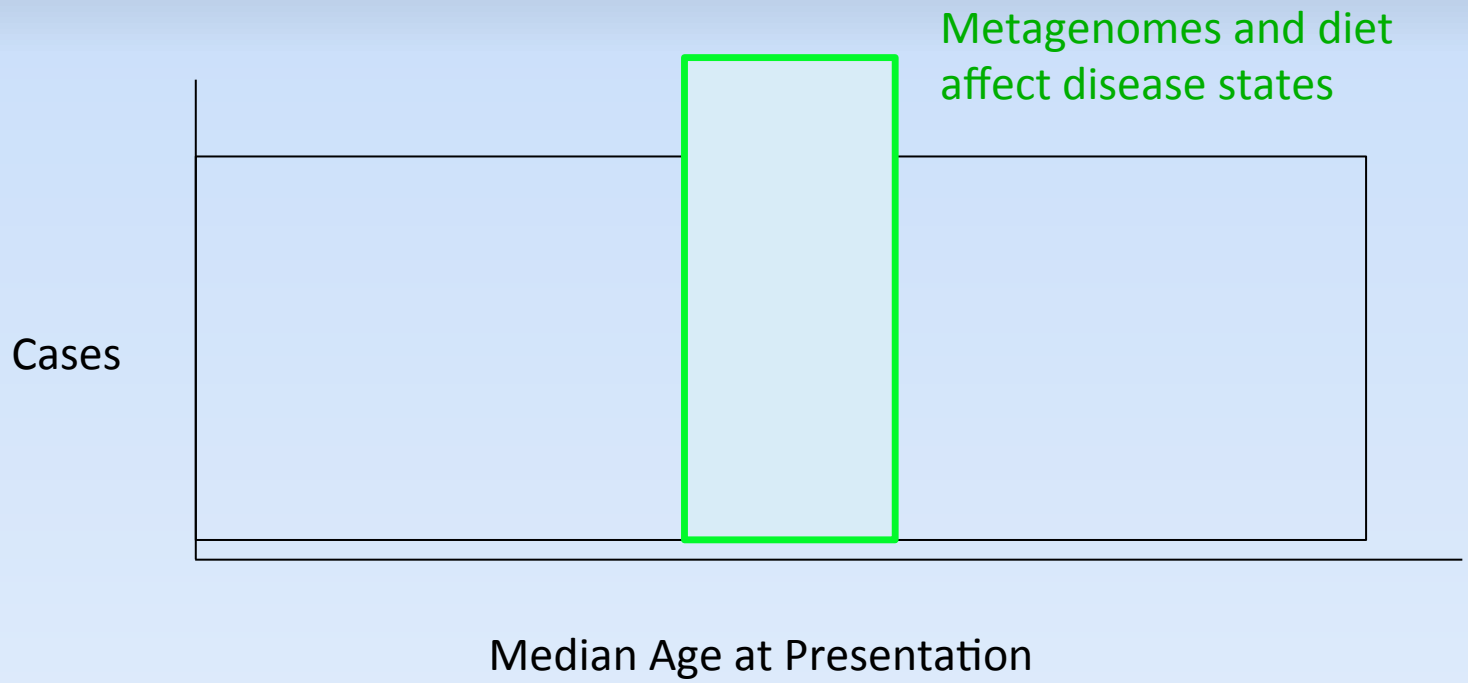
Rethinking Disease



A completely hypothetical example to Illustrate a point

Metagenomics

We have ~10 trillion human cells in and on our bodies

We have ~100 trillion bacterial cells in and on our bodies

Antibiotic Resistance

CDC Home

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People.™

SEARCH

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Antibiotic / Antimicrobial Resistance

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- Education Campaigns
- Interagency Task Force on Antimicrobial Resistance
- Public Health Action Plan
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- Laboratory Testing & Training Resources
- **Threat Report 2013**

Antibiotic / Antimicrobial Resistance

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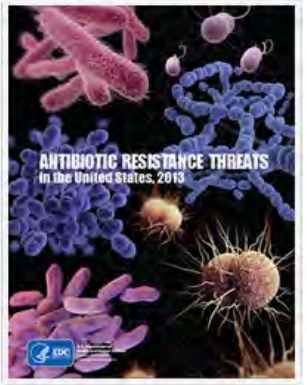
Threat Report 2013

This report, *Antibiotic resistance threats in the United States, 2013* gives a first-ever snapshot of the burden and threats posed by the antibiotic-resistant germs having the most impact on human health.



