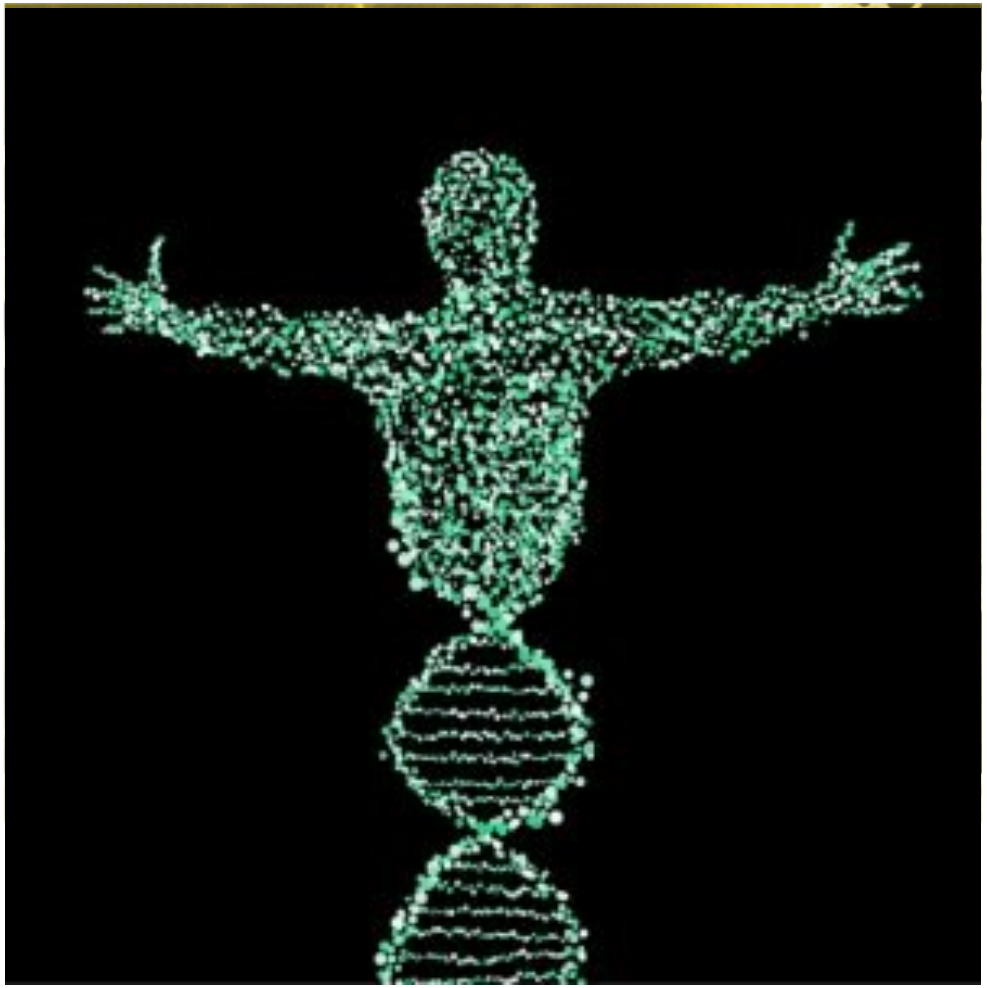
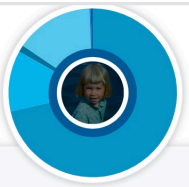
Salmonella Pathogenicity Genes

