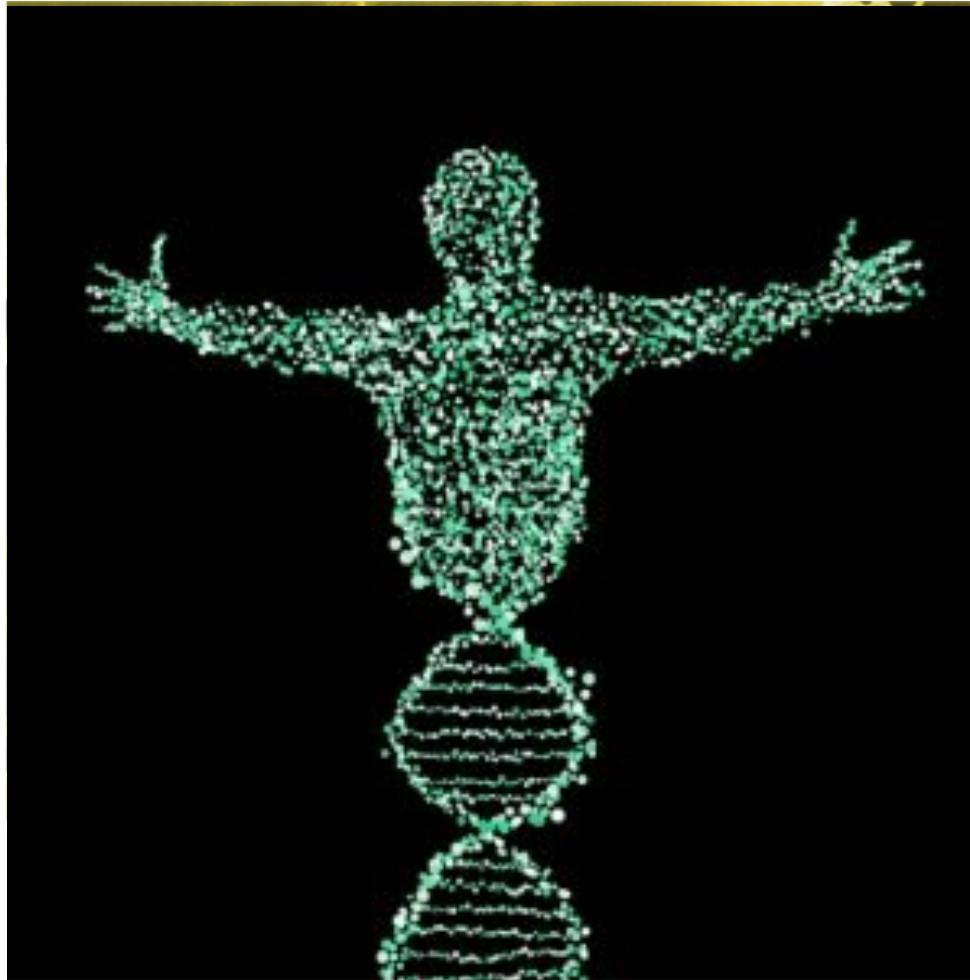