Each year in the United States, at least 2 million people become infected with bacteria that are resistant to antibiotics and at least 23,000 people die each year as a direct result of these infections. Many more people die from other conditions that were complicated by an antibiotic-resistant infection.

Antibiotic-resistant infections can happen anywhere. Data show that most happen in the general community; however, most deaths related to antibiotic resistance happen in healthcare settings such as hospitals and nursing homes.

What's in the Report

Foreword [page 5]

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Introduction [page 11]

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Antibiotic Resistance

NCBI Resources How To Sign in to NCBI

Pathogen Detection

NCBI Pathogen Detection integrates bacterial pathogen genomic sequences originating in food, environmental sources, and patients. It quickly clusters and identifies related sequences to uncover potential food contamination sources, helping public health scientists investigate foodborne disease outbreaks.

Getting Started

- About the NCBI Pathogen Detection project
- Pathogen Detection FAQ
- Submitting data for real time analysis
- Download analysis results

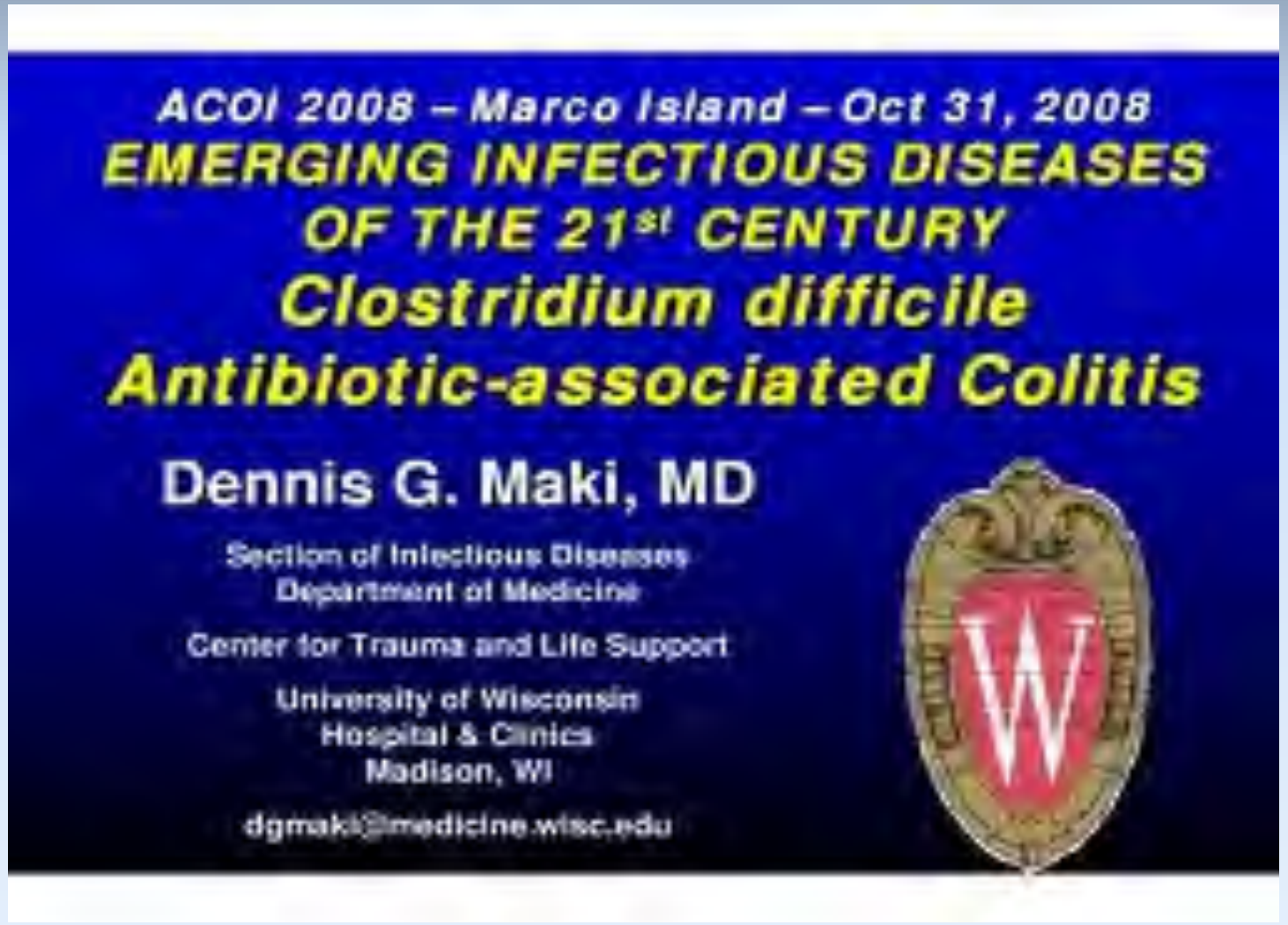
Success/News Stories

- CDC investigates Listeria linked to Caramel apples
- CDC investigates Listeria in ice cream products
- Food Quality and Safety article on foodborne pathogen project
- FDA working on including industry in food safety project

