

GEP CURRICULUM FOR BEGINNING STEM MAJORS

GEP Alumni Consortium

NSF Improving Undergraduate STEM Education Grants

- Effective Implementation of a Classroom Undergraduate Research Experience (CURE): Testing, Optimizing, and Extending a Bioinformatics Approach.**
 - Goal 2:** to modify curriculum and engagement strategies to reach beginning students; design and test research experience for freshmen using bioinformatics-based genome research.
 - Volunteer faculty will test new materials in class*

NSF Improving Undergraduate STEM Education Grants

- Enabling Undergraduate Research: A Collaboration between Community Colleges and the Genomics Education Partnership**
 - In **Aim 1** we will work with our current community college faculty members and new recruits to generate materials that will demonstrate the relevance of the problem we are studying (epigenetics in fruit flies) to environmental and health concerns; improve the functionality of our website, adapting it to hand-held devices; and generate oral/visual learning tools (screencasts) in addition to our written materials.
 - In **Aim 2**, our GEP workshops for new faculty members will be redesigned to accommodate those who would like to gain additional background in epigenetics and genomics, and/or wet-bench sequencing techniques, and/or more bioinformatics skills.

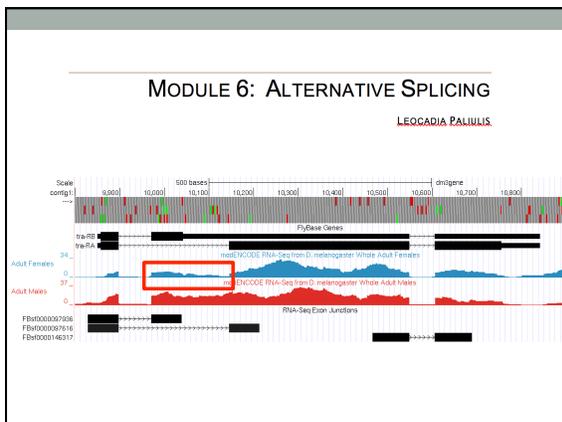
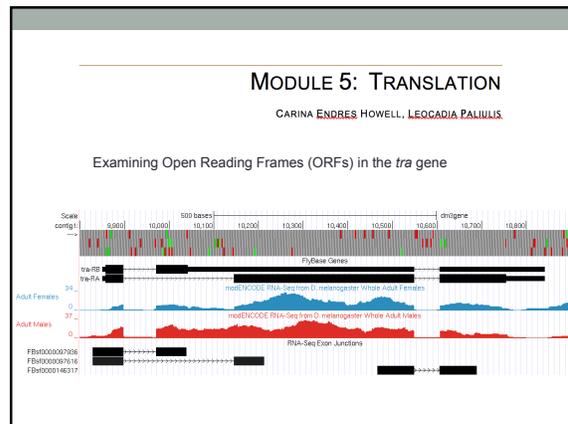
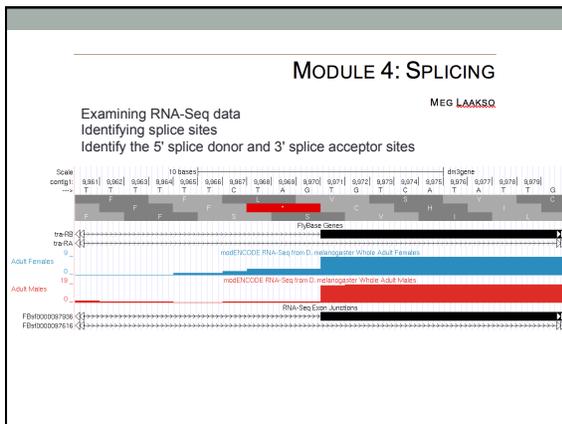
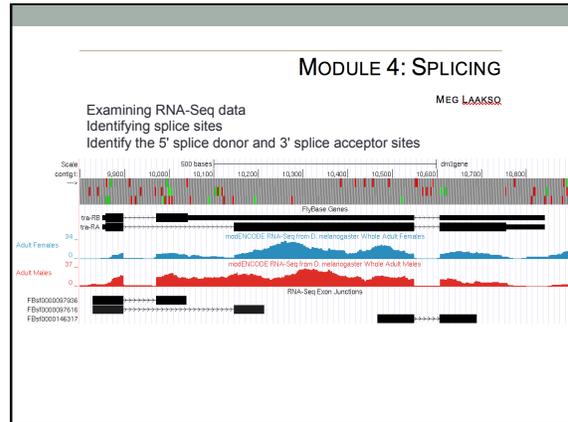
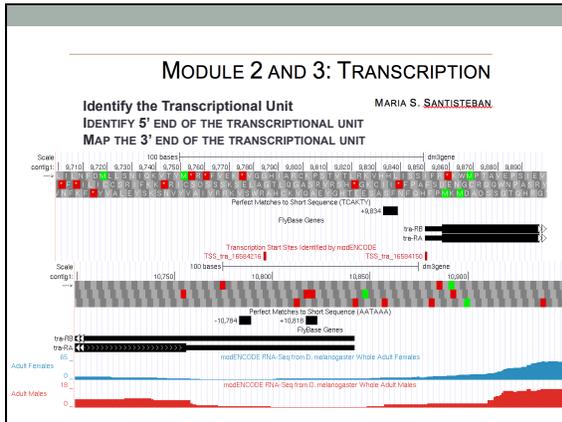
Understanding Eukaryotic Genes

- The "Understanding Eukaryotic Genes" modules makes use of a genome browser to let students explore the structure of eukaryotic genes.
 - Module 1: Introduction to the Genome Browser: What is a gene?
 - Module 2 and 3: Transcription
 - Module 4: Splicing
 - Module 5: Translation
 - Module 6: Alternative Splicing

MODULE 1: INTRODUCTION TO THE GENOME BROWSER: WHAT IS A GENE?

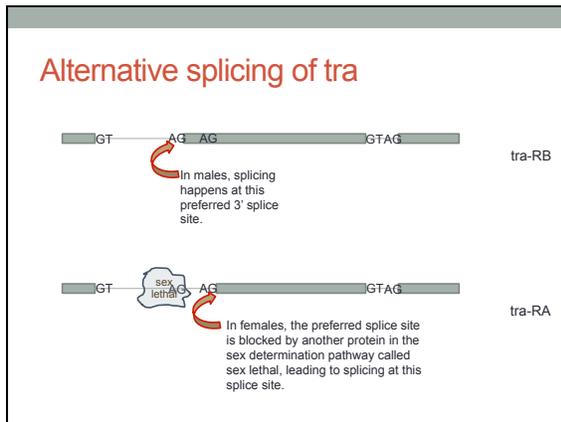
JOYCE STAMM

- Genes have directionality
- GENES ARE COMPOSED OF EXONS AND INTRONS
- GENES PROVIDE THE INFORMATION TO MAKE PROTEINS
- Coding exons are translated in a single reading frame



tra is expressed in the sex determination pathway of *Drosophila melanogaster*

- It is, as you saw in the previous exercise, alternatively spliced.
- In males, a splice site is blocked so the splicing machinery cannot access it. That splice site is not blocked in females



Alternative splicing is very common, and allows genomes to encode more polypeptides than you would expect based on the number of genes in the genome.

- 90% of genes (or more, depending on the source cited) in the human genome are alternatively spliced.
- This allows a genome of about 21000 genes to encode the production of many more than 21000 polypeptides!