A wide-angle photograph of a coastal sunset. The sky is filled with dramatic, dark clouds illuminated from behind by a low sun. The sun's reflection is visible on the calm water of a bay or inlet. In the background, there are rolling hills or mountains. On the right side, a sandy beach meets the water, and some dark, silhouetted trees are visible on a headland. The overall atmosphere is peaceful and scenic.

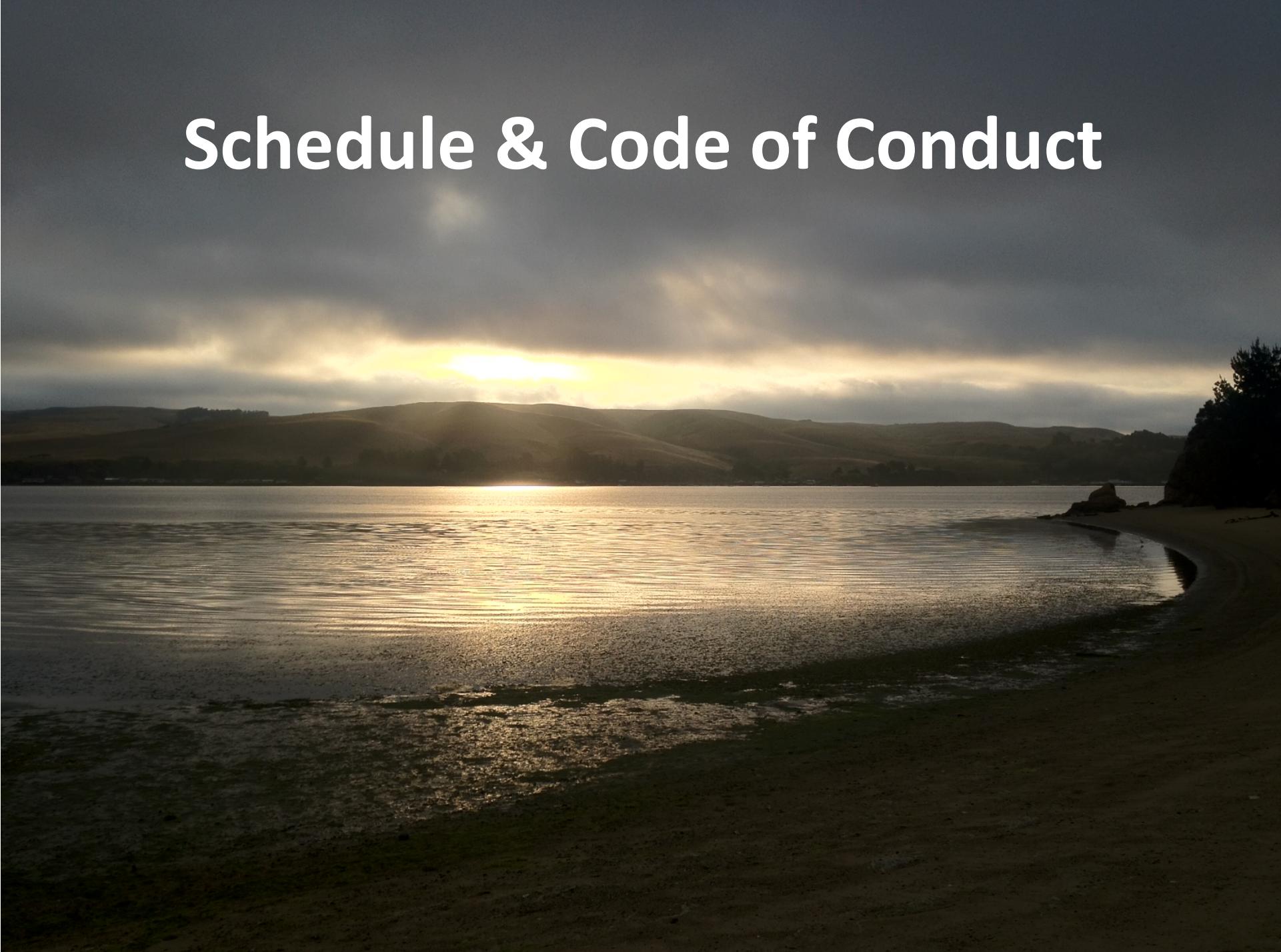
I. Introductions

II. Transcriptomics 101

Workshop Learning Objectives

