

In the name of the most high

Introduction to Bioinformatics

Microarray, NGS

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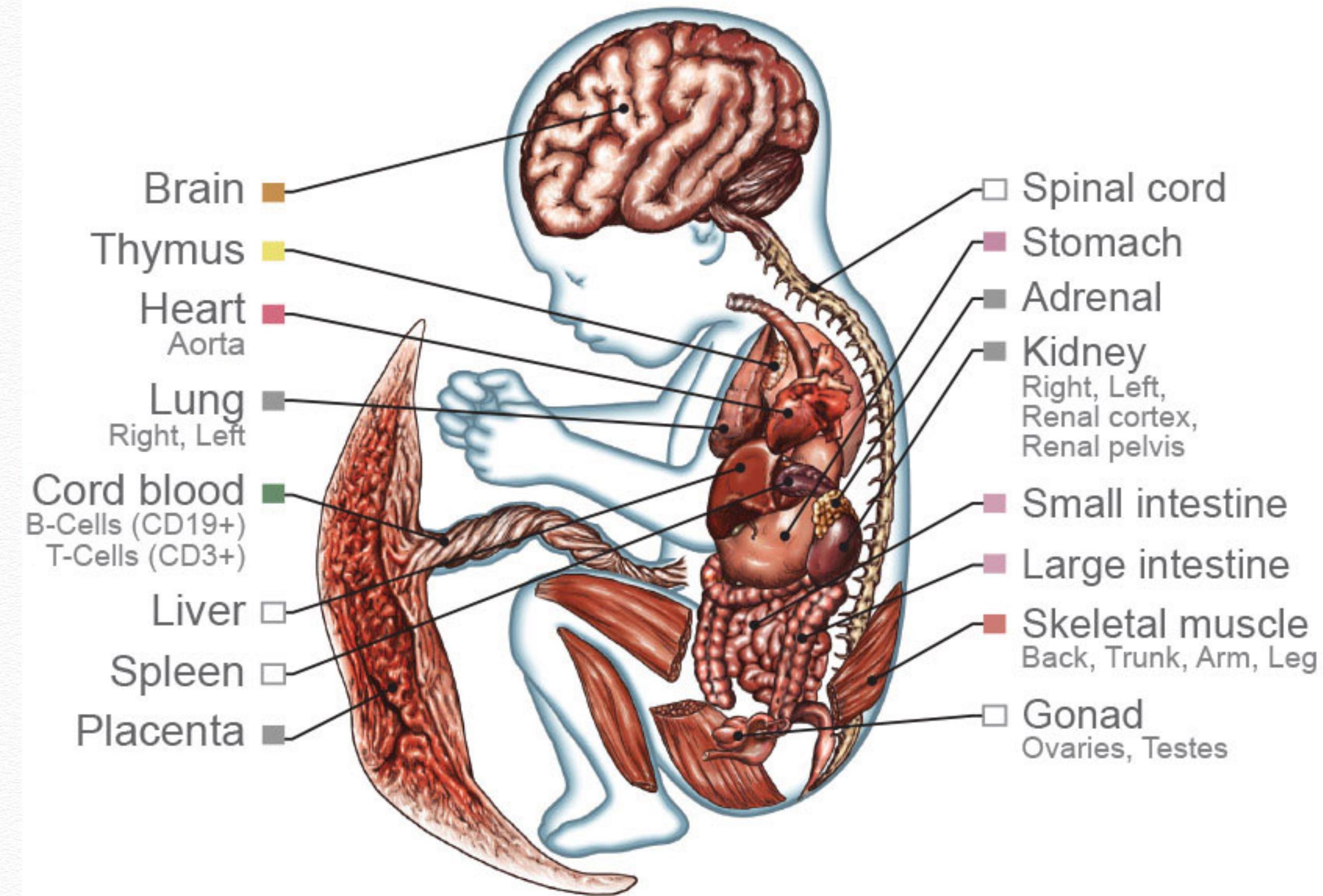
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Biodiversity



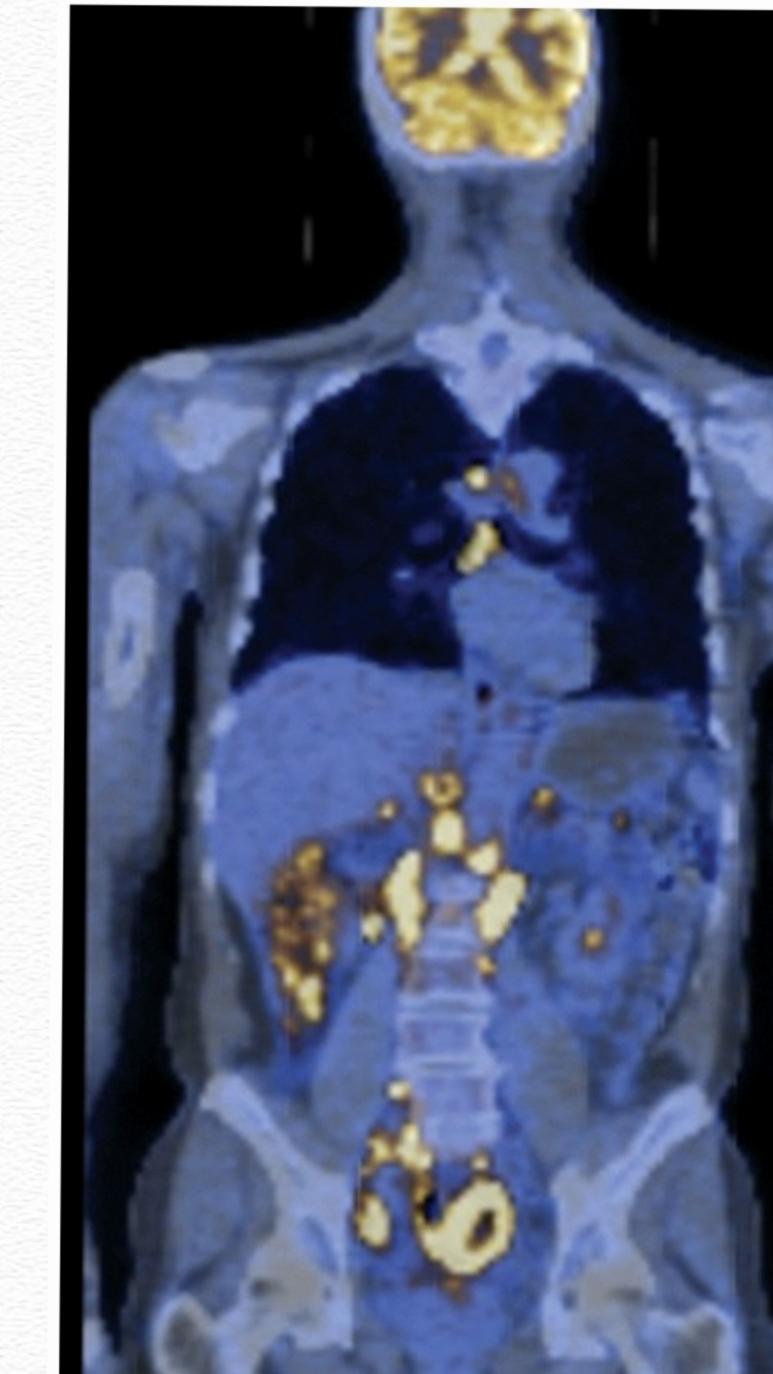
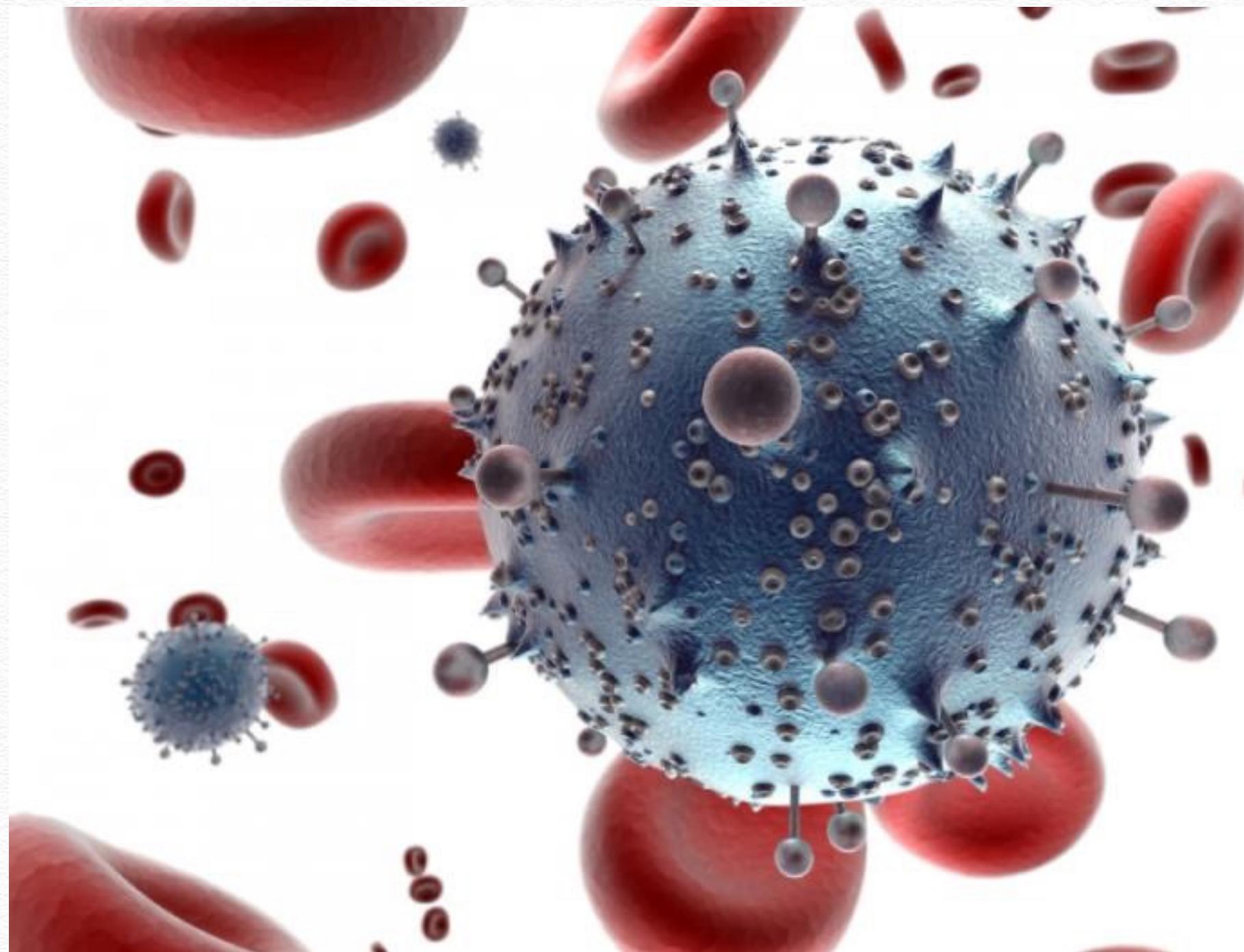
<http://www.greenrooftechnology.com/biodiversity>

