I. Introductions
II. Transcriptomics 101

Workshop Learning Objectives

1. **What types of research questions that transcriptomics can be used to address**

2. **Key things to consider in experimental design & analysis approaches**

3. **Conceptual understanding of steps and decisions involved in RNA-Seq data analysis**

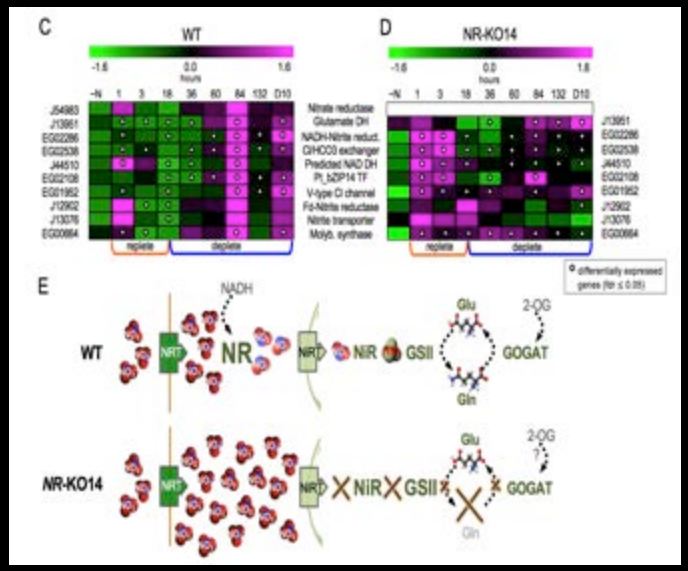
4. **Become comfortable working with RNA-Seq data in key workflow steps**

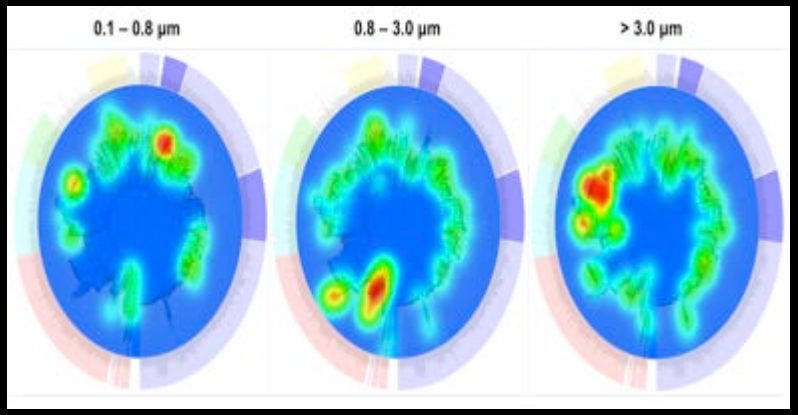
5. **Know about resources and where to go for help/future learning**
   (including building contacts community here with other participants!)

