

Gentechnik

KraLa Bio 1 2025

Dagens innehåll Del 1

- “ ● Vad är genteknik?
- PCR (Polymerase chain reaction)
- DNA-analys (Metoder, användningsområden)
- Genöverföring & genredigering

Dagens innehåll Del 2

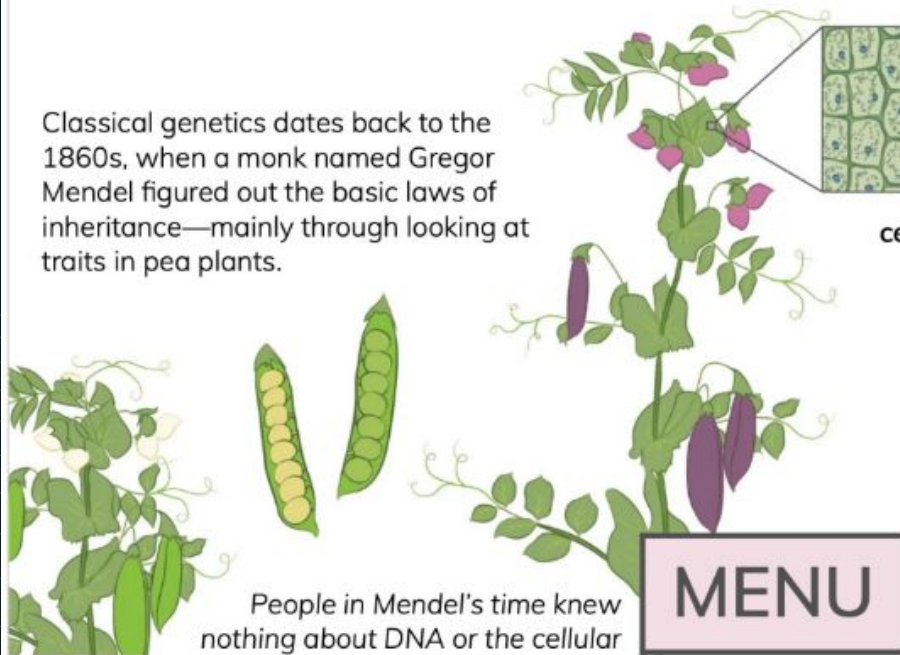
- “ ● CRISPR/Cas9 “Gensaxen”.
- Medicinska tillämpningar
- GMO.
- Genteknikens framtid?



Classical Genetics

is based on **observable traits**, and the **inheritance patterns** that they follow as they pass from parents to offspring.

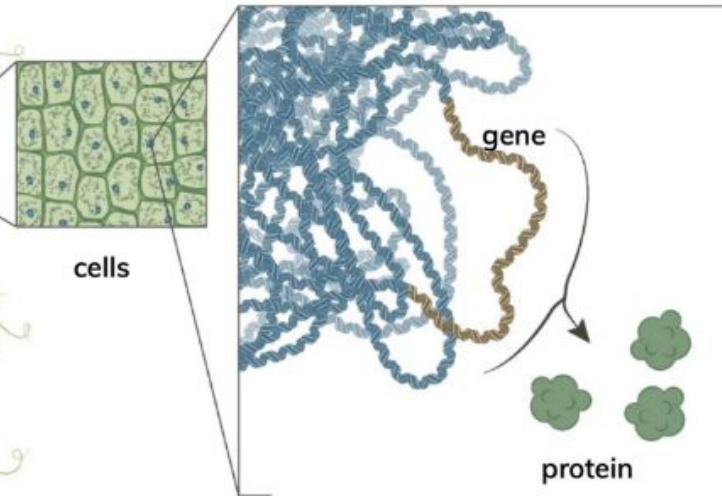
Classical genetics dates back to the 1860s, when a monk named Gregor Mendel figured out the basic laws of inheritance—mainly through looking at traits in pea plants.



People in Mendel's time knew nothing about DNA or the cellular

Molecular Genetics

focuses on the **molecules** of inheritance, and the **mechanisms** that underlie the inheritance patterns of classical genetics.



Molecular genetics relies on details about cells and the DNA, genes, and proteins they hold—knowledge gained bit by bit, by many thousands of scientists in the time since Mendel lived