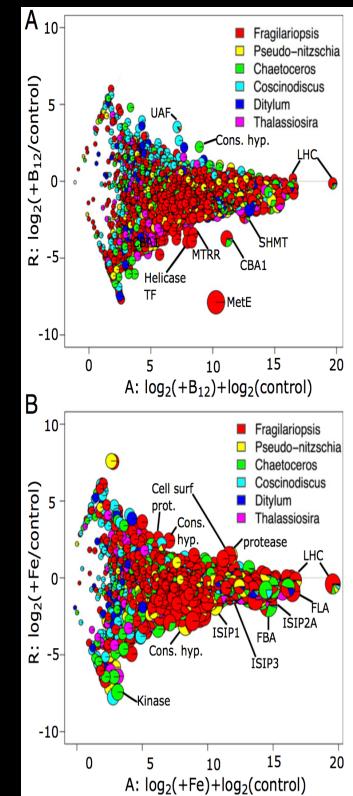
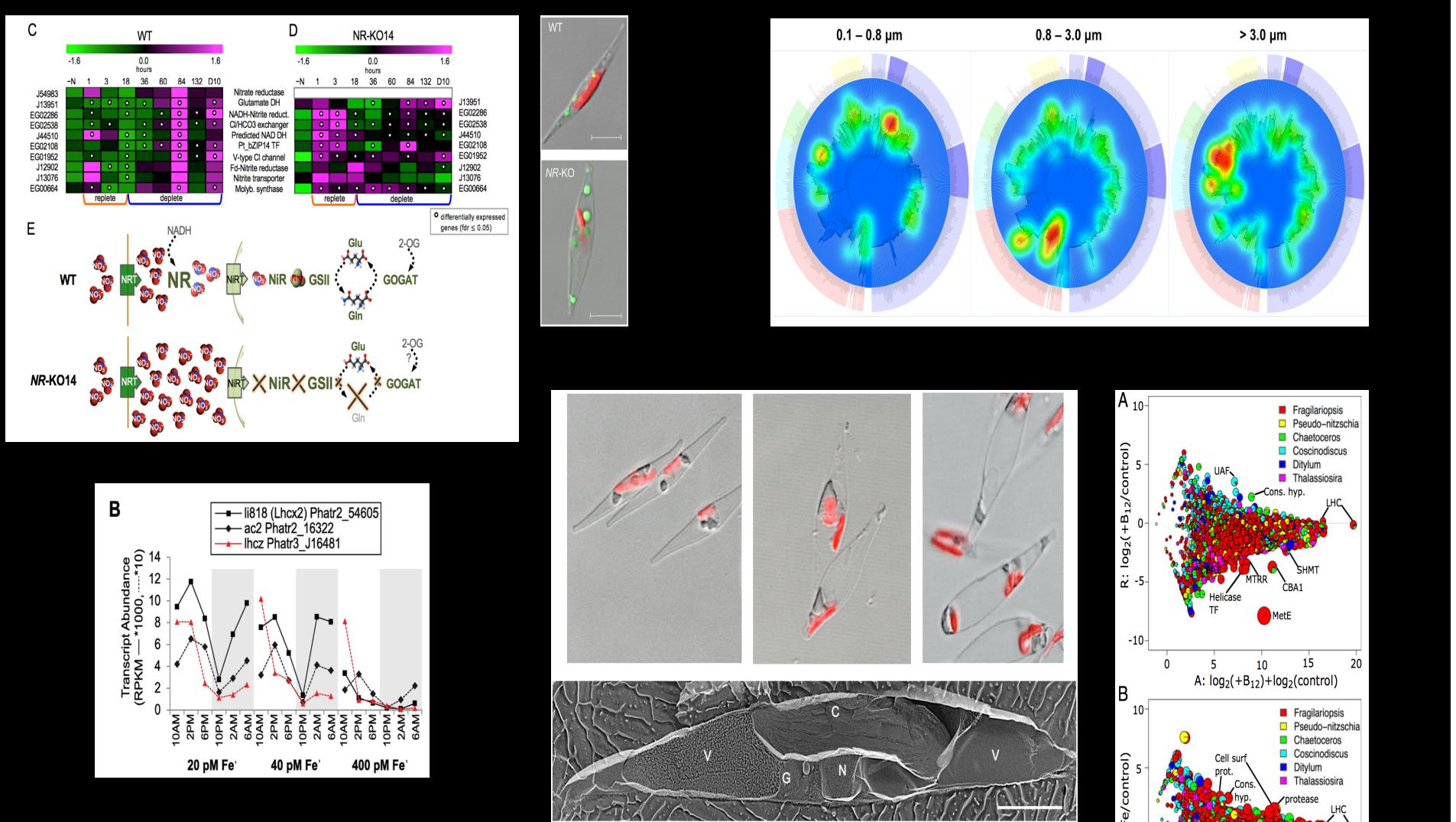
1. What types of research questions that transcriptomics can be used to address
2. Key things to consider in experimental design & analysis approaches
3. Conceptual understanding of steps and decisions involved in RNA-Seq data analysis
4. Become comfortable working with RNA-Seq data in key workflow steps
5. Know about resources and where to go for help/future learning
(including building contacts community here with other participants!)