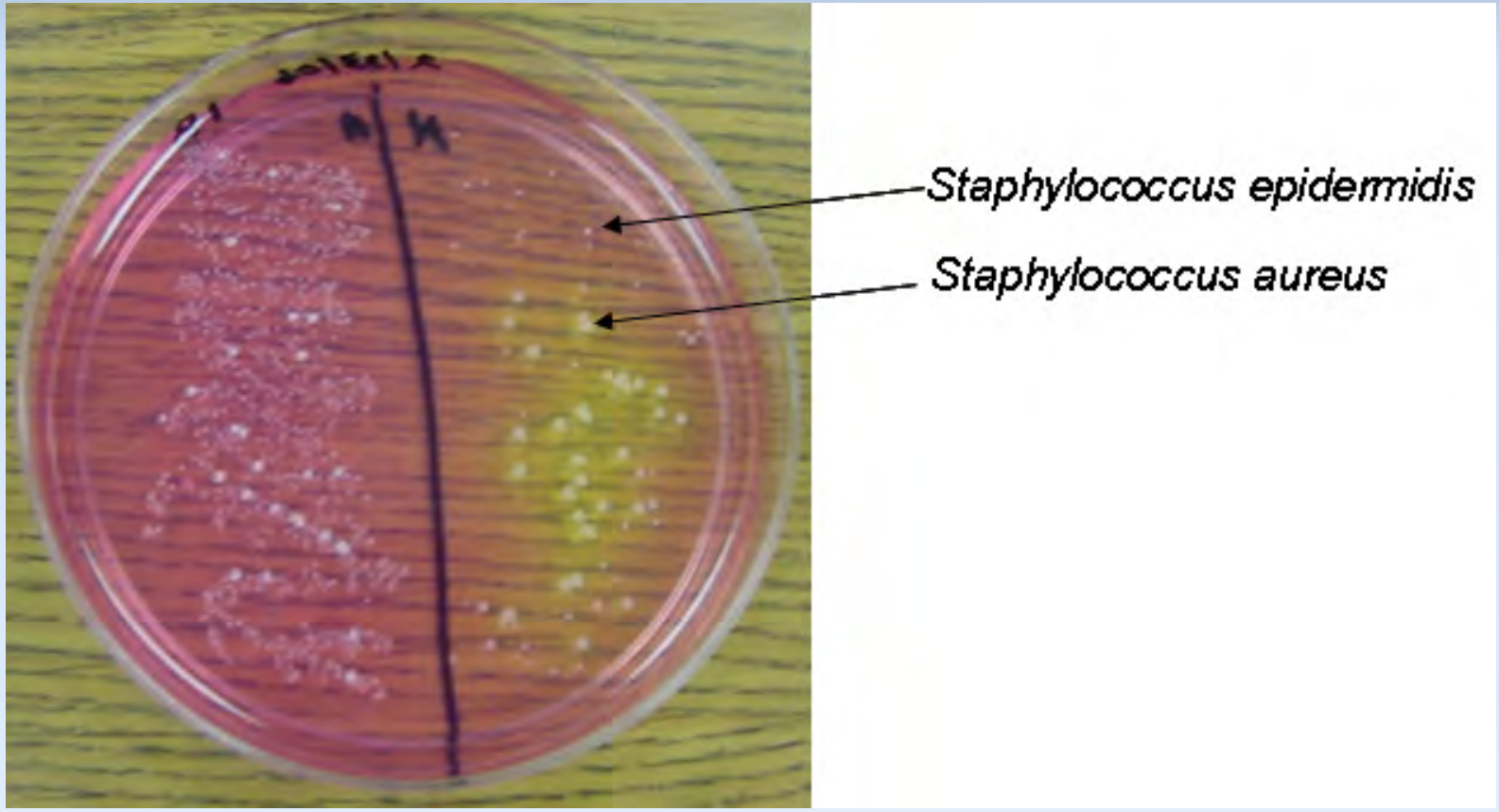
Related Projects

- National Database for Antimicrobial Resistant Organisms (NDARO)
- Submitting antibiotic resistance phenotypes
- Submitting beta lactamases
- Beta lactamase resources
- List of samples with antibiotic resistant phenotypes

