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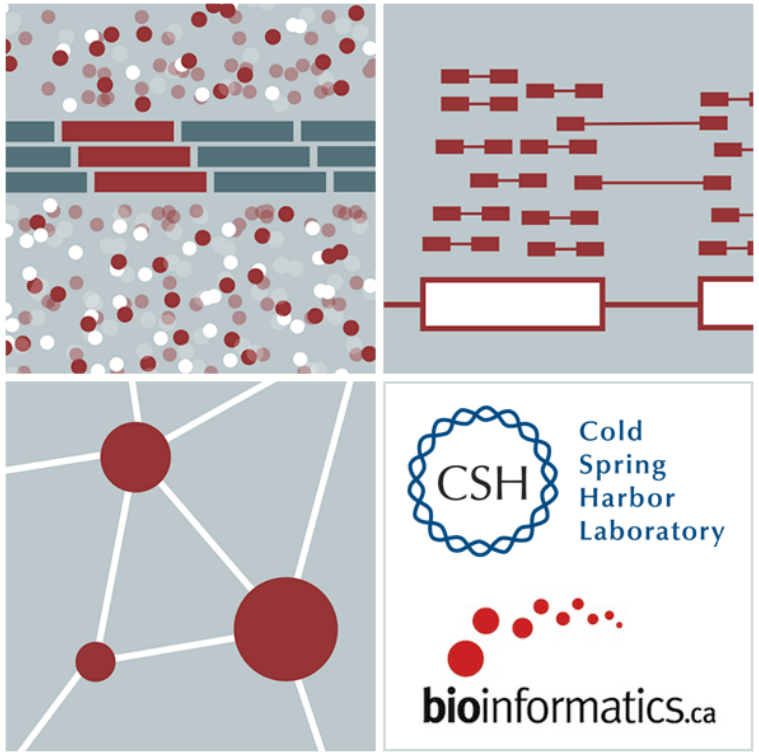
RNA-Seq Module 11
Discovery and Alternative Expression