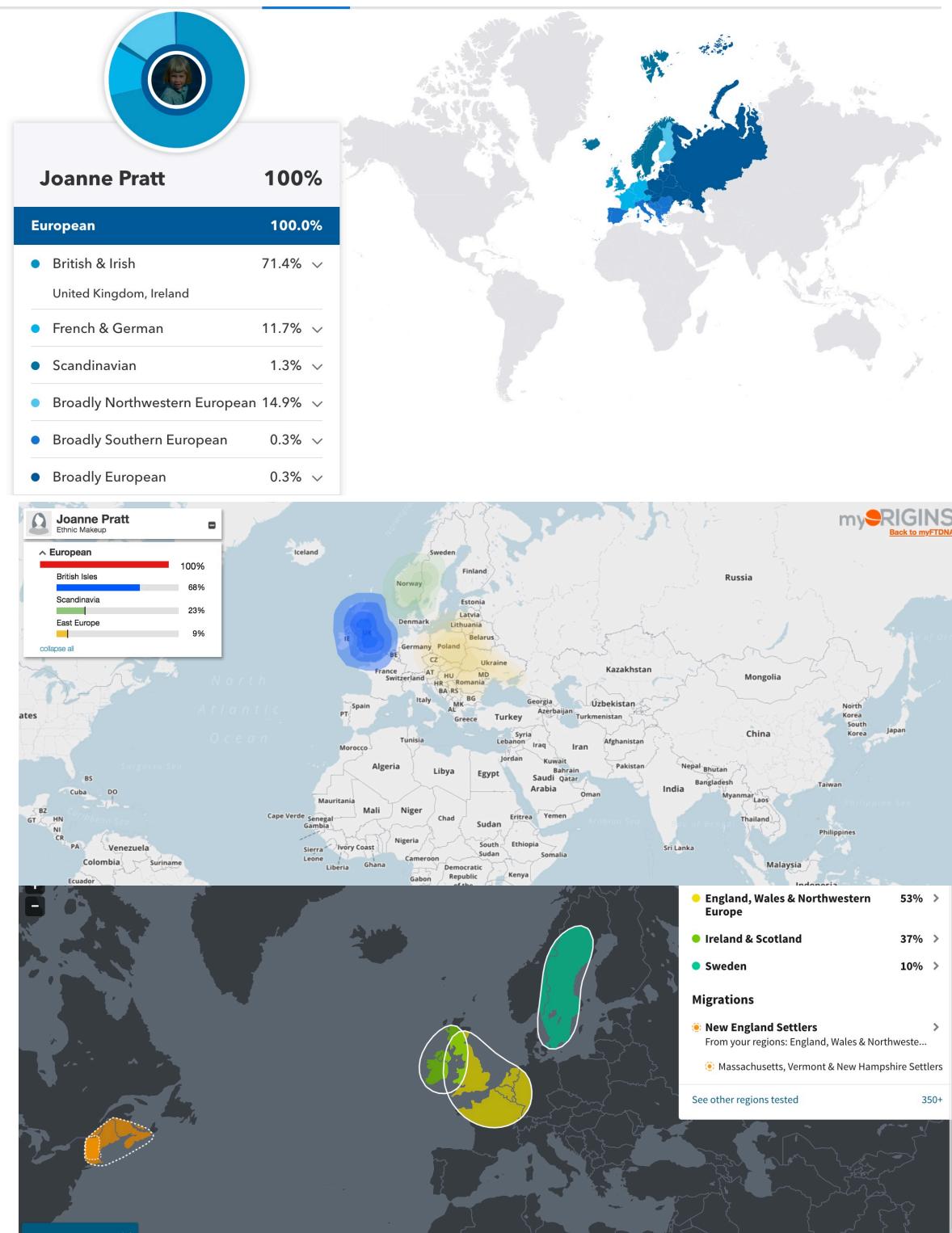