Differentiation



http://www.nih.gov/news/health/feb2015/images/niehs-18_xl.jpg

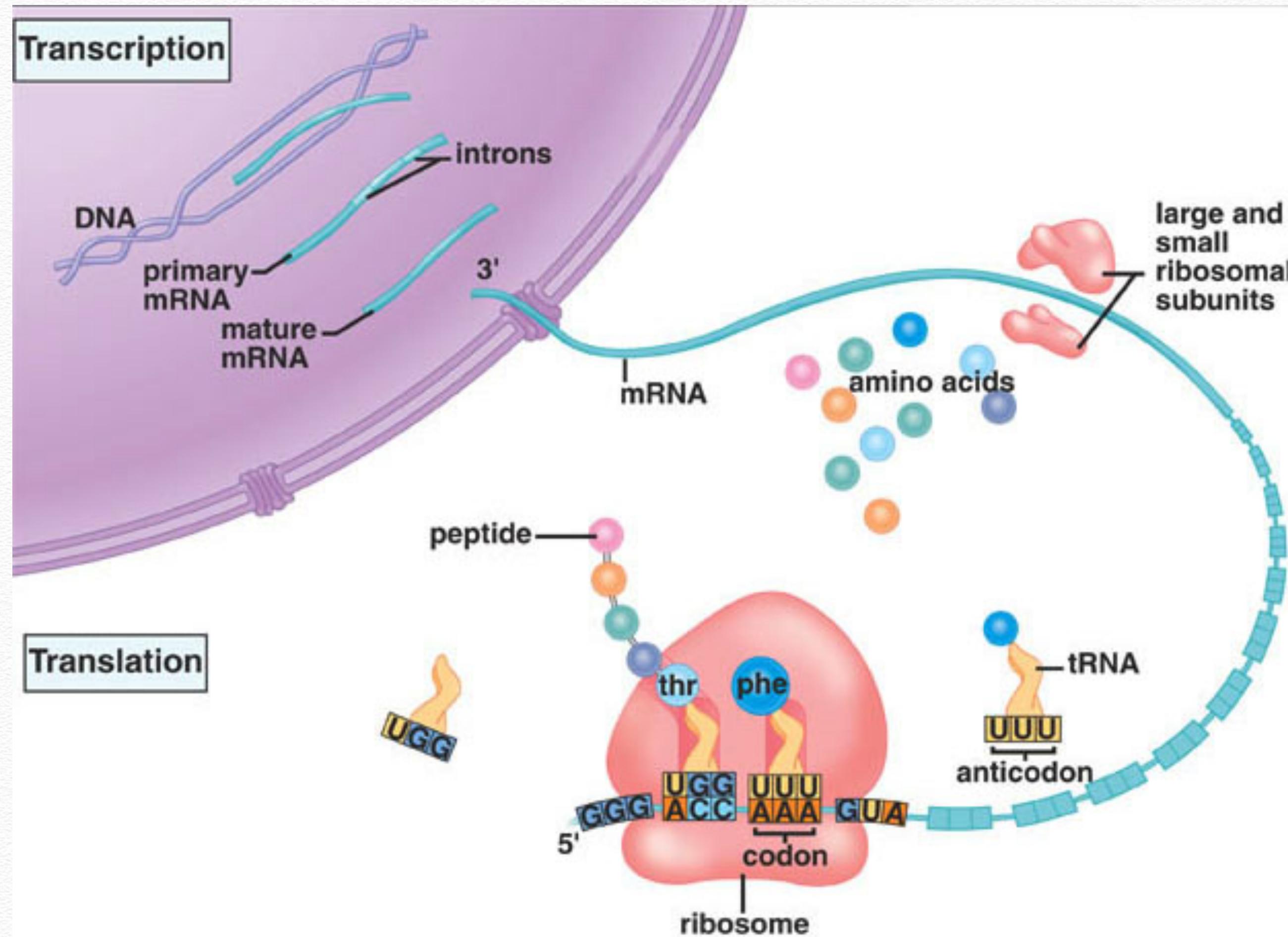
Disease



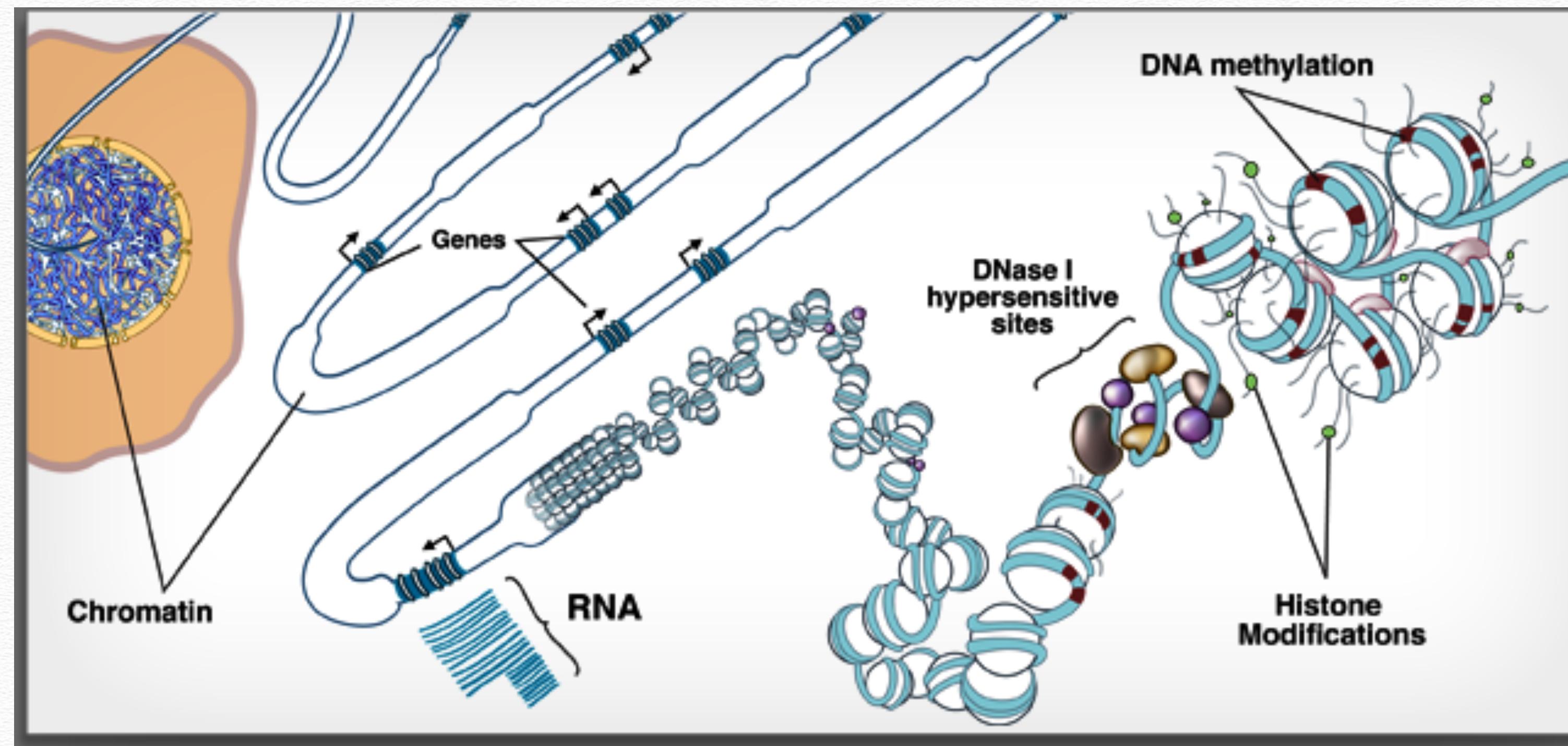
<http://cdn1.medicalnewstoday.com>, The Biology of Cancer (© Garland Science 2007)

What to Read?

What to Read?



What to Read



How to Read?

Technologies

- ❖ PCR



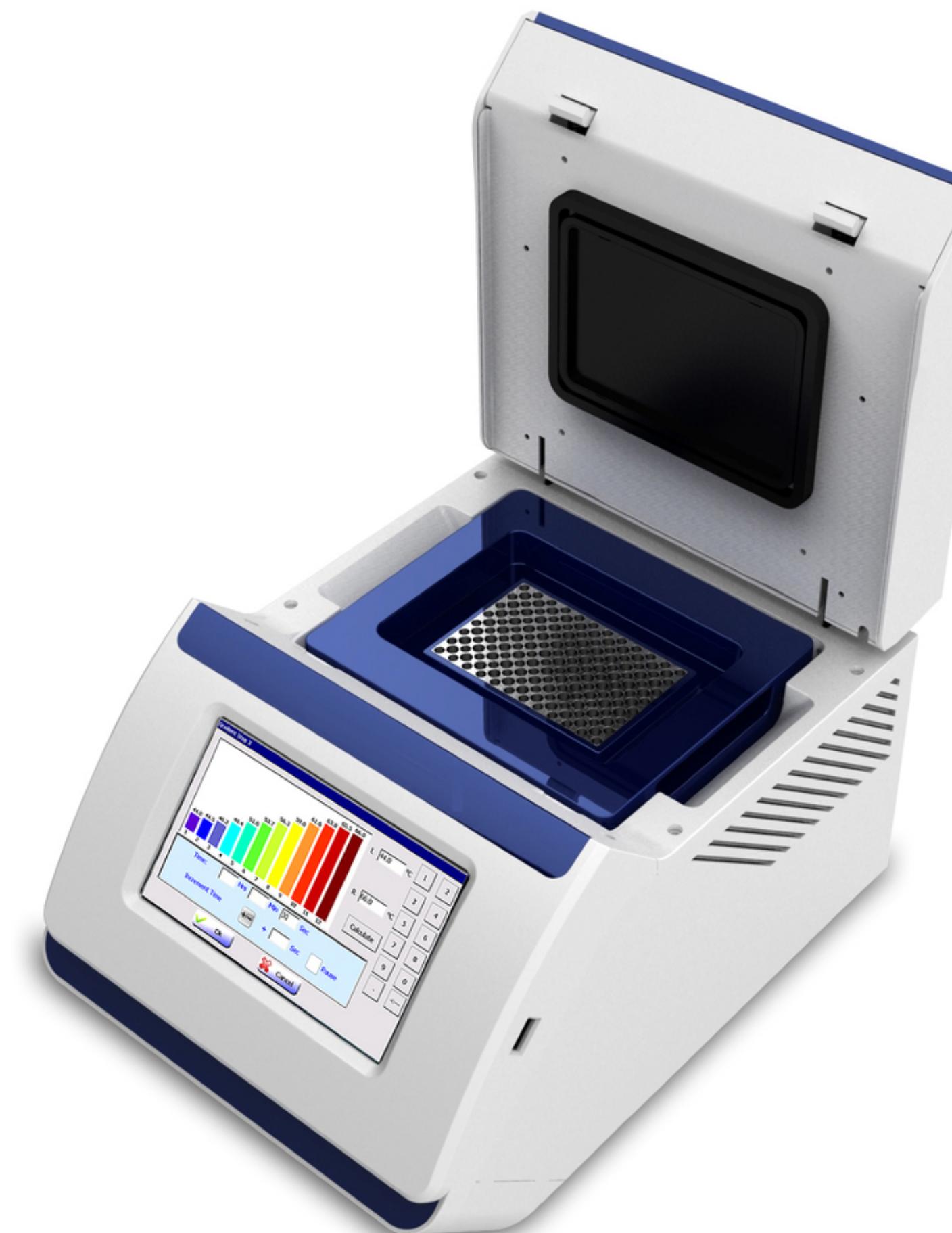
- ❖ Microarray



- ❖ Sequencing (Next-Generation)