DIFFERENT SPECIES



Western
Meadowlark



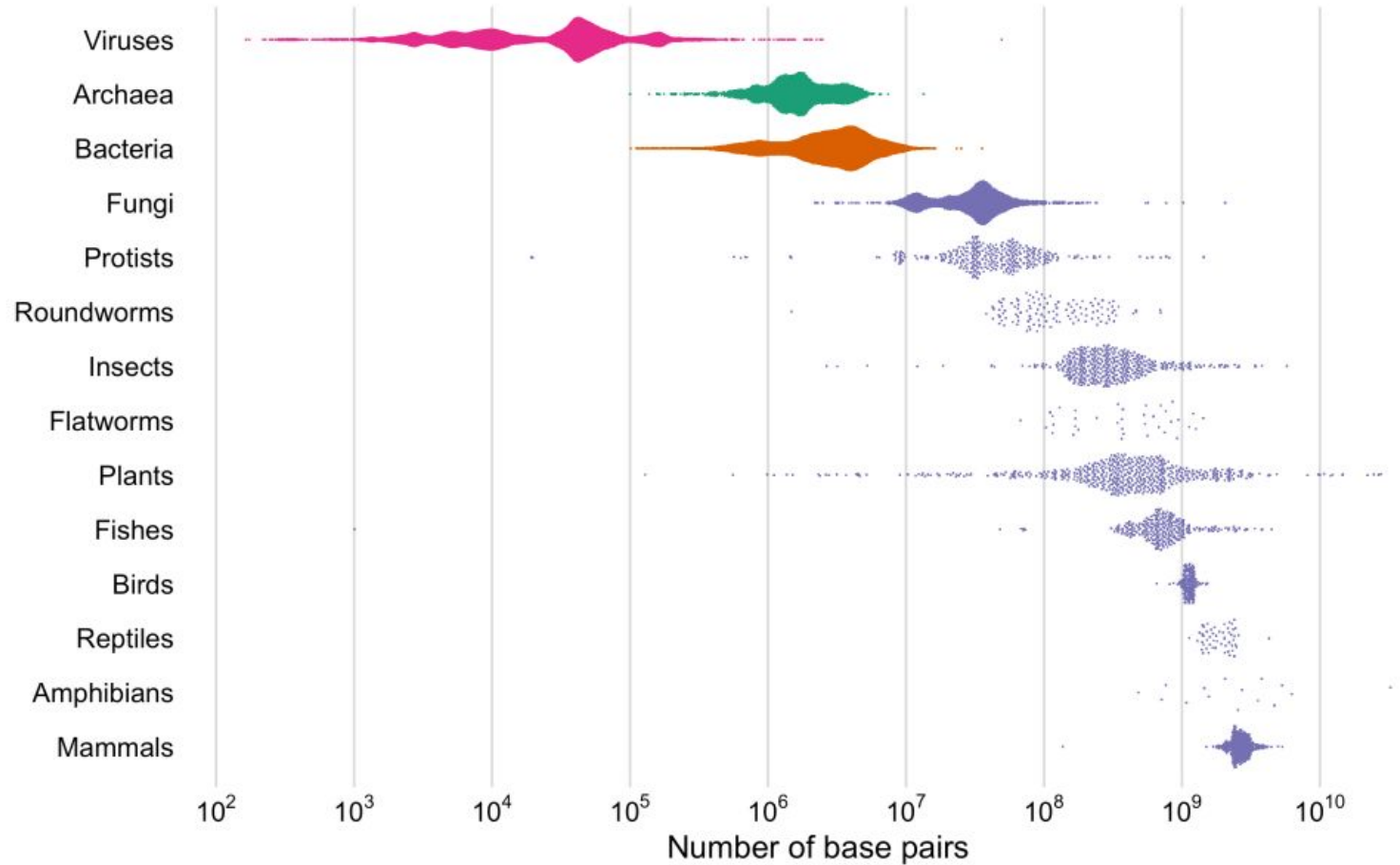
Eastern
Meadowlark

SAME SPECIES