Kelsy Cotto, Malachi Griffith, Chris Miller, Peter Ronning

High-Throughput Biology: From Sequence to Networks

March 11-17, 2019

bioinformatics.ca



THE GENOME INSTITUTE
at Washington University

Learning objectives of the course

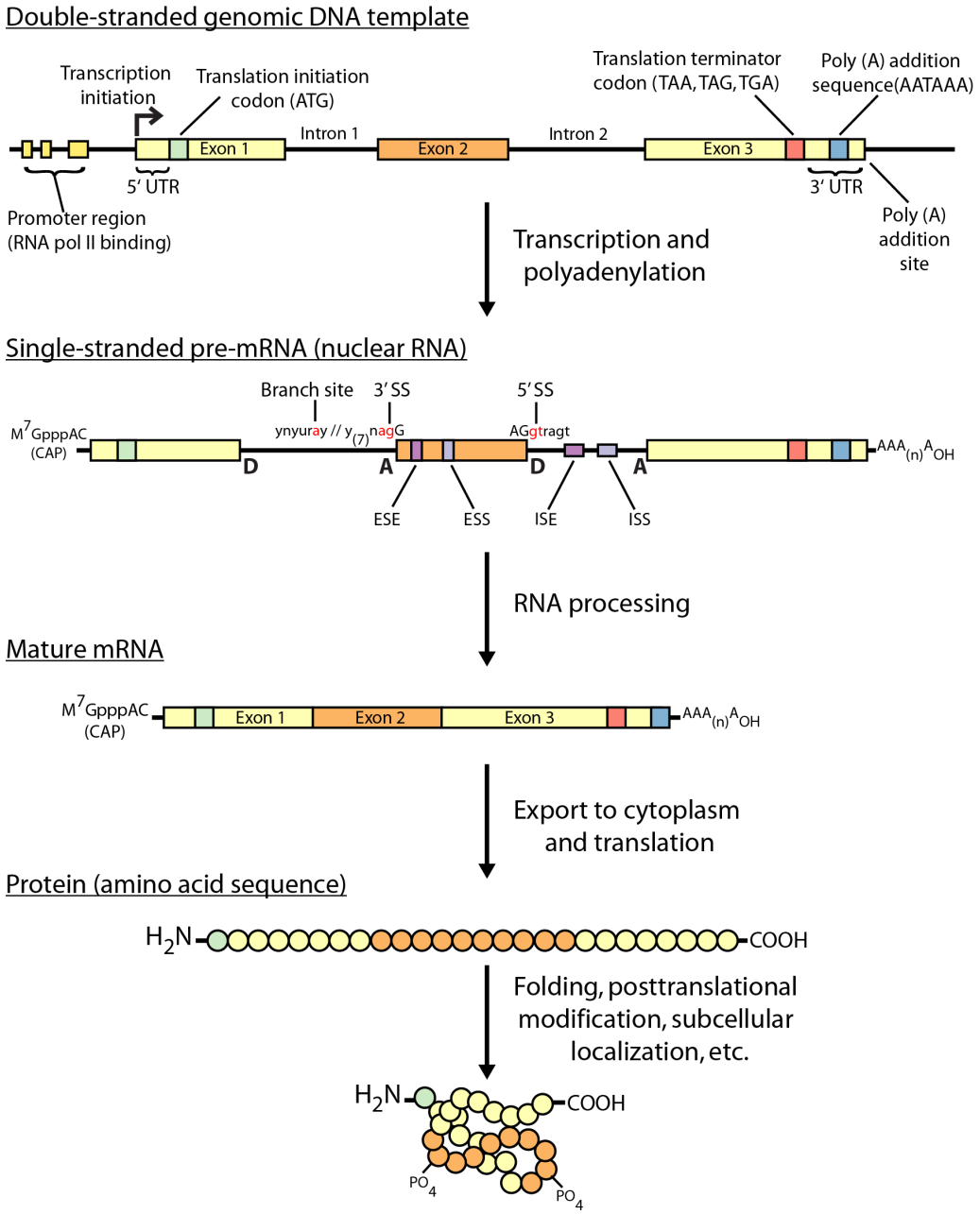
- Module 7: Introduction to RNA Sequencing
- Module 8: Alignment and Visualization
- Module 9: Expression and Differential Expression
- Module 10: Alignment Free Expression Estimation
- **Module 11: Isoform Discovery and Alternative Expression**

- Tutorials
  - Provide a working example of an RNA-seq analysis pipeline
  - Run in a ‘reasonable’ amount of time with modest computer resources
  - Self contained, self explanatory, portable