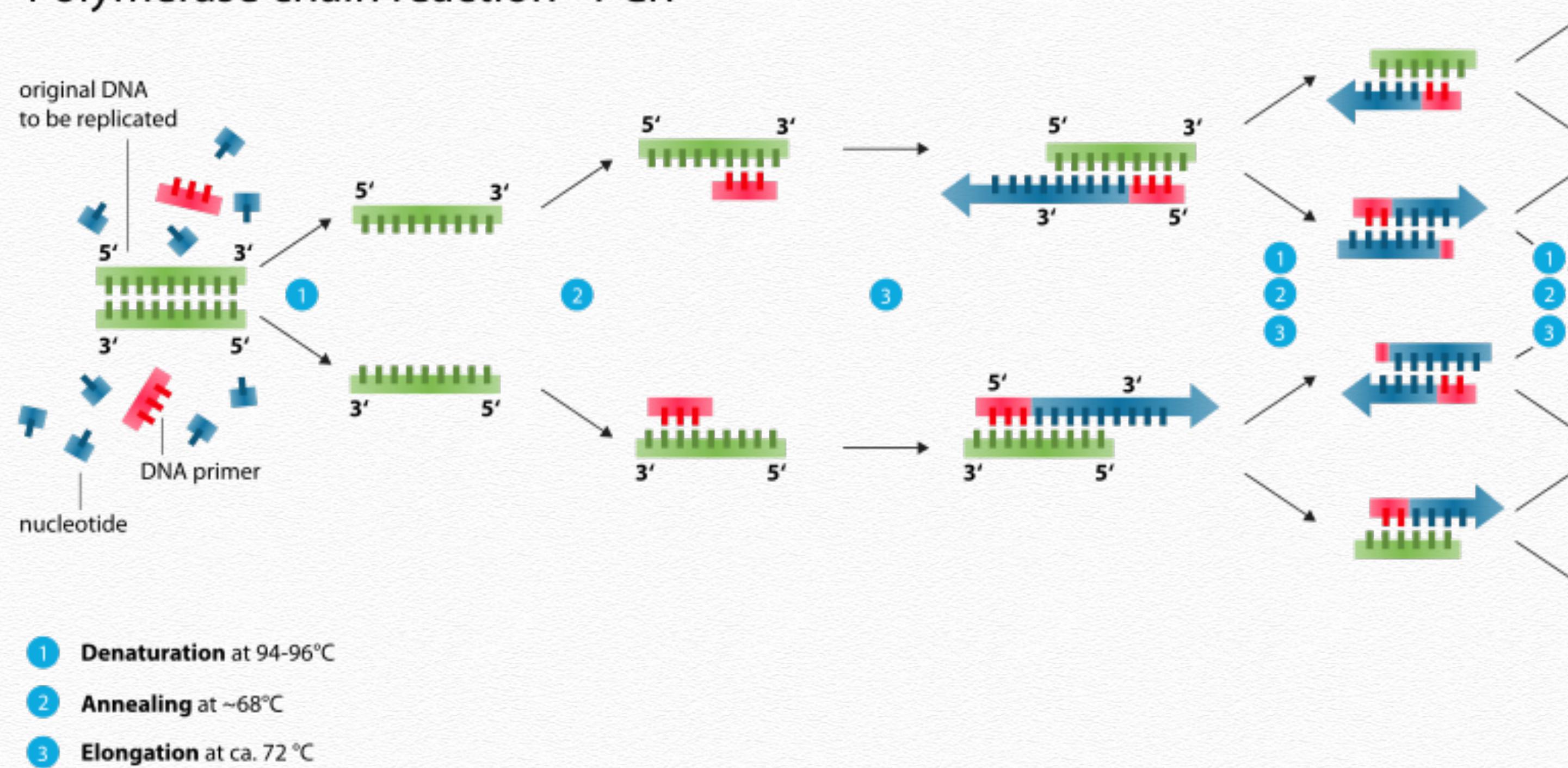


PCR



PCR

Polymerase chain reaction - PCR

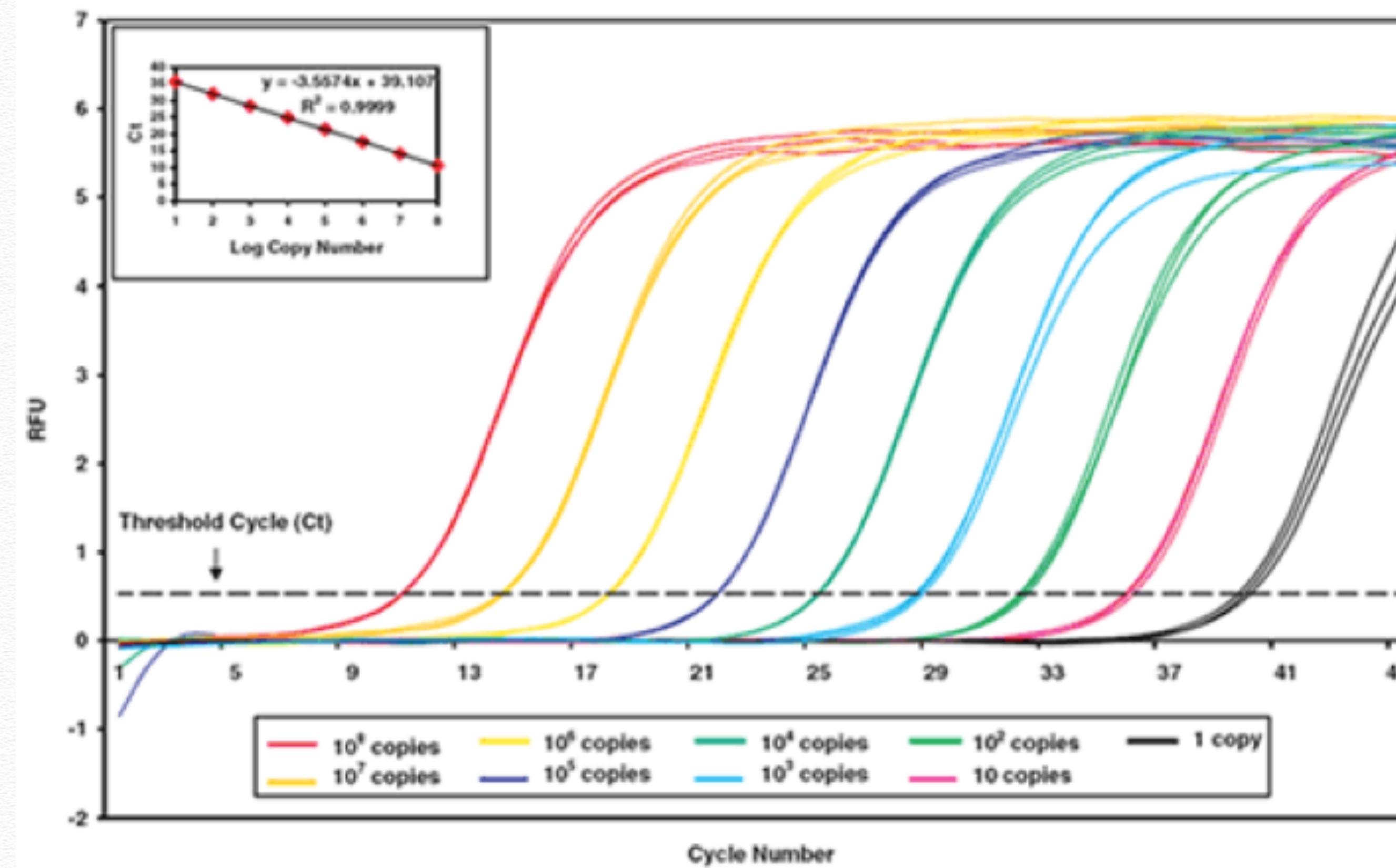


qPCR

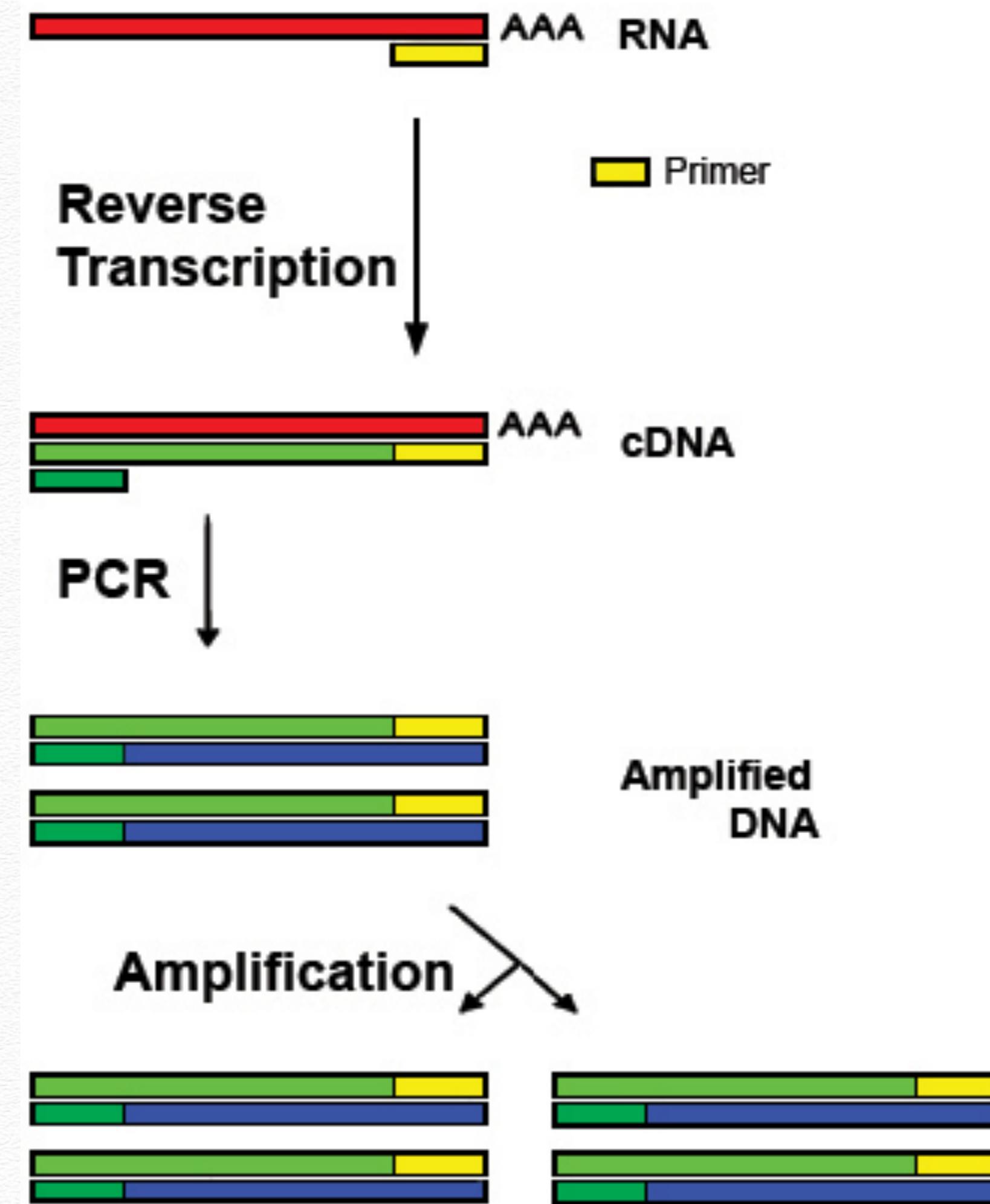


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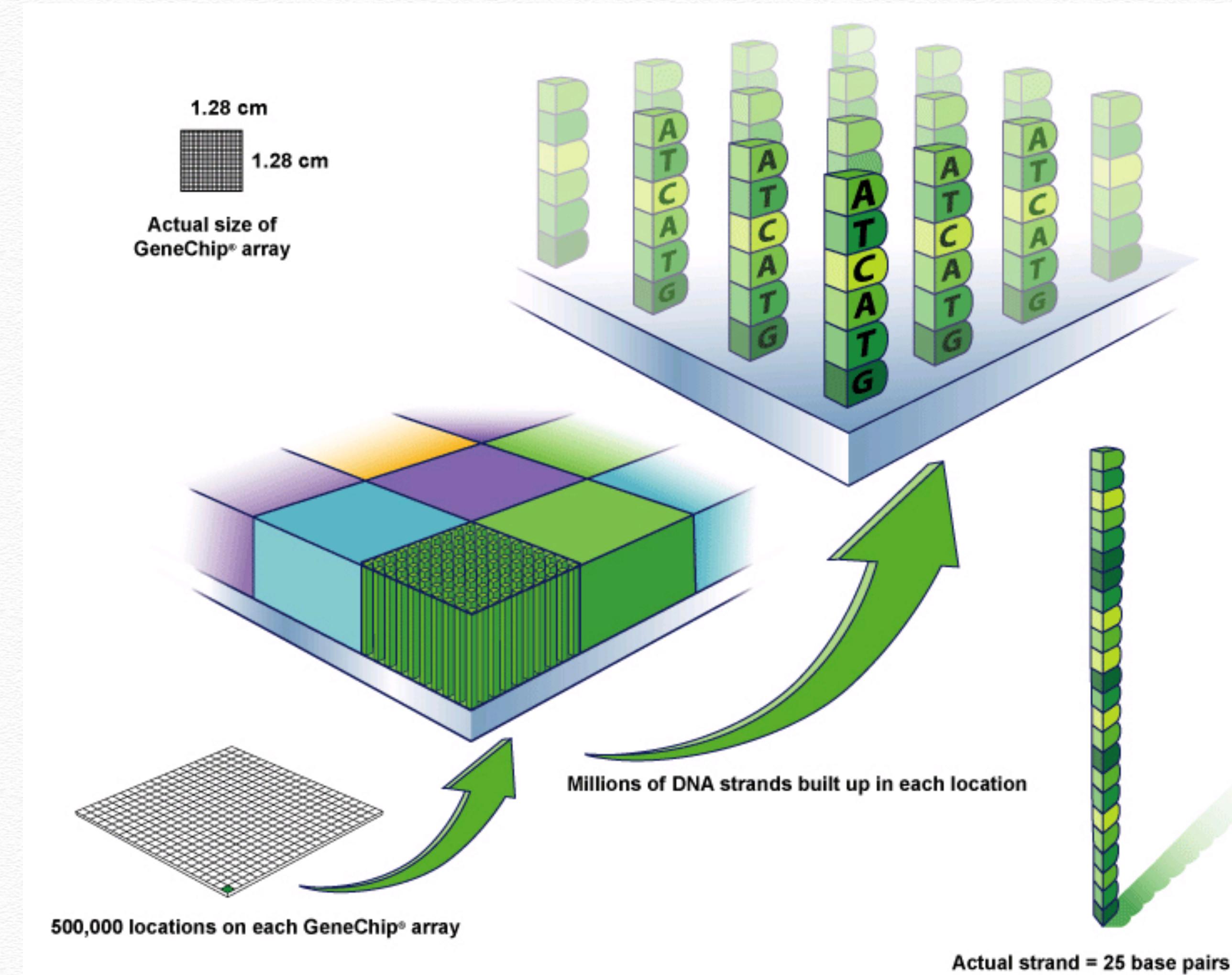
qPCR