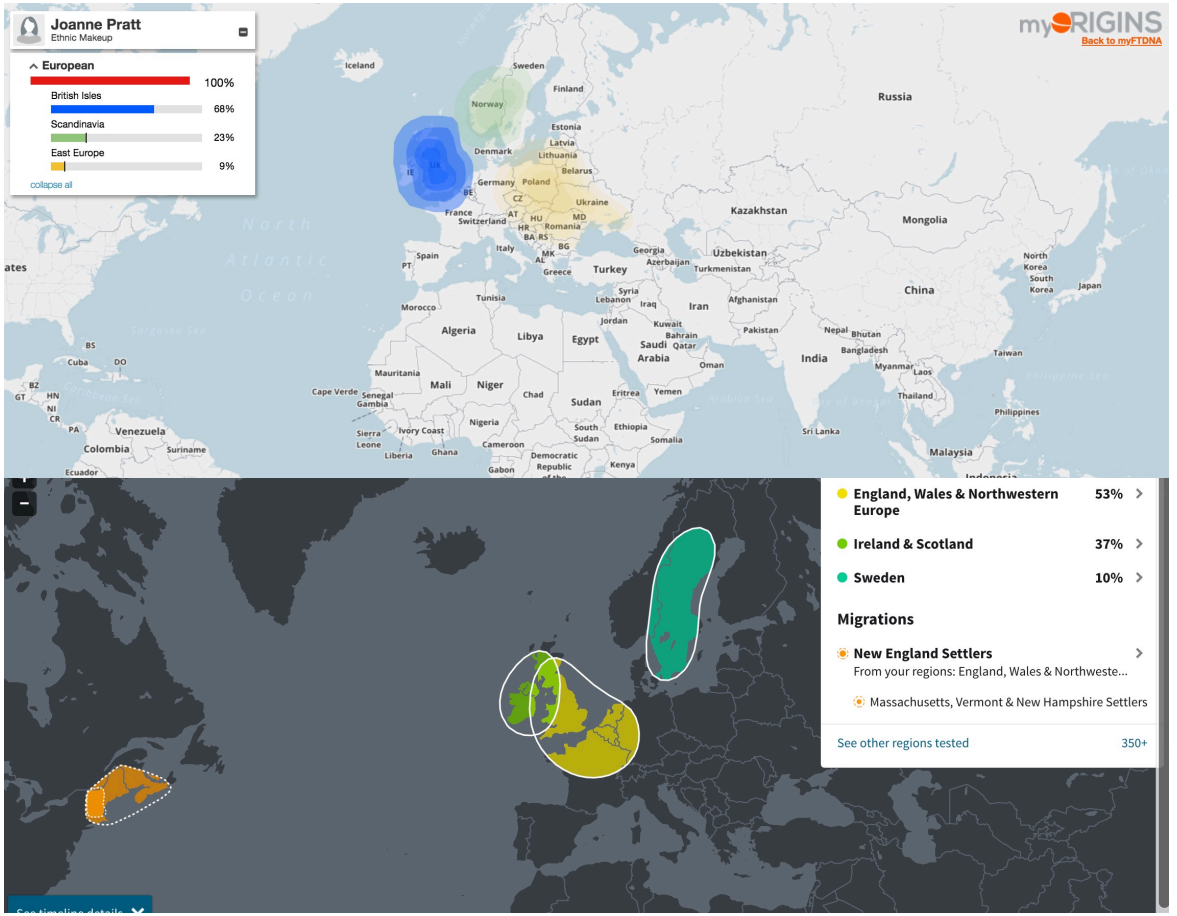


joanne.pratt@olin.edu



Joanne Pratt **100%**

European	100.0%
British & Irish	71.4%
United Kingdom, Ireland	
French & German	11.7%
Scandinavian	1.3%
Broadly Northwestern European	14.9%
Broadly Southern European	0.3%
Broadly European	0.3%