Schedule & Code of Conduct

A wide-angle photograph of a coastal sunset. The sky is filled with dramatic, dark clouds illuminated from behind by a low sun. The sun's reflection is visible on the calm water of a bay or inlet. In the background, there are rolling hills or mountains. On the right side, a sandy beach curves along the shore, with some dark, silhouetted vegetation and rocks visible. The overall atmosphere is peaceful and scenic.

Logistics

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



John McCrow
Computational Staff Scientist
Allen Lab, JCVI/SIO
[jmcrow@jcvi.org](mailto:jmccrow@jcvi.org)

J. Craig Venter®
INSTITUTE



Luke Thompson
Research Associate
NOAA SWFSC & AOML

Luke.thompson@noaa.gov

Transcriptomics

Genomics

Amplicon sequencing

Metagenomics

Ecosystem assessment

Data science

Bioinformatics

Fisheries biology

Environmental sequencing





bluegenes



@saltyscientist

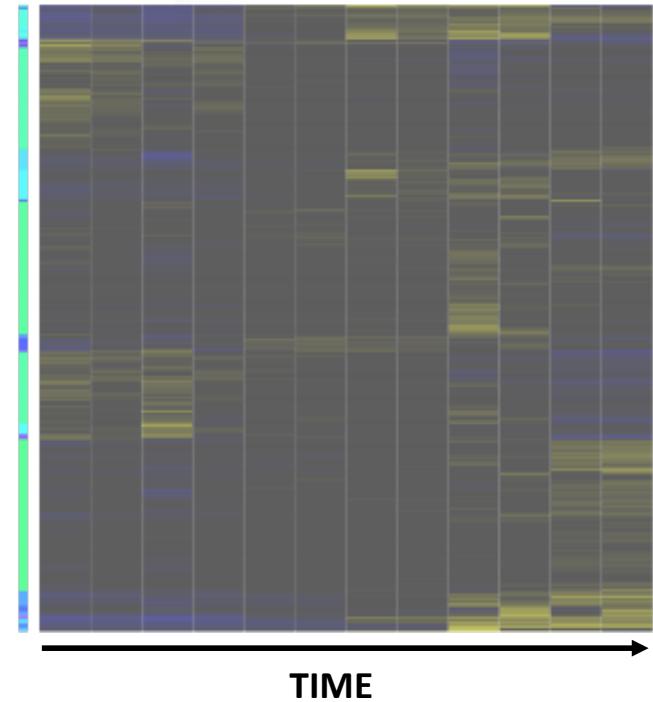


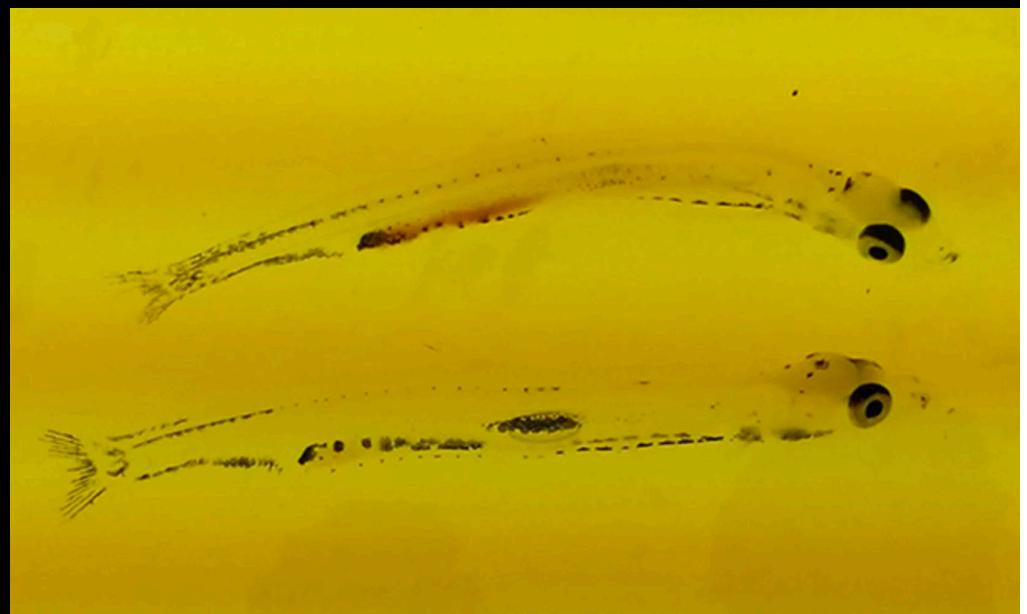
Tessa Pierce

ntpierce@ucdavis.edu

Nonmodel Transcriptomics

- Environmental Stressors
- Time Series Analysis





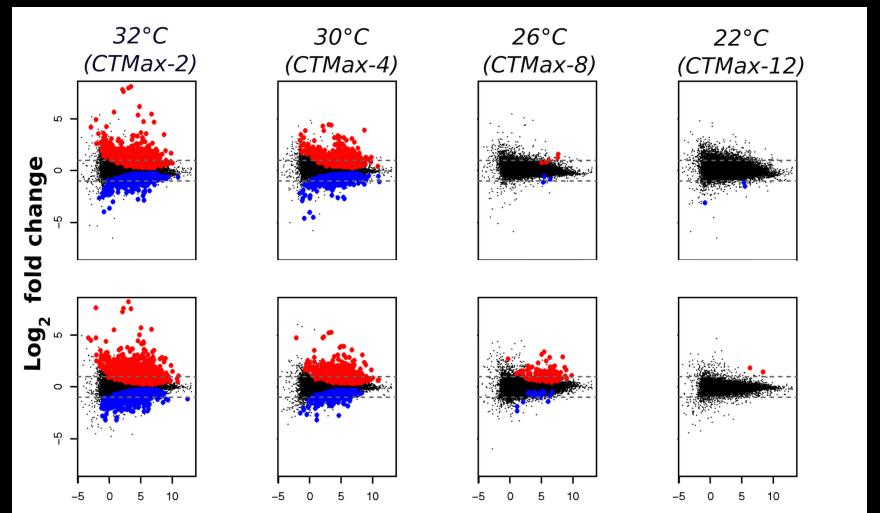
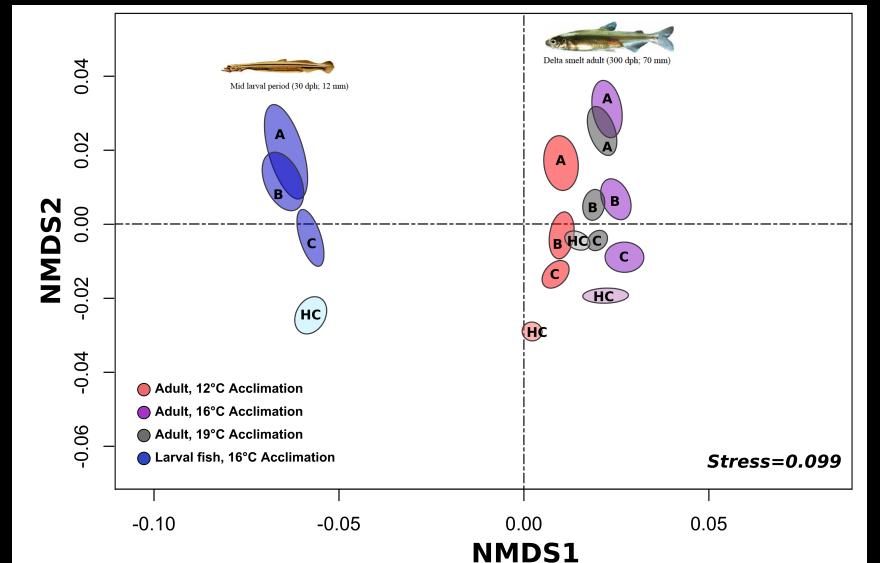
Lisa Komoroske