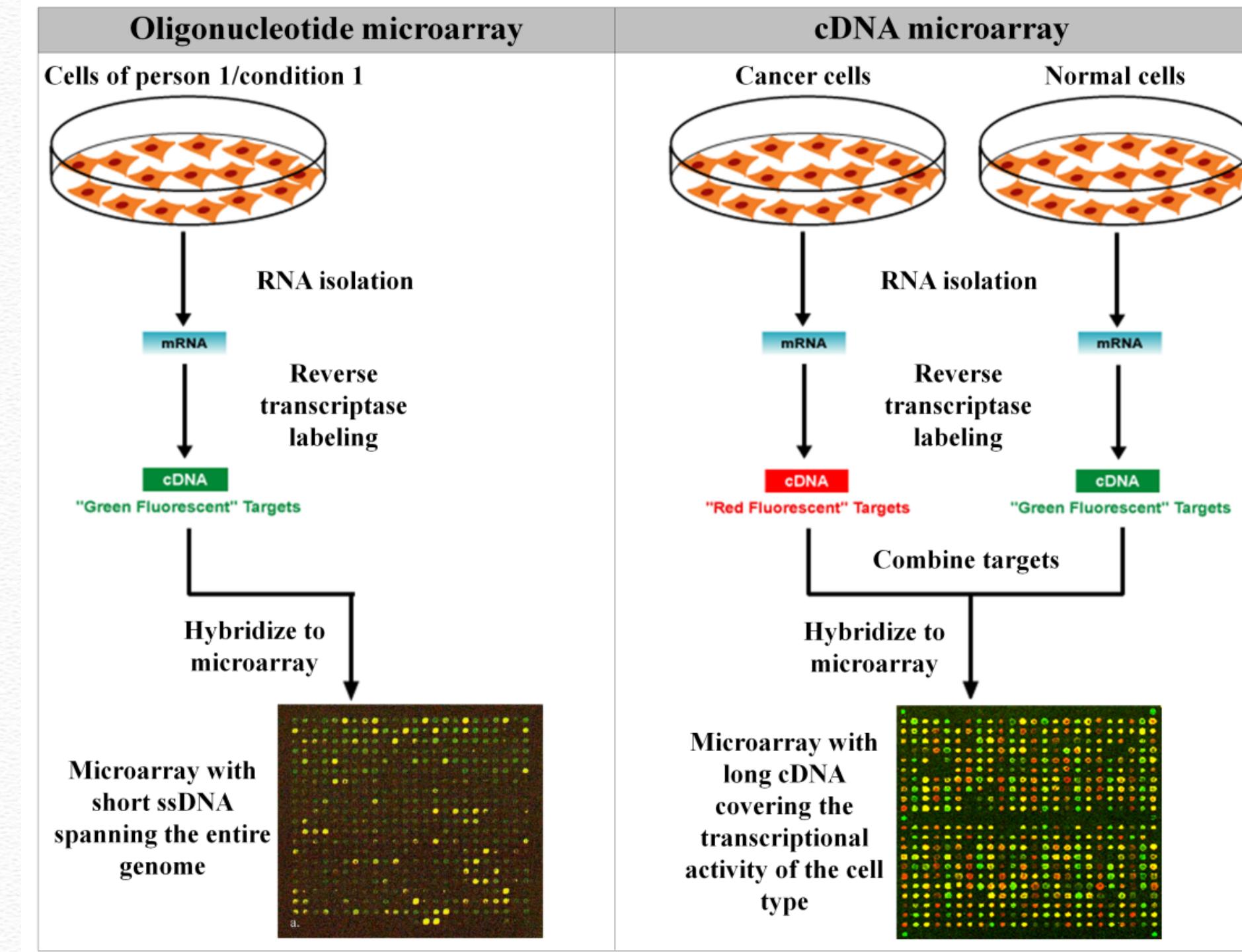
qRT-PCR



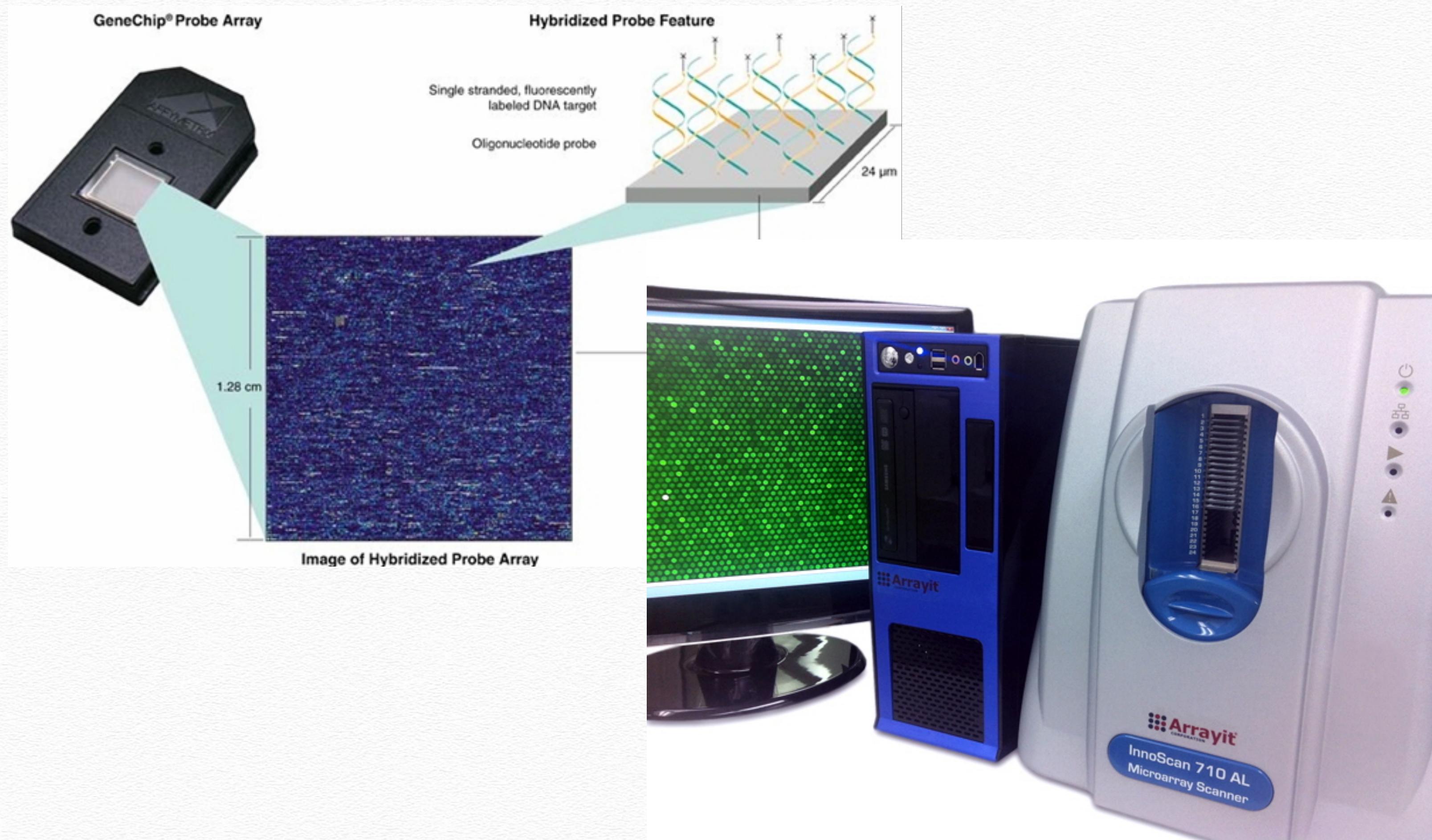
Microarray



Microarray

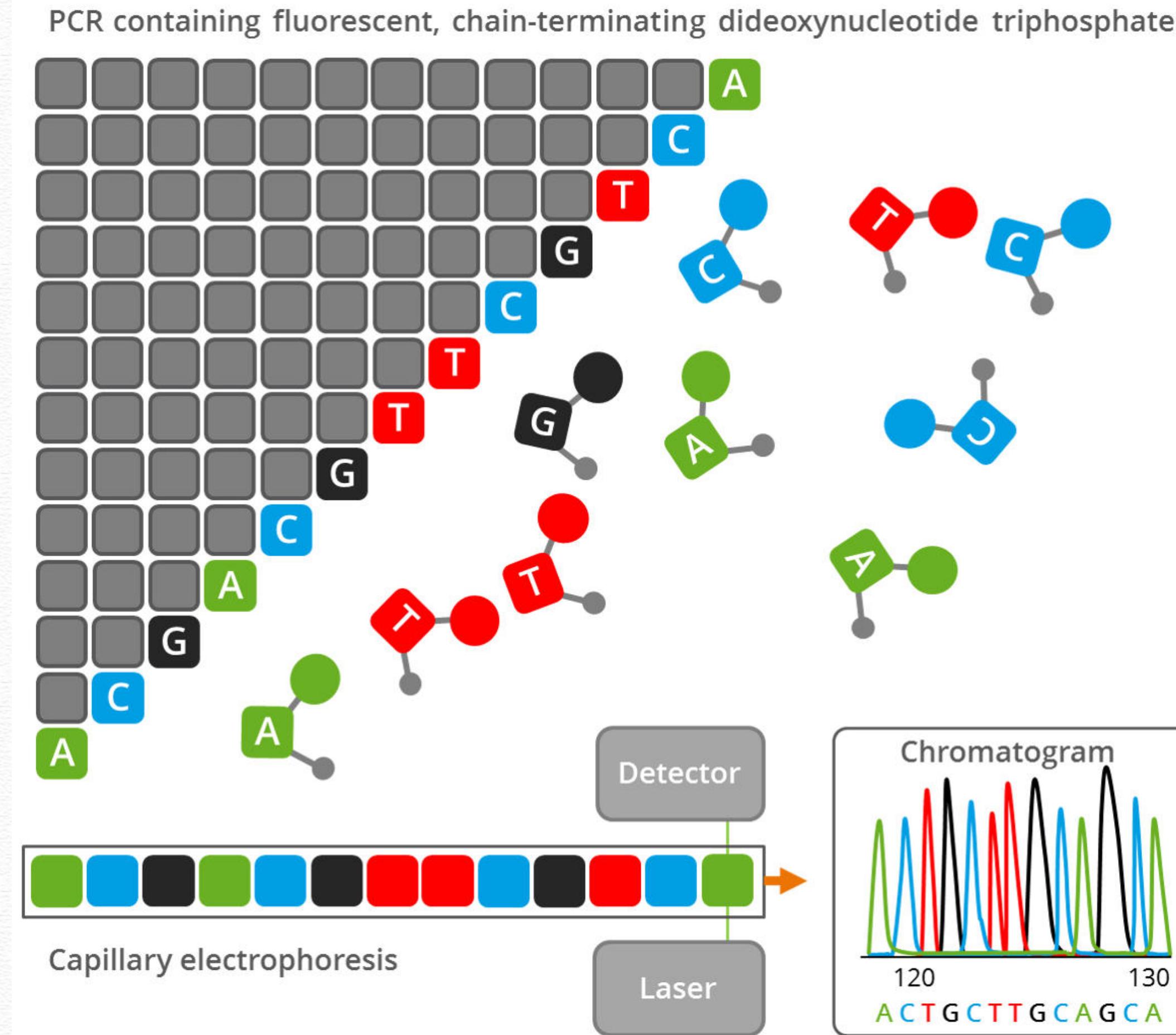


Microarray



Sequencing

Sequencing - Sanger



Sequencing - Sanger



Next Generation Sequencing (NGS)



