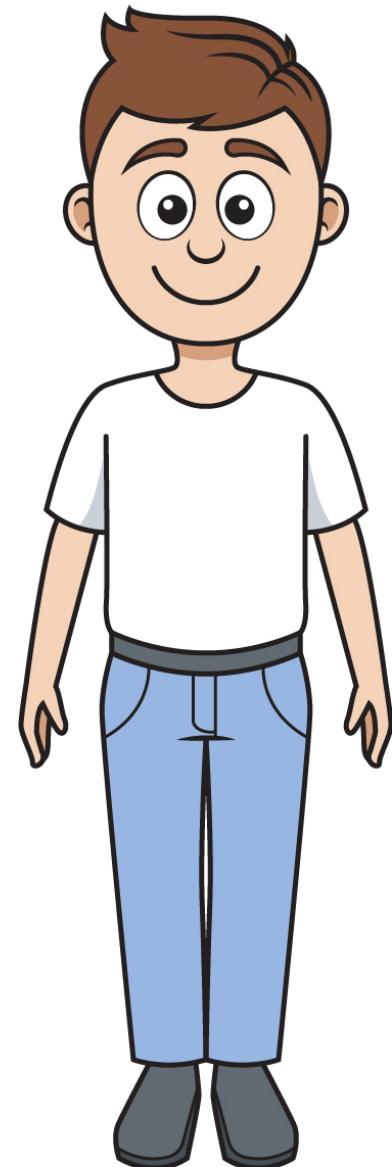


BIO

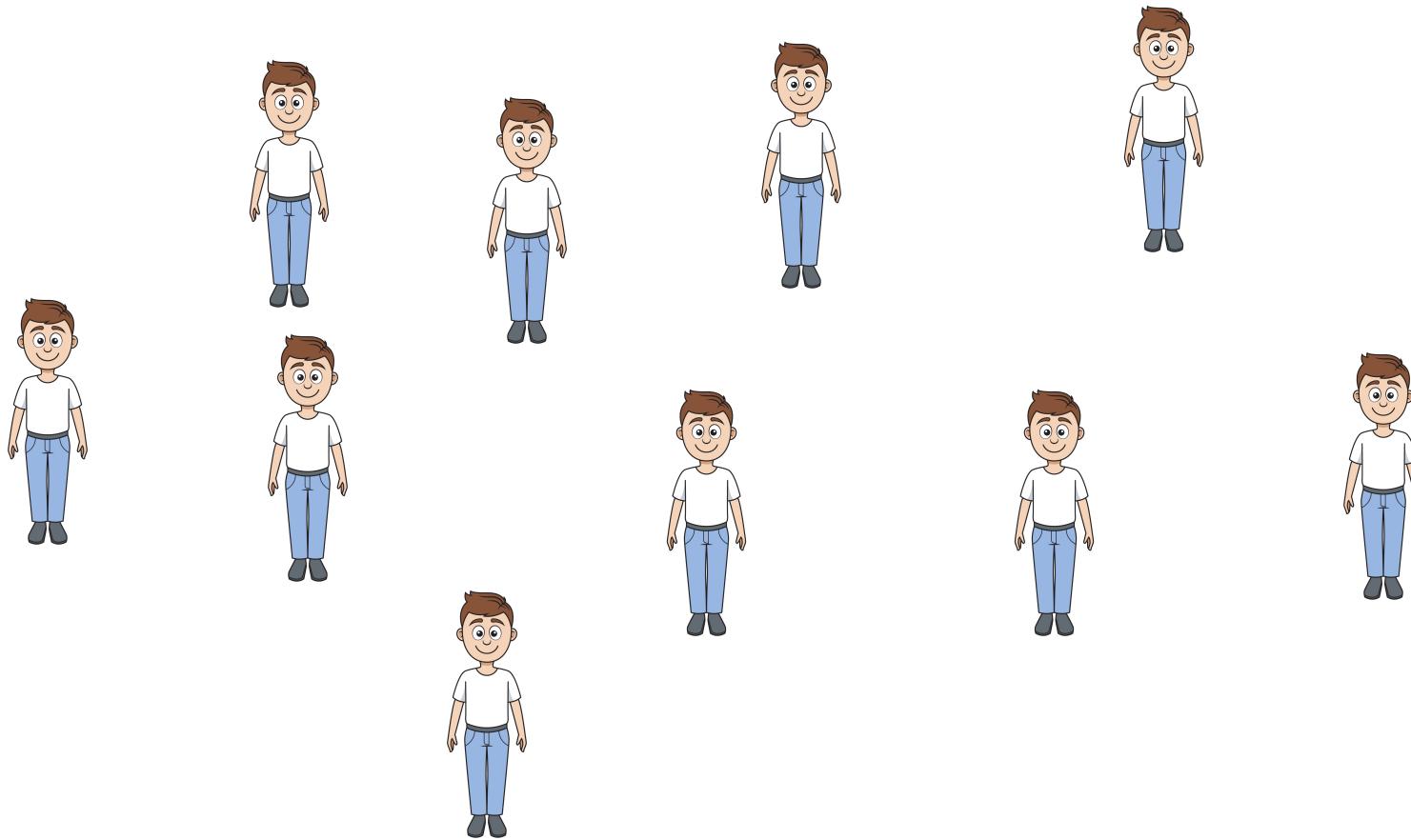
# Bioinformatics



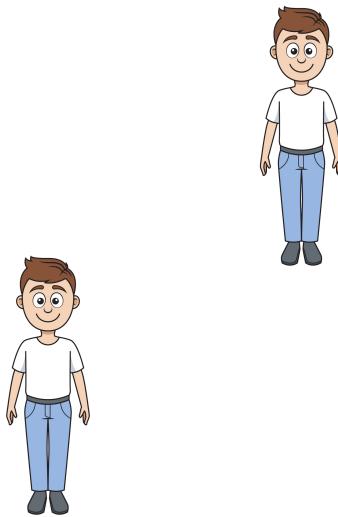
# Individuo



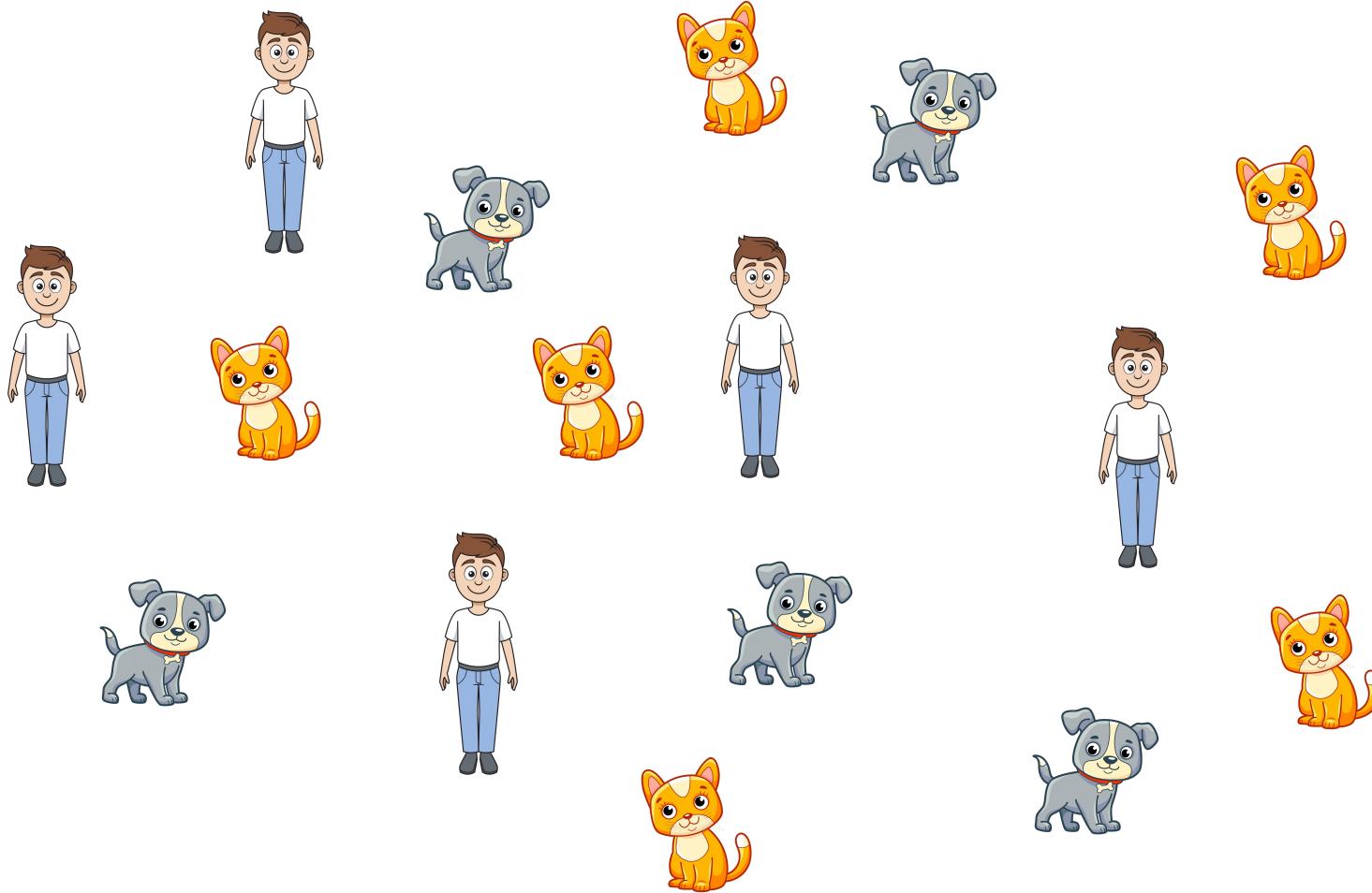
# Población



# Comunidad



# Comunidad



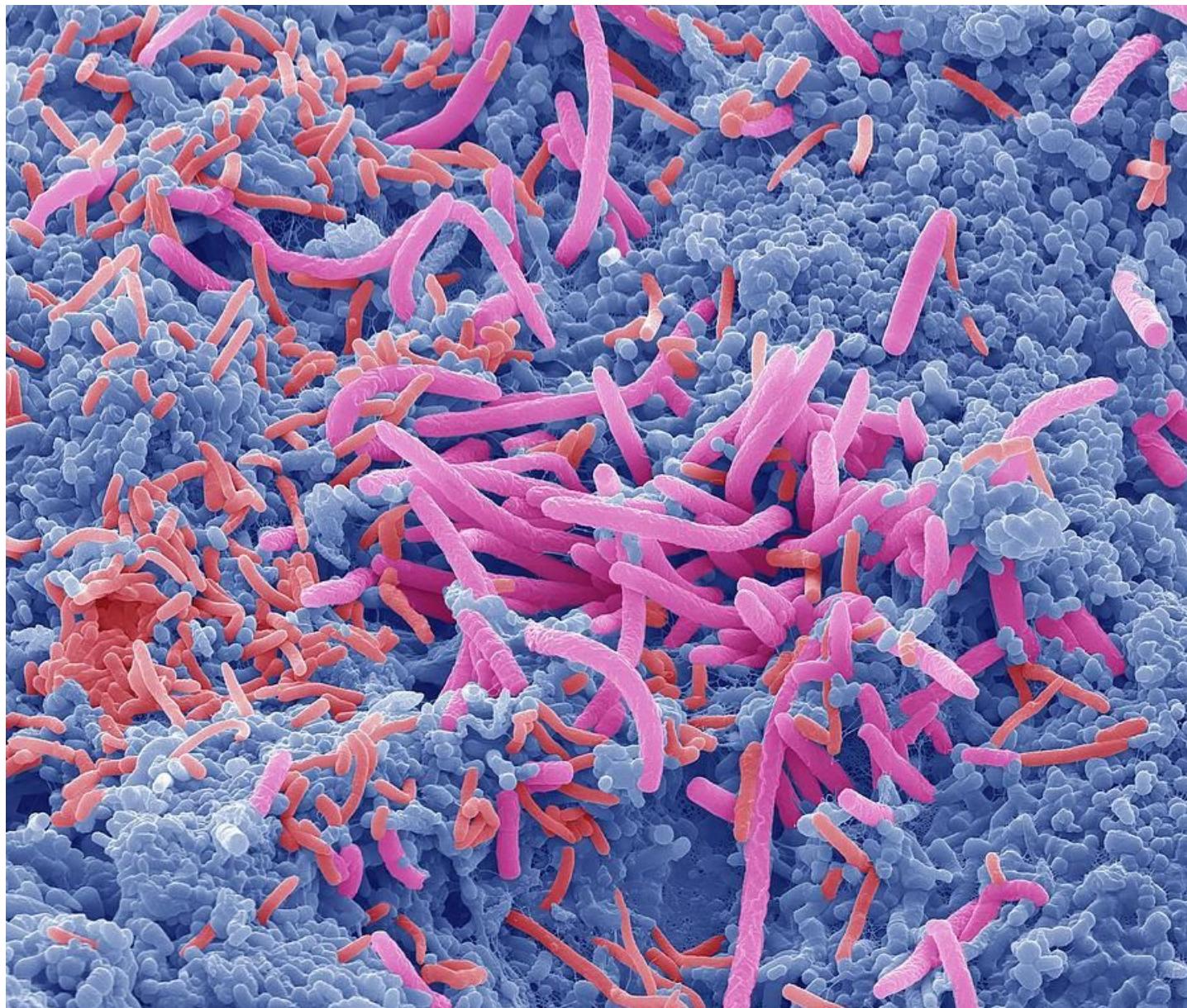
# Comunidad



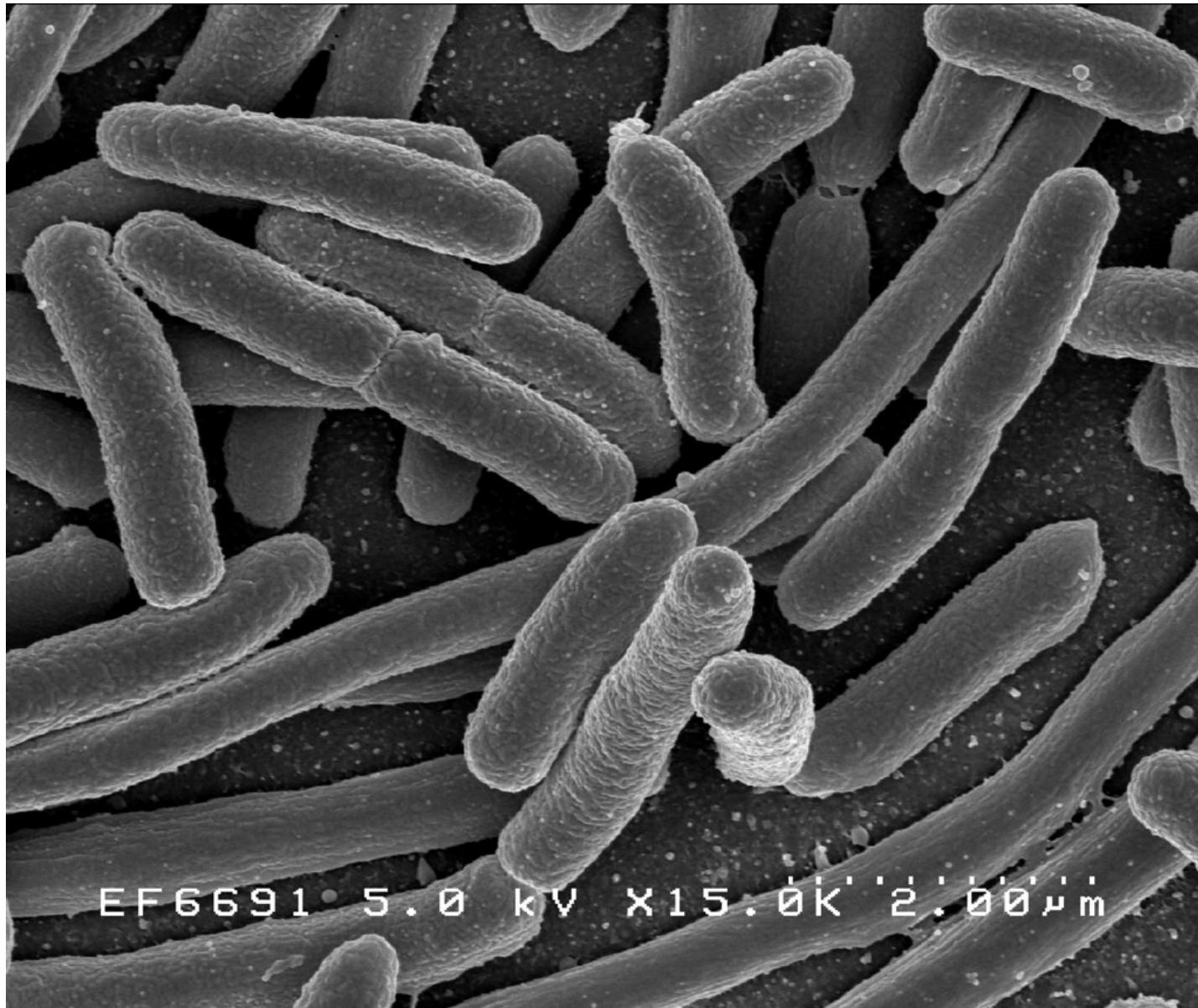