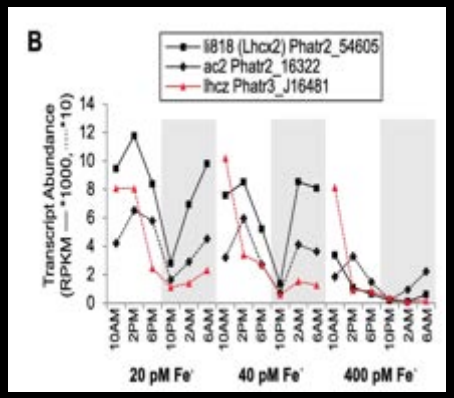
Schedule & Code of Conduct

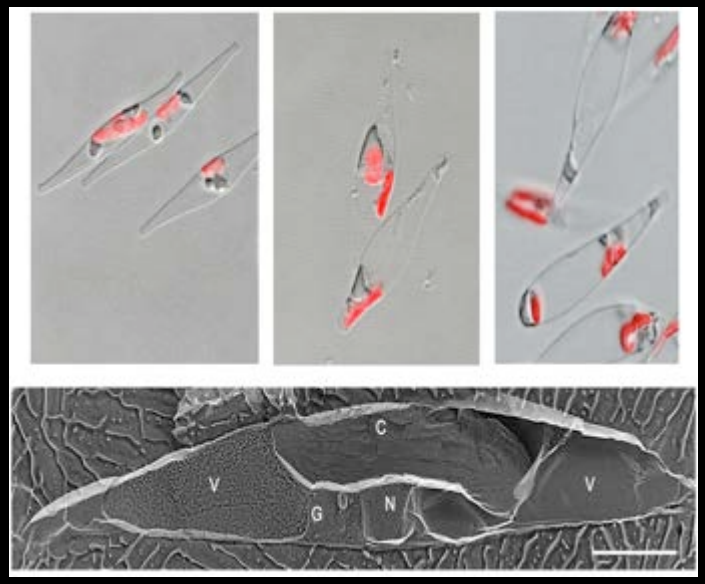
Logistics

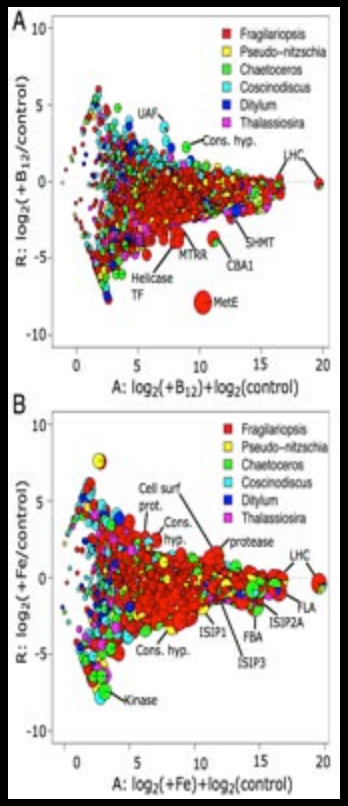
- Sticky Notes
- Etherpad
- Personal note taking suggestions
- Interactive Environment











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Transcriptomics

Genomics

Amplicon sequencing

Metagenomics

Ecosystem assessment

Data science

Bioinformatics

Fisheries biology

Environmental sequencing

OSD
Ocean Sampling Day

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

ATLANTIC OCEANOGRAPHIC & METEOROLOGICAL LABORATORY
AOML
NOAA

CalCOFI
Celebrating 68 Years
1949 - 2017

earth microbiome project

Tessa Pierce

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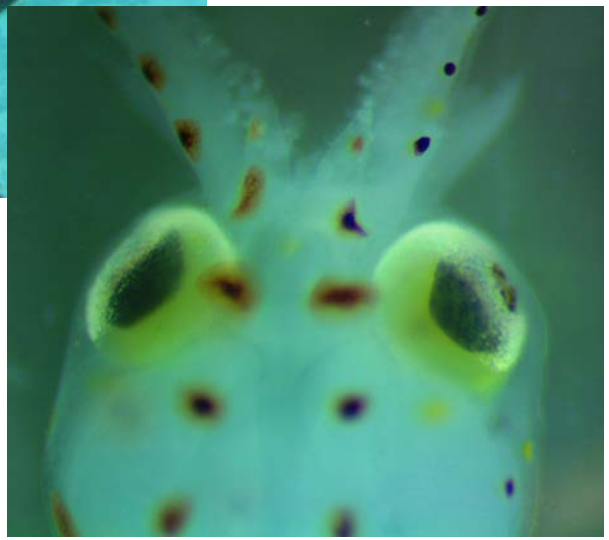
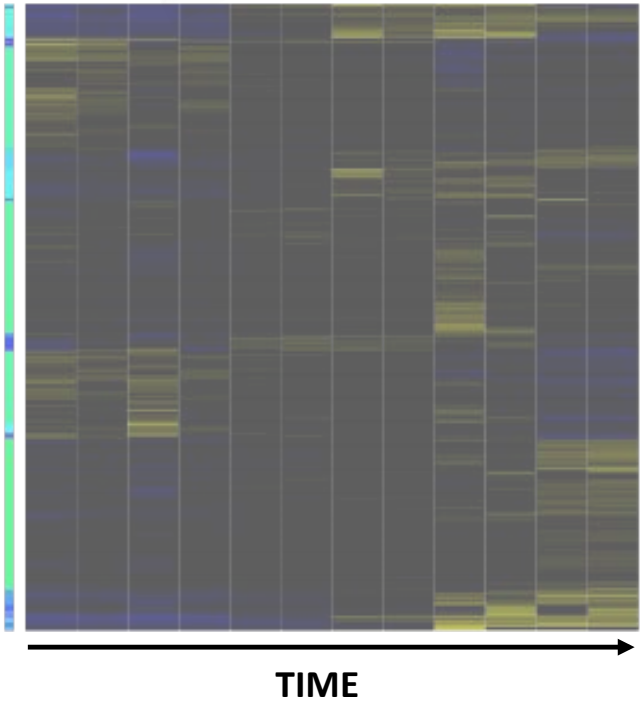
Nonmodel Transcriptomics