Roche GS-FLX



Life Technologies SOLiD

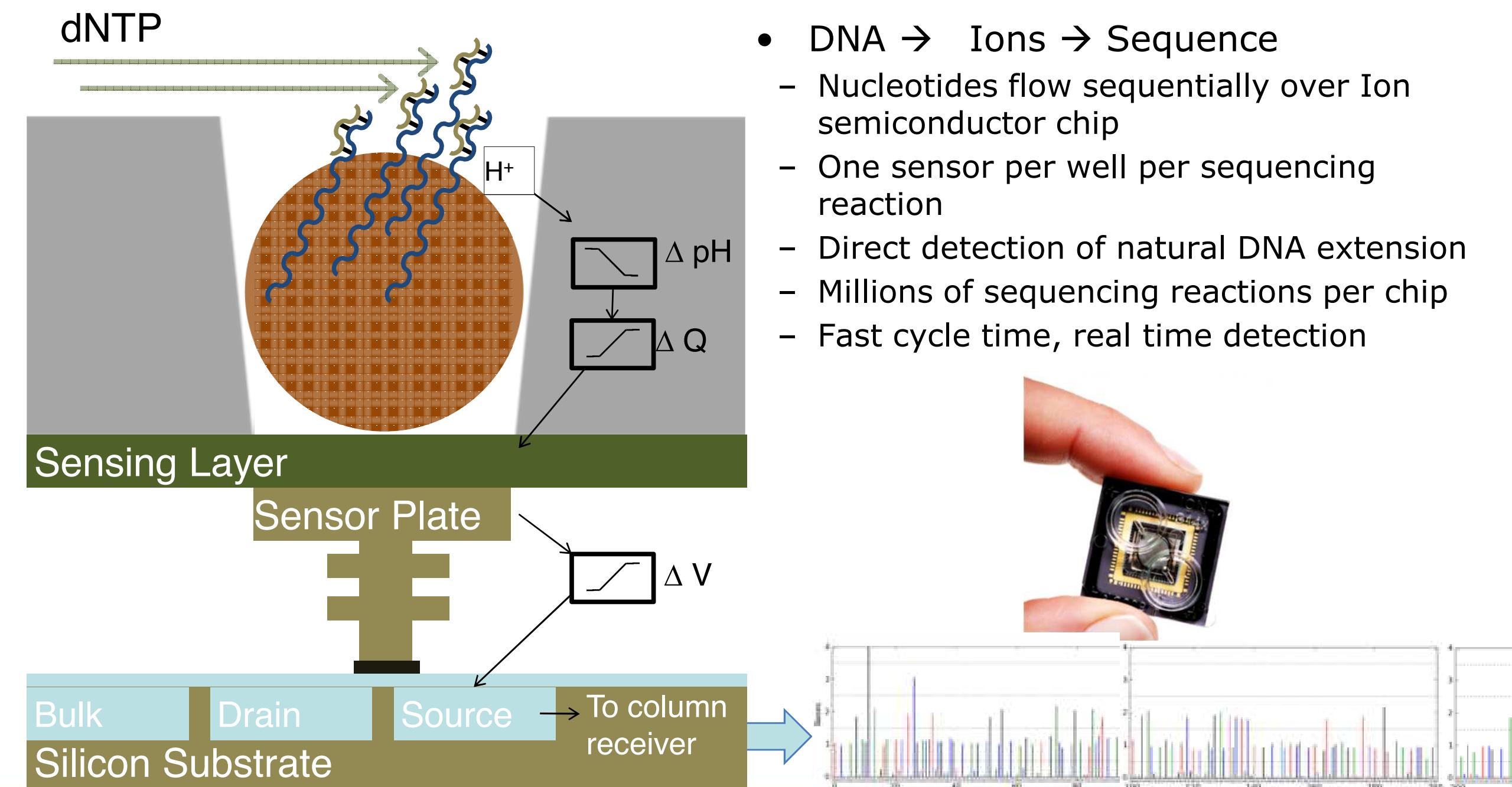


Illumina HiSeq

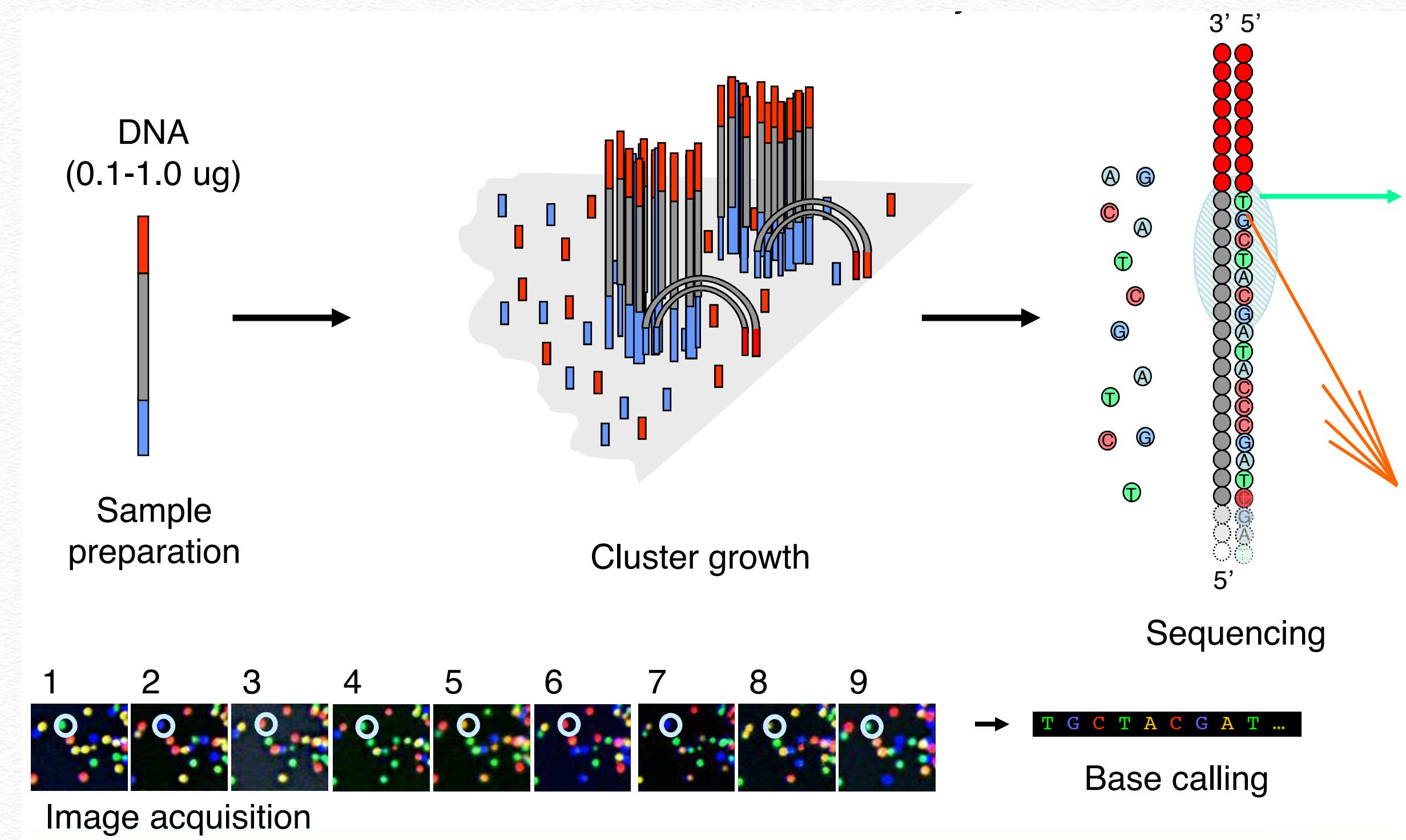


Life Technologies Ion Torrent/Proton

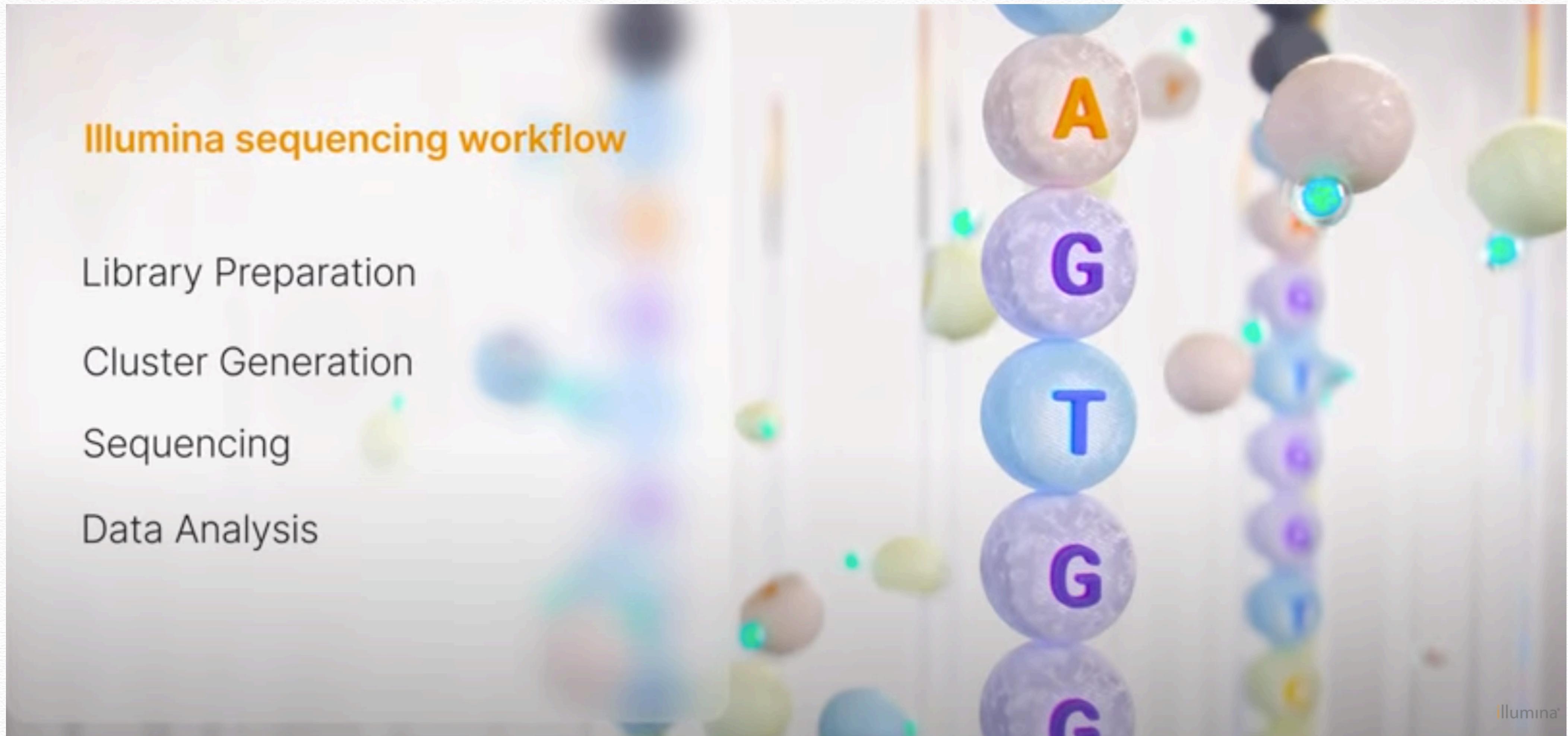
Ion Torrent



Illumina

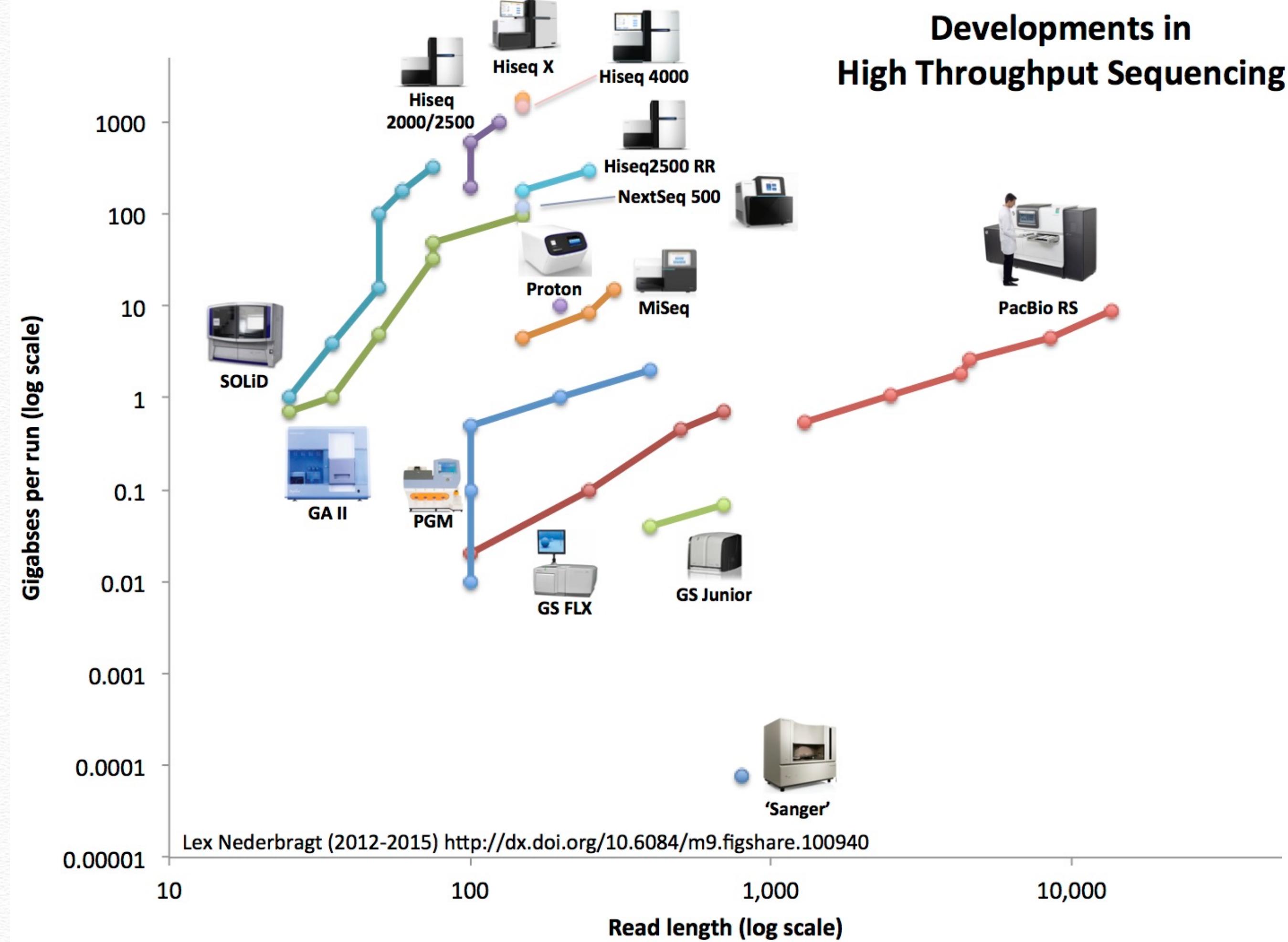


Illumina (video)