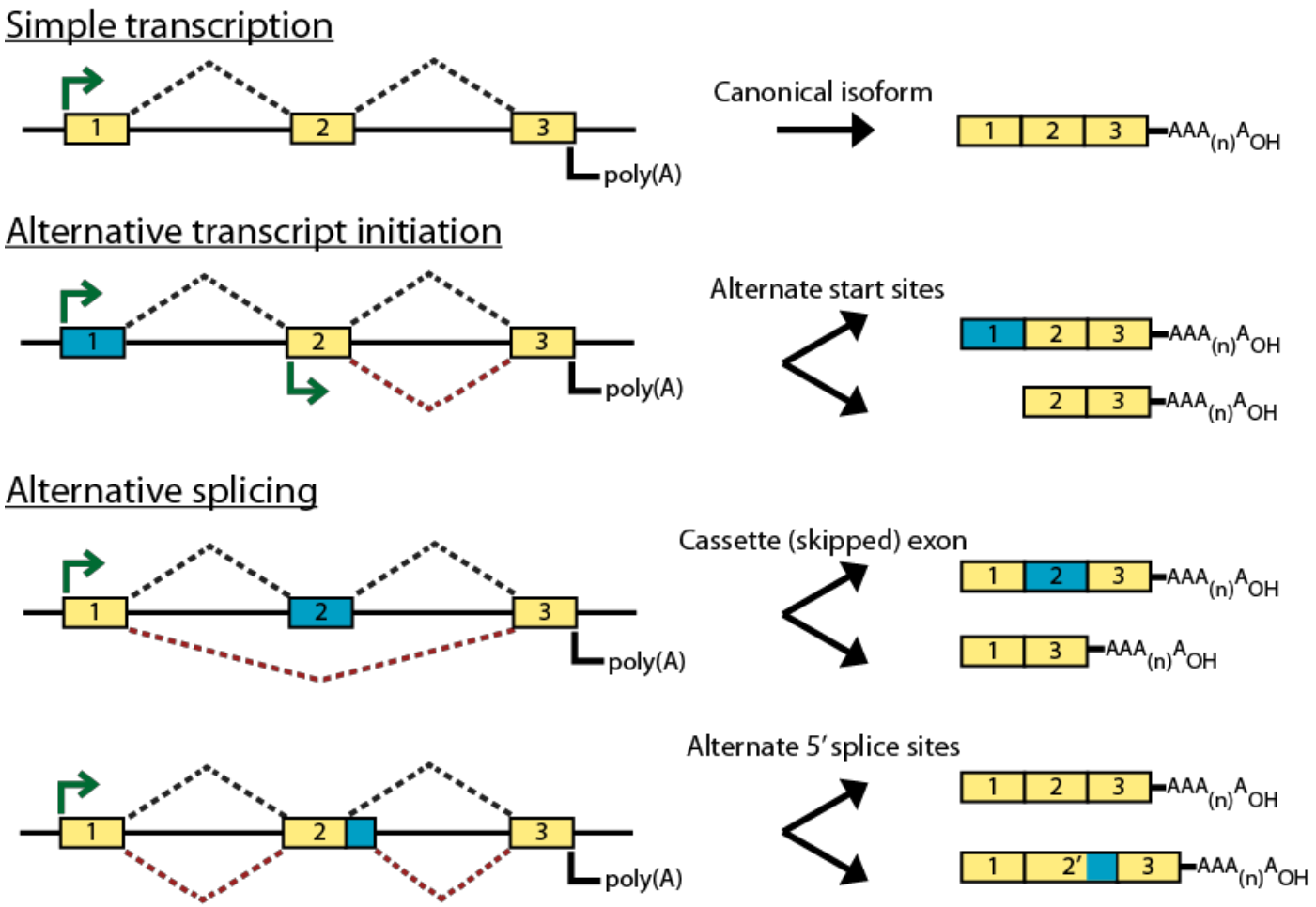
Learning objectives of Module 11

- Explore use of StringTie in modes that facilitate transcript/isoform discovery.
  - This still requires a reference genome sequence...

