for flower development proposes that floral organ identity is defined by five classes of homeotic genes, named A, B, C, D and E. According to the floral quartet models of floral organ specification, the A- and E-class protein complex develop sepals as the ground-state floral organs in the first floral whorl, the A-, B- and E-class protein complex specify petals in the second whorl, the B-, C- and E-class protein complex specify stamens in the third whorl, and the C- and E-class protein complex specify carpels in the fourth whorl.

Protein Complexes		
A + E	First Floral Whorl	Sepals
A + B + E	Second Floral Whorl	Petals
B + C + E	Third Floral Whorl	Stamens
C + E	Fourth Floral Whorl	Carpels

- In the past decade, a major milestone in plant developmental biology is the elucidation of the molecular genetic basis underlying floral organ identity specification. Based on the genetic characterization of floral homeotic mutants in *Arabidopsis thaliana* and *Antirrhinum majus*, a simple and elegant ABC model was established to explain how the four types of floral organs (sepals, petals, stamens, and carpels) are specified by A, B, and C classes of floral homeotic genes. Reverse genetics later led to the discovery of the E class genes, and the ABC model was renamed the ABCE model.
- The **MADS- box** is a conserved sequence motif found in genes which comprise of MADS box gene family.
- In plants, the MADS box genes are involved in controlling aspects of development, including male and female gametophyte development, embryo and seed development, floral organ identity , etc.
- In *Arabidopsis*, **class A, B, C, D, E genes** encode MADS-box transcription factors except for the class A gene APETALA2. Mutation of these genes induces floral organ homeosis.



The revised ABC model of flower organ identity. A-function genes, (*APETALA1* [*AP1*] in *Arabidopsis*) are necessary for the formation of the sepals, B-function genes (*APETALA3* [*AP3*] and *PISTILLATA* [*PI*] in *Arabidopsis*), together with A-function genes, are necessary for the formation of the petals. The B-function genes, along with those of C-function (*AGAMOUS* [*AG*] in *Arabidopsis*), are necessary for the formation of the stamens, and C-function genes alone are necessary for the formation of the carpels. The ABC model has been gradually expanded to include class D- and E-function genes, which are necessary for the ovules and the definition of the floral whorls, respectively. D-function genes in *Arabidopsis* include *SEEDSTICK* (*STK*) as well as *SHATTERPROOF1* and *SHATTERPROOF2* (*SHP1* and *SHP2*). E-function *sensu lato* requires at least one of the four *SEPALLATA* (*SEP1*, *SEP2*, *SEP3* and *SEP4*) genes (adapted from Theissen 2001; Theissen and Saedler 2001; Zahn et al., 2005).