Dept. of Environmental Conservation
SWFSC Marine Mammal & Turtle Division
Lisa.komoroske@noaa.gov
<https://Lmkomooroske.com>



NOAA FISHERIES | Southwest Fisheries Science Center





Lisa Komoroske



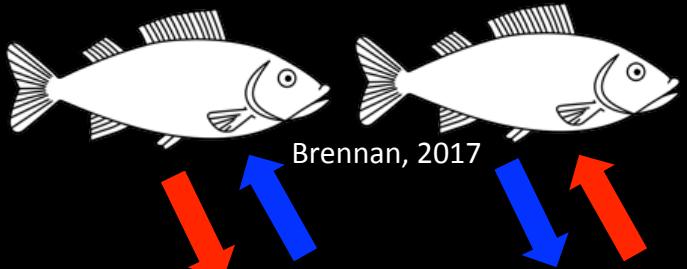
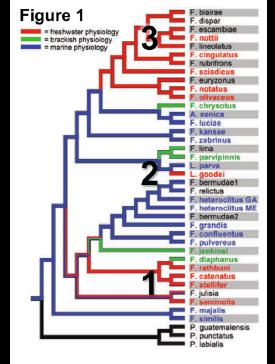
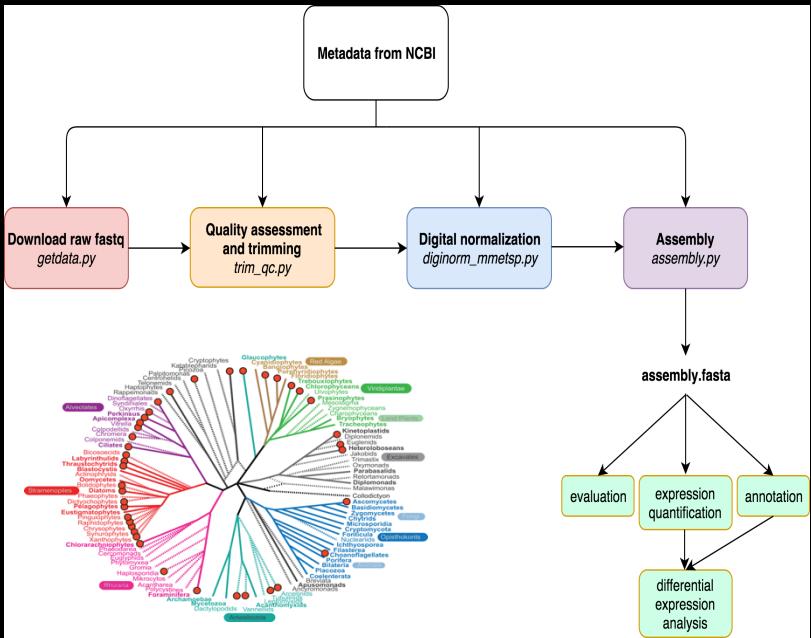
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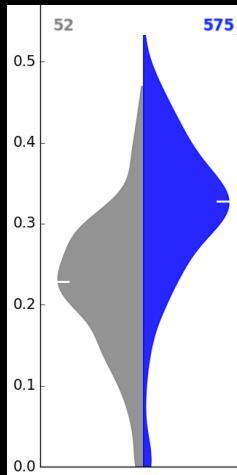
UMASS
AMHERST





