

# Canadian Bioinformatics Workshops

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# Alternative Splicing Analysis

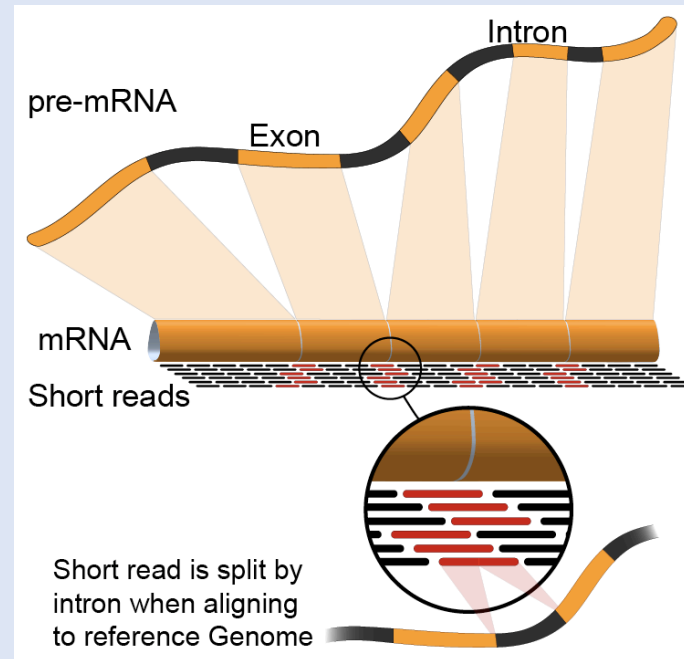
Emma Bell, Felicia Gomez, Obi Griffith, Malachi Griffith, Huiming Xia

RNA-Seq Analysis

Sep 8<sup>th</sup>-10<sup>th</sup>, 2021

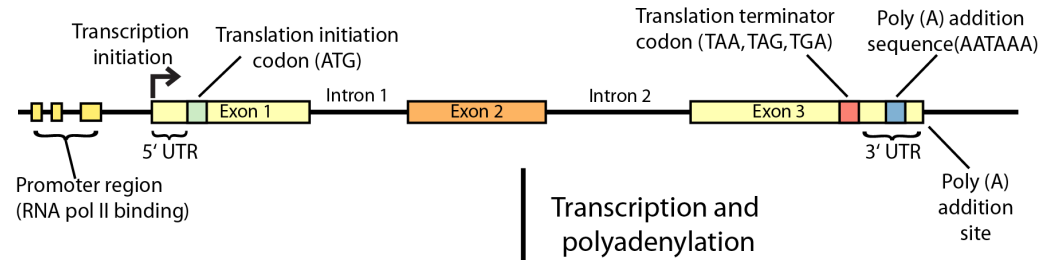


A composite image containing the bioinformatics.ca logo (top left), a network diagram with red nodes and white lines (bottom left), the Cold Spring Harbor Laboratory (CSH) logo (center), and the bioinformatics.ca logo (bottom right).

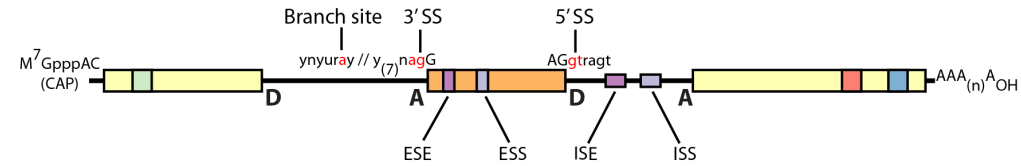


# Review of gene expression

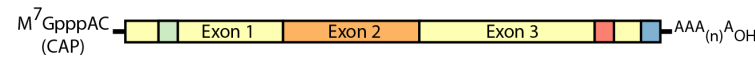
## Double-stranded genomic DNA template



## Single-stranded pre-mRNA (nuclear RNA)



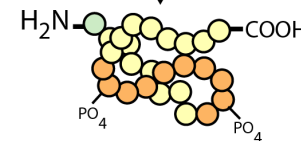
## Mature mRNA



## Protein (amino acid sequence)

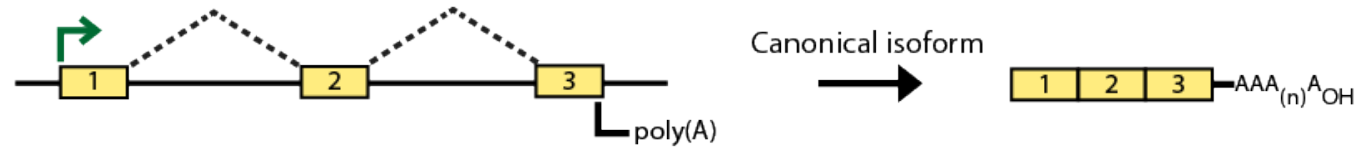


Folding, posttranslational modification, subcellular localization, etc.

