



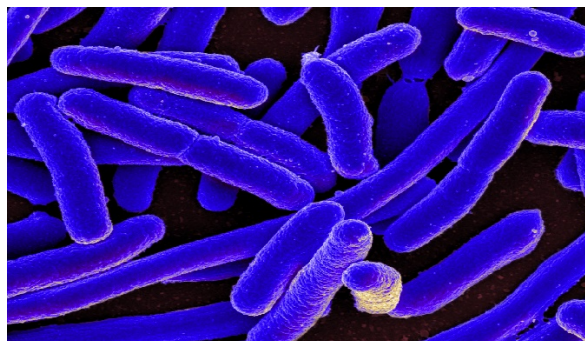
## *Investigating the History of Biotechnology*

### Props for stations

#### Station 1: Bacteria



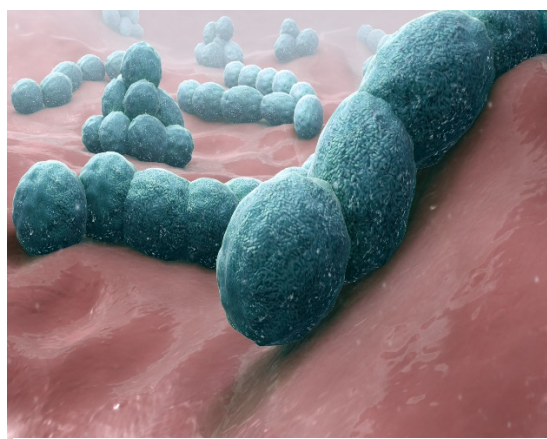
Bacteria: Staphylococcus;  
[https://commons.wikimedia.org/wiki/File:Staphylococcus\\_Bacteria.jpg](https://commons.wikimedia.org/wiki/File:Staphylococcus_Bacteria.jpg)



Bacteria: E. coli  
[https://commons.wikimedia.org/wiki/File:E.\\_coli\\_Bacteria\\_\(16578744517\).jpg](https://commons.wikimedia.org/wiki/File:E._coli_Bacteria_(16578744517).jpg)



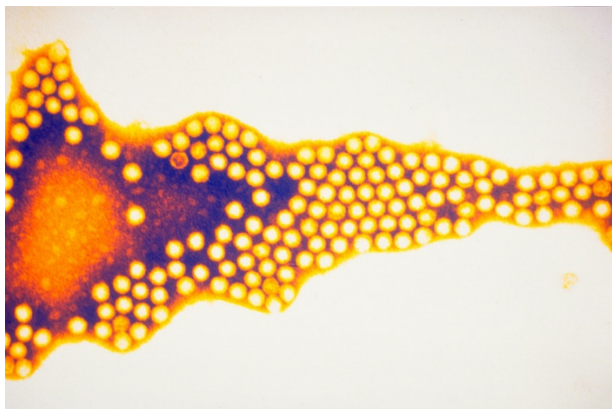
Bacteria: Mycobacterium tuberculosis  
<https://www.flickr.com/photos/niid/5149398656>



Bacteria: Streptococcus pneumoniae  
[https://en.wikipedia.org/wiki/File:Streptococcus\\_pneumoniae\\_-\\_A\\_causative\\_bacteria\\_of\\_meningitis.jpg](https://en.wikipedia.org/wiki/File:Streptococcus_pneumoniae_-_A_causative_bacteria_of_meningitis.jpg)



## Station 2



Polio virus

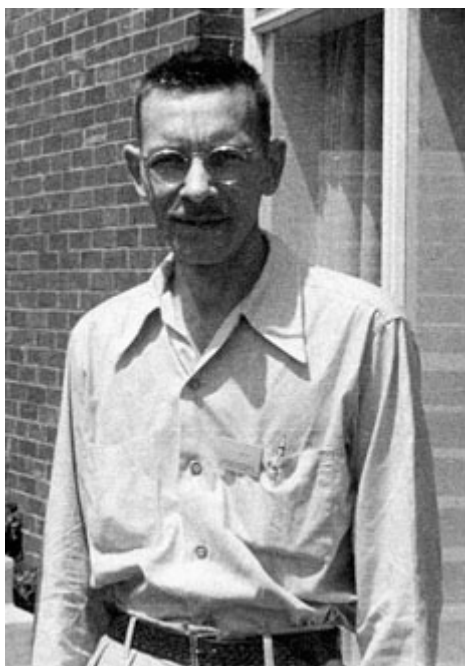
<https://www.flickr.com/photos/sanofi-pasteur/5280384448>



Polio victim in iron lung

[https://en.wikipedia.org/wiki/Iron\\_lung](https://en.wikipedia.org/wiki/Iron_lung)

## Station 3 Alfred Hershey:



By Unknown author -

<http://www.nndb.com/people/416/000130026/>, Public Domain

## Martha Chase:



Unknown author -

<http://bratpunkyg02.glogster.com/martha-chase/> Public Domain

Visit the following online sources to develop an explanation for their experiment. Or, direct students to one of the sources for them to read or view in class.