Salmonella Pathogenicity Genes



joanne.pratt@olin.edu



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.

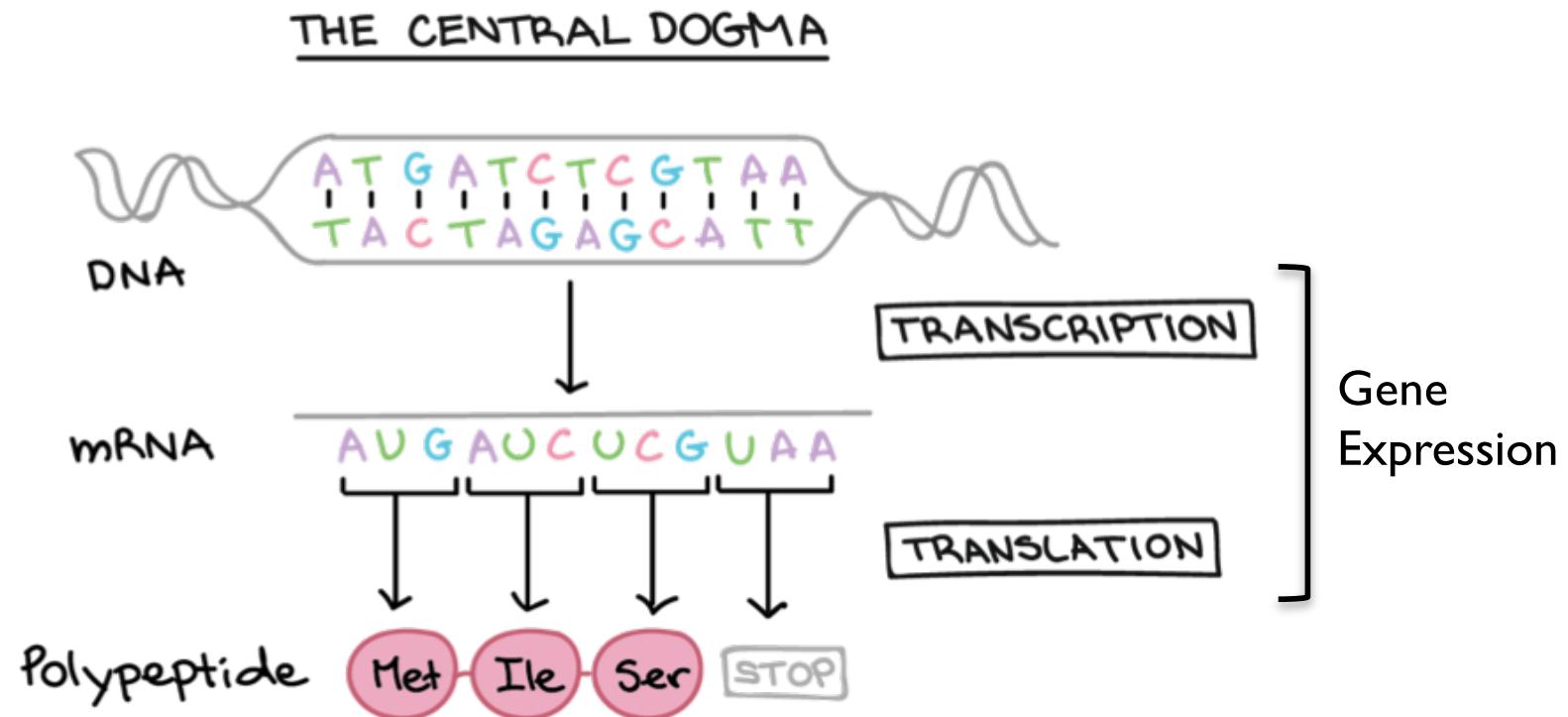
True or False?

- At least **1000 species** of bacteria in your body are
- Some of our cells
- If you have **1000 species** of bacteria in your body
- Hand washing