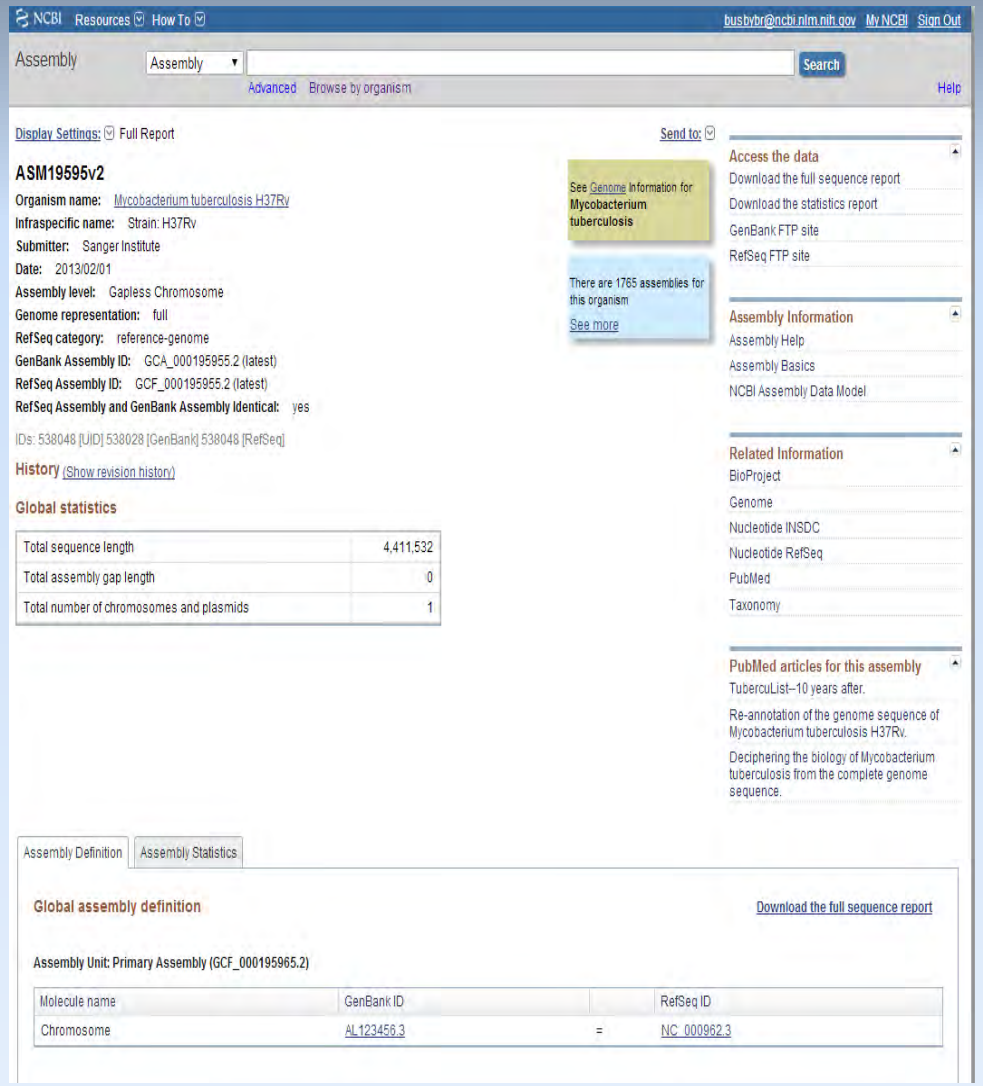
Clostridium dificile