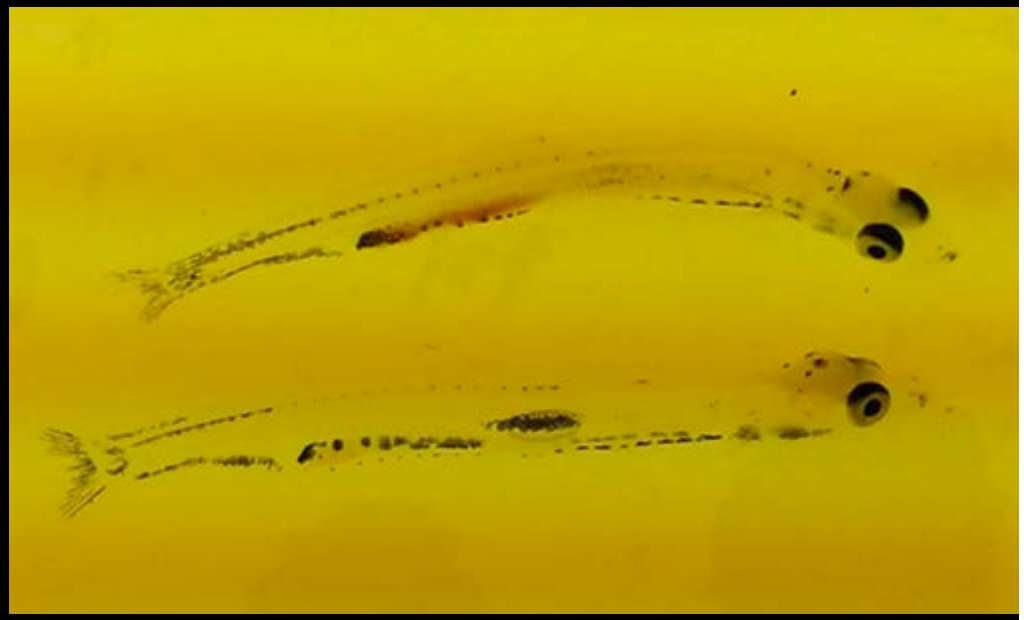
- Environmental Stressors
- Time Series Analysis





