

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

On-Line Learning Study Guide
Genome Sequencing

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

- **Highlighted .pdf Notes** (used in the on-line lecture)
- **On-Line Lecture**
- **Manuscripts (1)**

Learning Objectives

1. Understand the **basic principles** of DNA replication
2. Understand the **differences** Illumina and PacBio DNA sequencing procedures
3. Explain how large-scale DNA sequencing projects can develop a reference genome sequence and how RNA sequence data is used to identify genes
4. Describe how variant information can be collected for a plant population and the type of variants that can be discovered

Activities

1. View the **On-Line Lecture** which is ~1 hr 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 once (or preferably) the following videos that describe the Illumina and PacBio sequencing procedures
 - Illumina System: <https://www.youtube.com/watch?v=fCd6B5HRaZ8>
 - PacBio System (you will need to scroll down to see the video): <https://www.pacb.com/>
3. Read the pea and Mo17 genome papers
4. **Reflections on the Manuscripts**

When (and after) reading the manuscripts, you should develop answers to the following questions:

- What was the purpose for developing a pea reference genome? Why should corn researchers be interested in full reference genomes for the lines B73 and M017?
- Compare the procedures to develop the pea and Mo17 maize genomes.
- Compare the reference genome statistics between the two projects. If you were to rate the completeness of the data found in the two papers, which do you believe is of higher quality. Can you think of reasons that one of the genomes is of lower quality?
- What type and extent of variants were observed between B73 and Mo17?
- Is the legume chromosome evolution theory a well-developed?

Be prepared to be assessed with respect to your understanding of the learning objectives by *Thursday, April 2, 2020.*