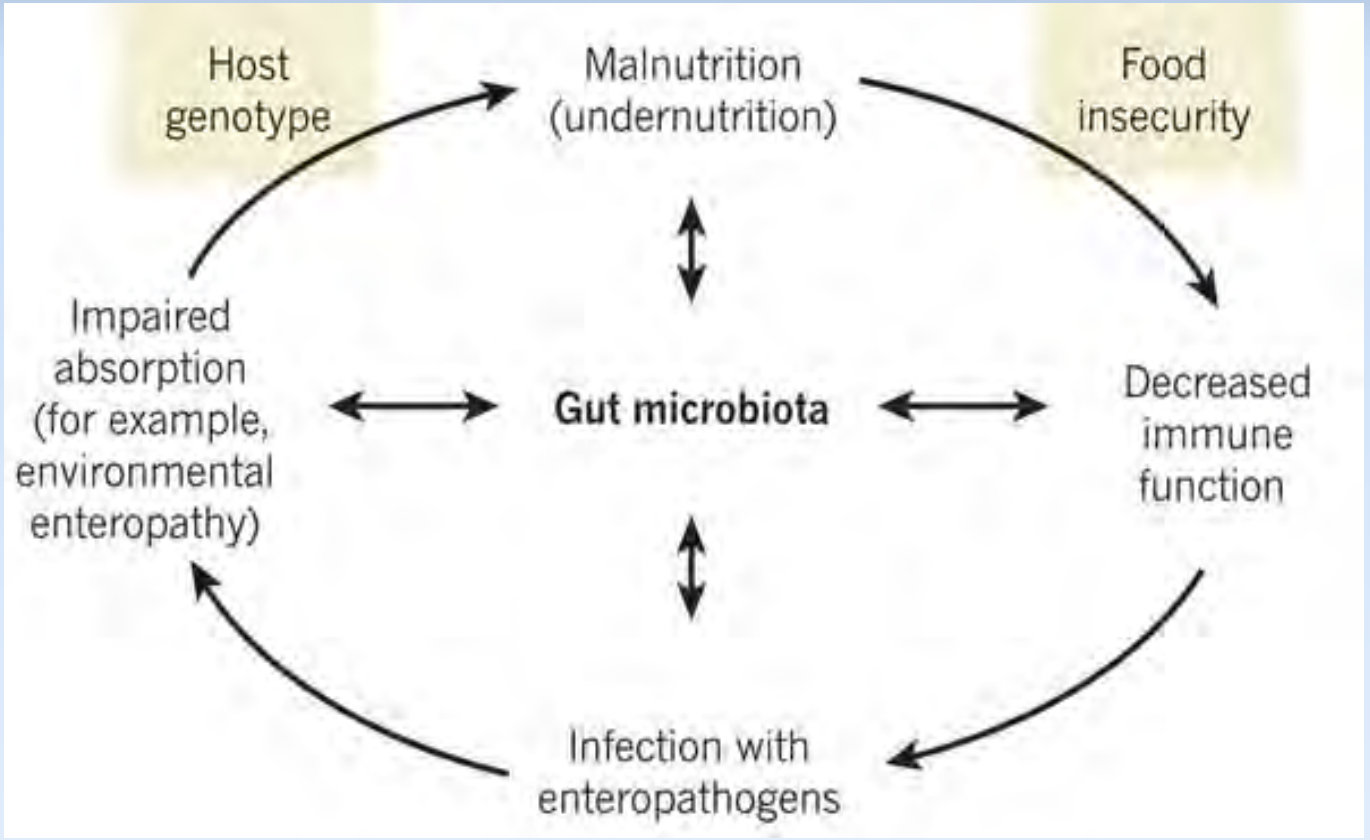
Staphylococcus epidermiditis



Where to Get the Genomes