bluegenes

@saltyscientist



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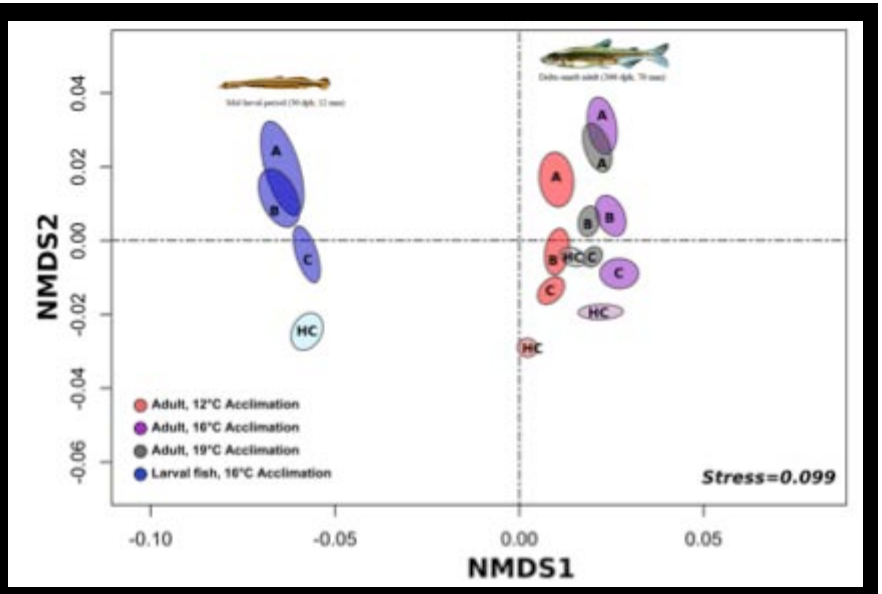
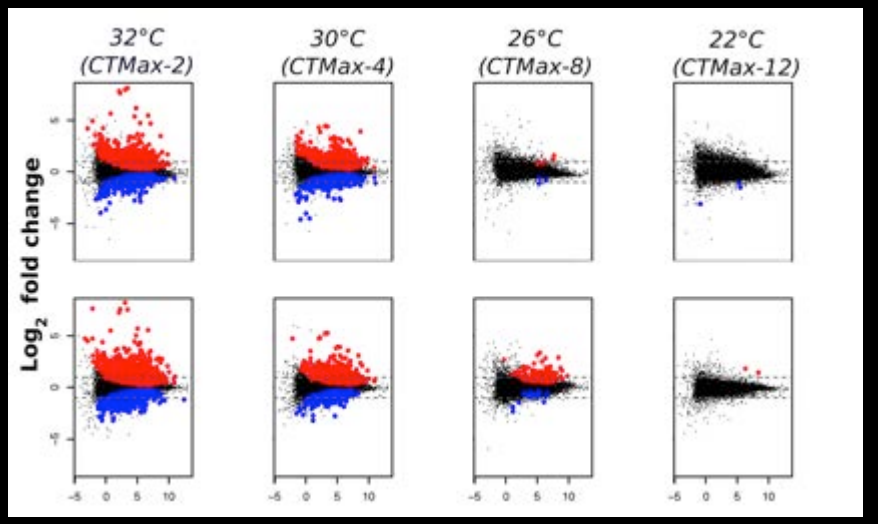
NOAA FISHERIES | Southwest Fisheries Science Center
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

UMASS AMHERST





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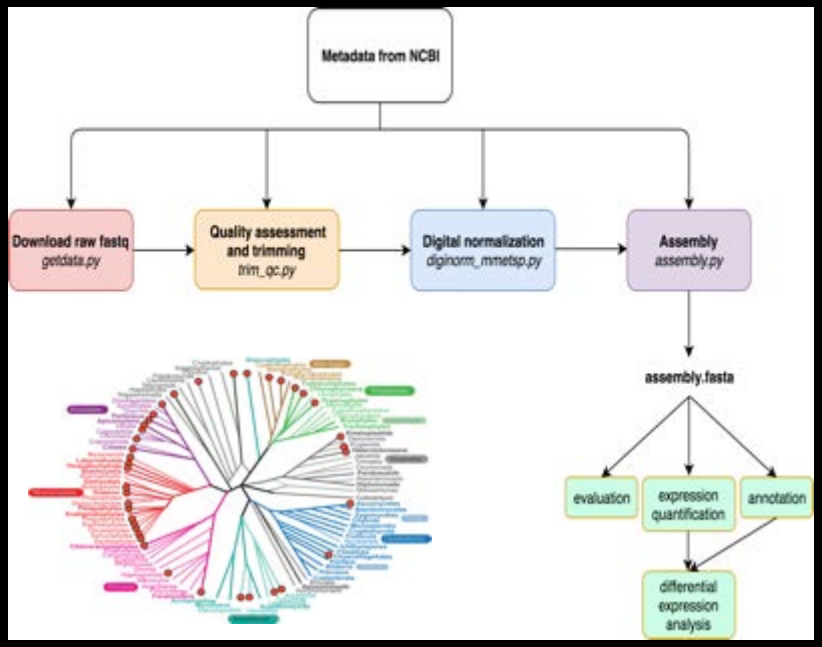
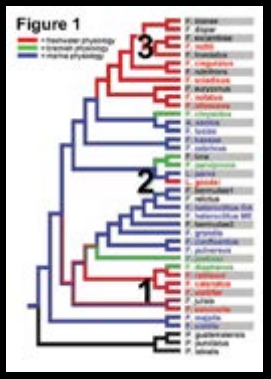
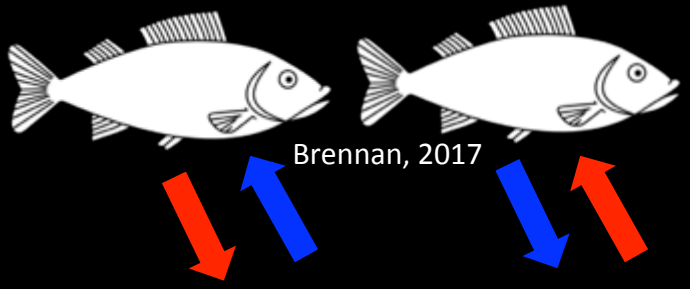