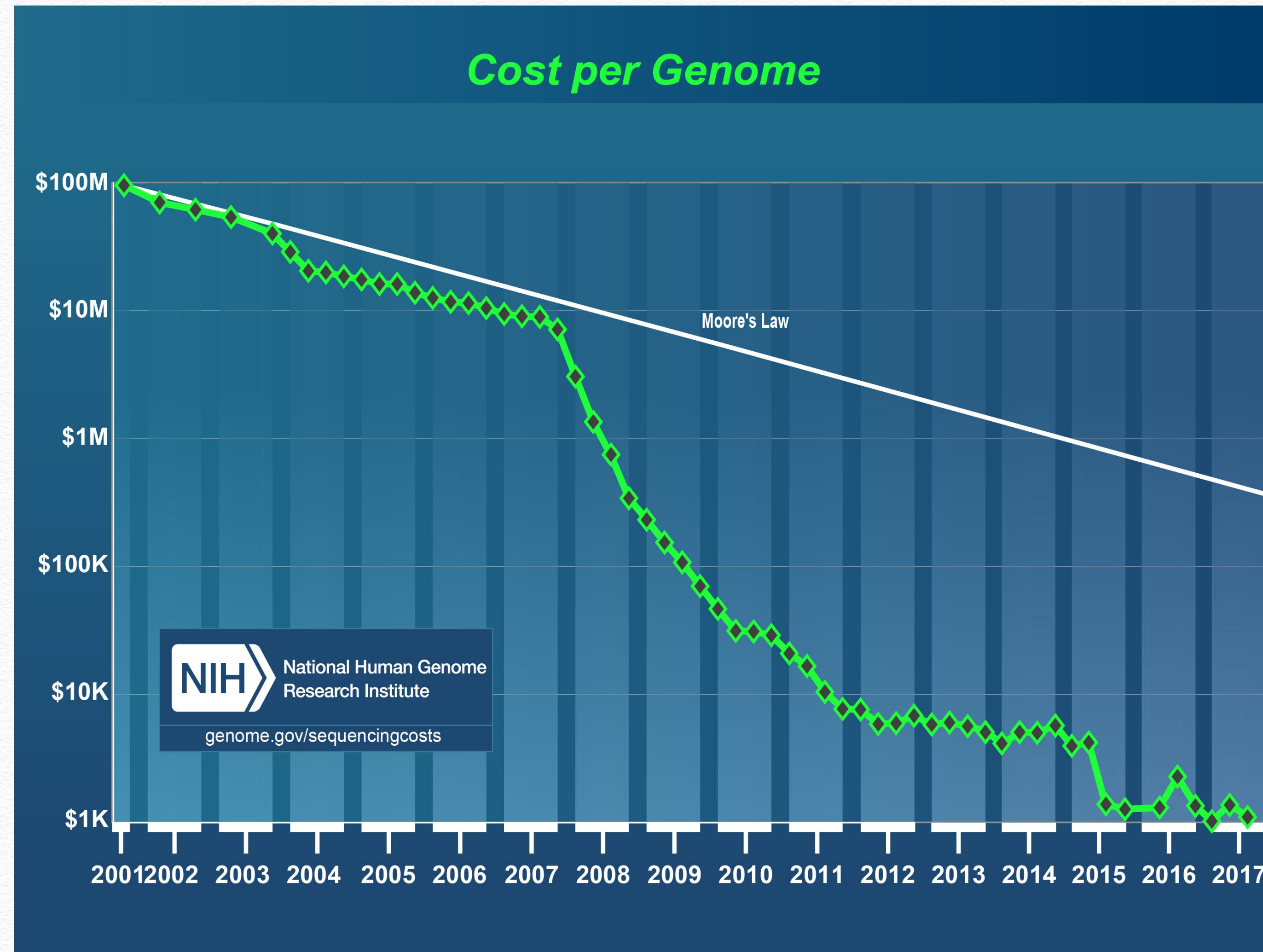


<https://www.youtube.com/watch?v=EDVKxSNdSic>

NGS Throughput



NGS Cost



Throughput

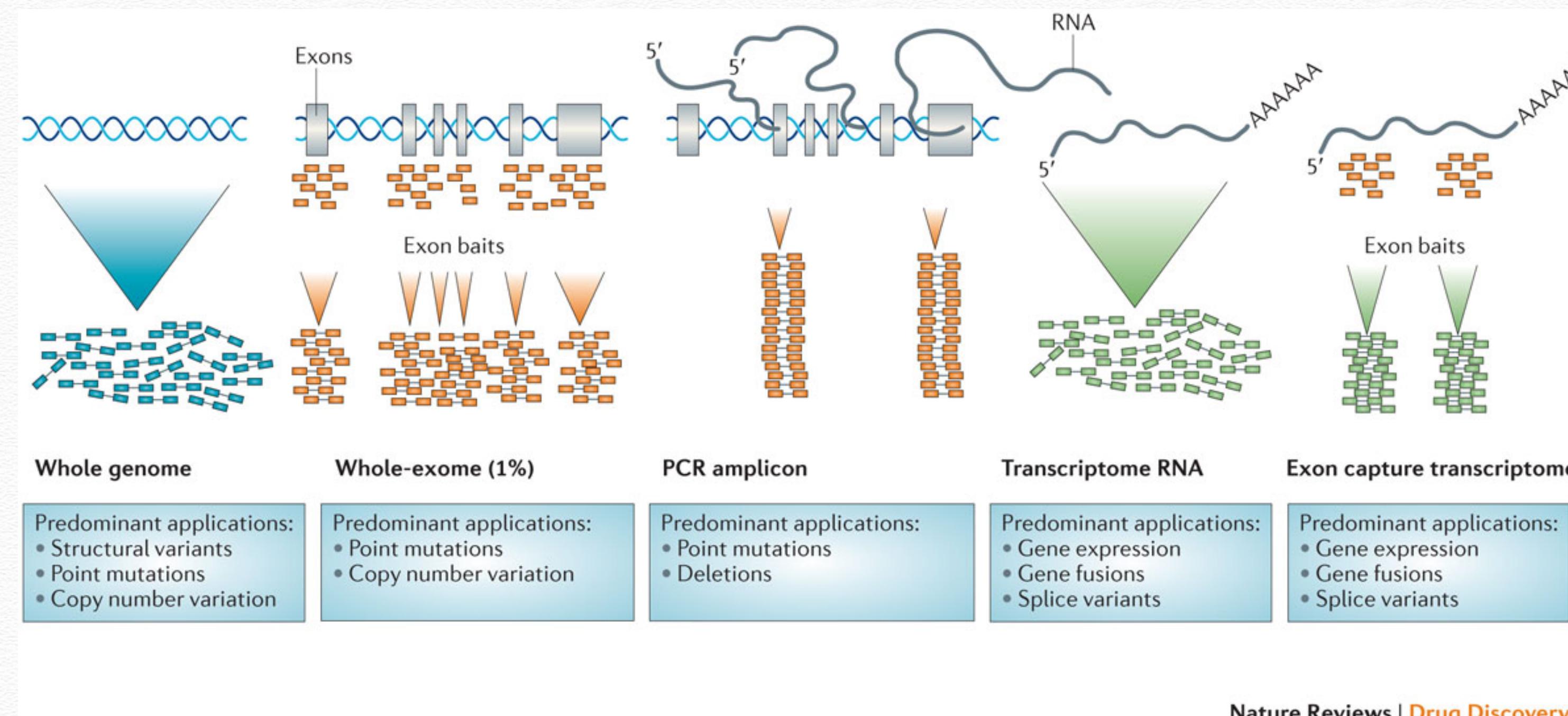
24 Hours



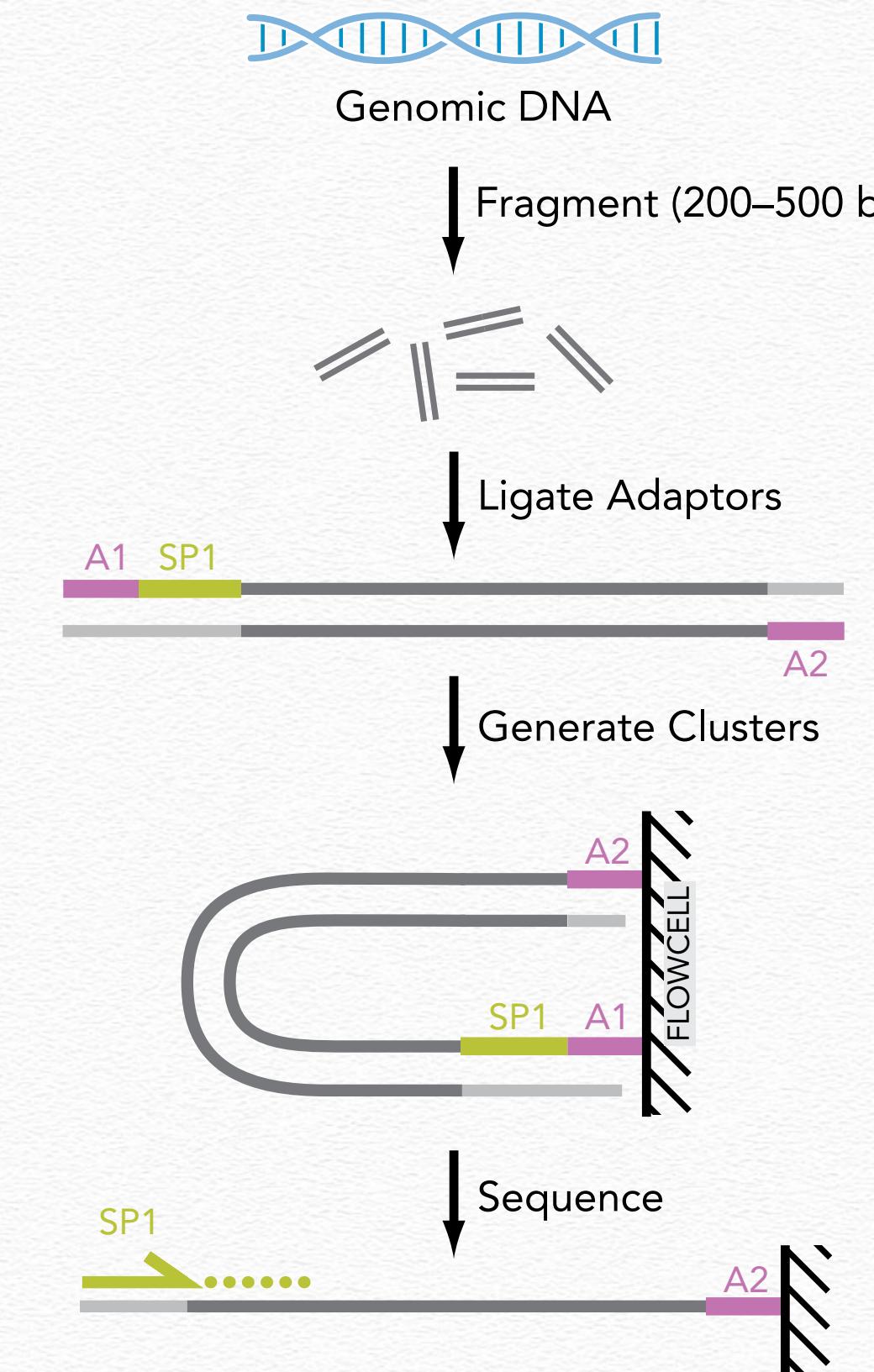
709 Years



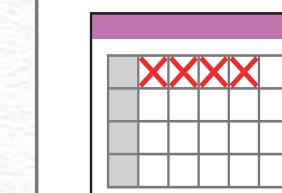
Applications



Single-end



DNA to Data



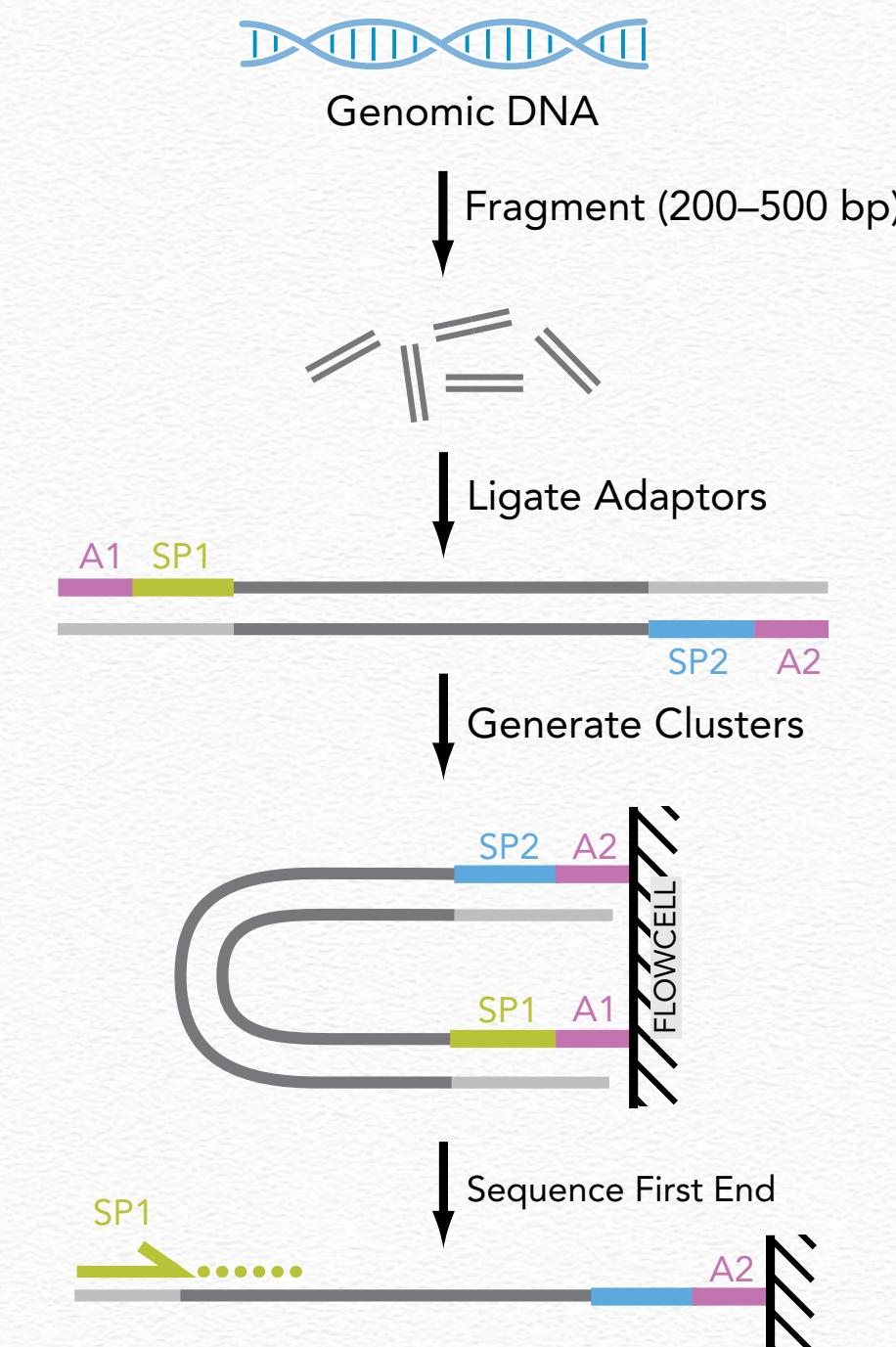
~4 days
36 bp reads
inc. sample prep

Sample Prep

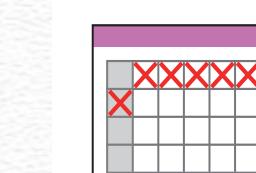