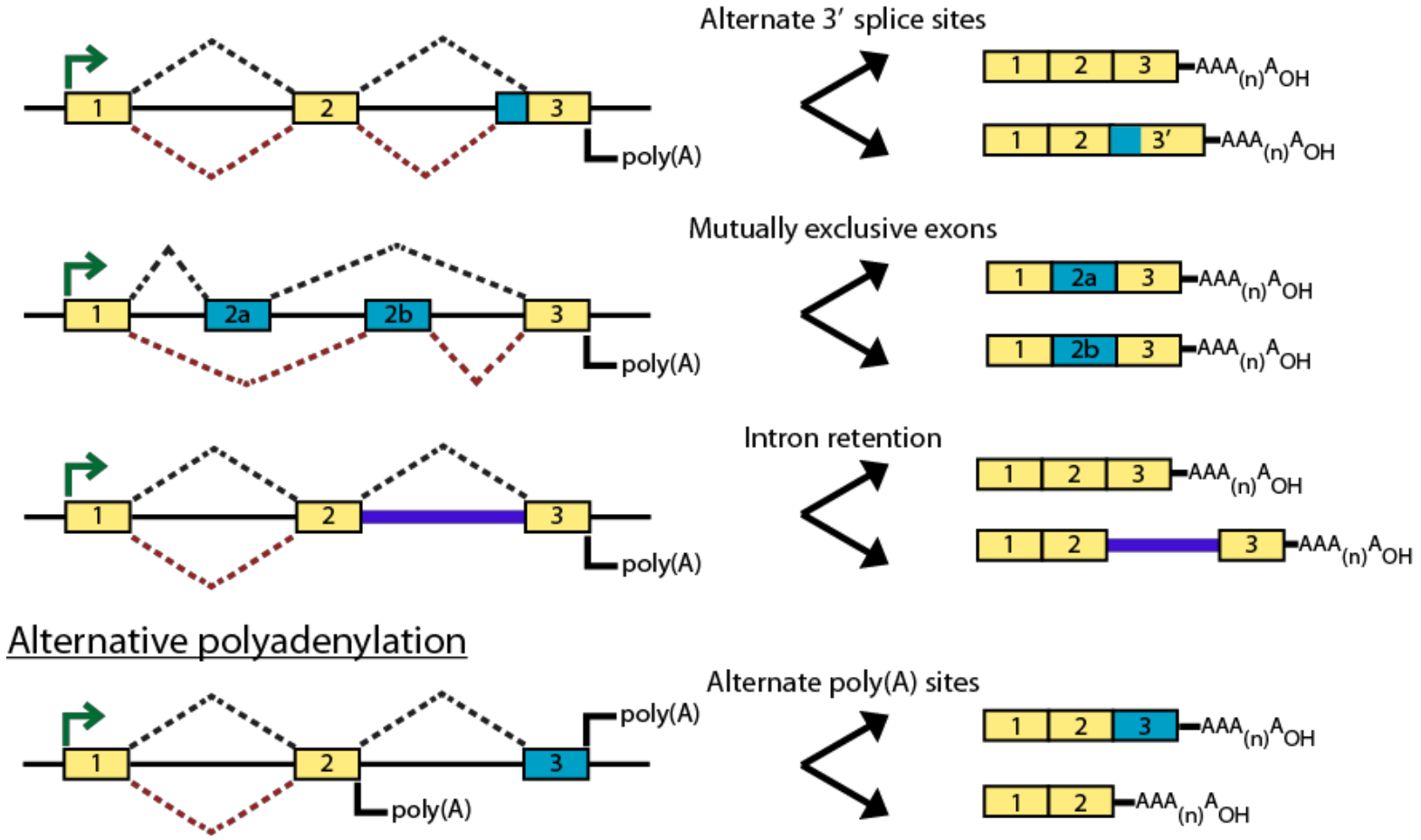
Review of gene expression



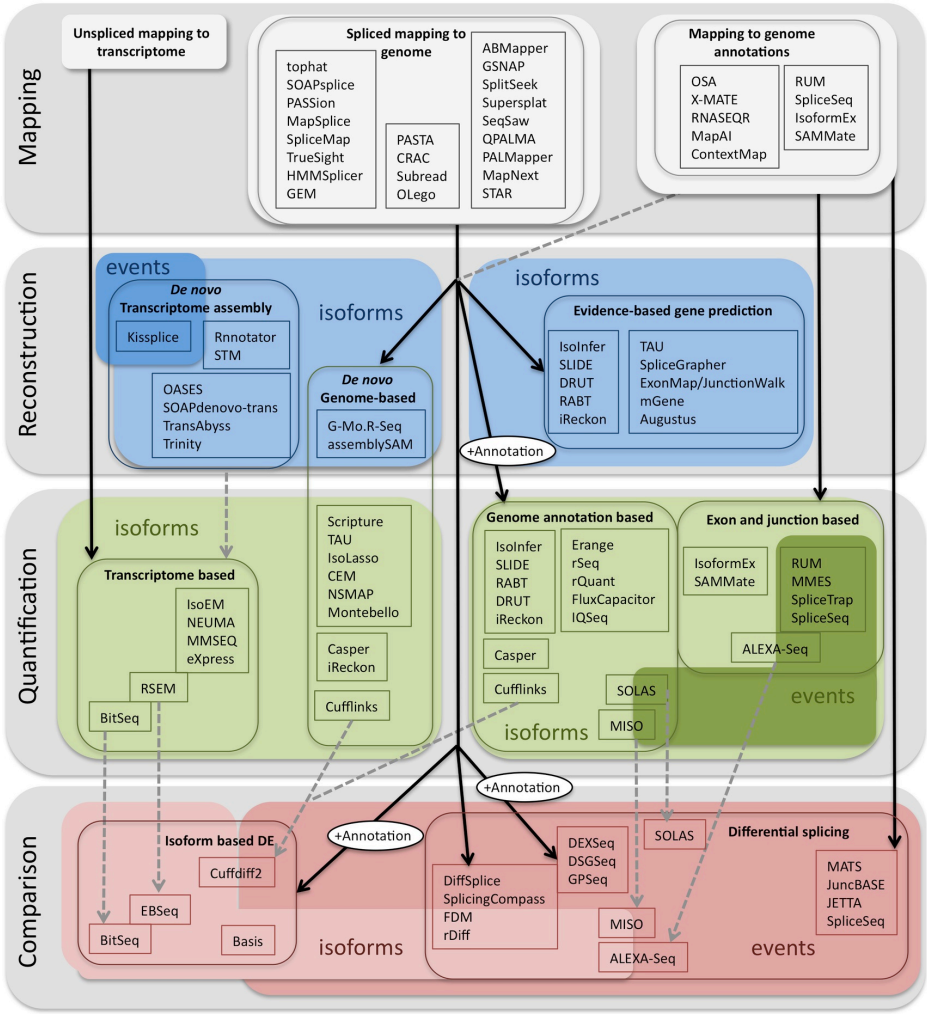
Types of alternative expression - part 1