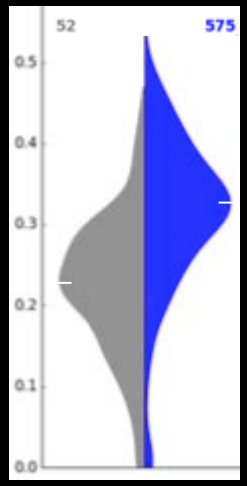
Keeling et al. 2014
PMID: 24959919



Whitehead 2010



Brennan, 2017



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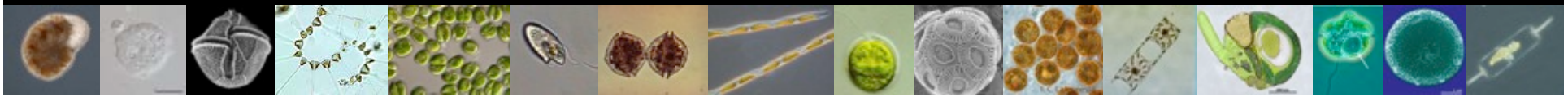
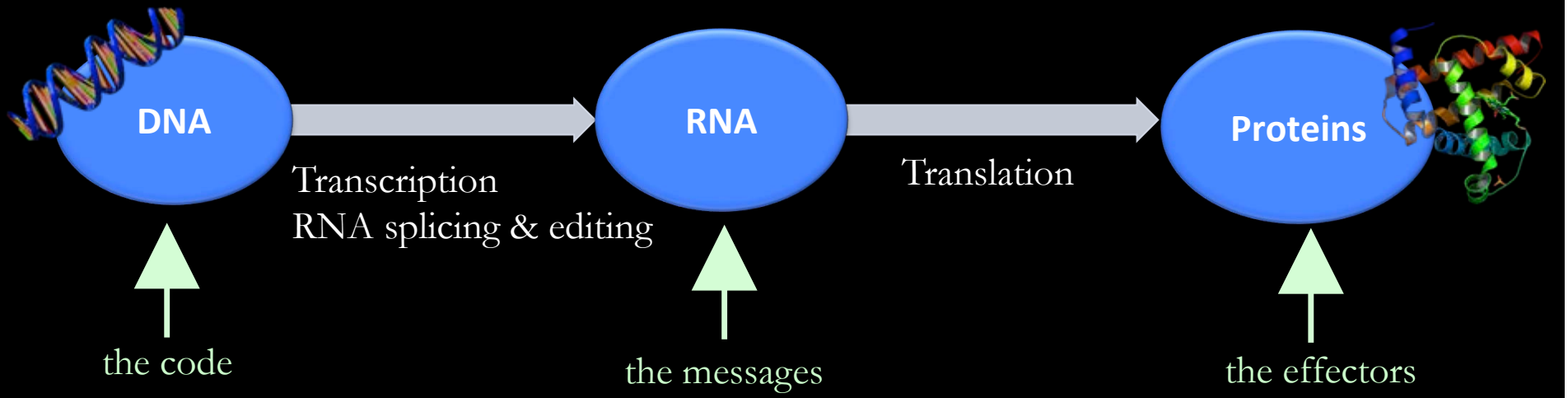