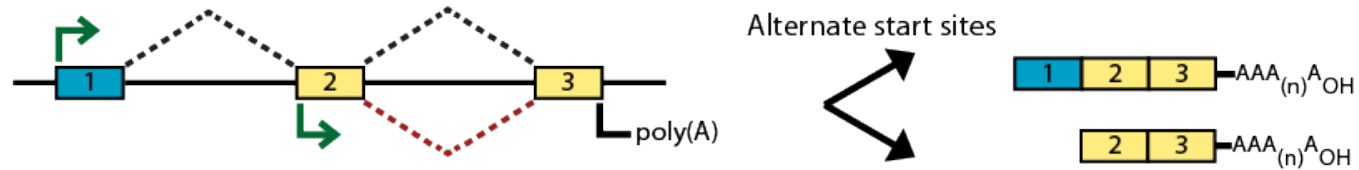


# Types of alternative expression - part 1

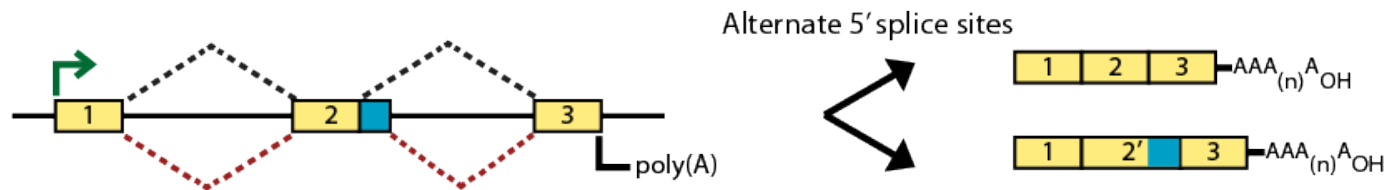
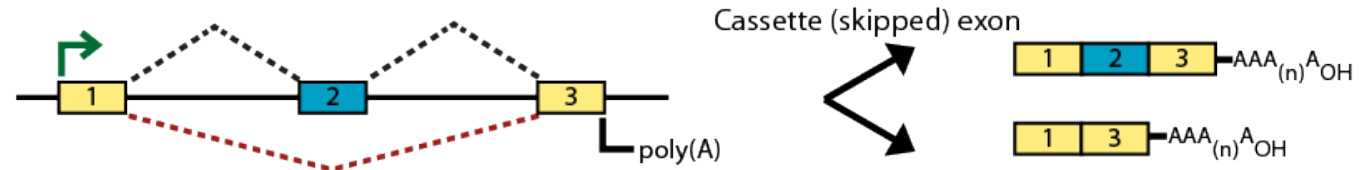
## Simple transcription