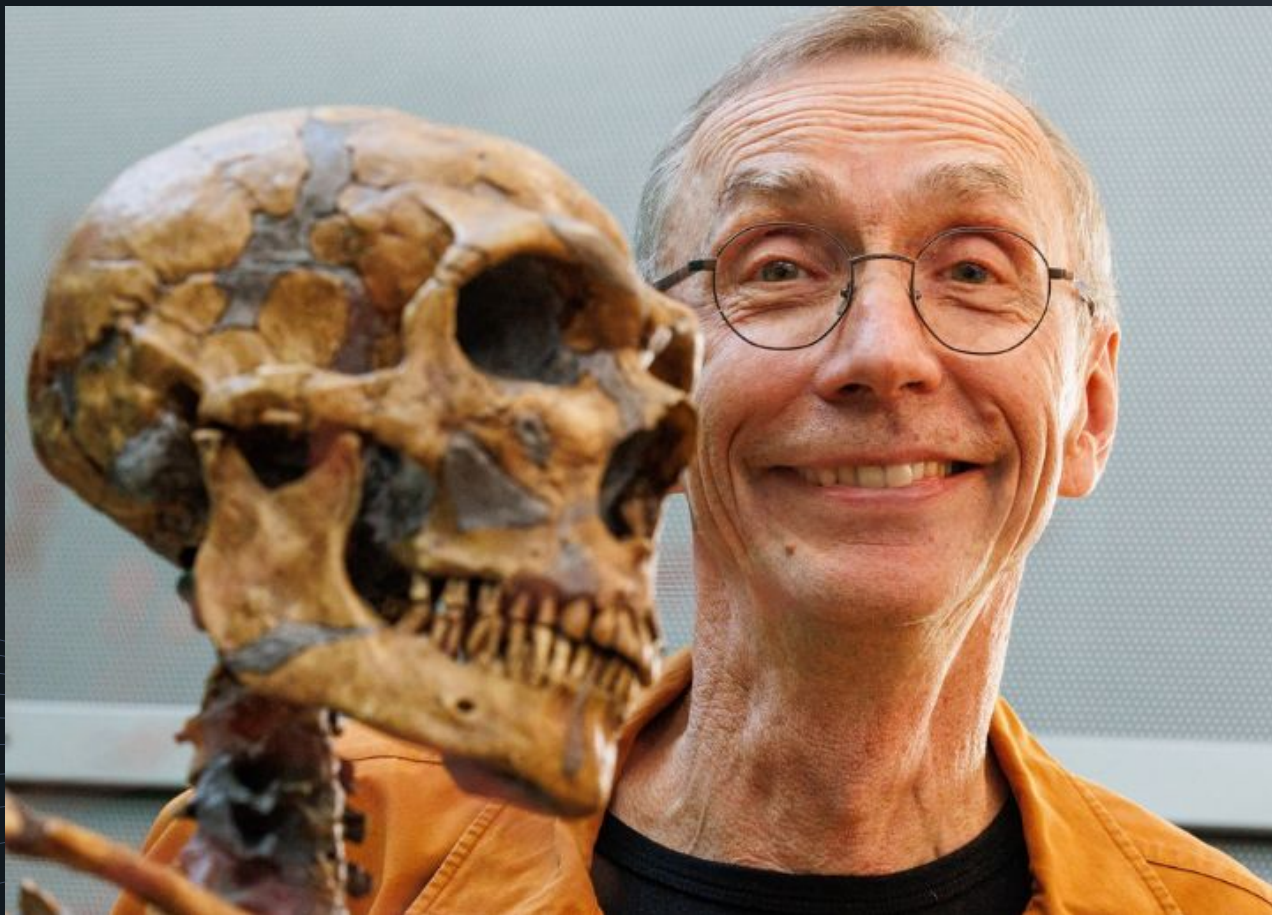


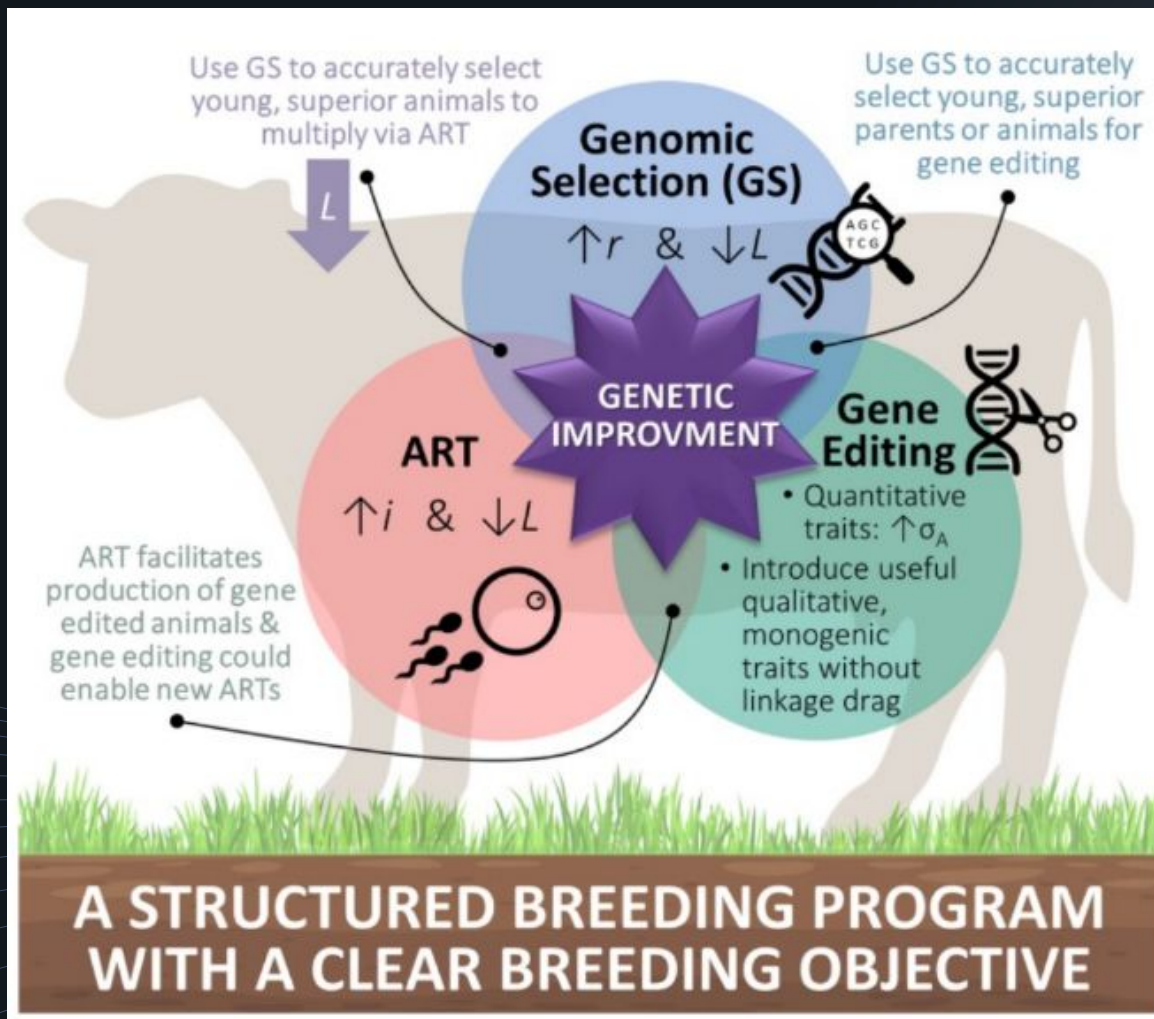
Gaudy Commodore
(*Precis octavia*)