Types of alternative expression – part 2

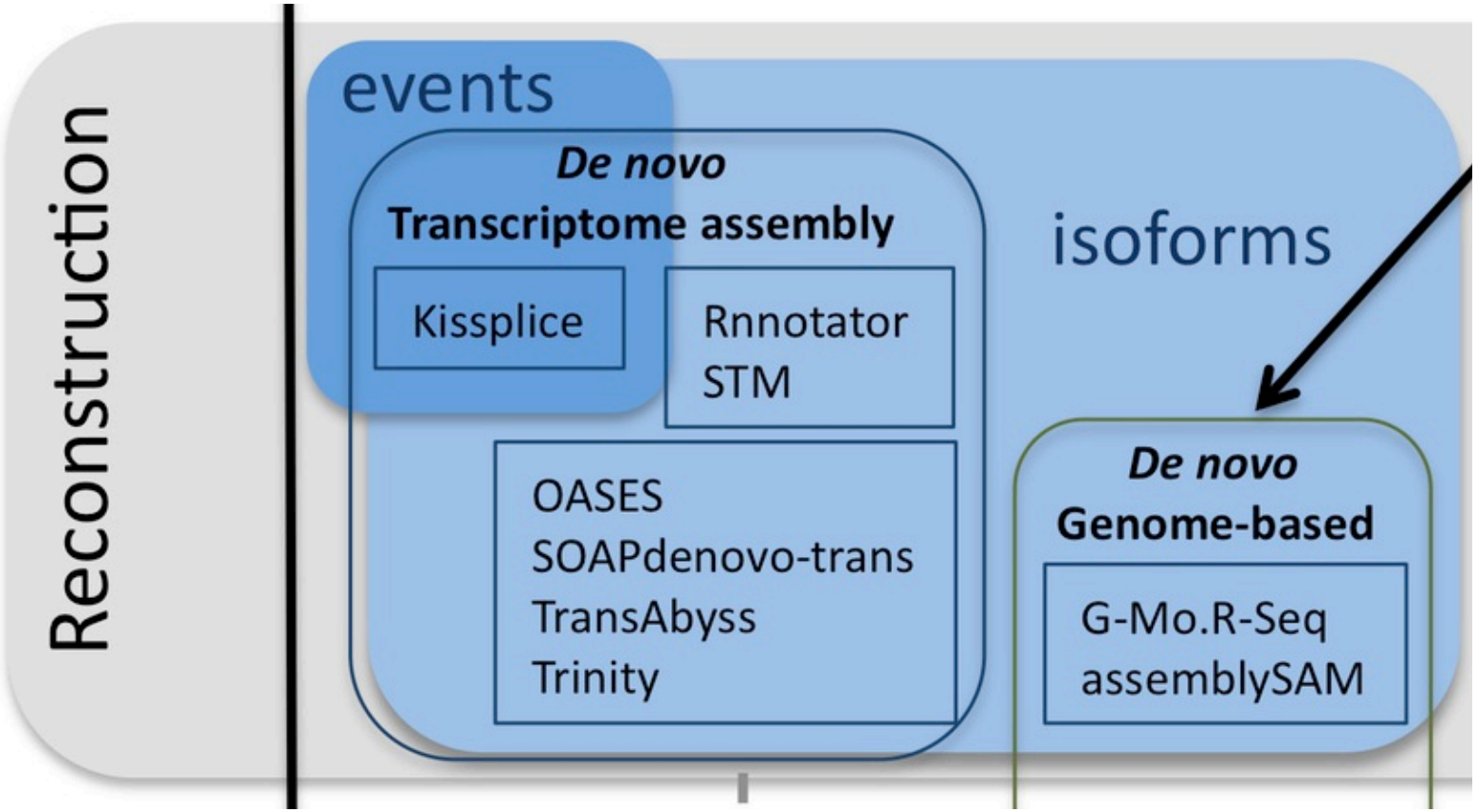


Methods to study splicing by RNA-seq



http://www.rna-seqblog.com/data-analysis/splicing-junction/methods-to-study-splicing-from-rna-seq/
http://arxiv.org/ftp/arxiv/papers/1304/1304.5952.pdf