The New York Times

How an Unlikely Family History Website Transformed Cold Case Investigations

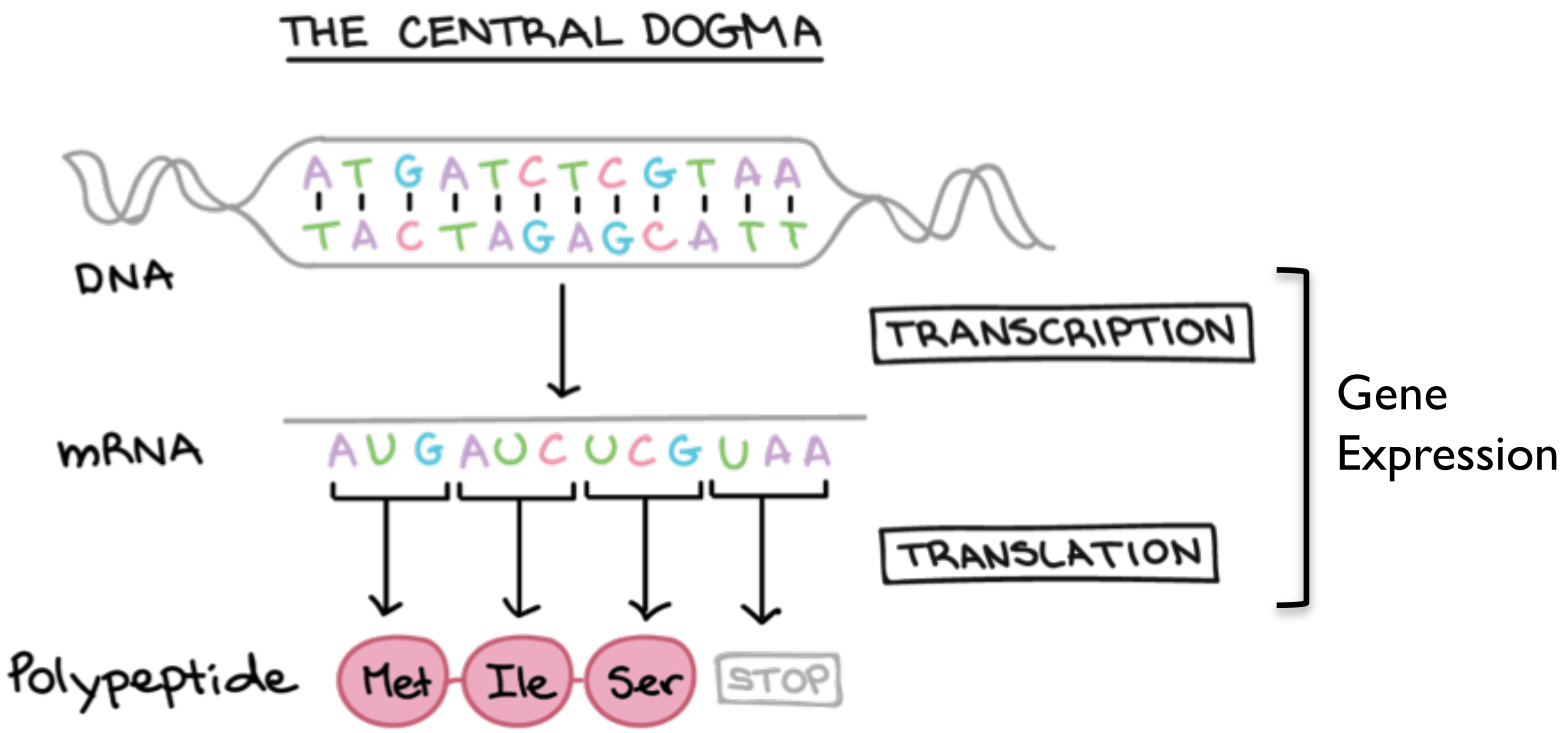
Fifteen murder and sexual assault cases have been solved since April with a single genealogy website. This is how GEDmatch went from a casual side project to a revolutionary tool.

True or False?