Lisa Johnson(Cohen)

Titus Brown – Lab for Data Intensive Biology
Andrew Whitehead – Environmental Genomics
UC Davis



@monsterbashseq



ljcohen@ucdavis.edu

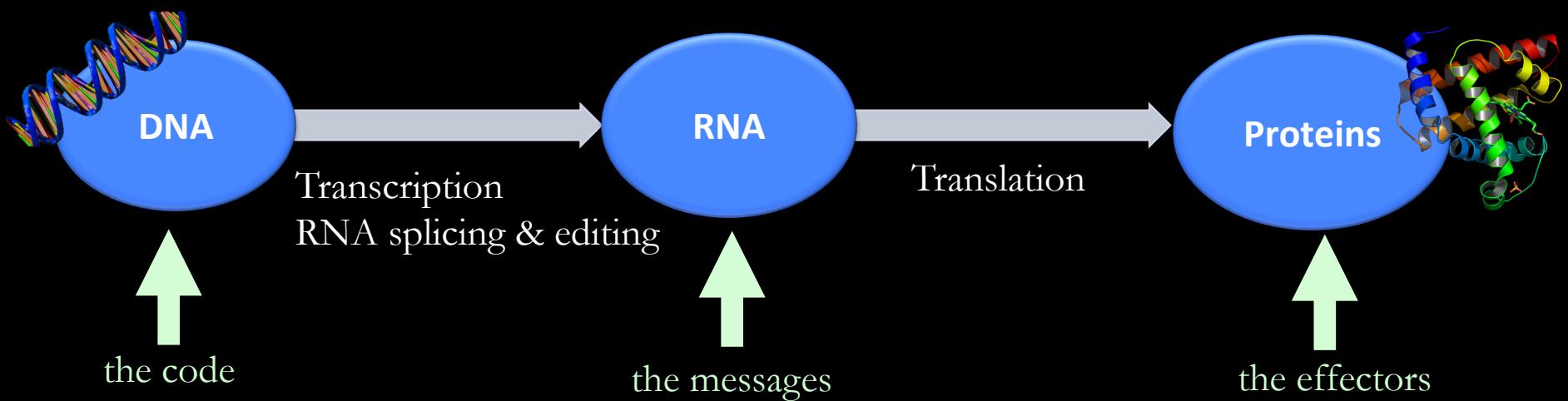


Student Introductions

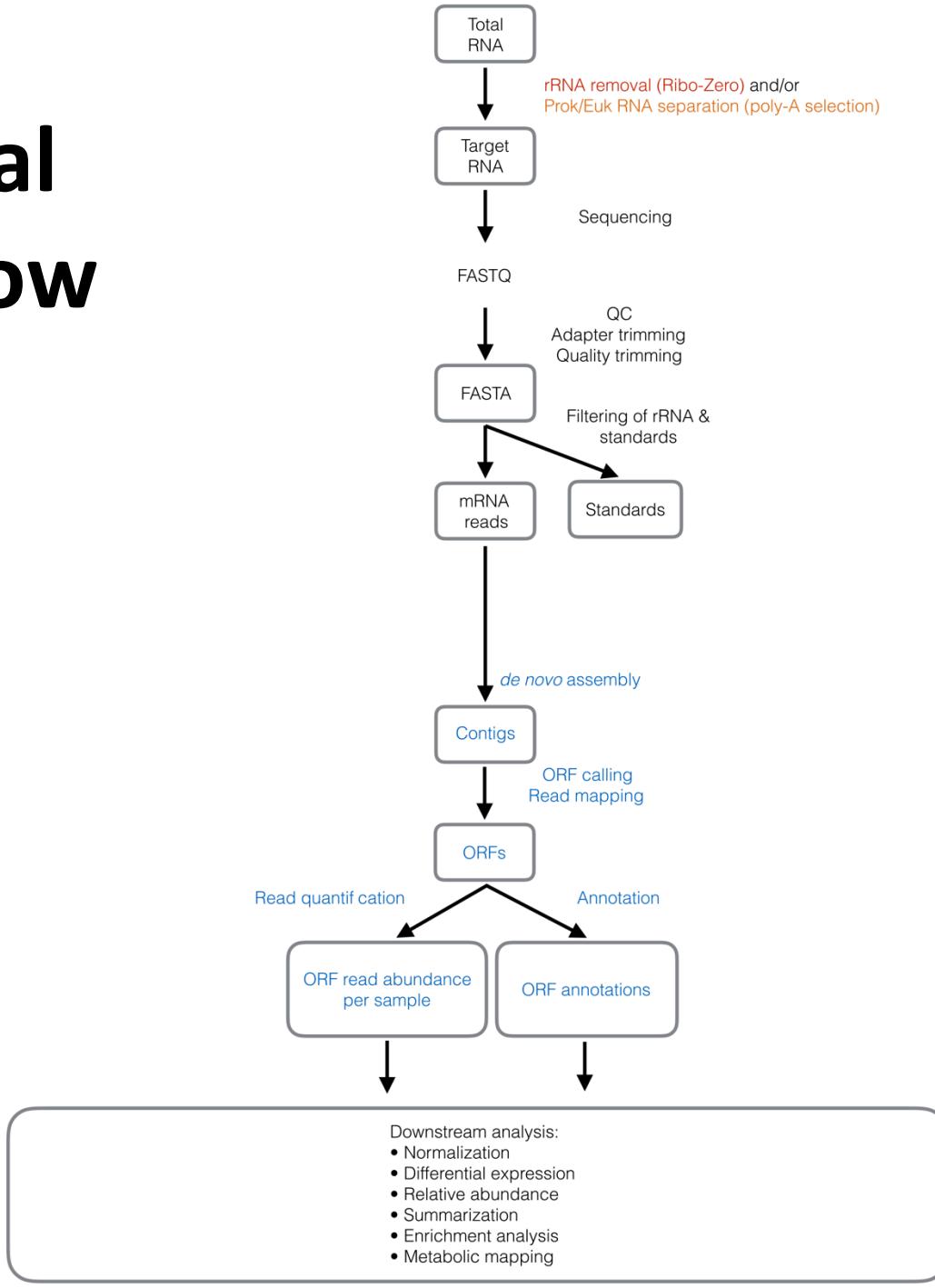
- What organisms/ systems are you studying?
- Why are you interested in transcriptomics?