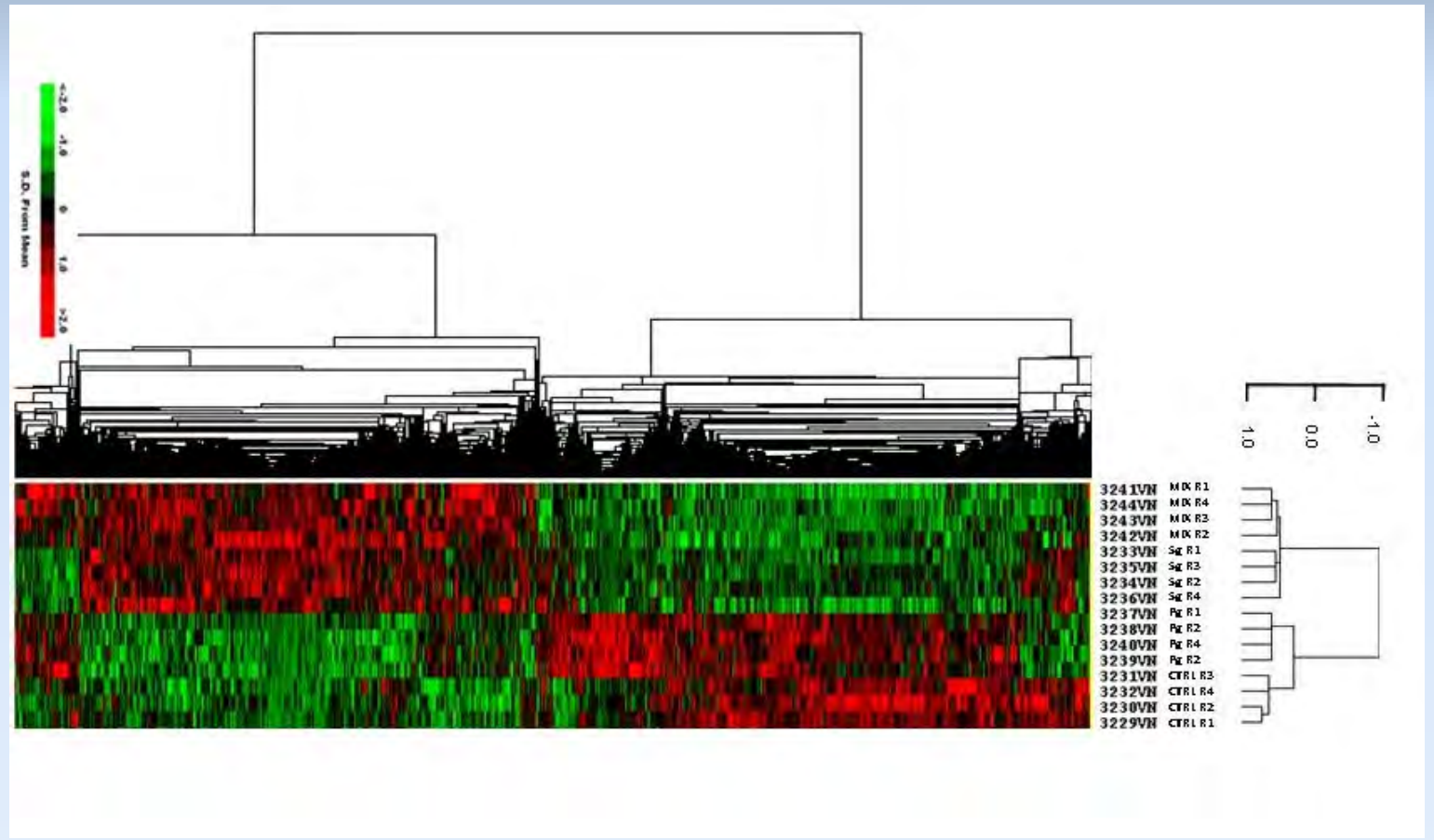


Metagenomics