# Individuo



# ¿Población o comunidad?



# ¿Población o comunidad?



**¿Cómo saber si es una población o  
una comunidad?**

# Comparación de genes

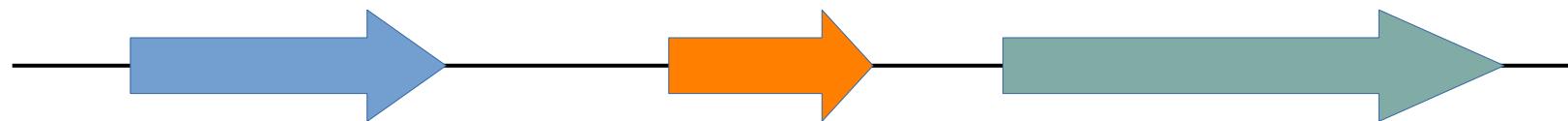


# Comparación de genes

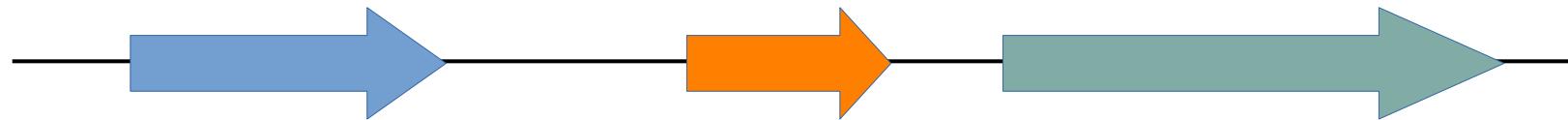


