

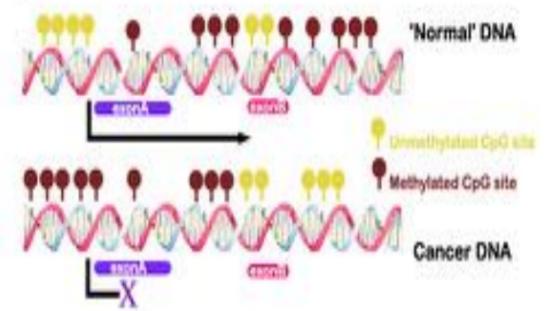
# Epigenetic effect of Bisphenol-A and Folic acid on plant growth and flower development of Snapdragons (*Antirrhinum majus*)

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## Background information

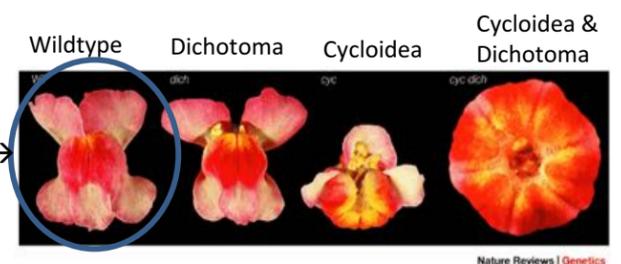
### What is epigenetics?

How could identical twins have different hair colours? How could a person have two different eye colours? Epigenetics helps us answer these questions. 'Epigenetics' means 'above' the genetics, which explains how the same DNA sequence could produce many different phenotypes or traits. One of the epigenetic mechanisms is **DNA methylation**, which causes certain genes to be turned on/off (via adding/releasing methyl groups in the DNA) by environmental factors, such as temperature, radiation, or as in this study, BPA and folic acid.



### Plant of interest

*Antirrhinum majus*, commonly known as snapdragon, has been widely appreciated as ornamental flowers owing to the attractiveness of its red, bilaterally symmetrical flowers. It is also rising as a popular genetic model for plant biology and development for its rich variety of appearance. Depending on the methylation state of genes called *Cycloidea* and *Dichotoma*, the snapdragon flower can change its symmetry from bilateral to radial. We are interested in seeing how BPA and folic acid may change the methylation state.



## Experimental Setup

### ① Control

- Control represents regular condition (i.e. watering with ground water)

### ② BPA

(Methyl disruptor – usually a methyl releaser)

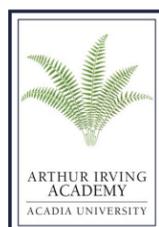
- It is widely used in the production of plastics; it is found in many food packaging, beverage containers, cash register receipts, etc.
- Once disposed, they go to landfills, releasing BPA via surface water. Over 8 billion pounds of BPA are produced each year, resulting in ~100 tons released into the air.
- BPA is known to act as a hormonal-disruptor in mammals. In plants, BPA has shown to exert toxicity and to cause morphological anomalies via DNA methylation and deter growth and development.

### ③ Folic Acid

(Methyl donor)

- Also known as vitamin B6, it mediates transfer of one-carbon units
- It is contained in maternal dietary supplements during pregnancy to reduce the risk of neural tube defect of gestating fetus.
- Folic acid is thought to counteract the effect of BPA by preventing and restoring the DNA "on/off switch" patterns

- Plants are treated with the three treatment above three times a week. On non-treatment days, they are watered using ground water.
- Plant height is measured every week. Flower development will be recorded and observed using scanning electron microscopy. At the end of the trial, plant weight will be compared between the three groups. Methylation state will be analyzed using variety of molecular techniques, such as DNA extraction, amplification, and methylation-sensitive amplification polymorphism (MSAP).



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