- At le body are bact
- Som our cells
- If yo in your body
- Han

Central Dogma of Molecular Biology

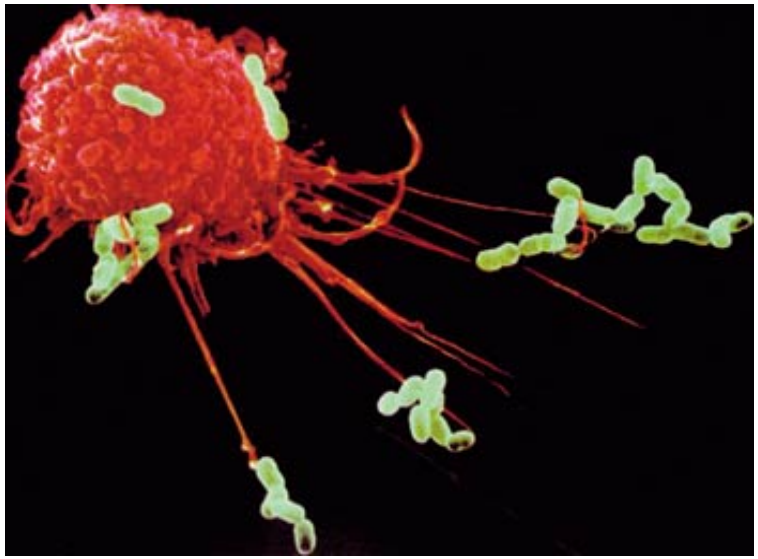
(aka DNA makes RNA makes Protein)



Source: Khan Academy

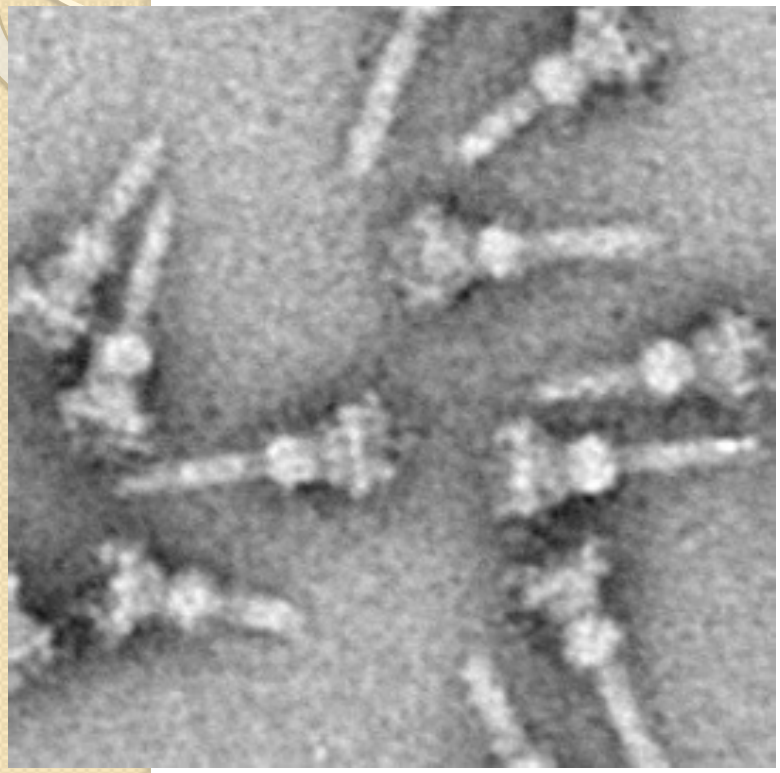
What do Salmonella need to do to survive?