Transcriptomics 101

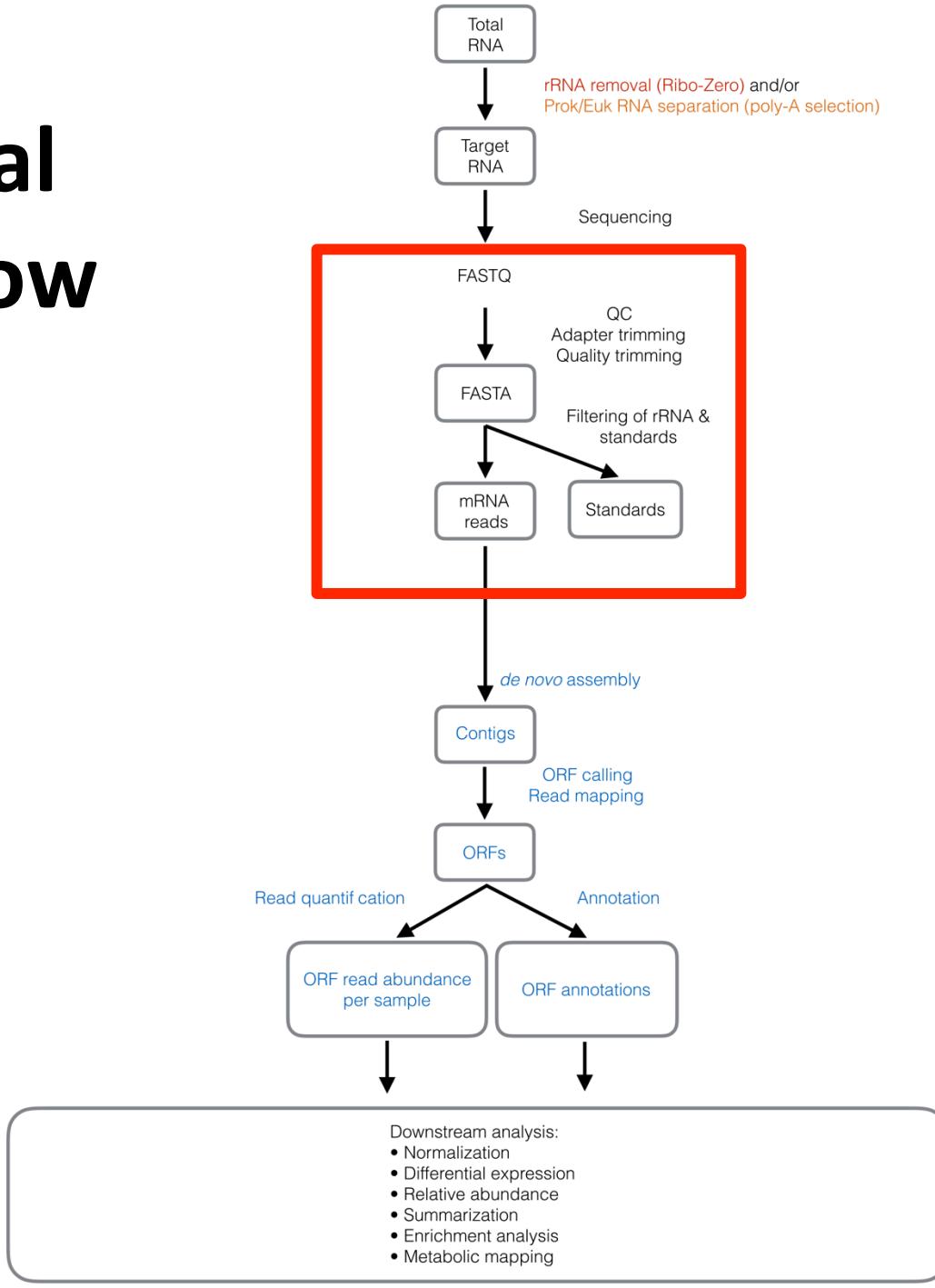
- What is Transcriptomics?
- When would it be a good tool?
- What type of data is generated?



General Workflow



General Workflow



FASTQ format

@K00180:331:HHVHJBBXX:1:1101:32471:1033 1:N:0:GTGGCC
NCAAGGCGGTGGACGTCCCCAAAACCAACCGAGGAAGCTTGGGATAGCA
+
#<-A-FJFA7FAJFJA<JJAJJJFJJJJFFA7FFJF<FA<FFJFFJJJJ

Illumina format includes read pair and index

Header

Sequence

Quality scores
(same length as sequence)

FASTA format

>K00180:331:HHVHJBBXX:1:1101:32471:1033 1:N:0:GTGGCC
CAAGGCGGTGGACGTCCCCAAAACCAACCGAGGAAGCTTGGGATAGCA

No quality scores

Trimmed for high-quality bases only (Q30)

Header

Sequence

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.