Student Introductions

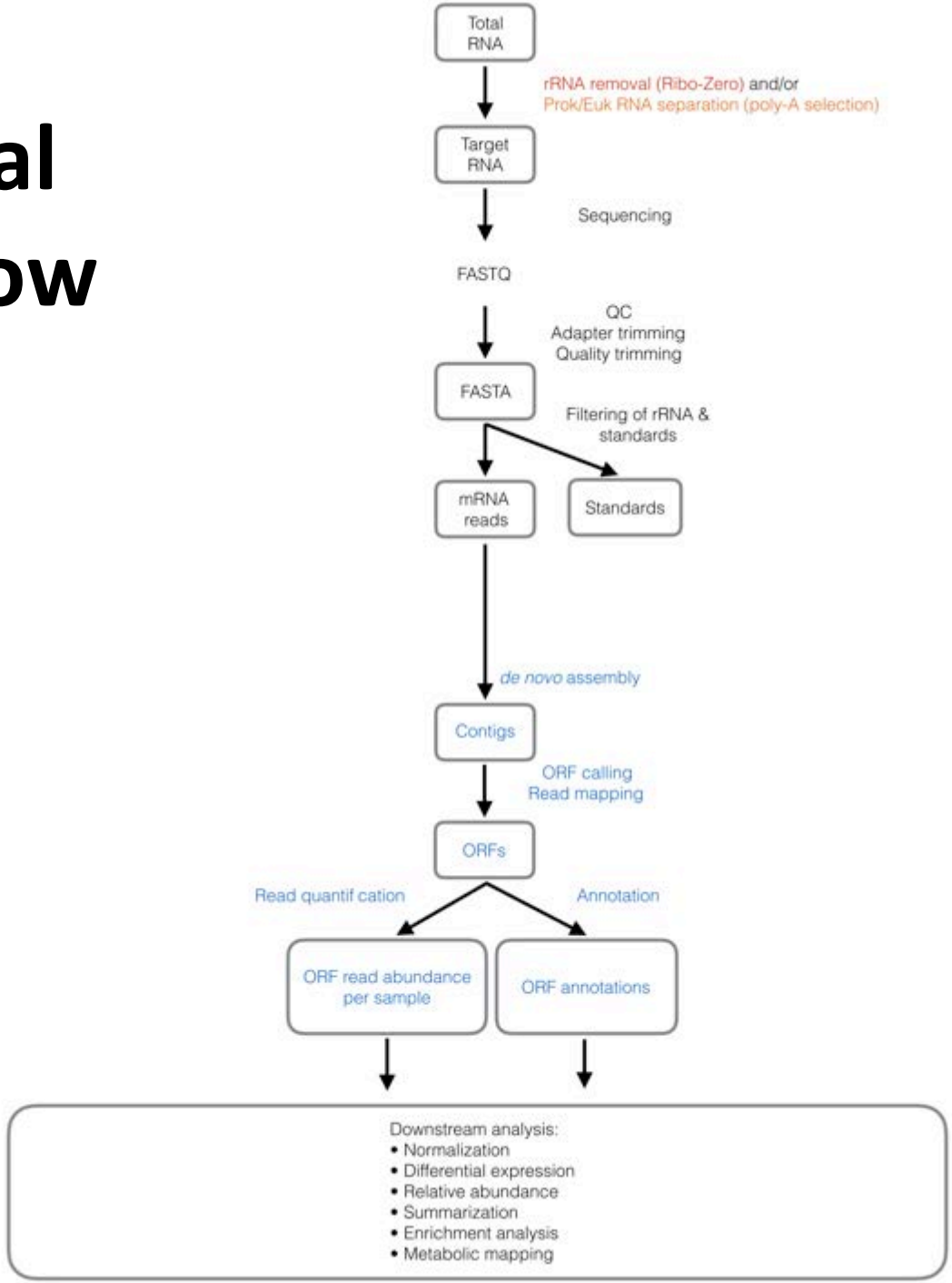
- What organisms/ systems are you studying?
- Why are you interested in transcriptomics?

Transcriptomics 101

- What is Transcriptomics?
- When would it be a good tool?
- What type of data is generated?