[https://en.wikipedia.org/wiki/Hershey%E2%80%93Chase\\_experiment](https://en.wikipedia.org/wiki/Hershey%E2%80%93Chase_experiment)

<https://embryo.asu.edu/pages/hershey-chase-experiments-1952-alfred-hershey-and-martha-chase>



Εθνική Νοτιοανατολική Χορδονατεδ Ινφραστρυκτηρε

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<https://www.khanacademy.org/science/biology/dna-as-the-genetic-material/dna-discovery-and-structure/v/hershey-and-chase-conclusively-show-dna-genetic-material>

#### Station 4

Rosalind Franklin



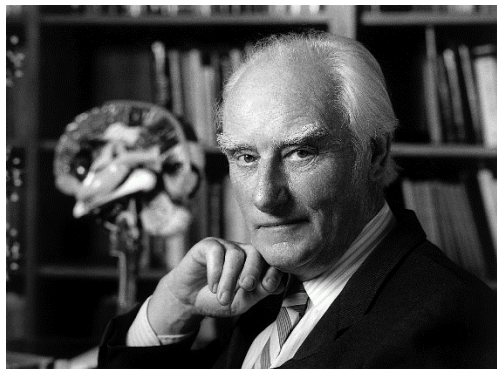
<https://www.flickr.com/photos/retusj/29107172585>

James Watson



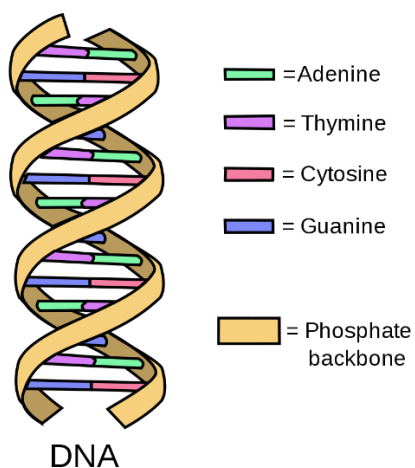
[https://en.wikipedia.org/wiki/James\\_Watson](https://en.wikipedia.org/wiki/James_Watson)

Francis Crick



[https://commons.wikimedia.org/wiki/File:Francis\\_Crick.png](https://commons.wikimedia.org/wiki/File:Francis_Crick.png)

Model of DNA [https://commons.wikimedia.org/wiki/File:DNA\\_simple2.svg](https://commons.wikimedia.org/wiki/File:DNA_simple2.svg)



Εθνική Ναυοτεχνηολογική Χοορδινατεδ Ινφραςτρυχτυρε

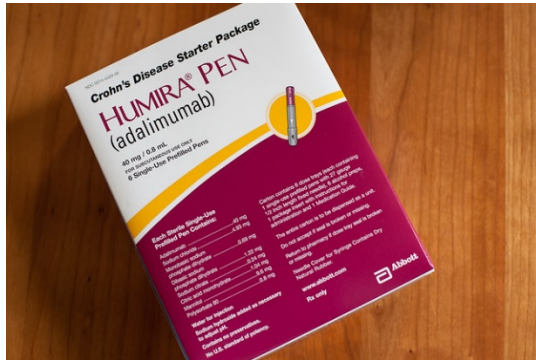
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## Station 5