3 hours
hands-on

Paired-end



DNA to Data



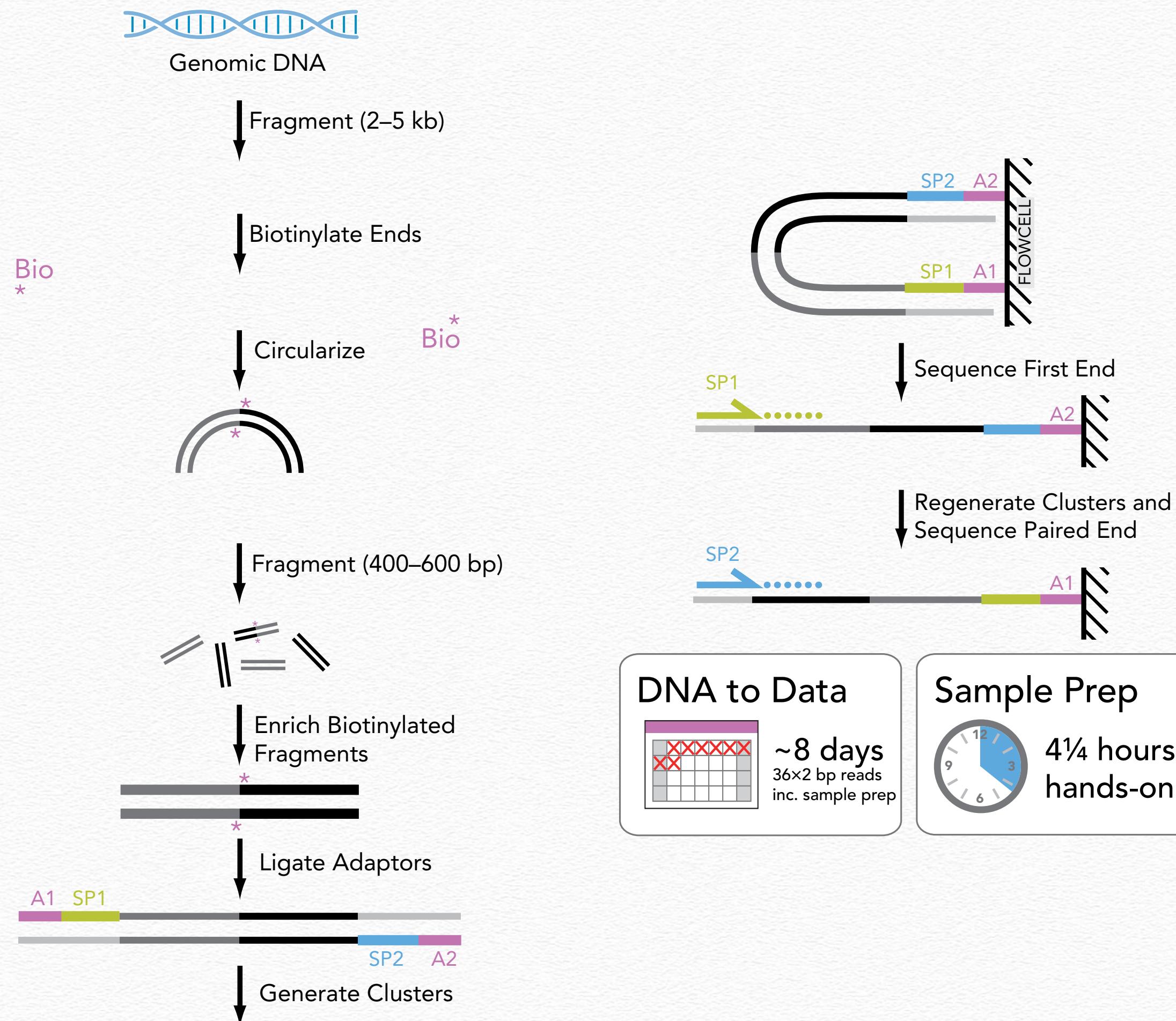
~7 days
36x2 bp reads
inc. sample prep

Sample Prep



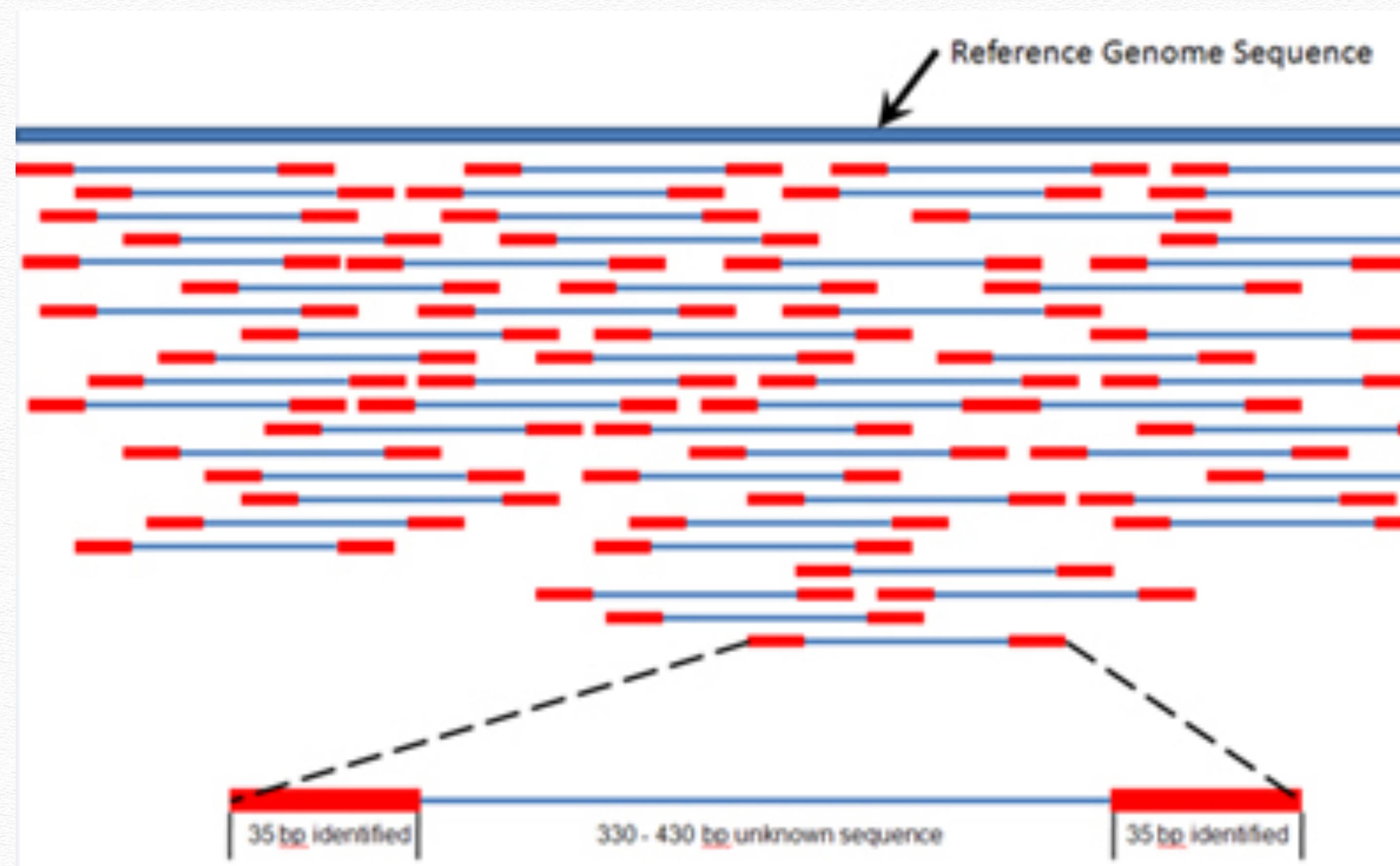
3 hours
hands-on

Mate-pairs

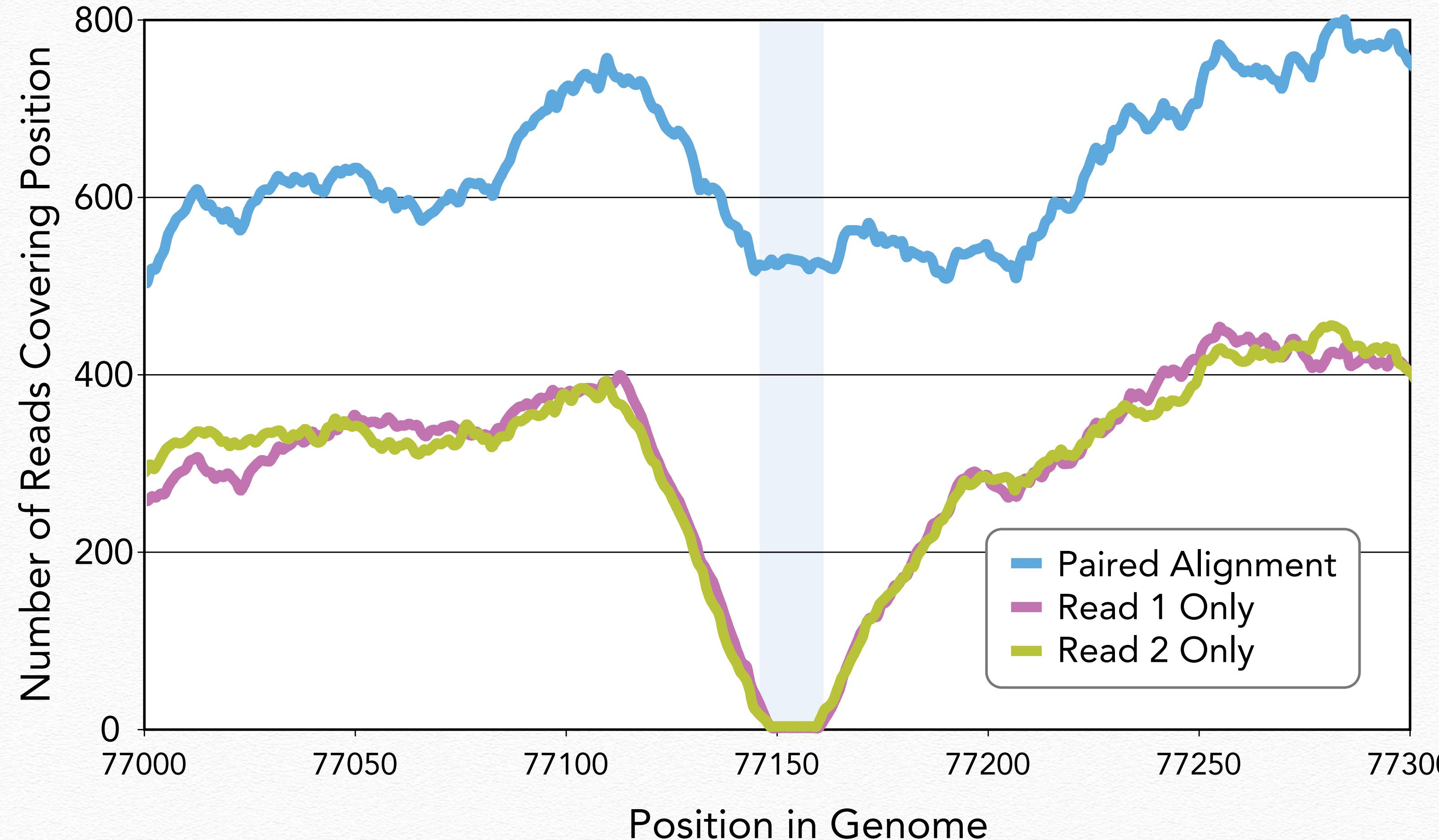


Illumina sequencing datasheet

Alignment

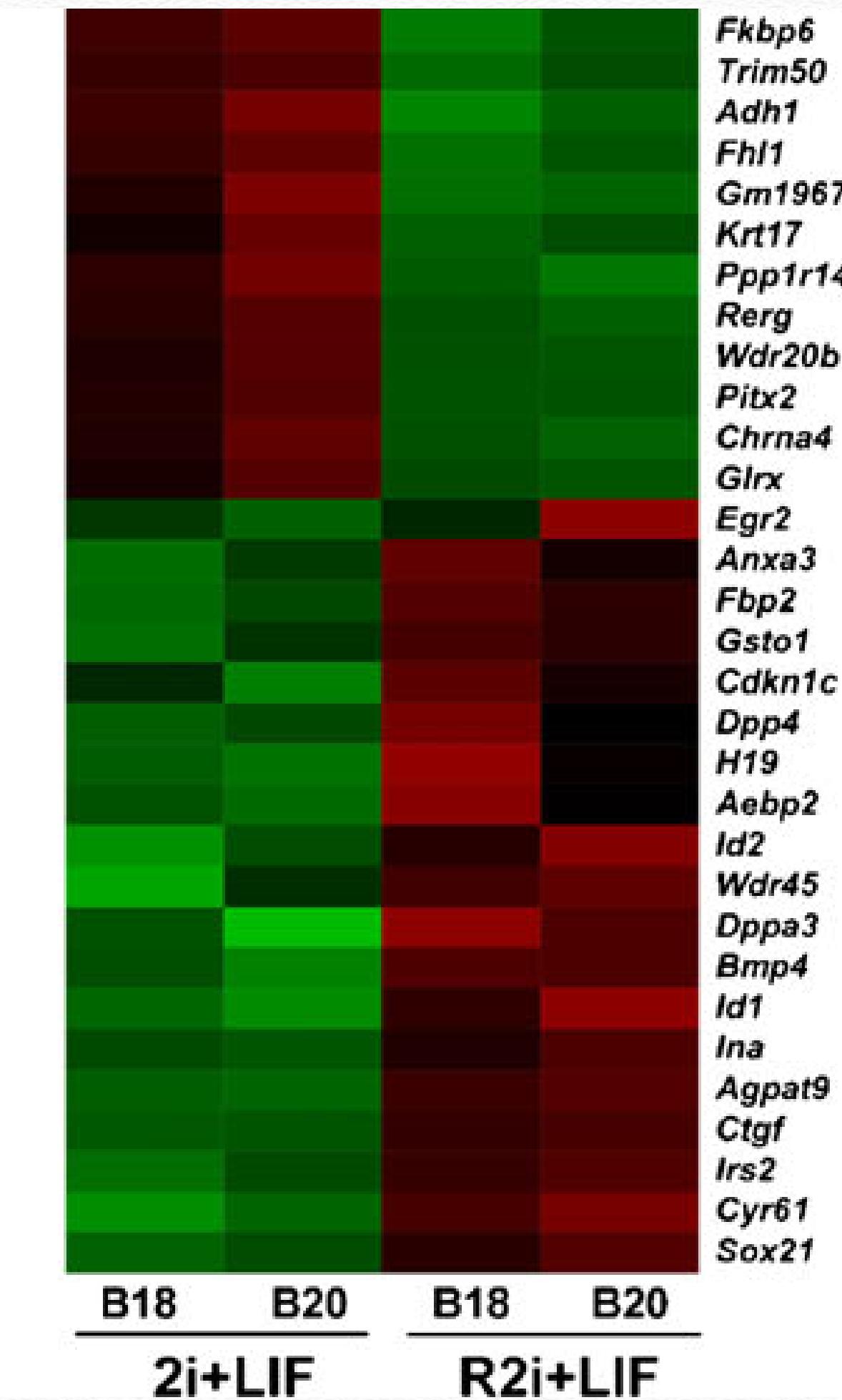


Paired-end vs. Single-end

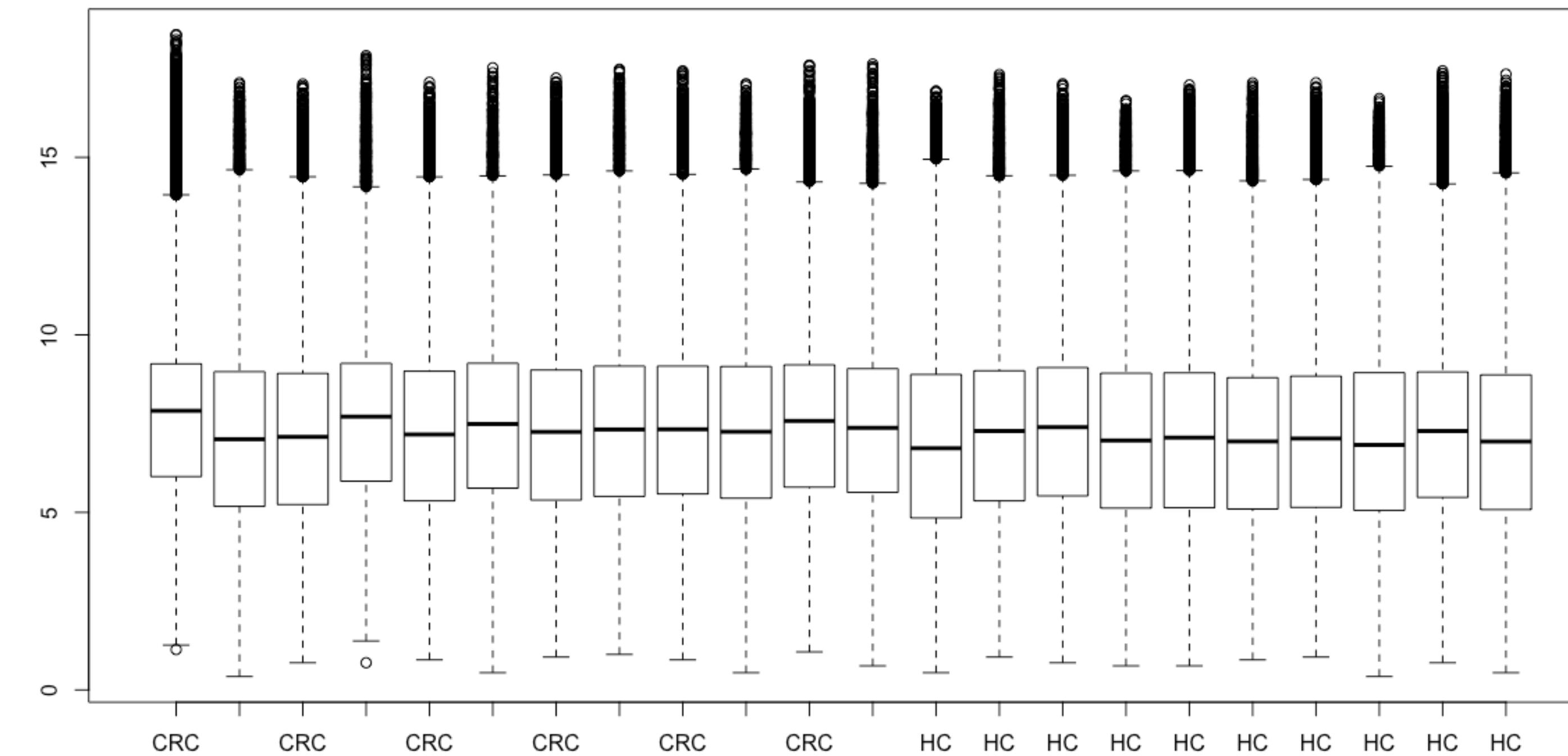


Bioinformatics Analysis