Methods to study splicing by RNA-seq

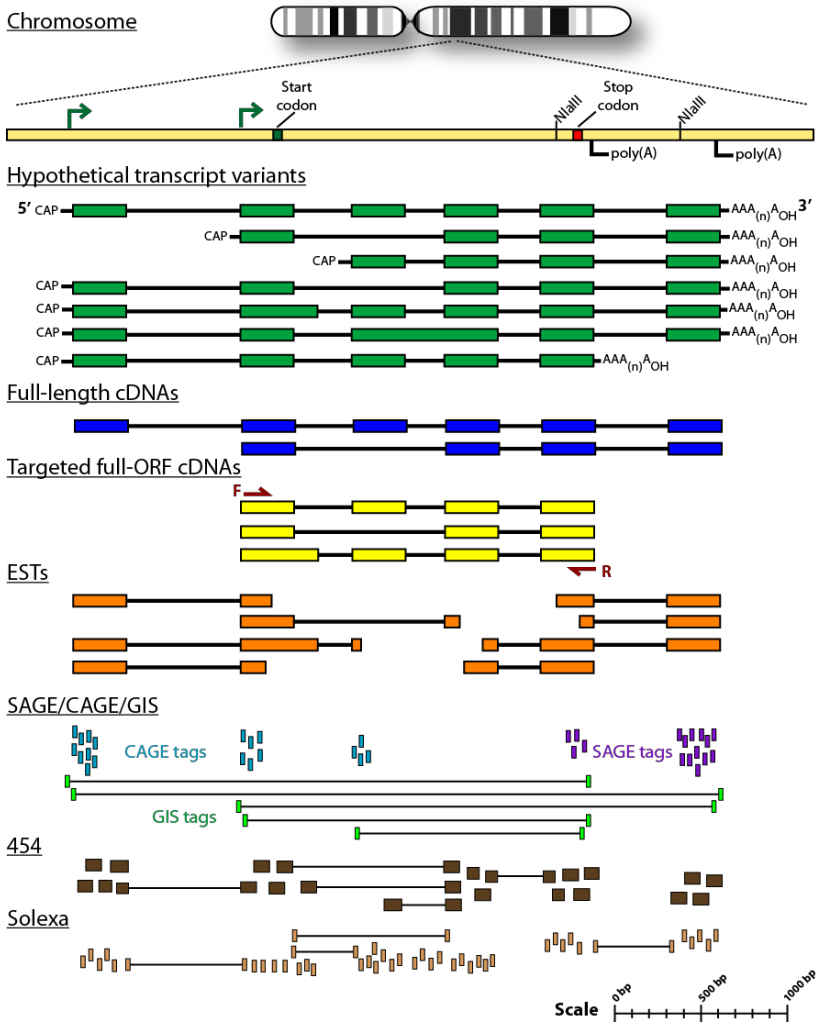


http://www.rna-seqblog.com/data-analysis/splicing-junction/methods-to-study-splicing-from-rna-seq/
http://arxiv.org/ftp/arxiv/papers/1304/1304.5952.pdf