### Humira Pen



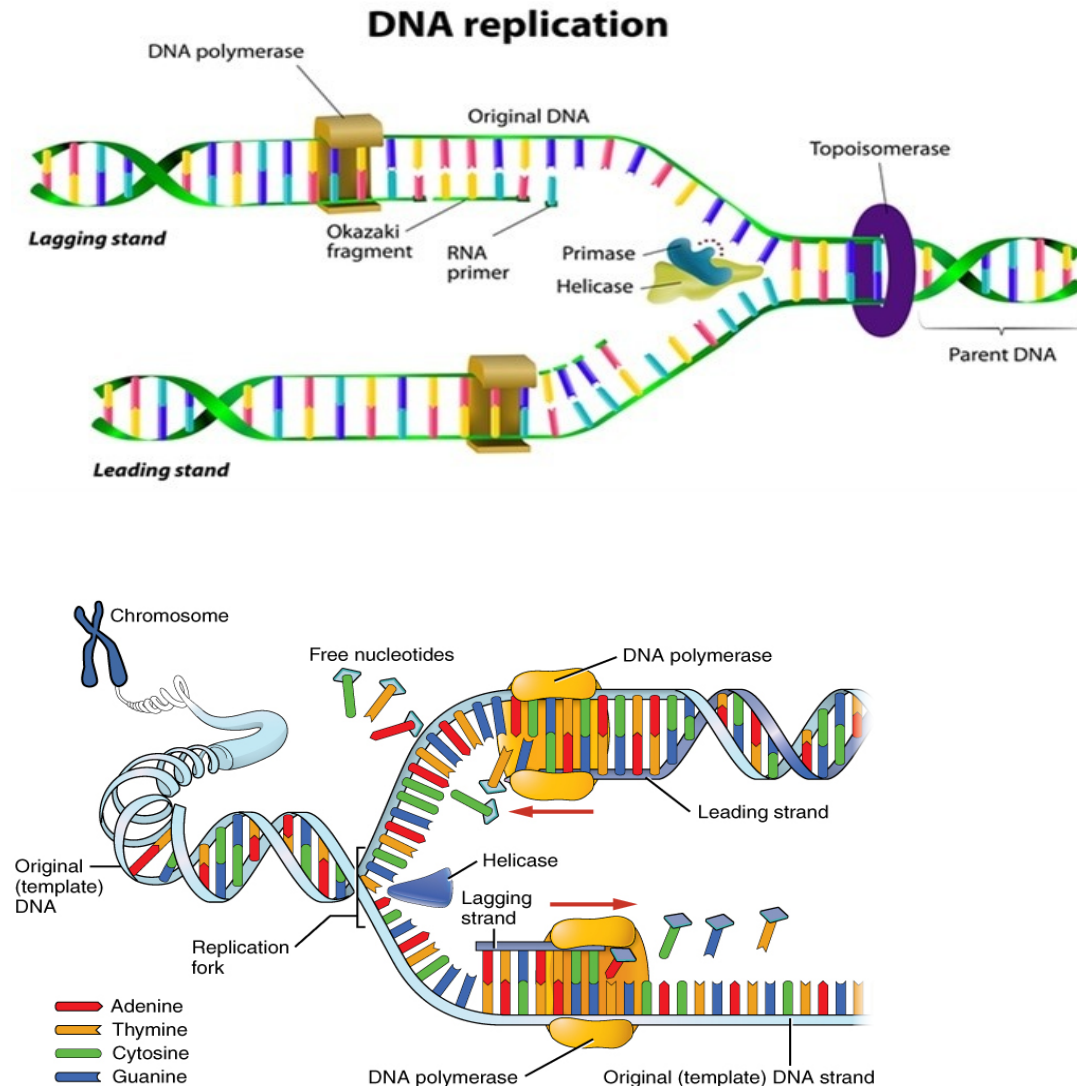
<https://www.flickr.com/photos/lyza/4423388174>

### Insulin



<https://commons.wikimedia.org/wiki/File:Insulin%3ADn.jpg>

Station 6 [https://commons.wikimedia.org/wiki/File:0323\\_DNA\\_Replication.jpg](https://commons.wikimedia.org/wiki/File:0323_DNA_Replication.jpg)



Εθνική Συντονιστική Αρχή Έρευνας και Τεχνολογίας

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## Station 7

Soybeans



Corn



Papaya



Yellow Squash



## Station 8



Featherless Chicken

<https://www.flickr.com/photos/bbum/7708764442>



Herman the Bull

<https://upload.wikimedia.org/wikipedia/commons/6/63/StierHerman-PeterMaasNaturalis2008.jpg>



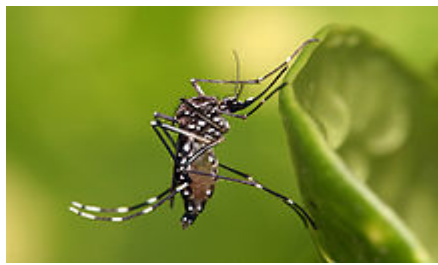
Εθνική Ναυοτεχνηολογική Χοορδινατεδ Ινφραστρυχτυρε

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Zebra fish to detect pollution  
<https://en.wikipedia.org/wiki/Zebra>



Altering mosquitos that carry Dengue Fever and  
 Sika Virus  
[https://en.wikipedia.org/wiki/Aedes\\_aegypti](https://en.wikipedia.org/wiki/Aedes_aegypti)



AquAdvantage Salmon  
[https://en.wikipedia.org/wiki/AquAdvantage\\_salmon](https://en.wikipedia.org/wiki/AquAdvantage_salmon)

**Station 9 is below on a separate page**

## Station 10

Google current news and media outlets for articles on GMO organisms and print some out.