Genome size

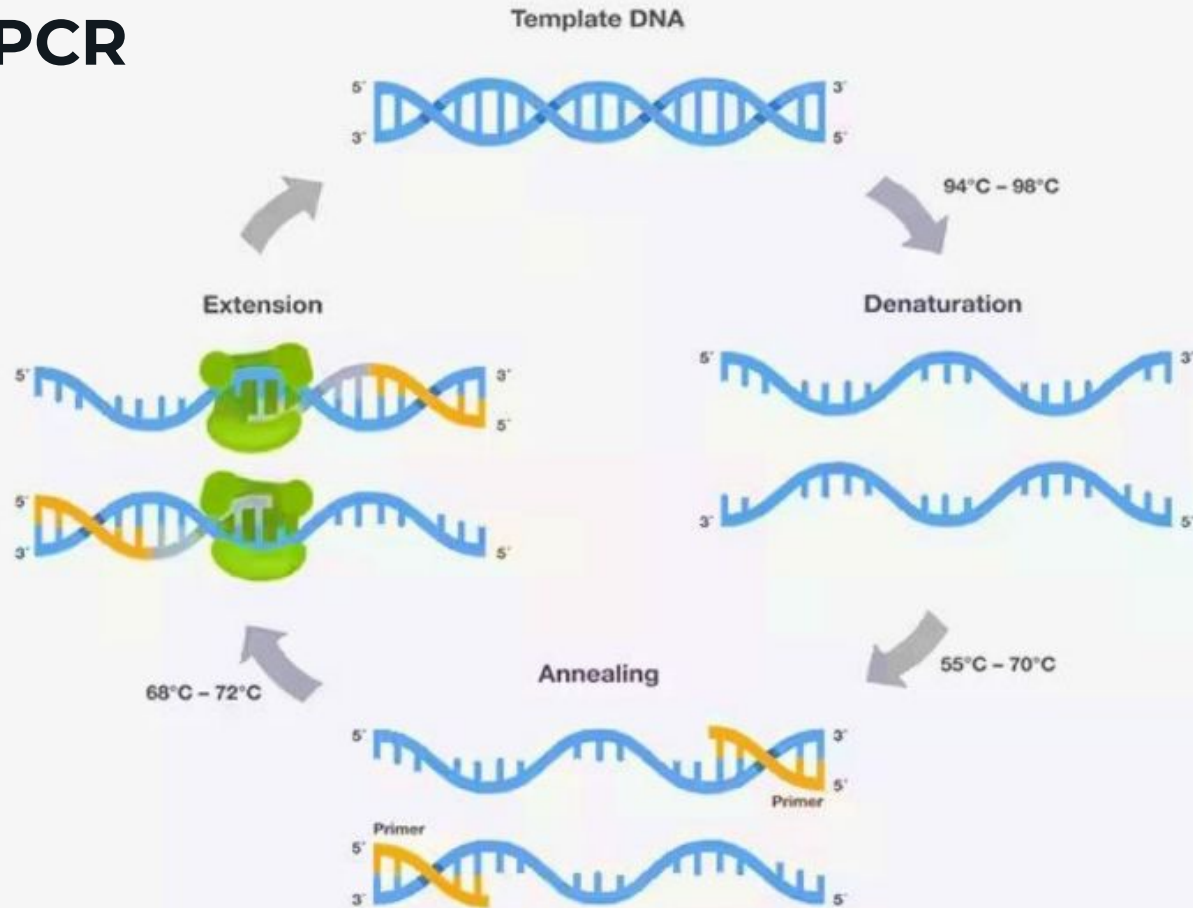


Data source: National Center for Biotechnology Information

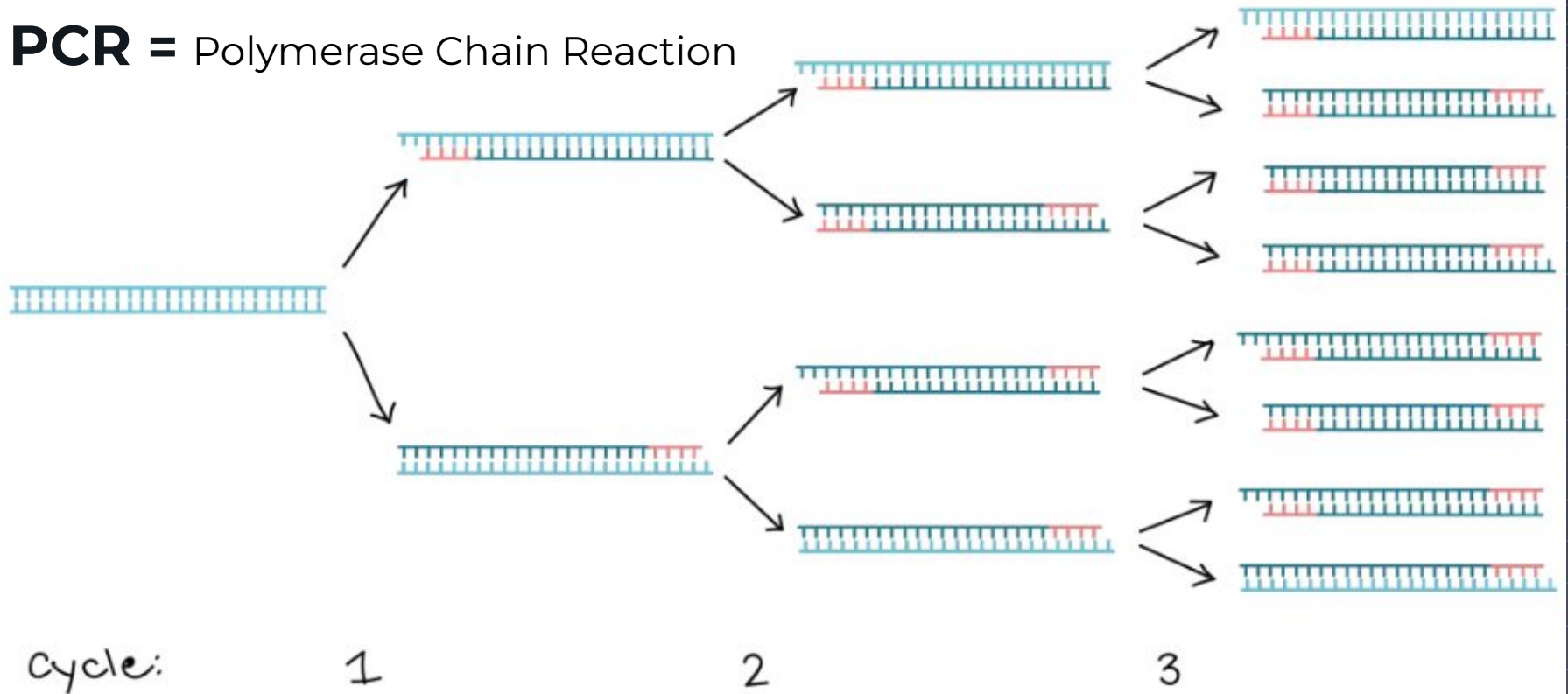




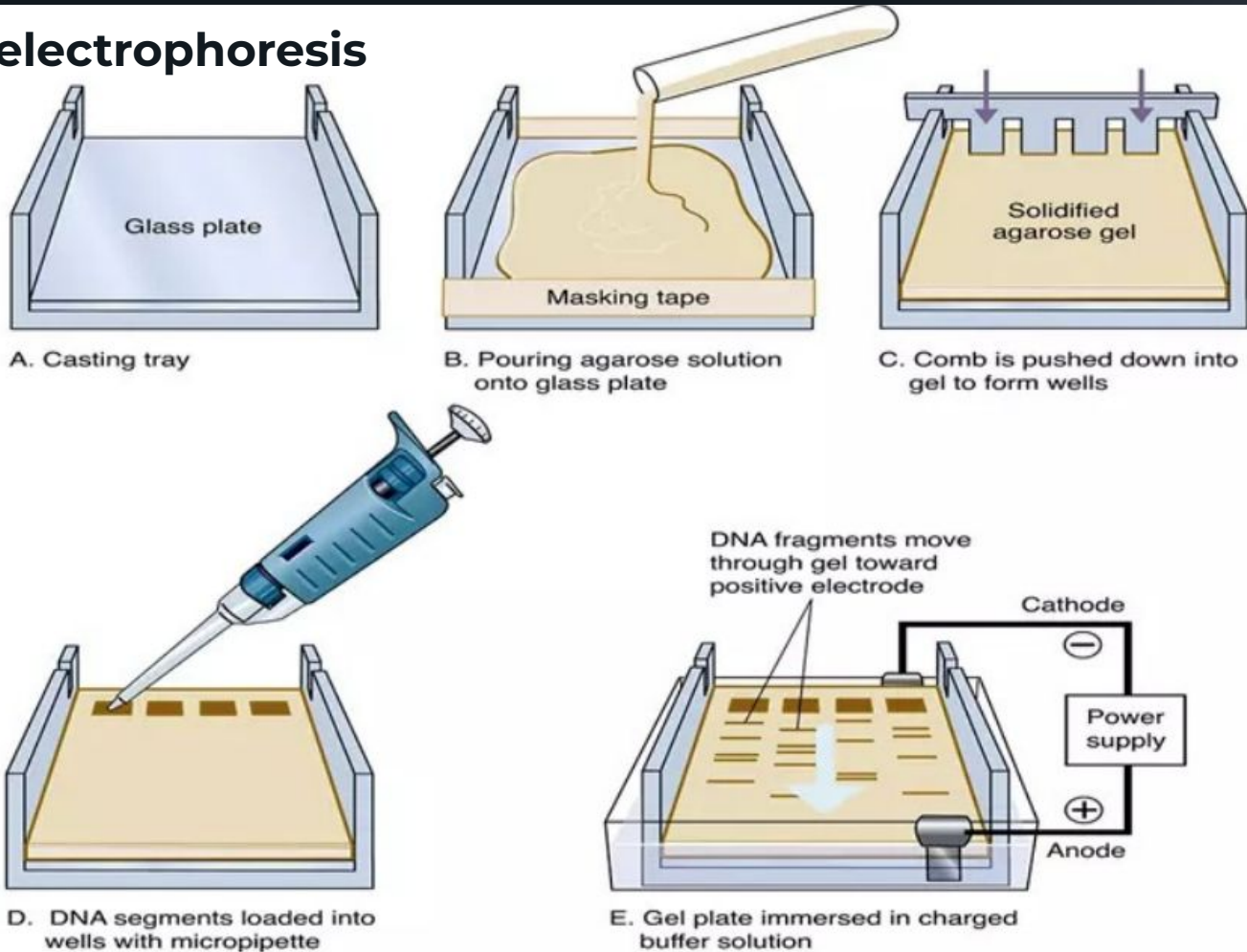
PCR



PCR = Polymerase Chain Reaction