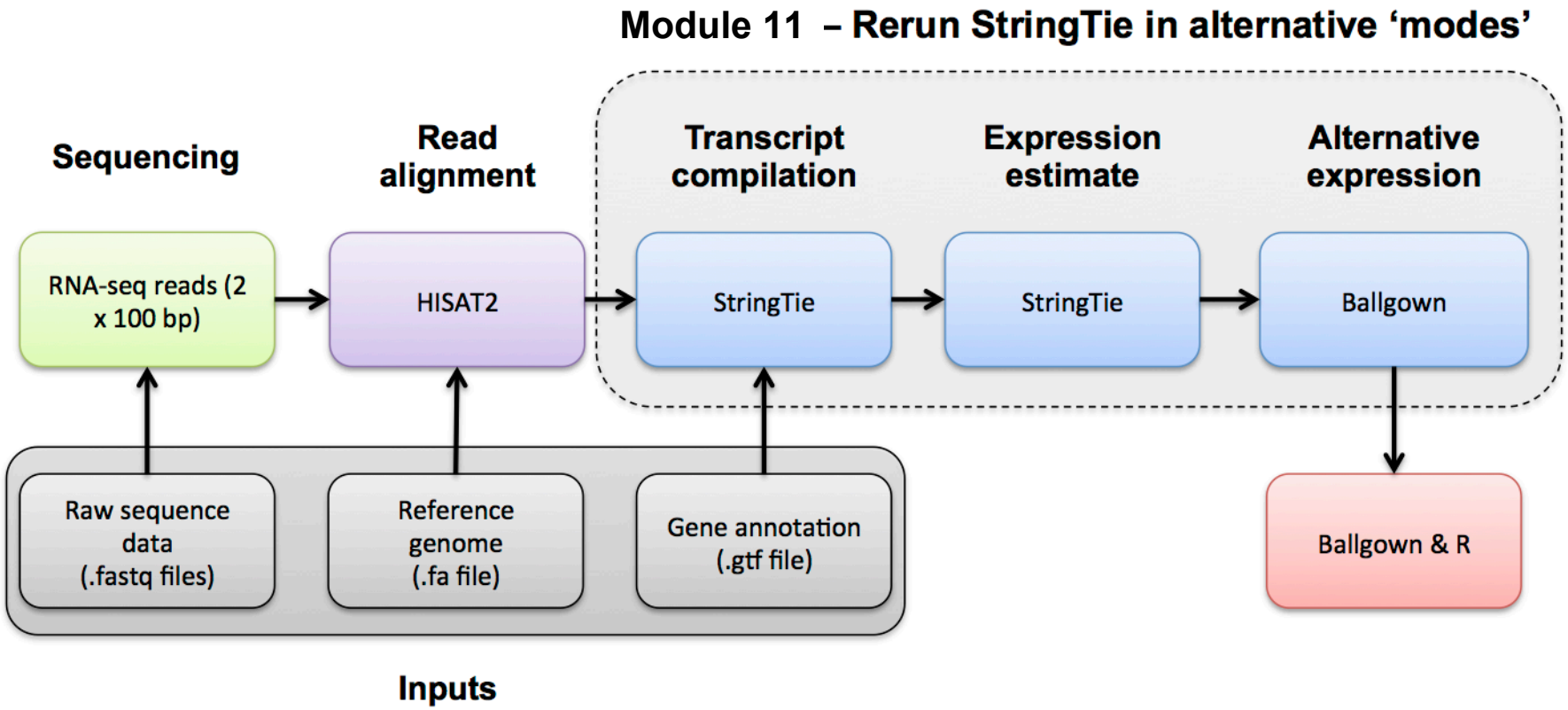
Useful resources and discussion

- Best approach to predict novel and alternative splicing events from RNA-seq data
  - http://www.biostars.org/p/68966/
  - http://www.biostars.org/p/62728/
- Alternative splicing detection
  - http://www.biostars.org/p/65617/
  - http://www.biostars.org/p/11695/
- Identifying genes that express different isoforms in cancer vs normal RNA-seq data
  - http://www.biostars.org/p/50365/
- Cufflinks / Cuffdiff Output - How are tests different?
  - http://www.biostars.org/p/13525/
- Visualization of alternative splicing events using RNA-seq data
  - http://www.biostars.org/p/8979/

Sequencing methods for studying alternative isoforms



HiSat/StringTie/Ballgown RNA-seq Pipeline



We are on a Coffee Break & Networking Session

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