# Comparación de genes

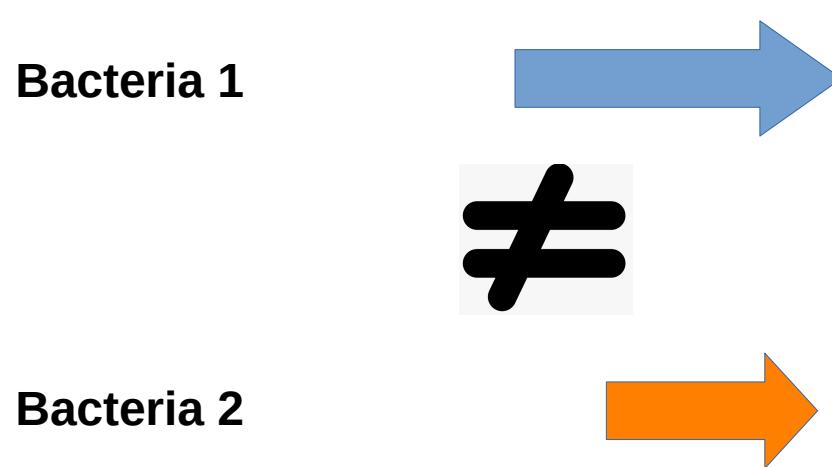
Bacteria 1



Bacteria 2



# Comparación de genes



Conclusión: la bacteria 1 es distinta a la bacteria 2.  
¿es correcto?

# Comparación de genes

Bacteria 1



Bacteria 2



¿Cómo saber si dos genes son exactamente iguales?

# Comparación de genes

>Bacteria\_1

ATGGGCGCTATATGAGCGC

