



Cold  
Spring  
Harbor  
Laboratory

# RNA-Seq Module 6

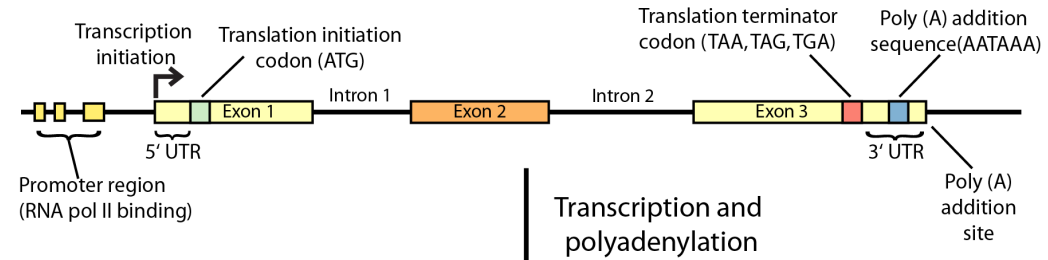
## Alternative Splicing Analysis

Kelsy Cotto, Felicia Gomez,  
Obi Griffith, Malachi Griffith, Huiming Xia  
Advanced Sequencing Technologies & Applications  
November 5- 16, 2019



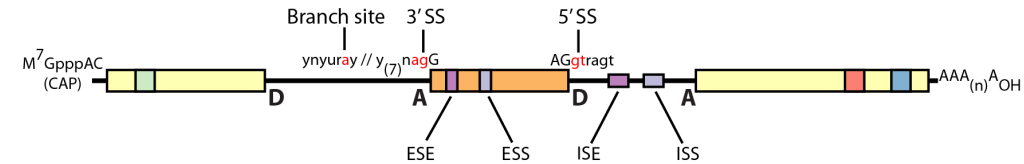
# Review of gene expression

## Double-stranded genomic DNA template



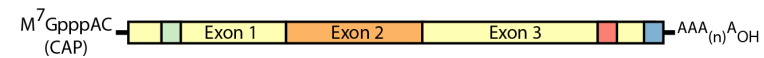
Transcription and polyadenylation

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



RNA processing

## Mature mRNA

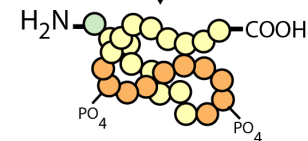


Export to cytoplasm and translation

## Protein (amino acid sequence)

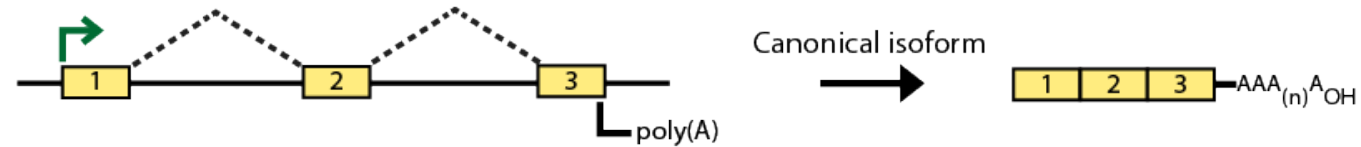


Folding, posttranslational modification, subcellular localization, etc.