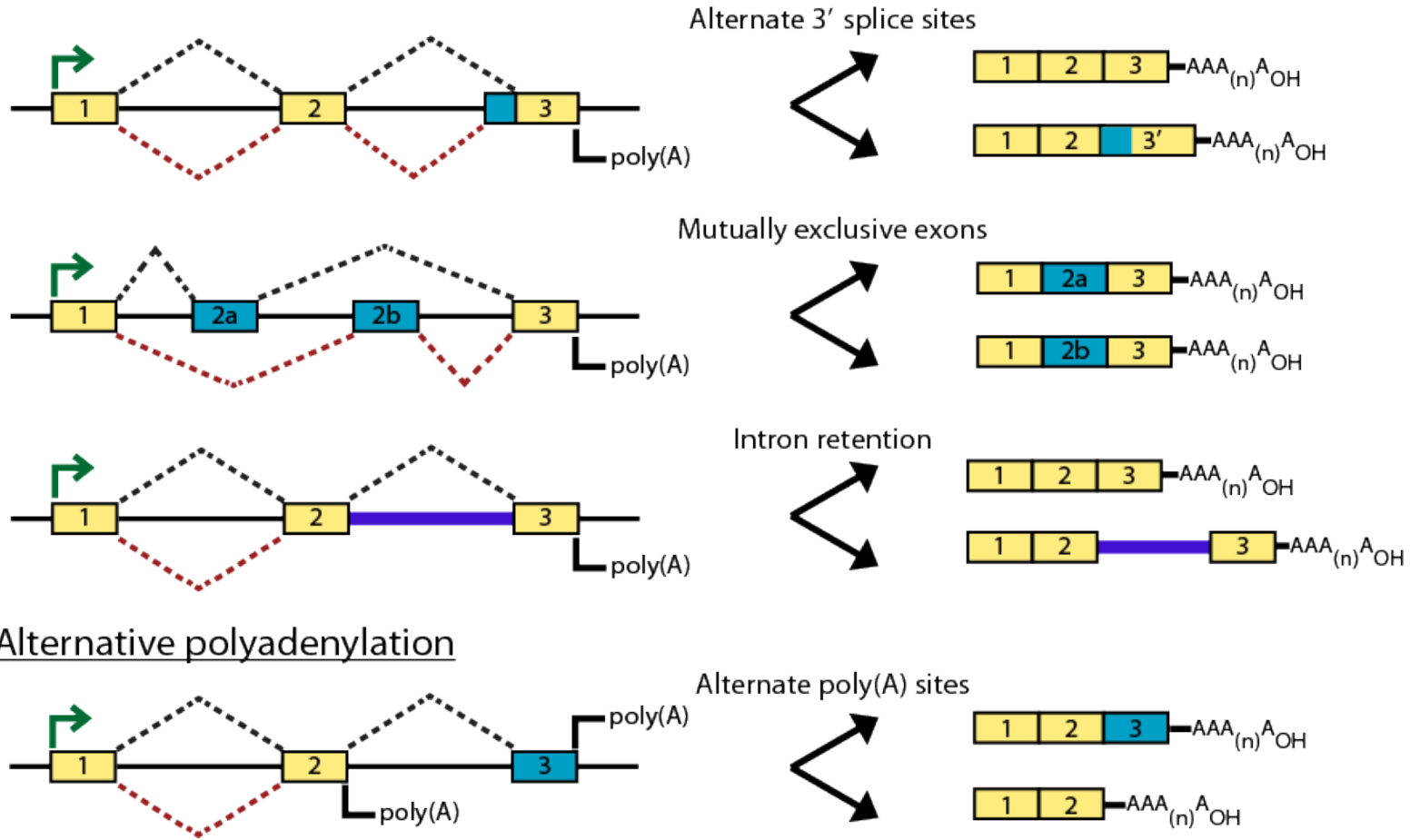
## Alternative transcript initiation



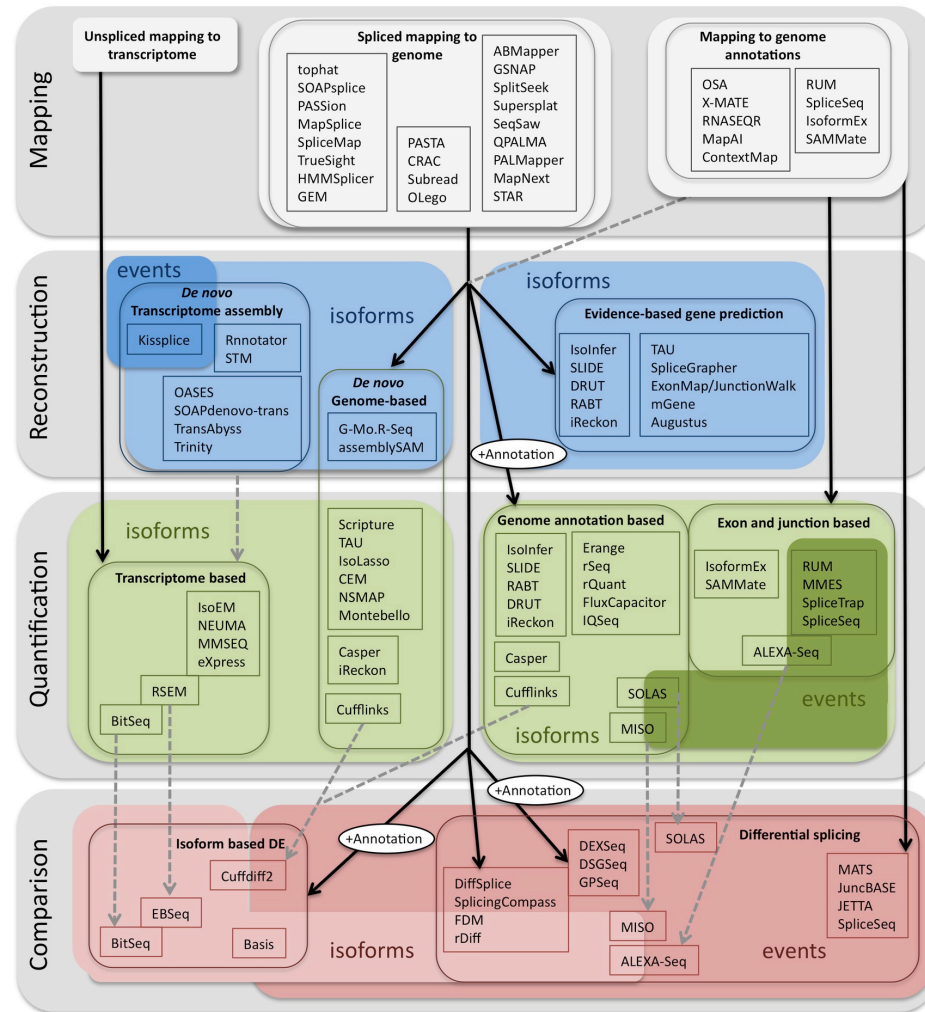
## Alternative splicing



# Types of alternative expression – part 2

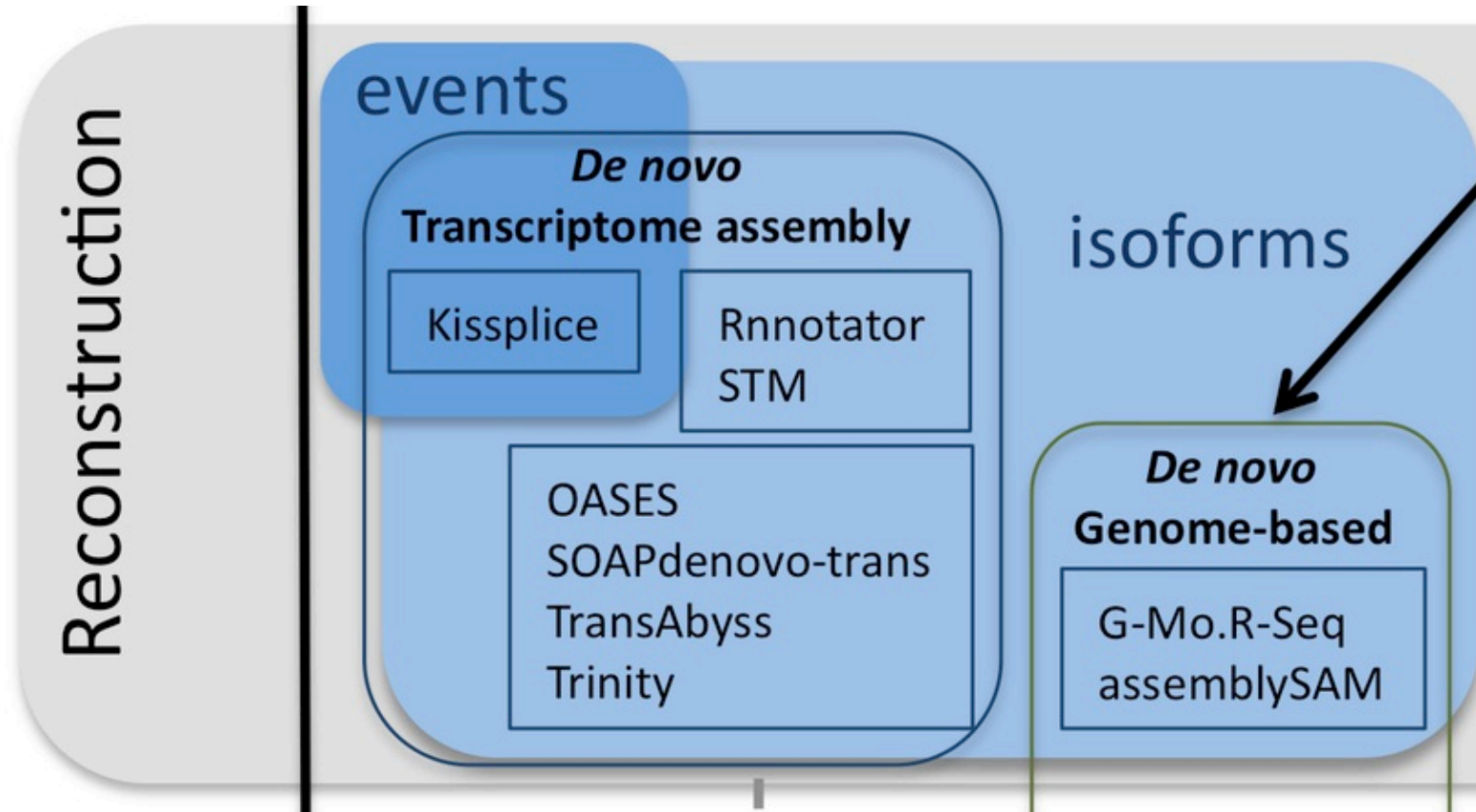