>Bacteria\_2

ATGGGCGCTATATGAGCGC

# Comparación de genes

>Bacteria\_1

ATGGGCGCTATATGAGCGC

>Bacteria\_2

ATGCGCGCTATATGAGCGC

¿Puedo concluir que son especies distintas?

# Tipos de genes



# Tipos de genes

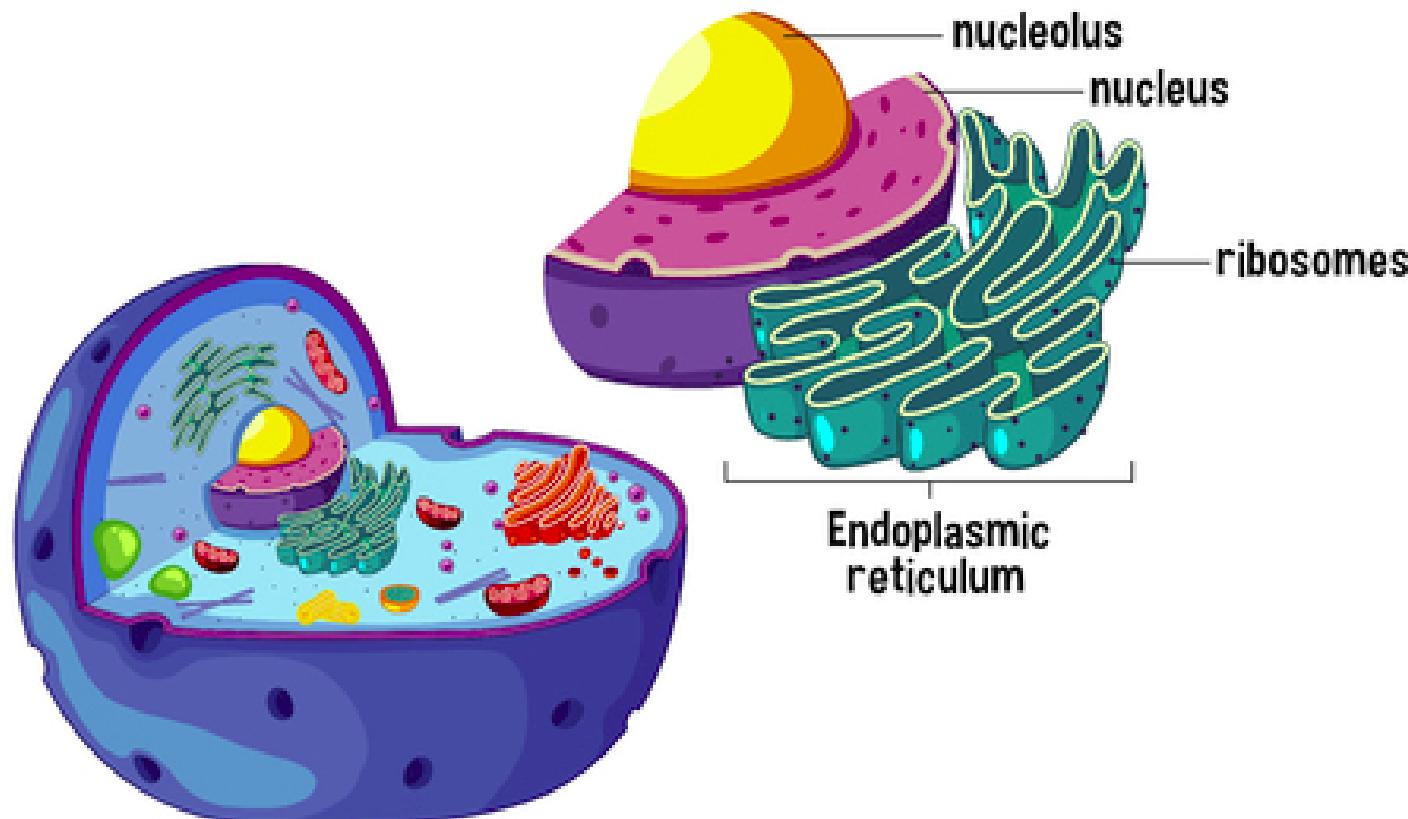
- Genes conservados: cambian muy poco.
- Ejemplo: Genes housekeeping

