

## **AGRI5710 Module : Endogenous Retroviruses    Module 2**

Instructor: Dr. Bernie Benkel  
Dept. Plant and Animal Science, Haley Institute

Schedule: October-November, 2014; 5 week period, class sessions of 1.5 hours /week  
Location and time to be determined in consultation with interested students

Evaluation: Participation: 20%, essay 40%, written exam 40%

Prerequisite: no specific course requirements, but a working knowledge of genetics and genomics is desirable

The genomes of complex species are not entirely composed of 'essential' genetic elements. In fact, up to 40% of the human genome, for example, is composed of largely 'non-essential' repetitive elements. By far the largest proportion of repetitive elements is comprised of 'retroid' elements, i.e. RNA elements that use reverse transcriptase to generate DNA copies which are inserted into the host genome. The superclass of 'retroid' elements is composed of three different classes of elements as follows: (i) short interspersed nuclear elements (SINEs); (ii) long interspersed nuclear elements (LINEs); and (iii) endogenous retroviruses (ERVs). Approximately 1/5th of the retroid element space in the human genome, or 8% of the genome, is composed of ERVs, which are frequently described as fossils or ancient relics of the colonization of genomes by exogenous retroviruses via infections of germ line cells. However, evidence from a number of species indicates that some ERVs are complete and transcribed, and that a small number of ERVs may, in fact, still be actively transposing. This module will explore the ERV class of retroid elements in a number of species, and investigate the effects of ERVs on host physiology.

Topics to be covered include:

1. Retroid-omics – an overview of classes of retroid elements in complex genomes
2. Genome colonization and endogenization of retroviruses
3. Fossil ERVs versus active elements
4. Effects of ERVs on hosts and implications for host genome evolution