

North Dakota State University  
PLSC 731: Plant Molecular Genetics  
Spring 2020

**On-Line Learning Study Guide**  
***Plant Transposable Elements***

The following is your on-line study guide for the topic of “**Plant Genome Evolution**”. You have access to the following resources at this WWW site:

- **Highlighted .pdf Notes** (used in the on-line lecture)
- **On-Line Lecture**
- **Manuscripts (2)**

### Learning Objectives

1. Understand the **structural differences** between Class I and Class II transposable elements and satellite DNA and the **contributions** of these sequences to chromosomal composition.
2. Understand the concepts of **copy and paste** and **cut and paste** and their relationship to **how Class I and Class II elements transpose** from one position in the genome to another position.
3. Understand the **effects of transposable elements on gene function and evolution** and how these are manifested during gene expression.
4. Explain the **evolution of retrogenes** and how retrogenes **affect gene expression**.

### Activities

1. View the **On-Line Lecture** which is ~1.33 hrs long (if you view it without stops). I would suggest that you first print out the **Highlighted .pdf Notes** and go over them before watching the lecture. This way, in general, you will be familiar with the material that will be covered in the lecture.
2. View the followings lecture once (or preferably several times) about the plant transposable elements
  - <https://www.youtube.com/watch?v=8kqsj0EGRGQ>
  - <https://www.youtube.com/watch?v=bdnqpoels6A>
3. Read the two papers regarding the phenotypic effects of transposable elements and the structure and function of a retrogene.
4. **Reflections on the Manuscripts**

During (and after) reading the manuscripts, develop and consider the following:

- Create a table that lists five genes whose function is modified/controlled by a plant transposable element and review the paper referenced in Table 1 of Wei and Cao.
- Consider how a transposable element insertion into the coding or regulatory region of a gene can affect its expression.
- Consider how transposable elements can control gene expression by genetic mechanisms and/or epigenetic mechanisms.
- Understand the details of the cloning of the *Ruby* gene in oranges and the structural differences between the different alleles.
- Understand how the blood orange phenotype is expressed.

**Be prepared to be assessed with respect to your understanding of the learning objectives by *Thursday, April 16, 2020.***