*Housekeeping*

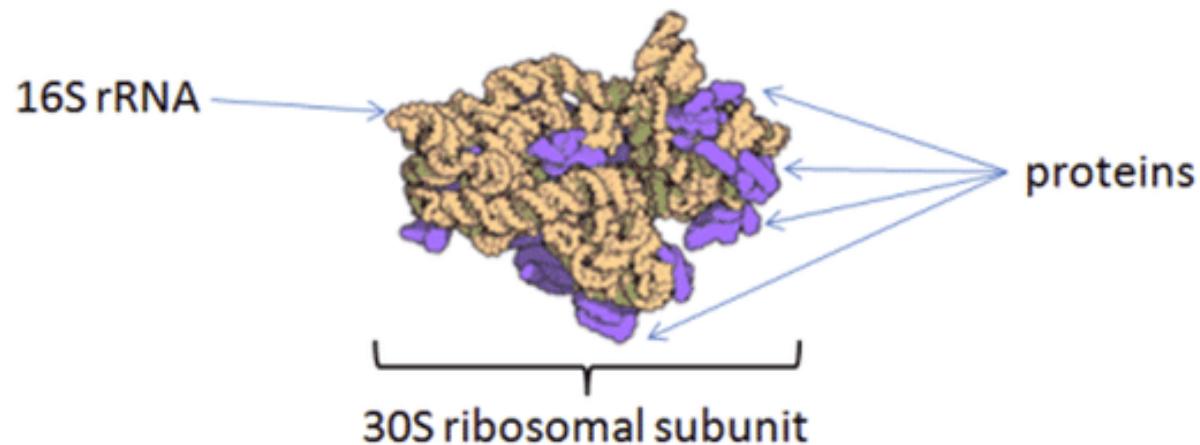


# Tipos de genes

- Genes conservados: cambian muy poco.
- Ejemplo: Genes ribosomales



# Genes ribosomales



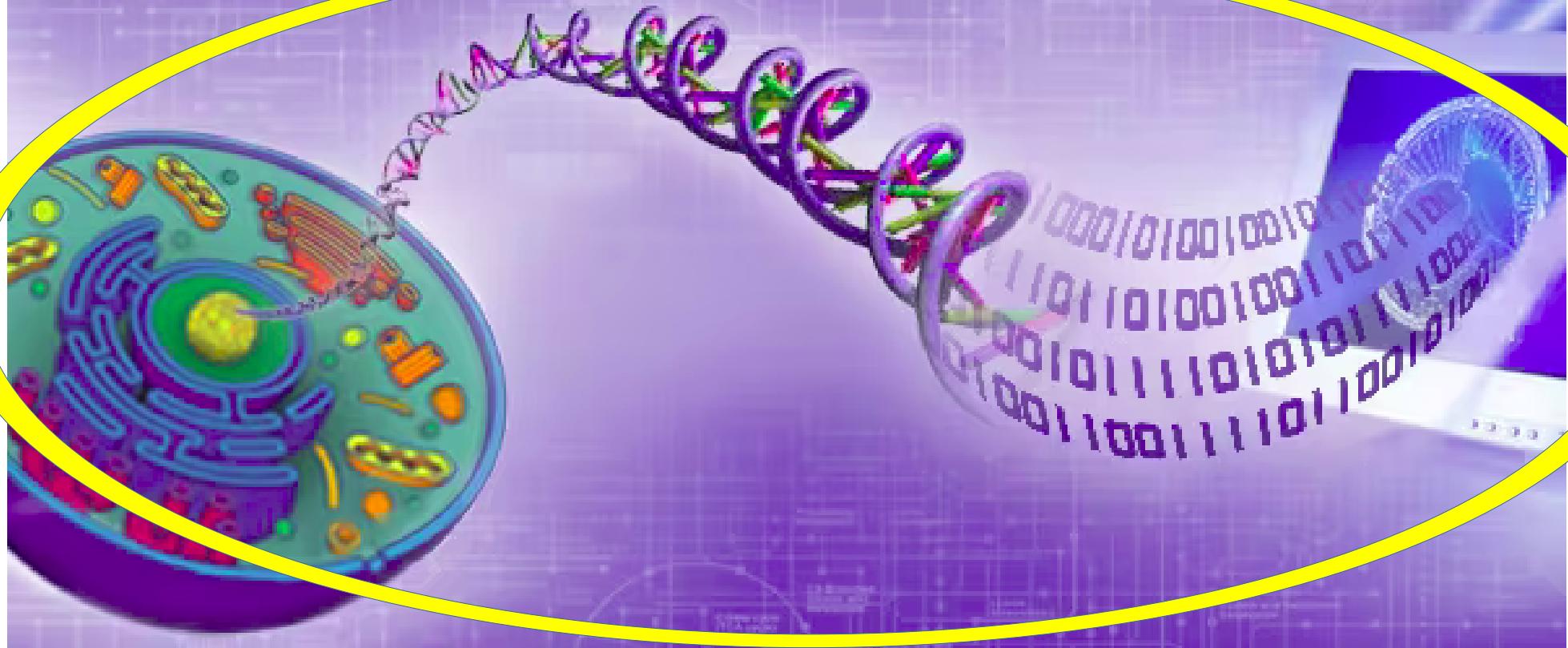
— = Conserved region  
..... = Variable region