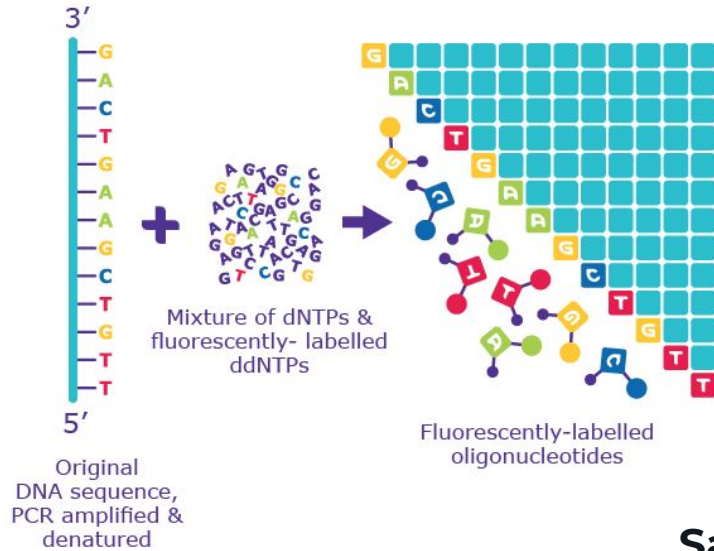


Gel electrophoresis



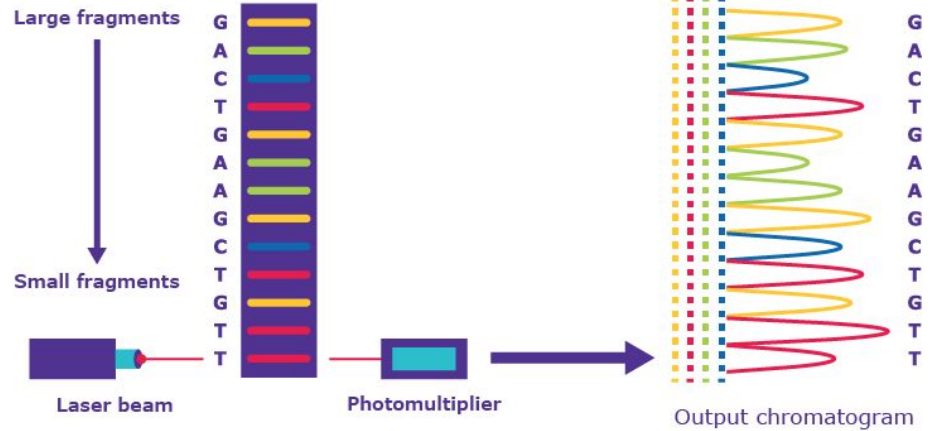
1

PCR with fluorescent,
chain-terminating ddNTPs



2

Size separation by capillary
gel electrophoresis

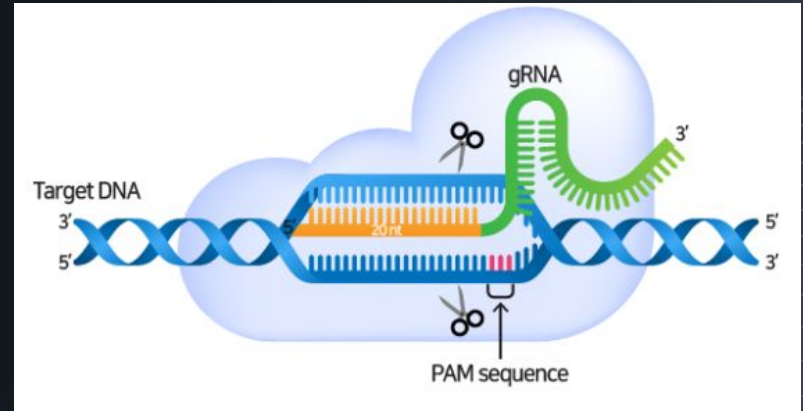