# Methods to study splicing by RNA-seq



<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



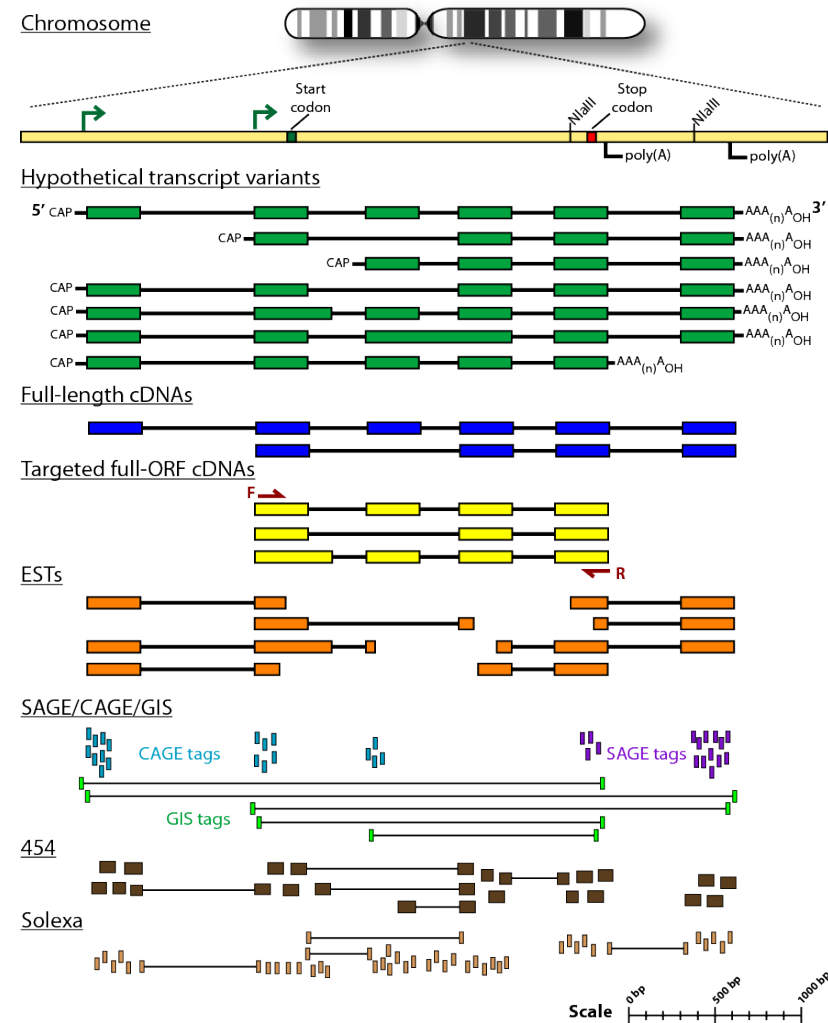
<http://www.rna-seqblog.com/data-analysis/splicing-junction/methods-to-study-splicing-from-rna-seq/>  
<http://arxiv.org/ftp/arxiv/papers/1304/1304.5952.pdf>



# 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



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