**Todo ser vivo tiene ribosomas**

**¿Por qué?**

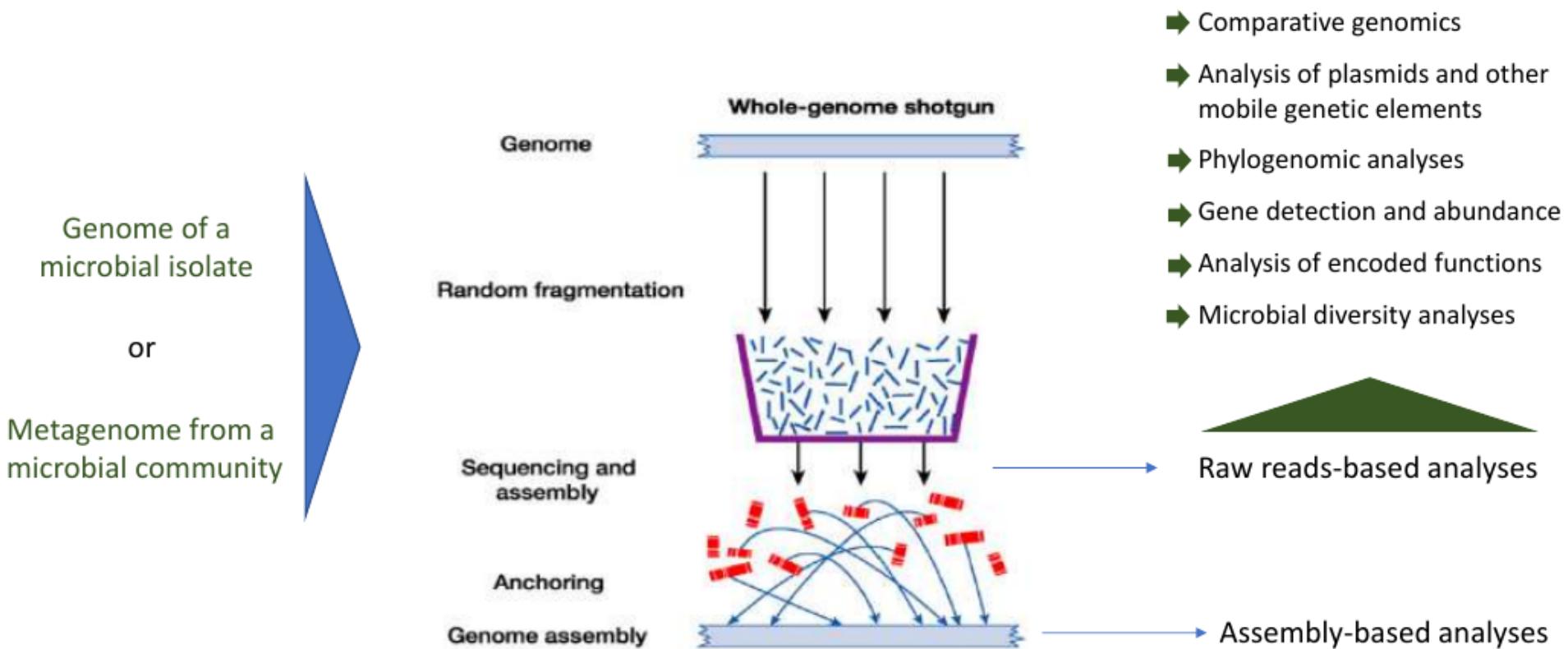
BIO

# Bioinformatics



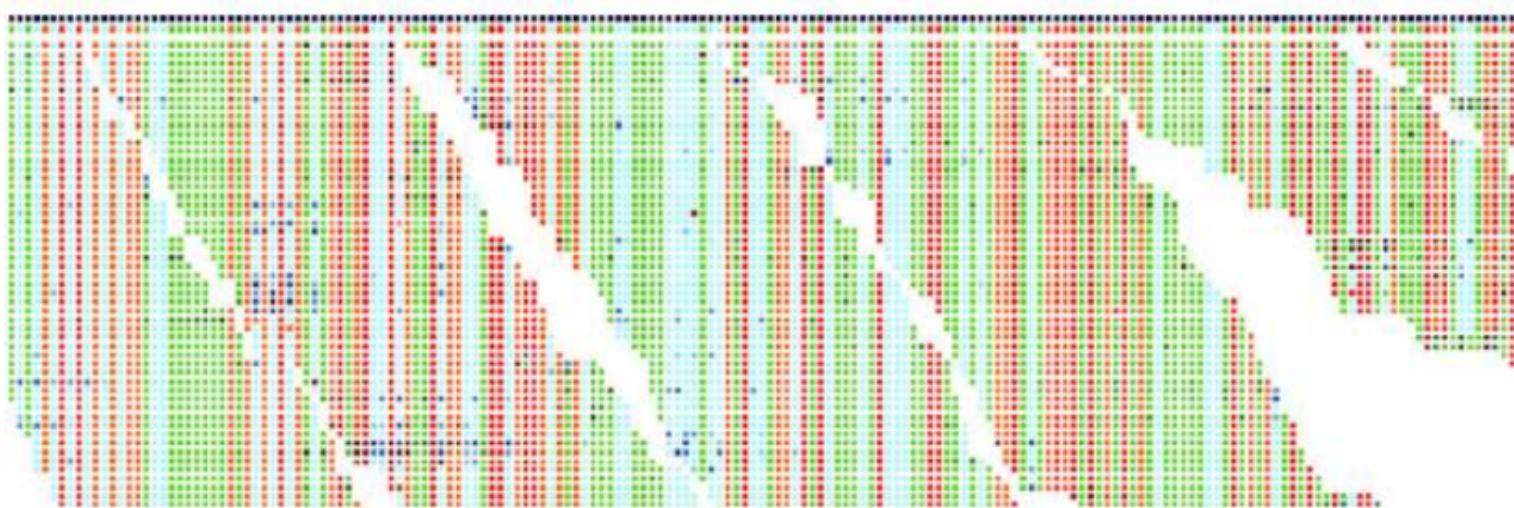
# Shotgun DNA sequencing

Sequencing of all the DNA present in the sample (not only a targeted gene or region)



## The “secret” of massive DNA sequencing

To sequence in parallel a huge amount of relatively small fragments of a given DNA sample (i.e., whole genome, chromosome, metagenome, etc.)