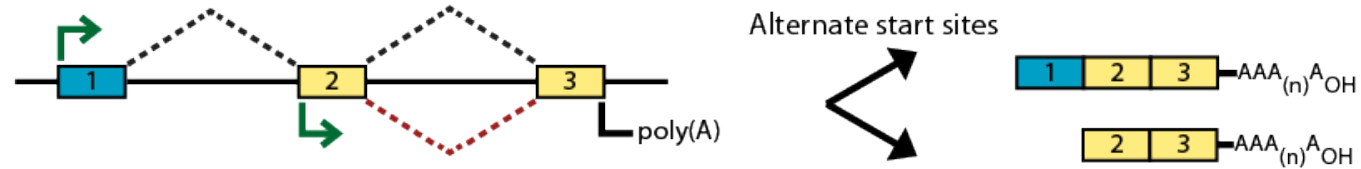


# Types of alternative expression - part 1

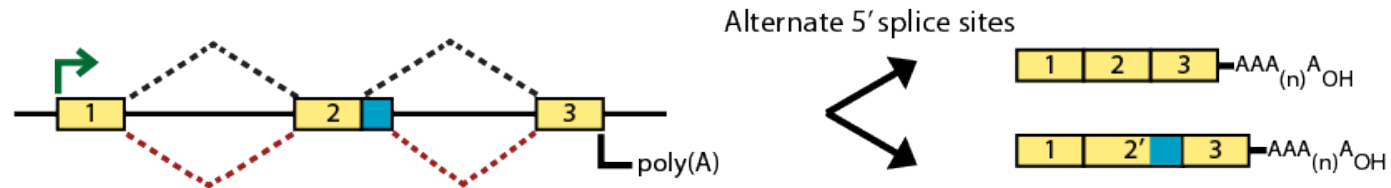
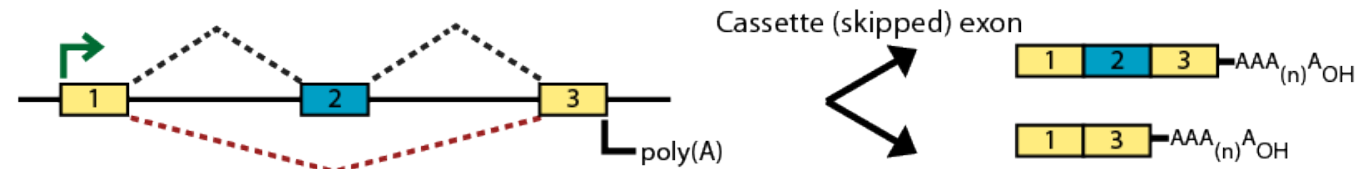
## Simple transcription