Εθνική Nanοτεχνολογική Χοορδινάτεδ Ινφραστρυχτυρε

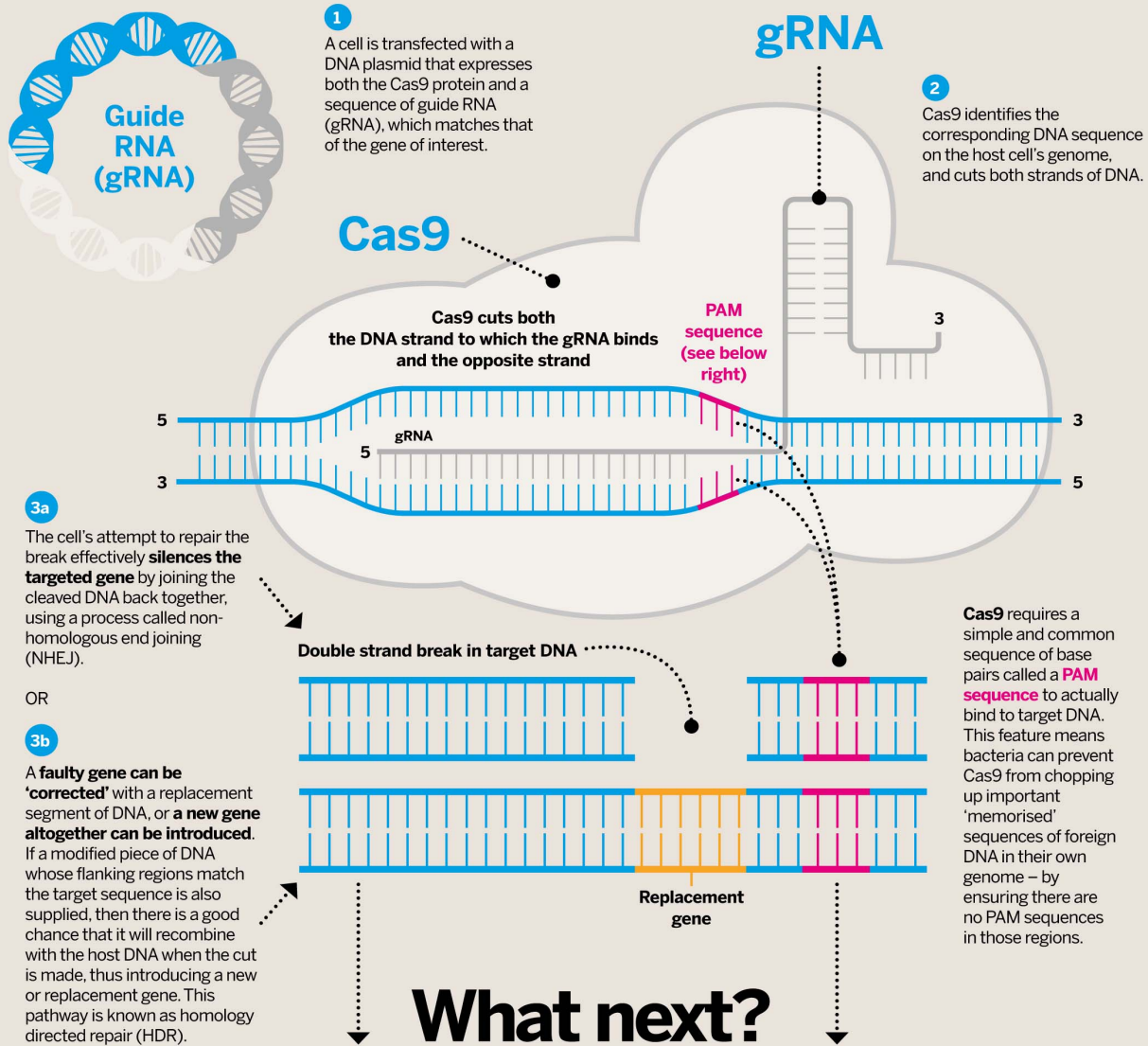
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# CRISPR-Cas9

## How the genome editor works



### FOOD AND LIVESTOCK MODIFICATION

Researchers have already created plants and mammals with edited genomes. It is hoped such technology could help boost productivity and improve food security.



### GENE DRIVE

Some genes are more likely to be passed on than others. If an 'edit' is linked to these genes, it will quickly spread through a wild population. That sounds alarming, but could help eradicate malaria-carrying mosquitos.



### GENE THERAPY

Genetic disease could be treated by introducing gene editing systems into affected cells. Researchers in the USA are trialling this to treat HIV by knocking out the gene for the specific T-cell receptor that the virus targets.



### HUMAN GERM LINE

Modifying human embryos, sperm or eggs would introduce changes to the genome of future generations. Some argue that other techniques, such as embryo screening, can just as effectively prevent genetic disease.



### DESIGNER ORGANISMS AND MORE...

In future, could babies be 'designed' with a genome of our choosing? Could amateur biologists do their own gene editing outside regulatory systems?