But... you get a huge puzzle with thousands of pieces, hard to reconstruct completely and accurately

Computing capacity



Data storage capacity



DNA sequencing capacity and cost



## (meta)Genomics



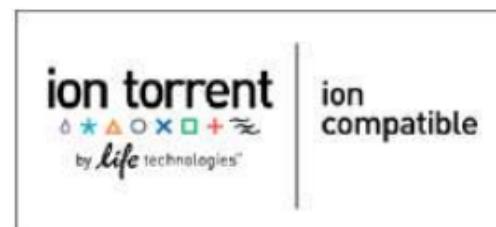
Analysis and search tools



Database development and maintenance

## 2nd Generation massive DNA sequencing technologies

### ION Torrent



### illumina

### illumina®

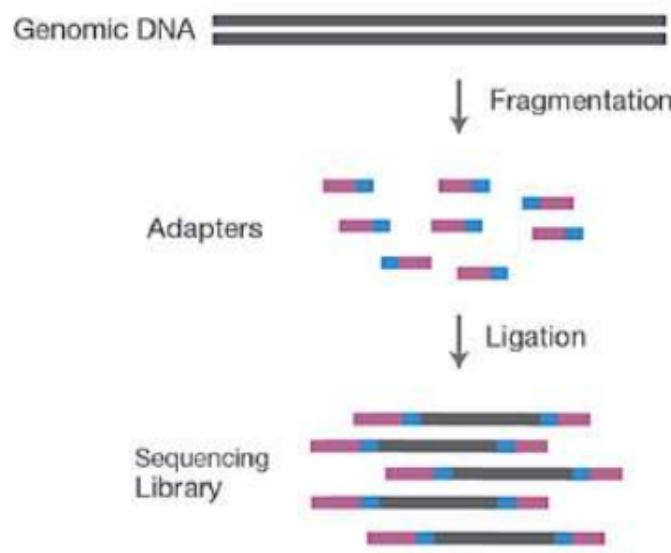
### SOLiD

SOLID™ System  
The SOLID Generation Delivers

AB Applied Biosystems

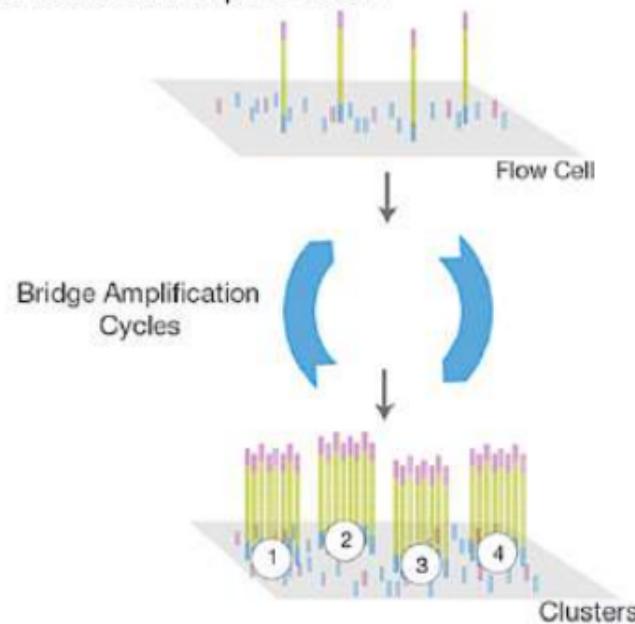
# illumina Sequencing workflow

## A. Library Preparation



NGS library is prepared by fragmenting a gDNA sample and ligating specialized adapters to both fragment ends.

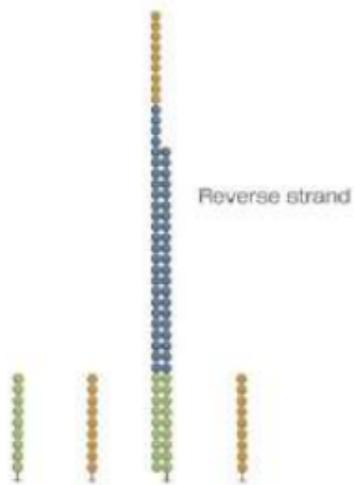
## B. Cluster Amplification



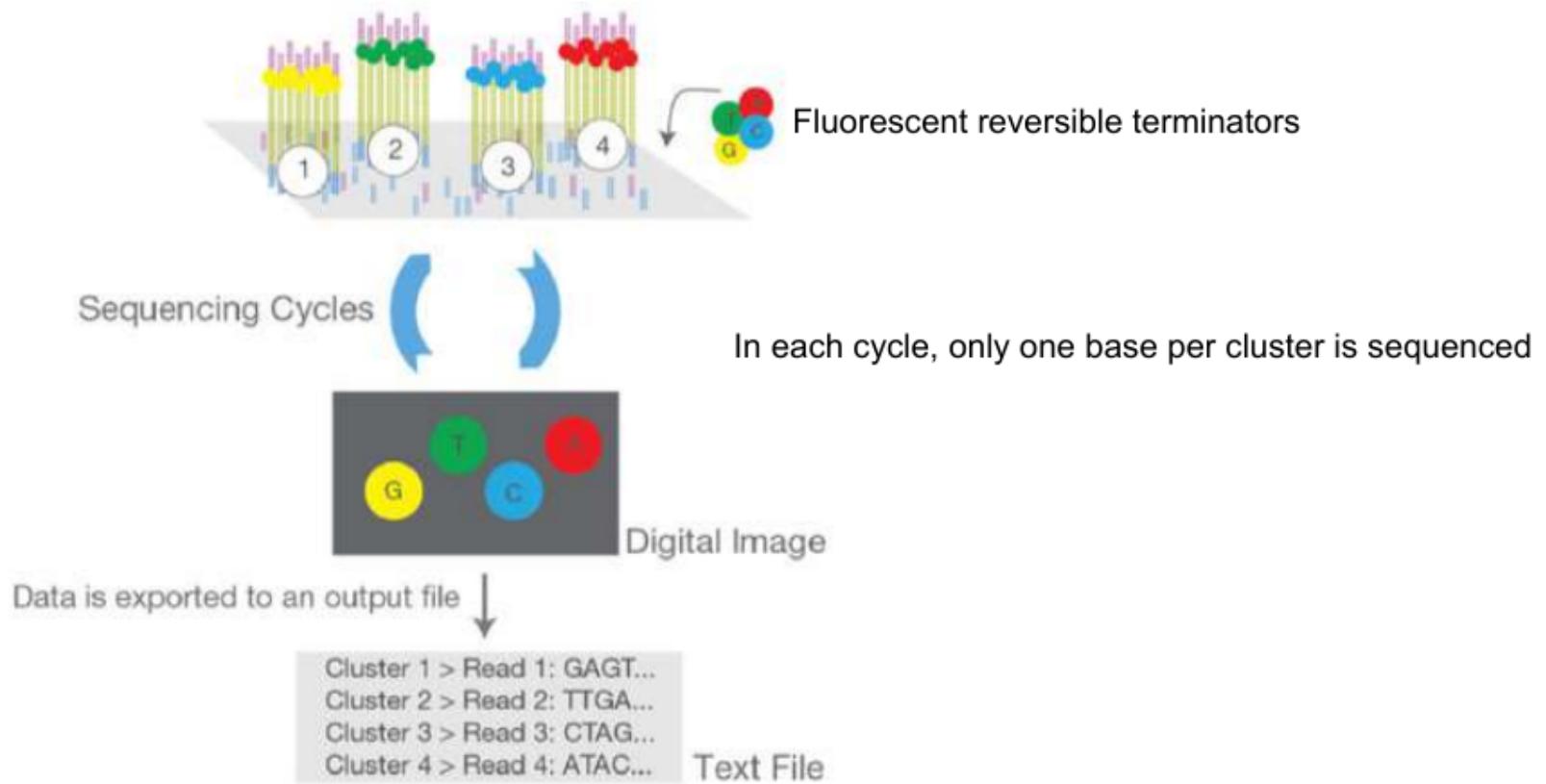
Library is loaded into a flow cell and the fragments are hybridized to the flow cell surface. Each bound fragment is amplified into a clonal cluster through bridge amplification.