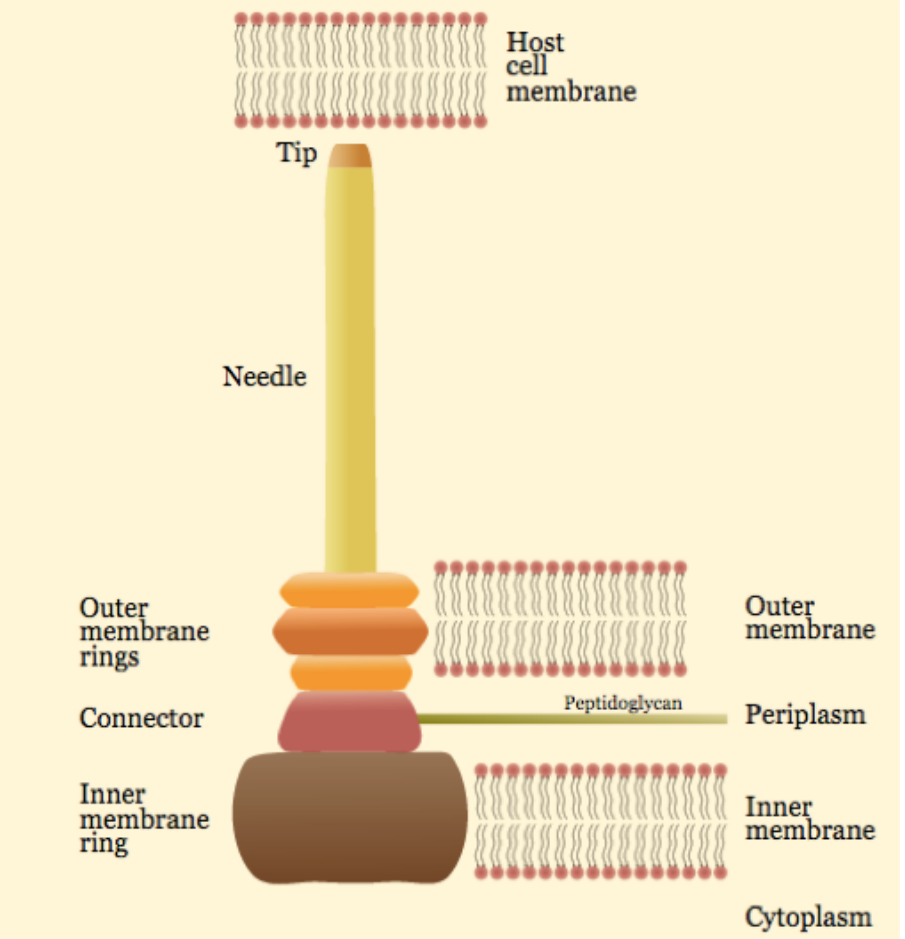
- Get inside your body
- Survive the stomach environment
- Get inside cells
- Avoid the immune system
- Acquire nutrients
- Reproduce



http://m.harunyahya.com/tr/Books/3752/The-Miracle-In-The-Cell/chapter/4966/The-Cell-Membrane

Transmission EM and schematic of T3SS





Interpreting Blast: bacteria classifications

Salmonella species: enterica and bongori

subspecies, serovar, serotype (cell surface proteins)