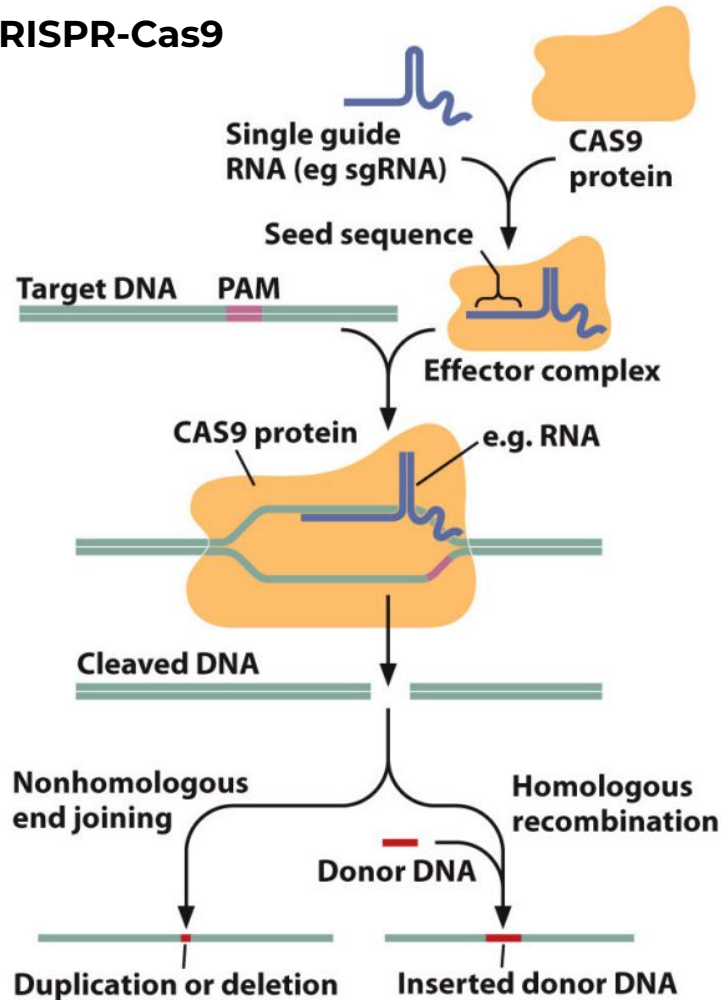


3

Laser excitation & detection
by sequencing machine

Sanger Sequencing

CRISPR-Cas9



Sker naturligt i bakterier och arkéer som en immunrespons mot bakteriofager (virus).