# illumina Sequencing workflow

## Cluster Generation



## illumina Sequencing cycles



# Illumina

<https://www.youtube.com/watch?v=fCd6B5HRaZ8>

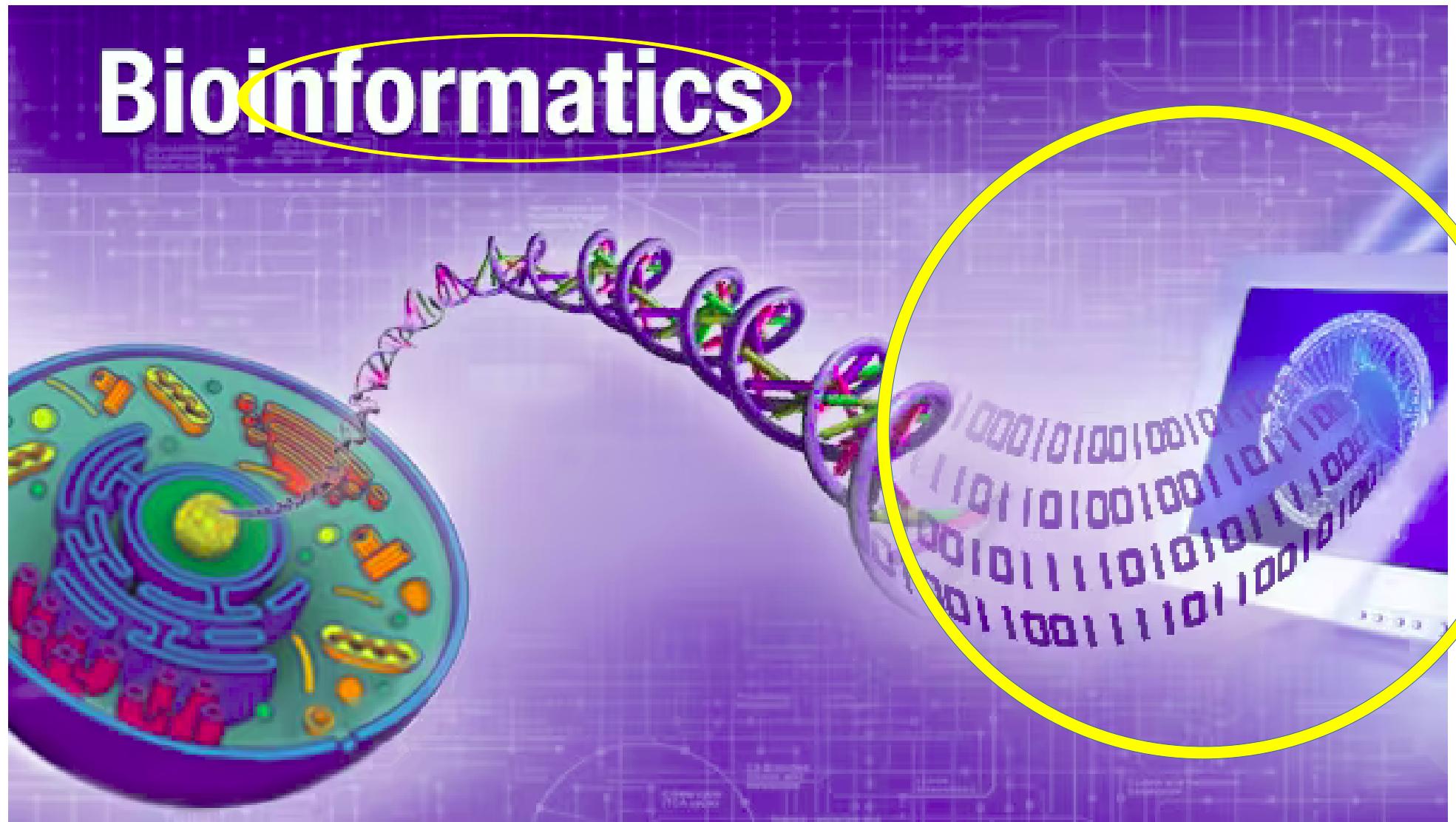
<https://www.youtube.com/watch?v=CZeN-lgjYCo>

<https://www.youtube.com/watch?v=jFCD8Q6qSTM>

# Illumina

<https://www.youtube.com/watch?v=BimurK8vIYc>

# Informática



# Grupos de trabajo

- Trabajarán por mucho tiempo (si es que siguen)
- Recomiendo trabajar en grupos de dos personas, pero pueden trabajar solos.
- Definir un nombre de usuario personal (corto)