General Workflow



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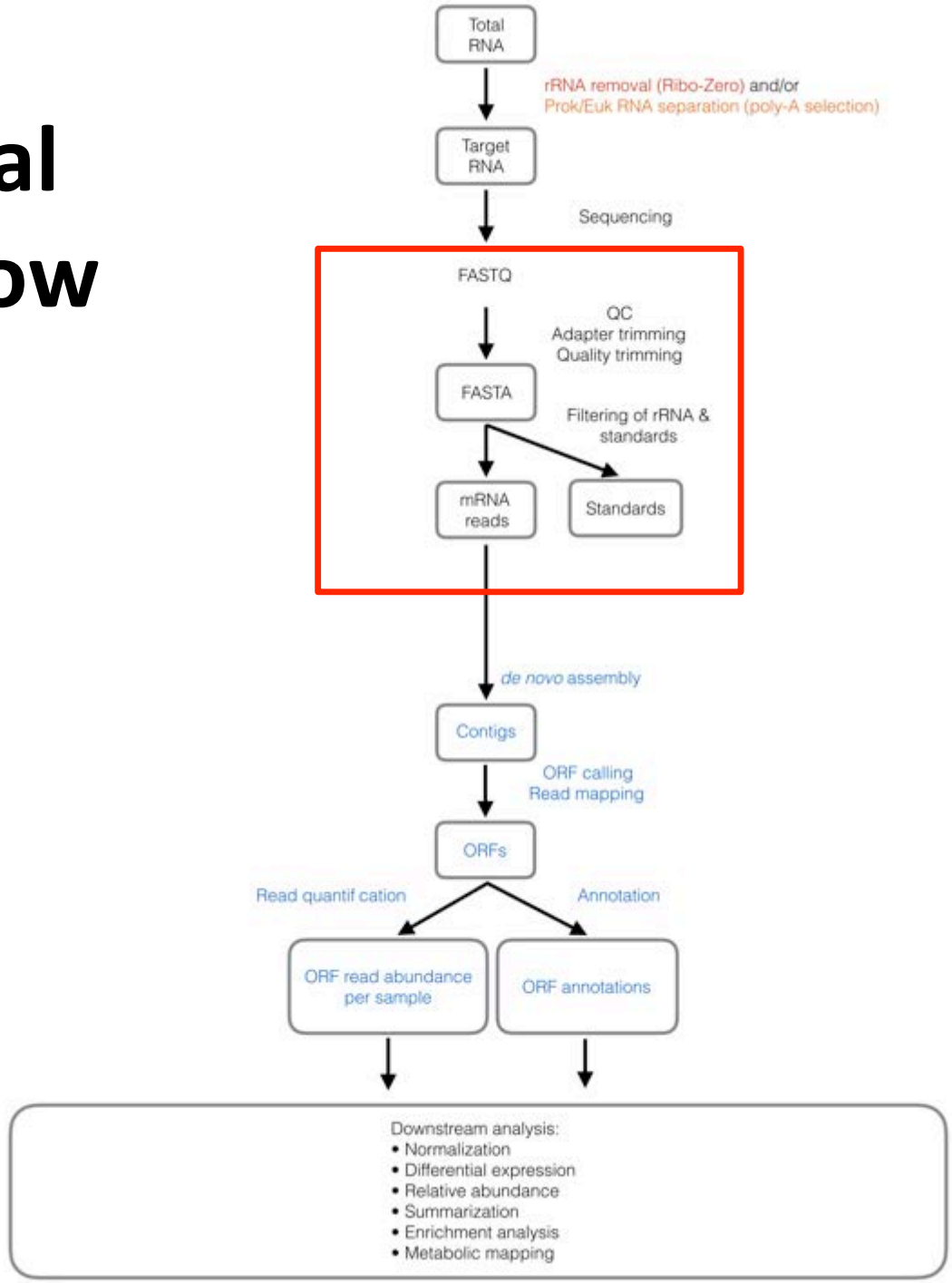
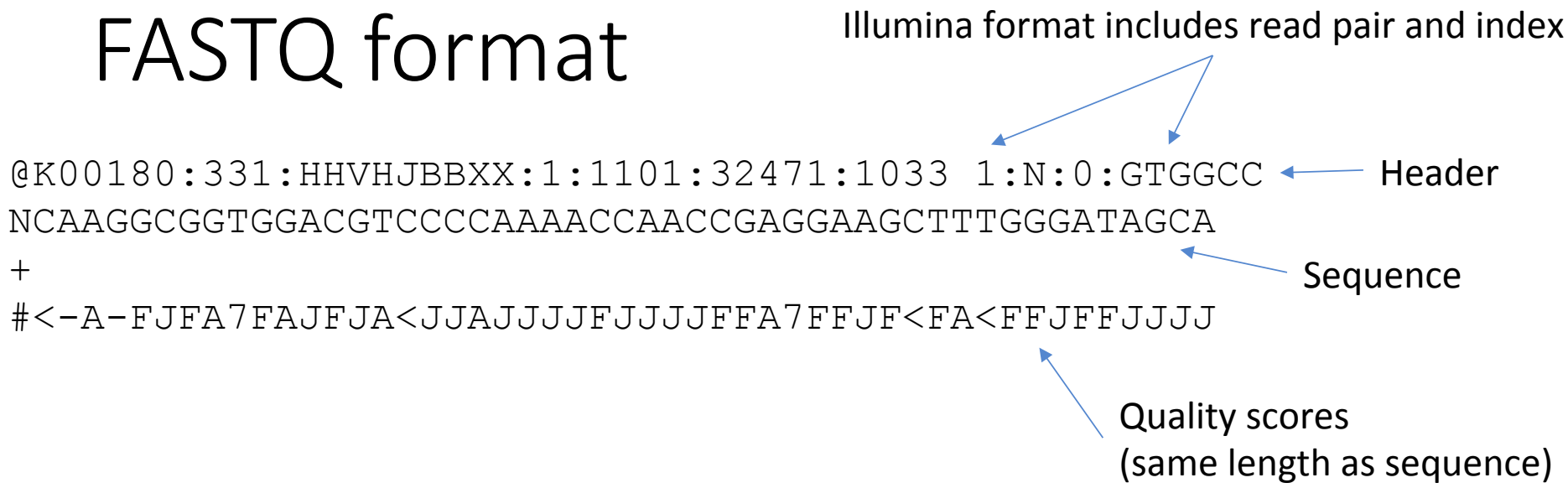