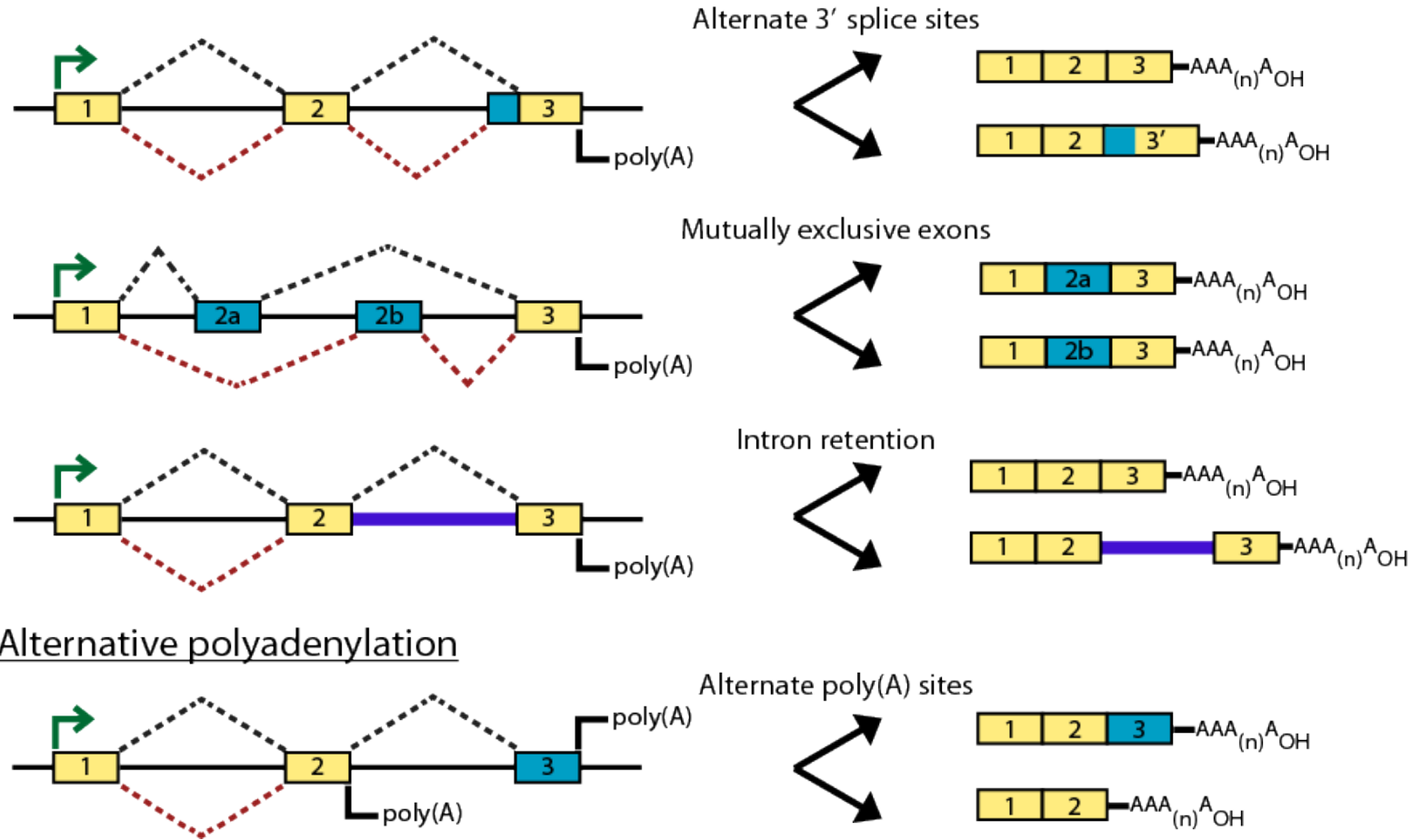
## Alternative transcript initiation



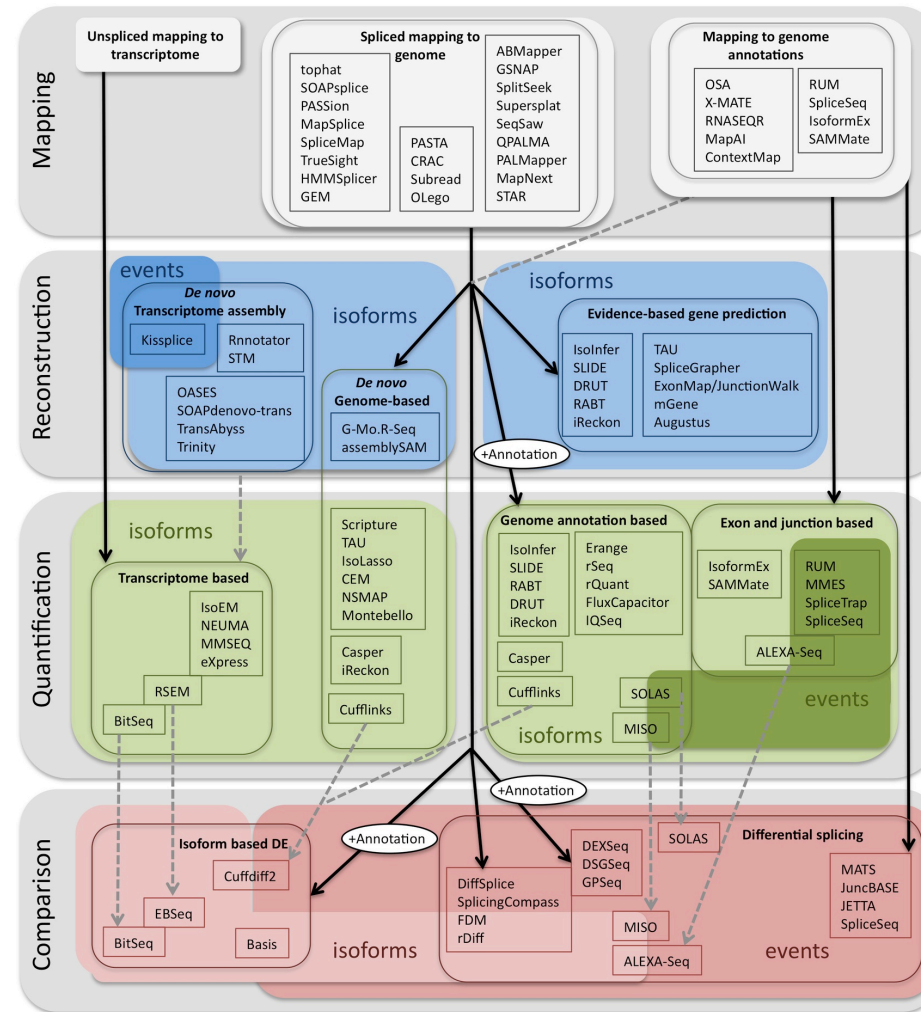
## Alternative splicing



# Types of alternative expression – part 2

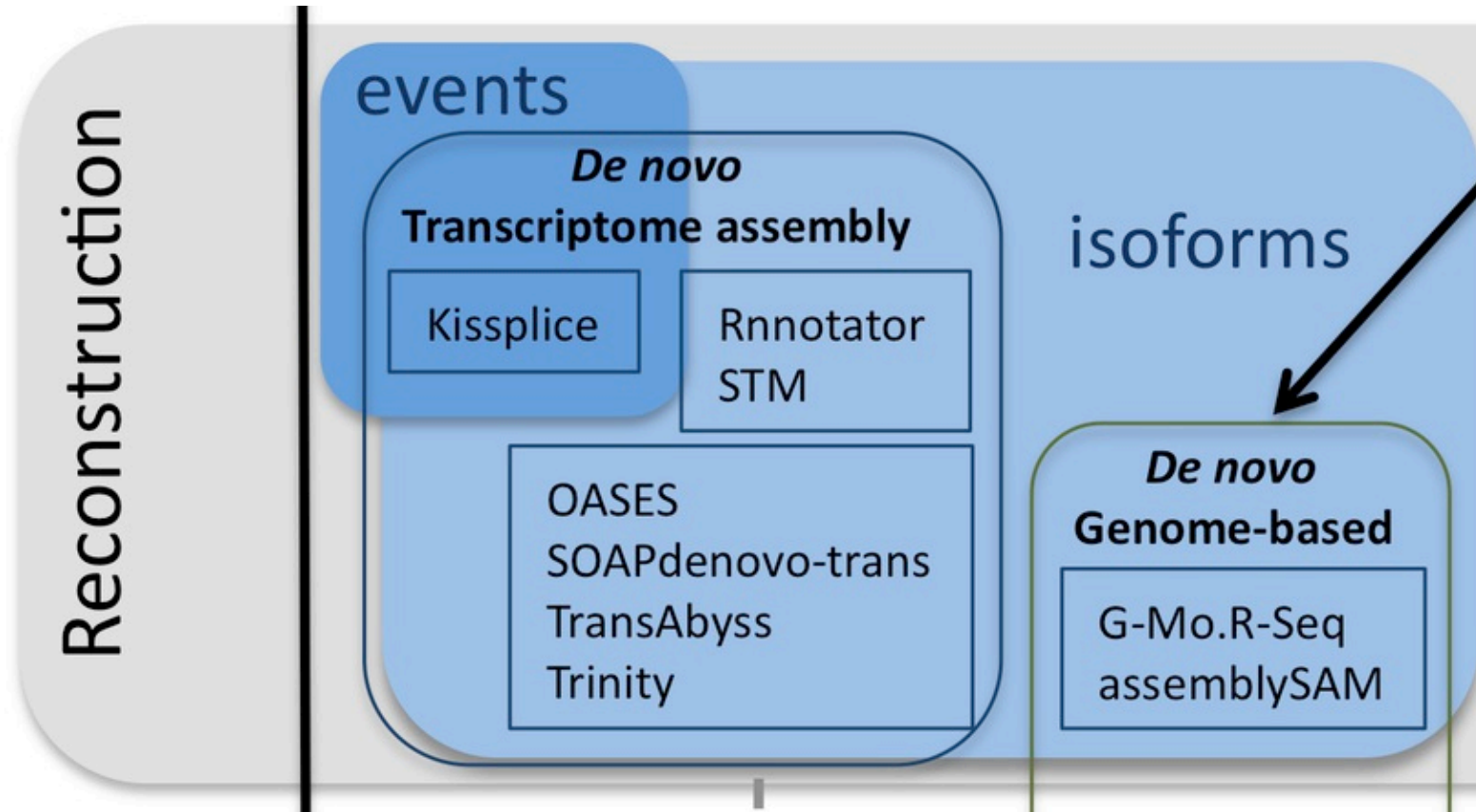


# Methods to study splicing by RNA-seq



<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>

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<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