- Typhi, Typhimurium, Enteritidis, Newport, Javiana, Heidelberg

strain, subtype

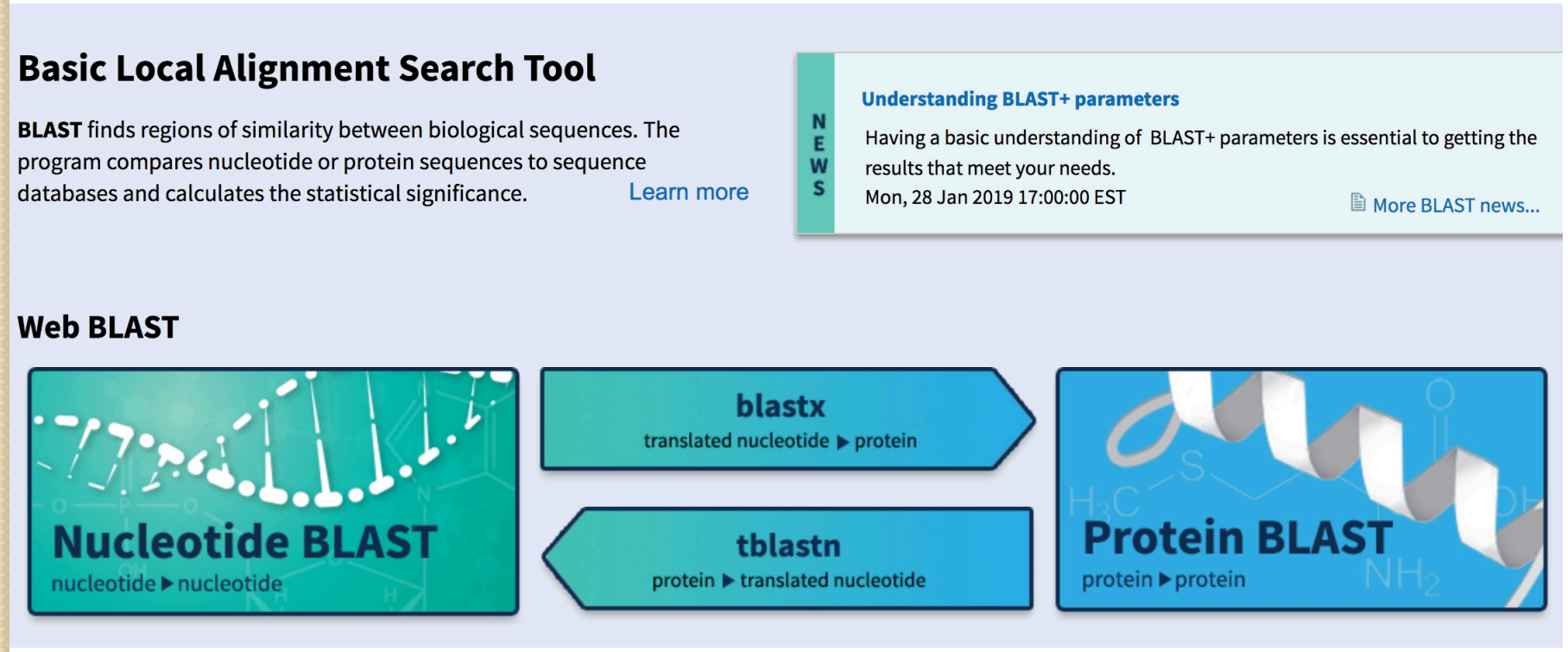
- DT2, O8-1736, U288

Interpreting Blast: virulence sequences and protein names

- Salmonella Pathogenicity Islands (SPI's)
  - Regions of DNA where several genes essential for virulence are clustered
- Type (I, II, III) Secretion Systems (ex. T3SS)
  - Protein Groups associated with virulence
- Fimbriae, Chaperone, ATP synthase, Protein tyrosine kinase, ABC Transporter
  - Examples of proteins associated with virulence
- GAP, PTP, PTK
  - Examples of protein domains

Blast DNA or protein sequences

Blast



Protein Blast

surface presentation of antigens, partial [Salmonella enterica subsp. enterica serovar Typhimurium]

GenBank: CAA51921.1

Identical Proteins FASTA Graphics

Your turn to Blast

Mystery sequence 1:

You haven't been feeling well lately, and your doctor takes a few cells from you for full genome sequence analysis. In addition to your human cells, the doctor also finds the unknown mystery sequence 1. Should you be concerned about this finding?