FASTQ format



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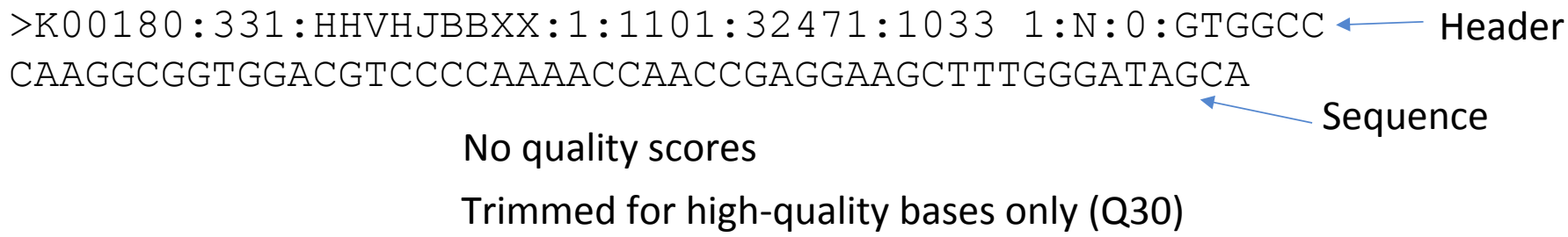

No quality scores

Trimmed for high-quality bases only (Q30)

What is Transcriptomics?

- Sequencing of cellular mRNA transcripts (or depleted total RNA-prokaryotes)
- Powerful measure of functional response to changing environmental conditions, cell types, or populations, etc.
- Small tissue requirements & multiplexing capacity
- Non-omics approaches: RT-qPCR, RNase protection assay, Northern blot
- Other applications (e.g., variant calling)

Why use Transcriptomics?

- Want to know about many genes, don't know which genes are present or are interesting
- Want to know about overall biological processes and/or pathways affected
- Genomes are not comprised of just single-copy single-function proteins, especially in more complex eukaryotes
- Even when measurement of a short list of genes is desired, value in knowing the context of other genes.