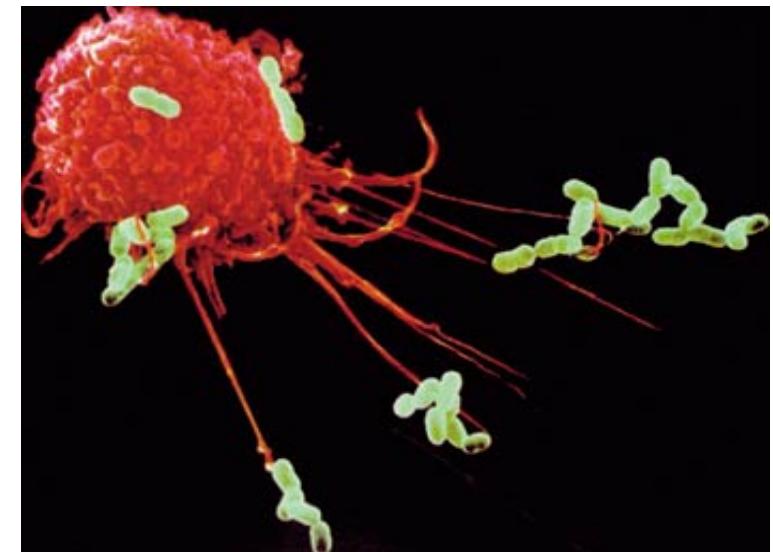
Central Dogma of Molecular Biology

(aka DNA makes RNA makes Protein)



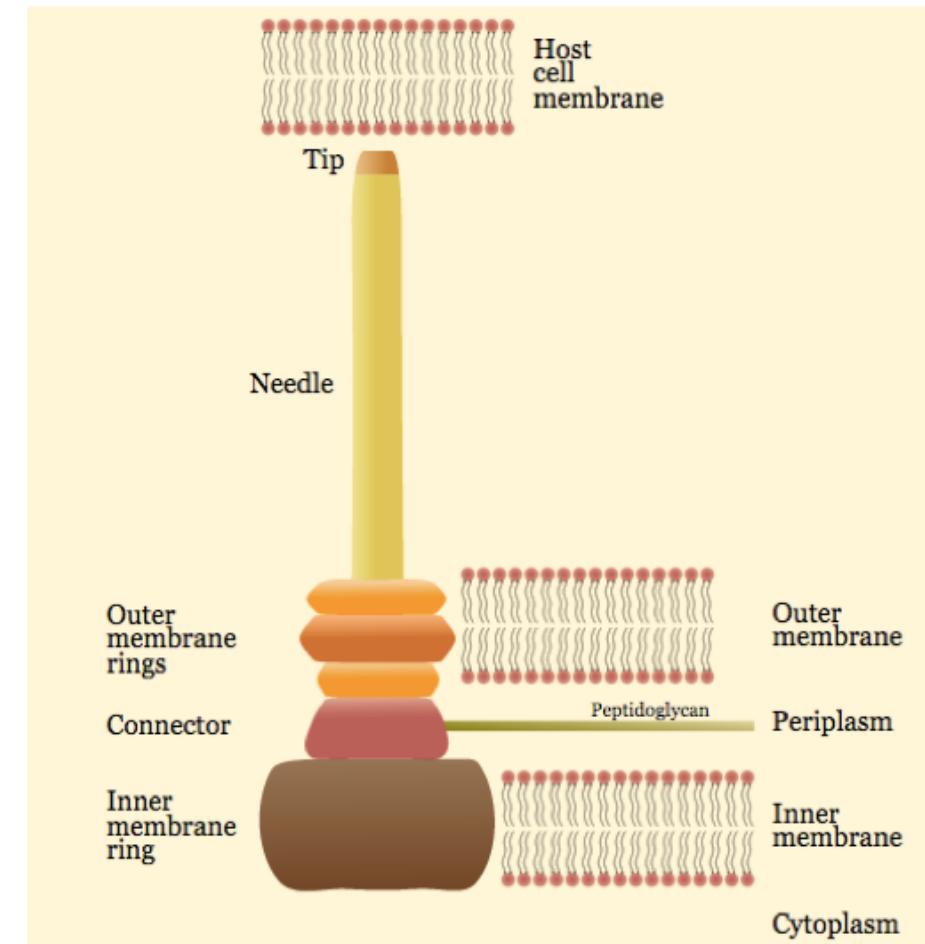
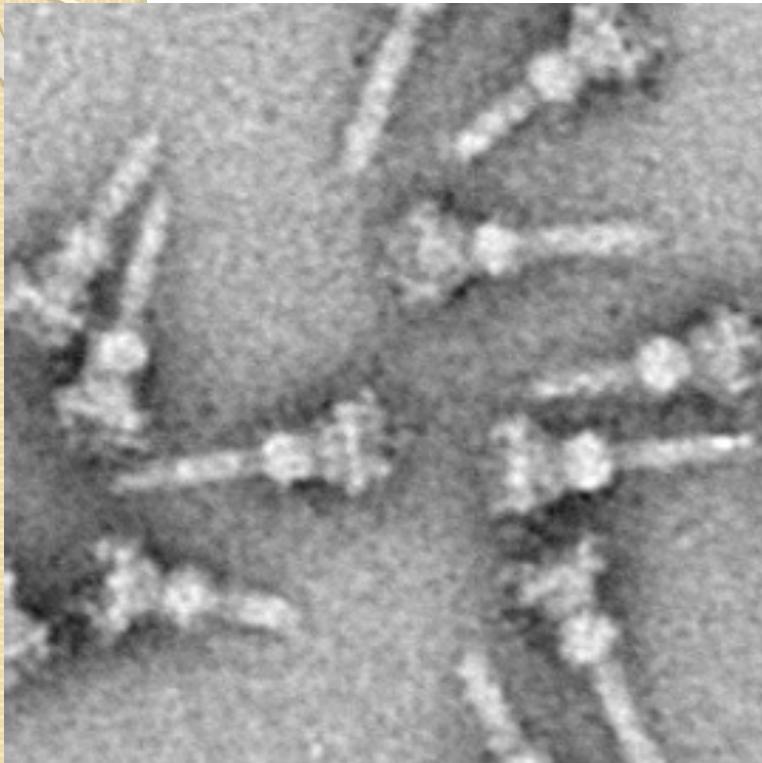
What do Salmonella need to do to survive?