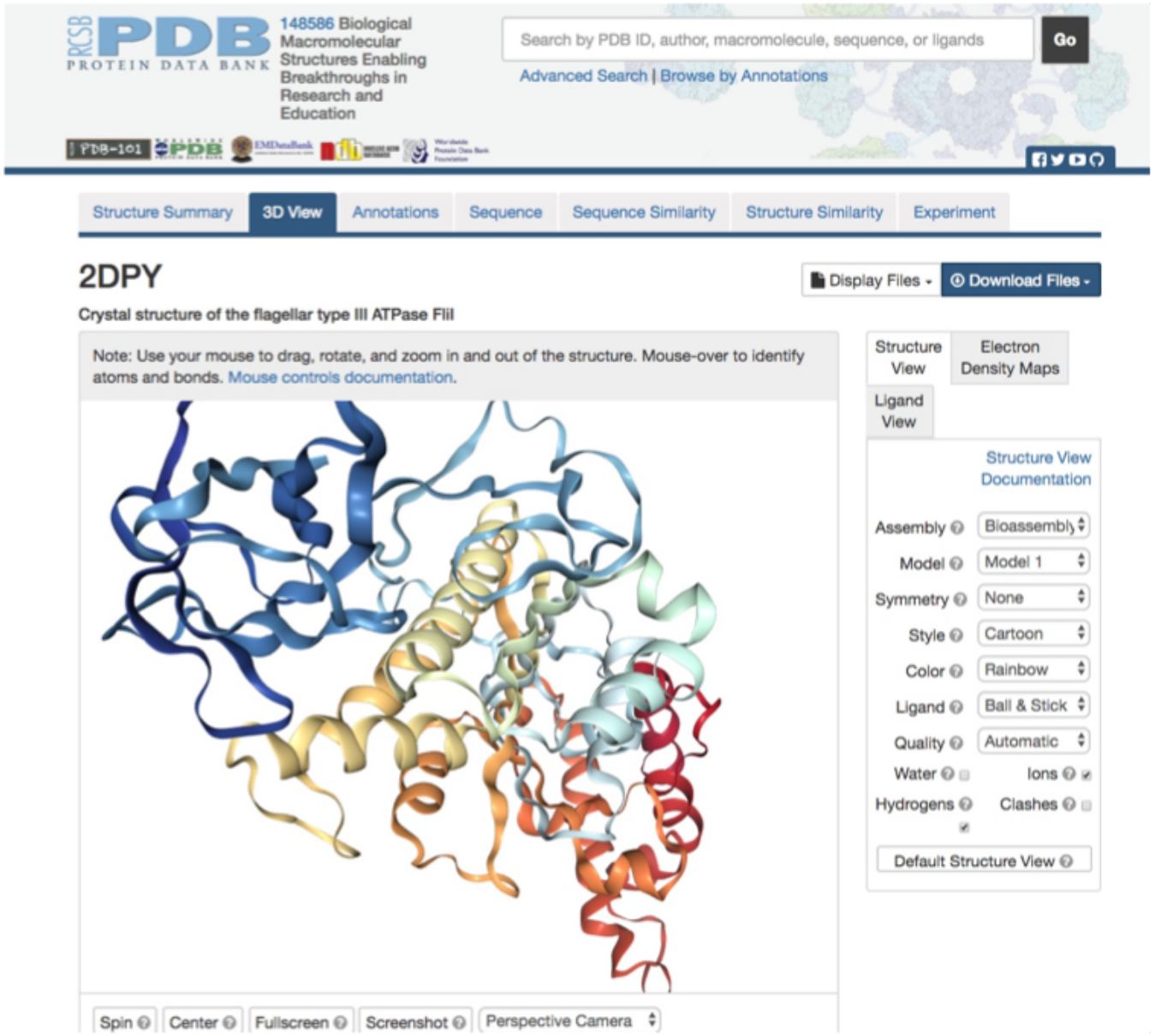
Mystery sequence 11:

You want to learn more about your ancestry, and you have your DNA sequenced. You get the result of one of your genes, but it isn't immediately clear what it tells you about your ancestry. Google the gene name (after Blasting to get the name) to see if there is a hint about your ancestry.

Blat

- Alternative to Blast created at UCSC
- Faster due to the database that is queried

Protein Structure: Protein Data Bank



Salmonella virulence factors affect normal cellular pathways and functions

KEGG - Table of Contents

Sources for protein information

- Protein Blast (or Blat) to find related protein sequences (possibly with already known functions)
- Protein Data Bank for structural information
- Kegg database for intracellular pathway information
- PubMed/Google scholar articles for studies published on the protein

Questions?

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