Effector complex → sgRNA + CAS9

PAM = en "säkerhetsmekanism" för att förhindra att Cas9 klipper i fel sekvens i genomet.



Specified expression of regulated red-green fluorescence gene

WT

Ubi-fRed-GFP

Ubi-fRed-GFP/
Ubi-CreERT2
Tamoxifen oral 7d

Ubi-fRed-GFP/
Ubi-Cre

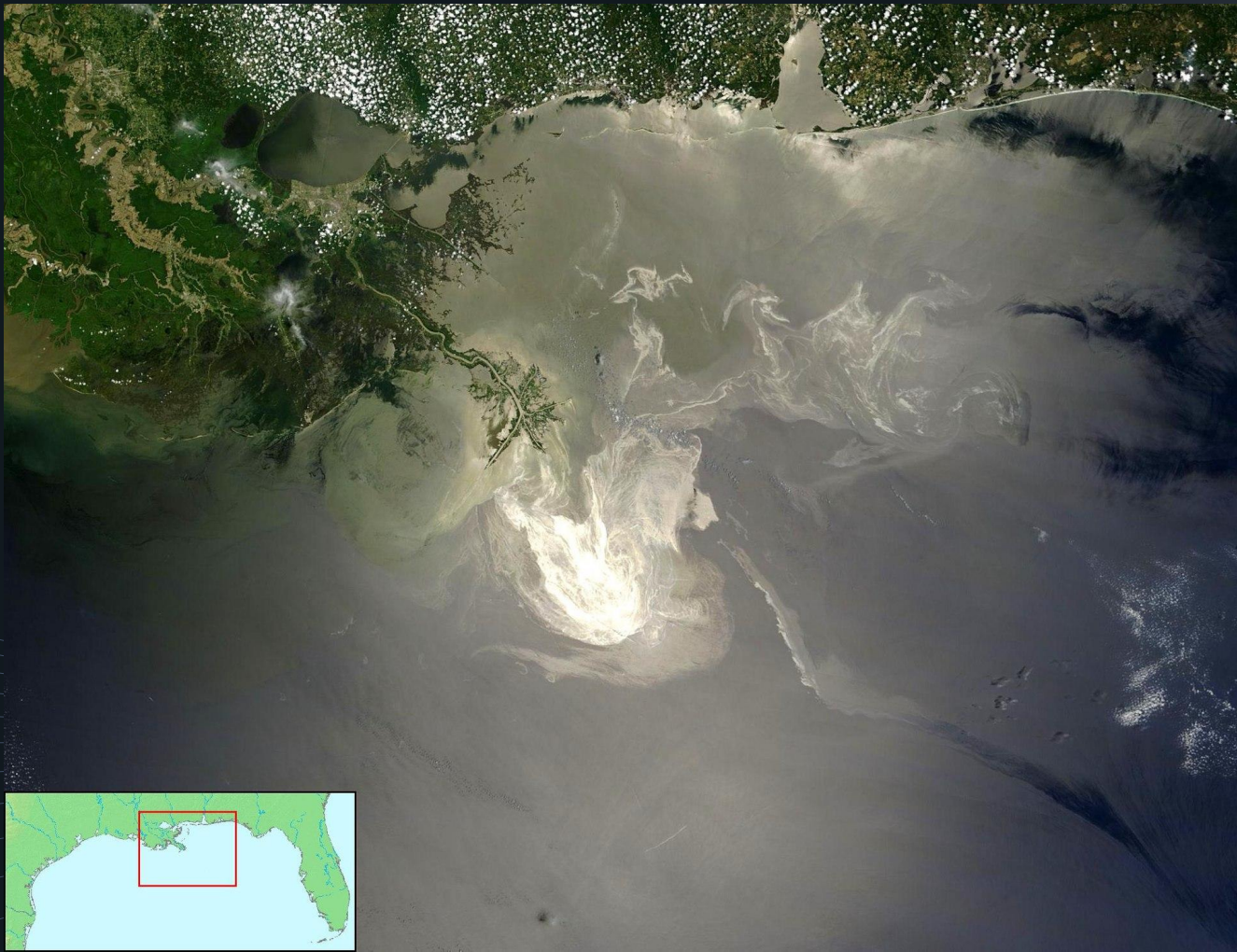
Non-fluorescence

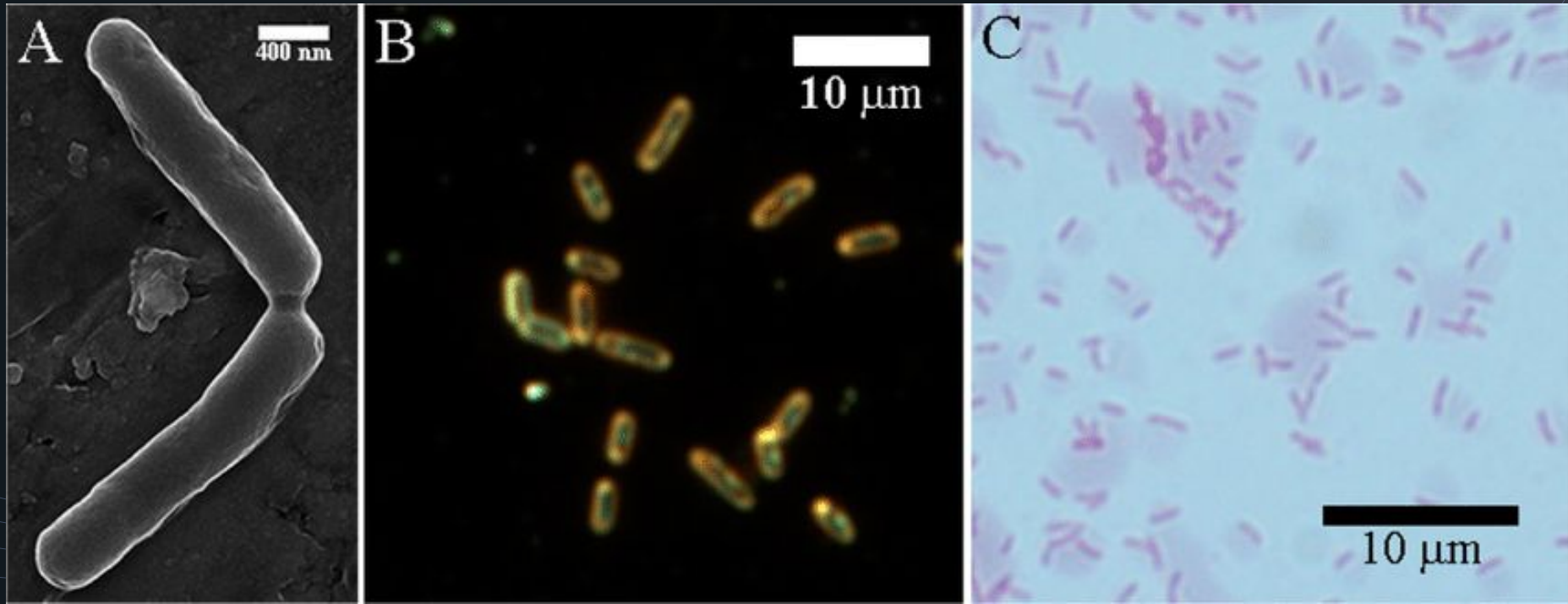
Red fluorescence

Red-green
fluorescence transition

Green fluorescence







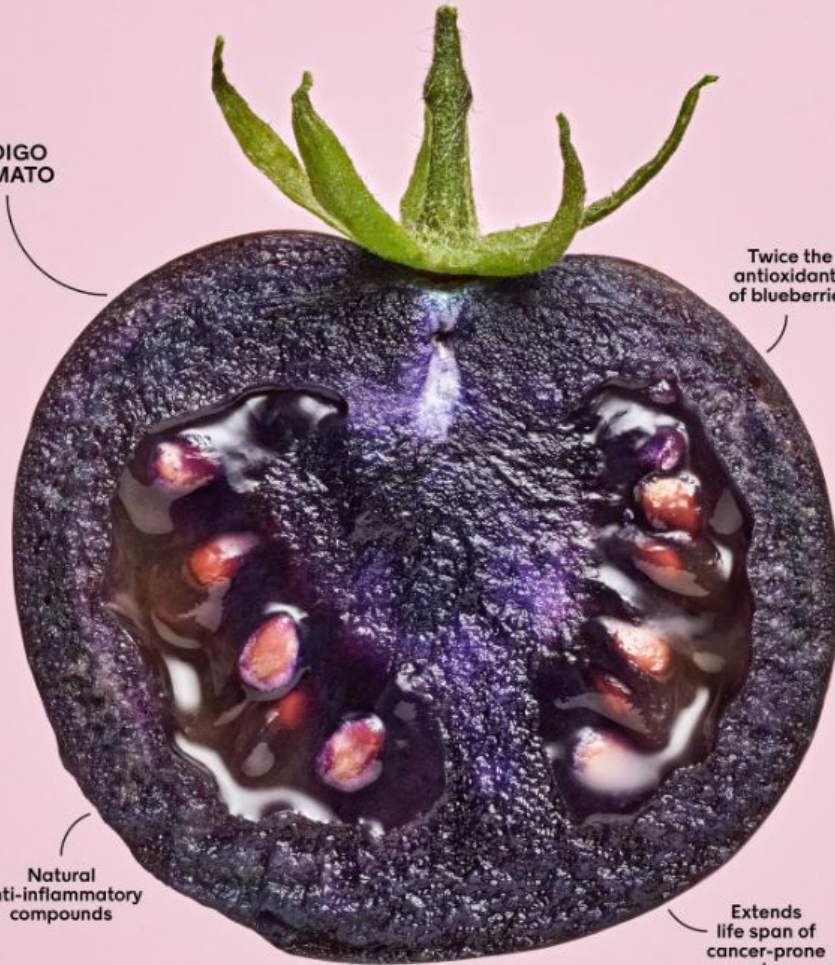
Alcanivorax borkumensis - En naturlig "oljeätande" bakterie genmodifierades för ökad dispersion av råoljan.

INDIGO
TOMATO

Twice the
antioxidants
of blueberries

Natural
anti-inflammatory
compounds

Extends
life span of
cancer-prone
mice



Growing Plants in Space



NASA's Matt Romeyn works in the Crop Food Production Research Area of the Space Station Processing Facility at the agency's Kennedy Space Center in Florida.

NASA/Cory Huston

<https://www.youtube.com/watch?v=Kuo1O8TzQ30>