- 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

Basic Local Alignment Search Tool

BLAST finds regions of similarity between biological sequences. The program compares nucleotide or protein sequences to sequence databases and calculates the statistical significance.

[Learn more](#)

N
E
W
S

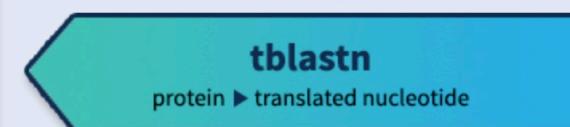
Understanding BLAST+ parameters

Having a basic understanding of BLAST+ parameters is essential to getting the results that meet your needs.

Mon, 28 Jan 2019 17:00:00 EST

[More BLAST news...](#)

Web 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 I:

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 I. Should you be concerned about this finding?

Mystery sequence II:

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

PDB PROTEIN DATA BANK 148586 Biological Macromolecular Structures Enabling Breakthroughs in Research and Education

Search by PDB ID, author, macromolecule, sequence, or ligands **Go**

Advanced Search | Browse by Annotations

PDB-101 EMDDataBank Worldwide Protein Data Bank Resource

Structure Summary **3D View** Annotations Sequence Sequence Similarity Structure Similarity Experiment

2DPY Crystal structure of the flagellar type III ATPase Fil

Note: Use your mouse to drag, rotate, and zoom in and out of the structure. Mouse-over to identify atoms and bonds. Mouse controls documentation.

The image shows a complex protein structure composed of multiple subunits, each represented by a distinct color-coded ribbon. The subunits are arranged in a large, roughly spherical or ring-like assembly. The colors used for the different subunits include various shades of blue, yellow, green, orange, red, and purple. The overall structure is highly intricate, with many loops and protrusions.

Display Files - Download Files -

Structure View Electron Density Maps

Ligand View

Structure View Documentation

Assembly Bioassembly

Model Model 1

Symmetry None

Style Cartoon

Color Rainbow

Ligand Ball & Stick

Quality Automatic

Water Ions

Hydrogens Clashes

Default Structure View

Spin Center Fullscreen Screenshot Perspective Camera

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?

joanne.pratt@olin.edu