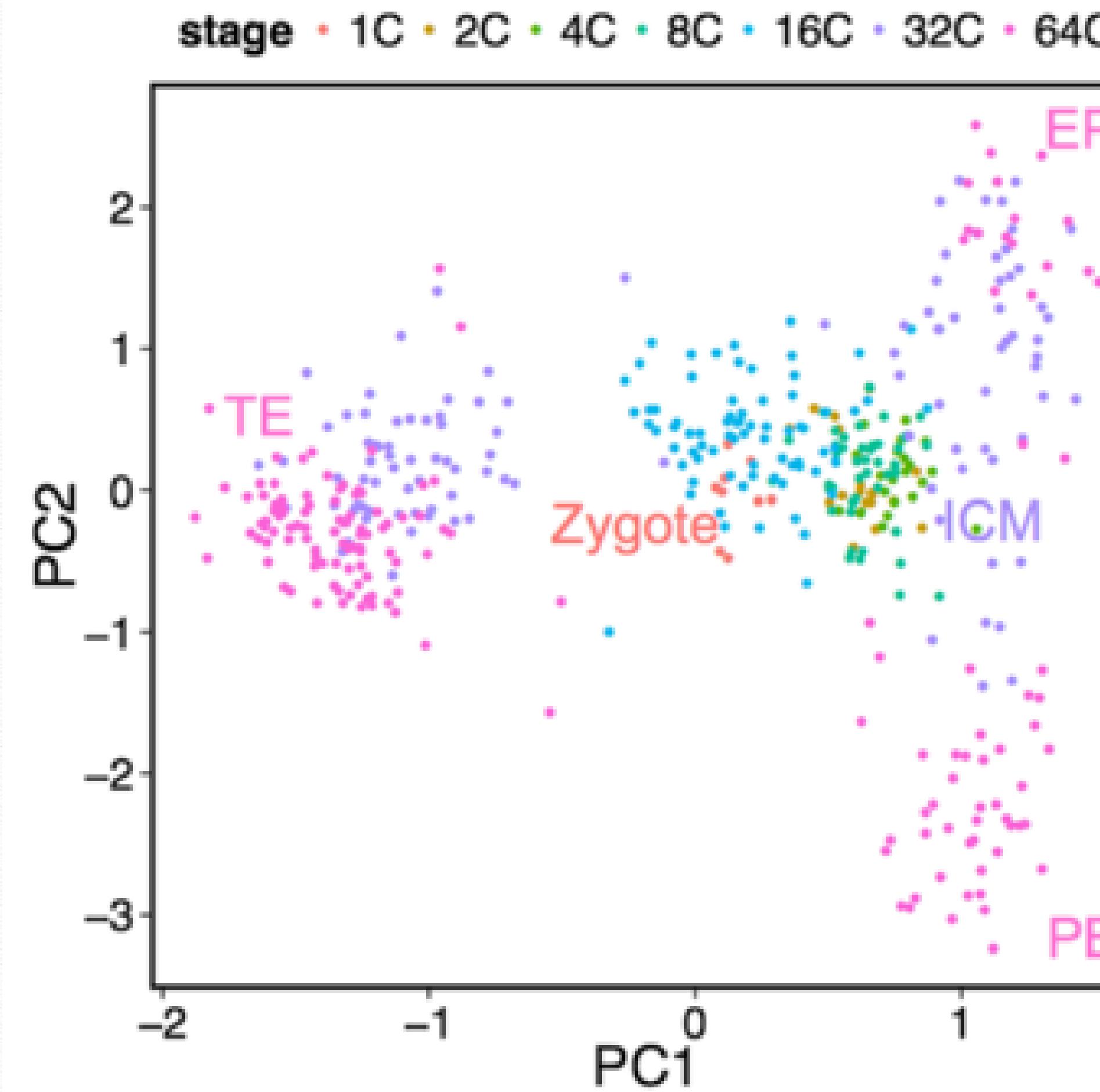
Gene Expression Analysis



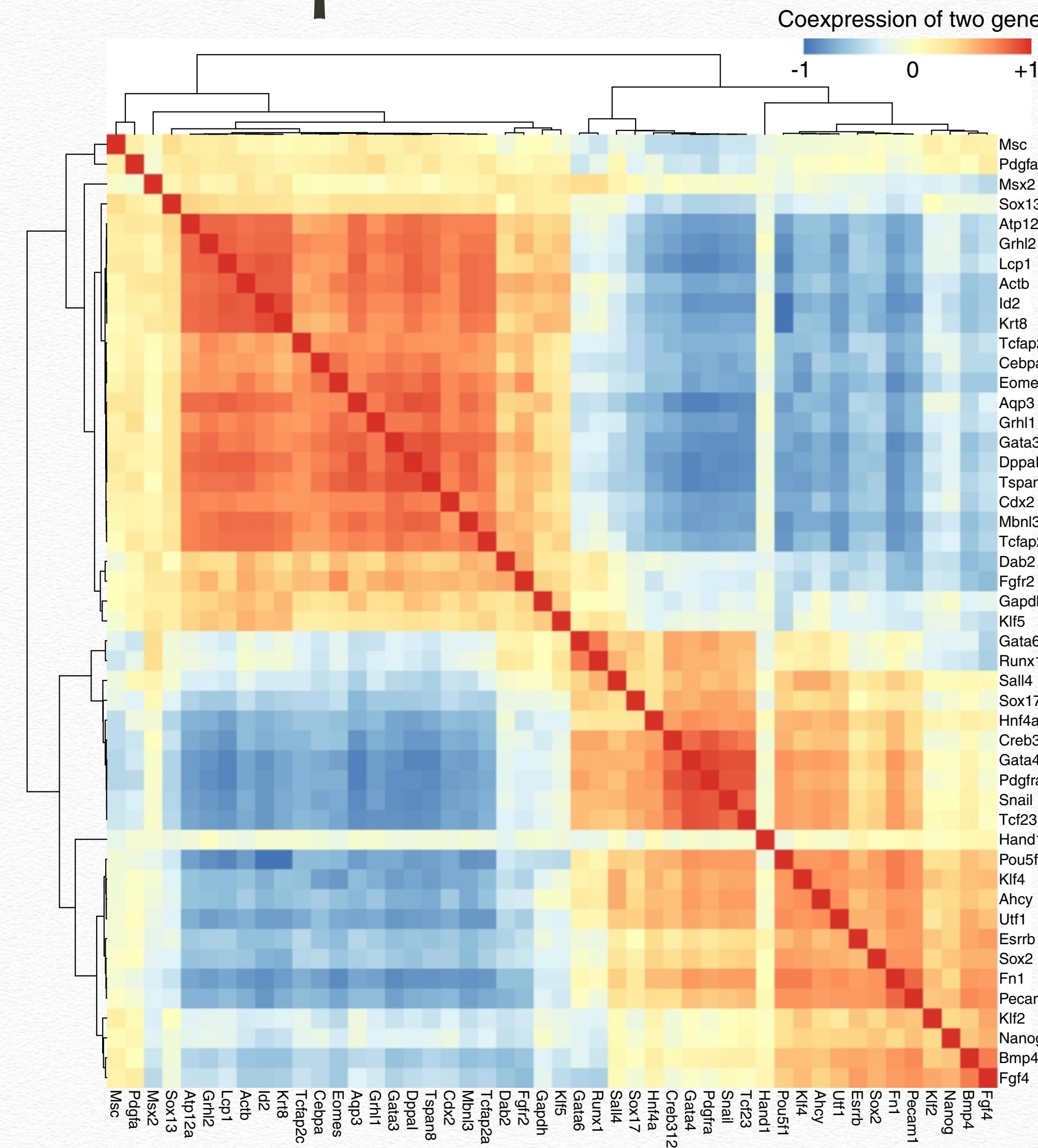
Gene Expression Analysis



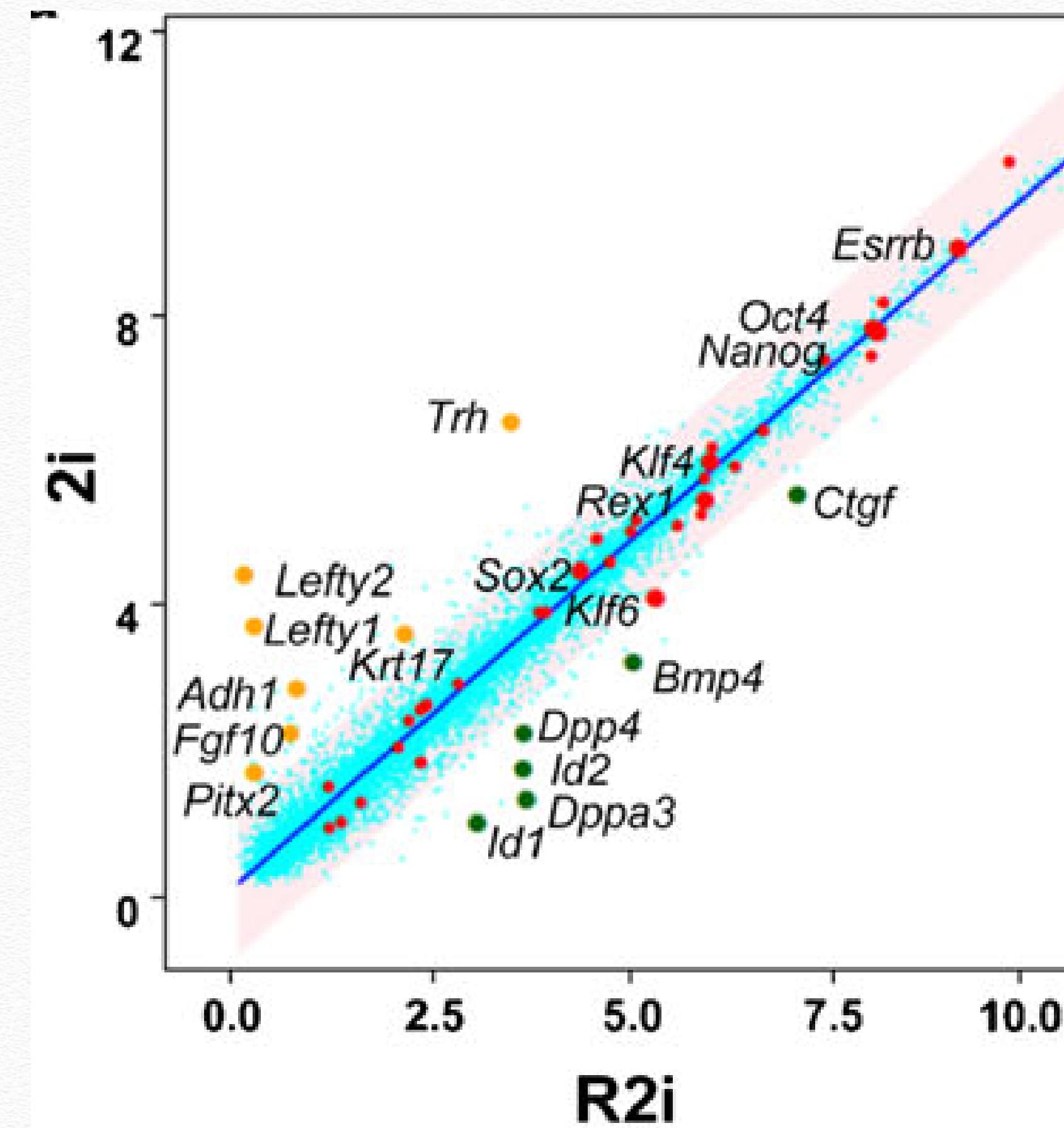
Gene Expression Analysis



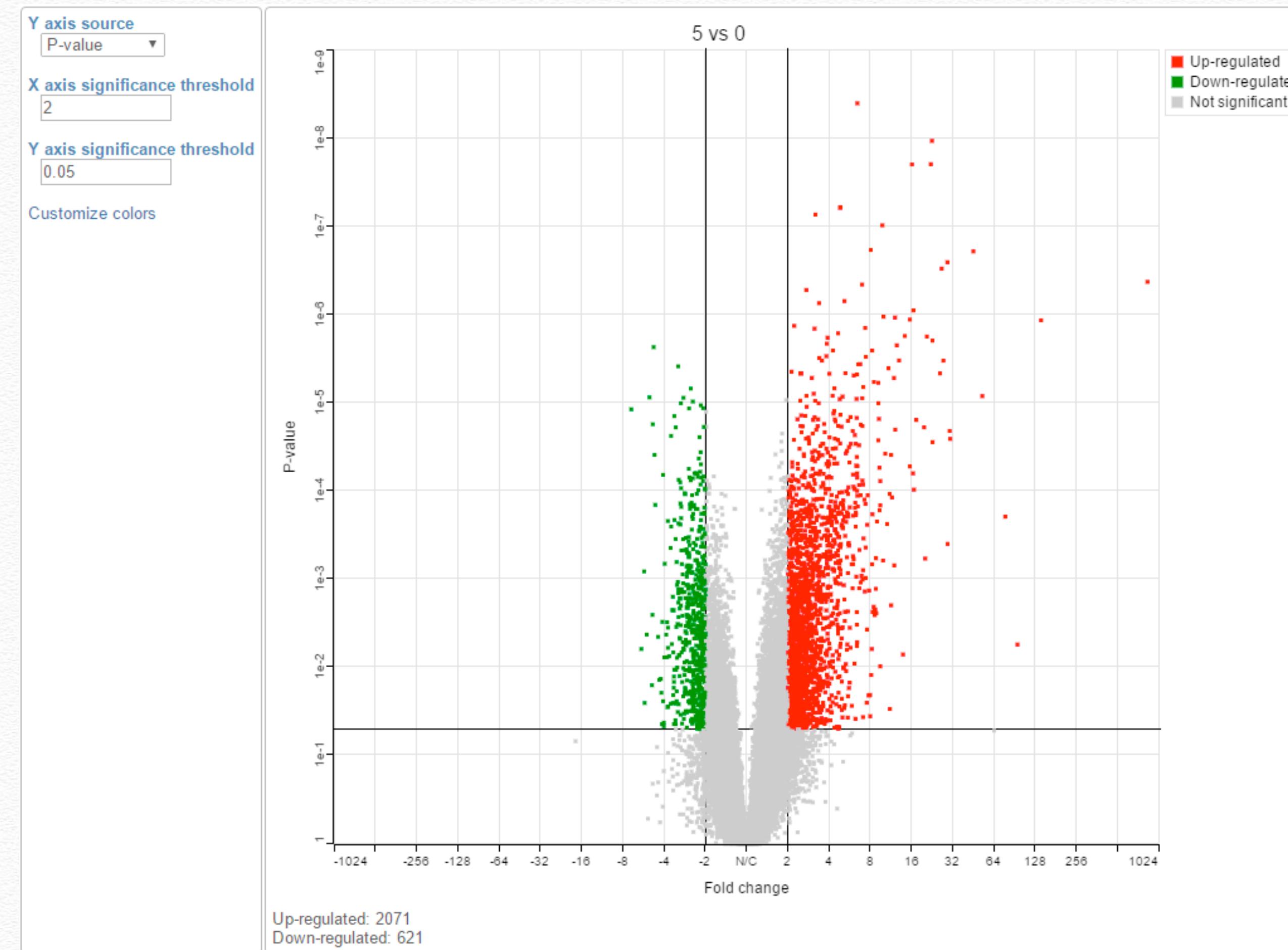
Gene Expression Analysis



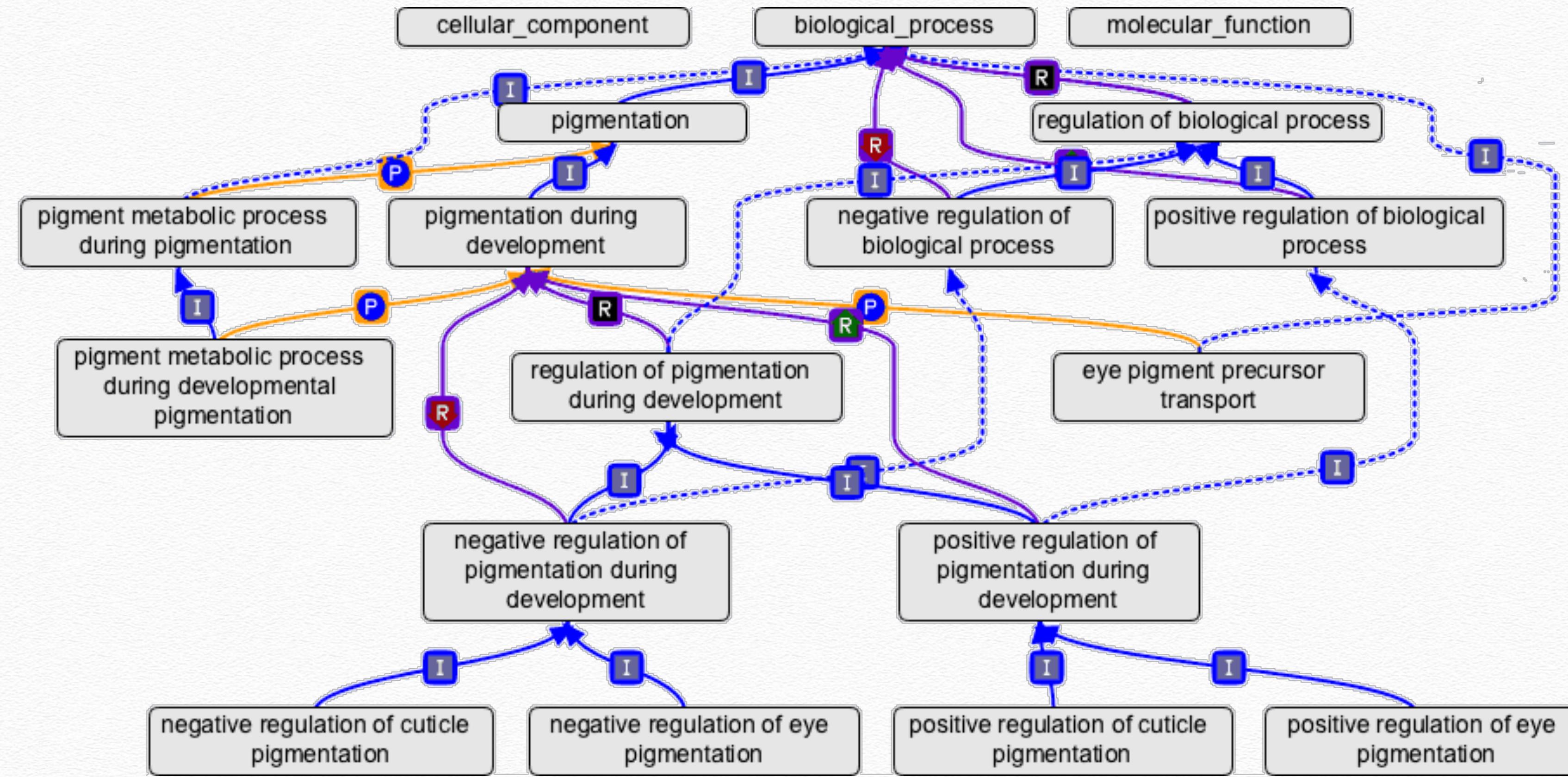
Gene Expression Analysis



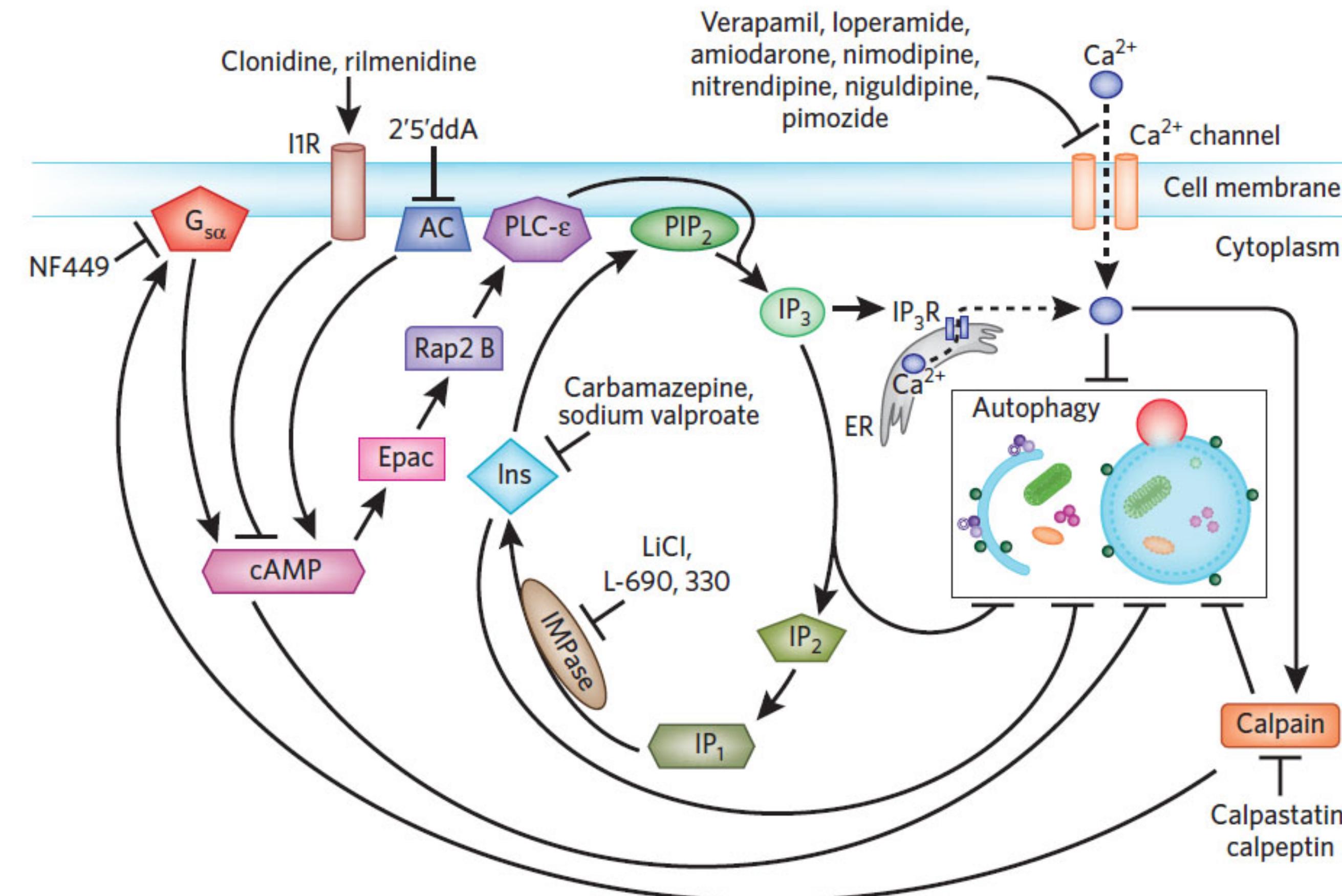
Gene Expression Analysis



Gene Ontology



Pathways



Analysis Pipeline