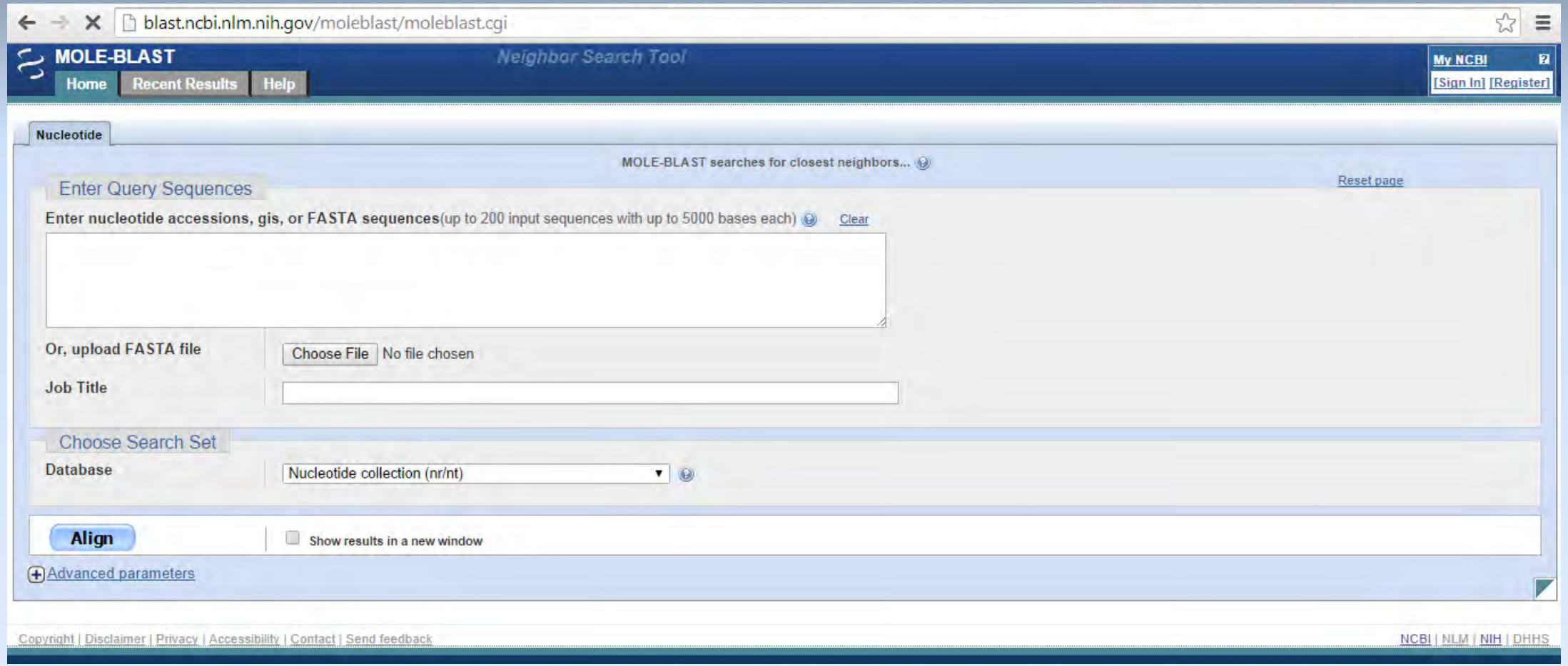
Metagenomics

Affects transcription in gut epithelia

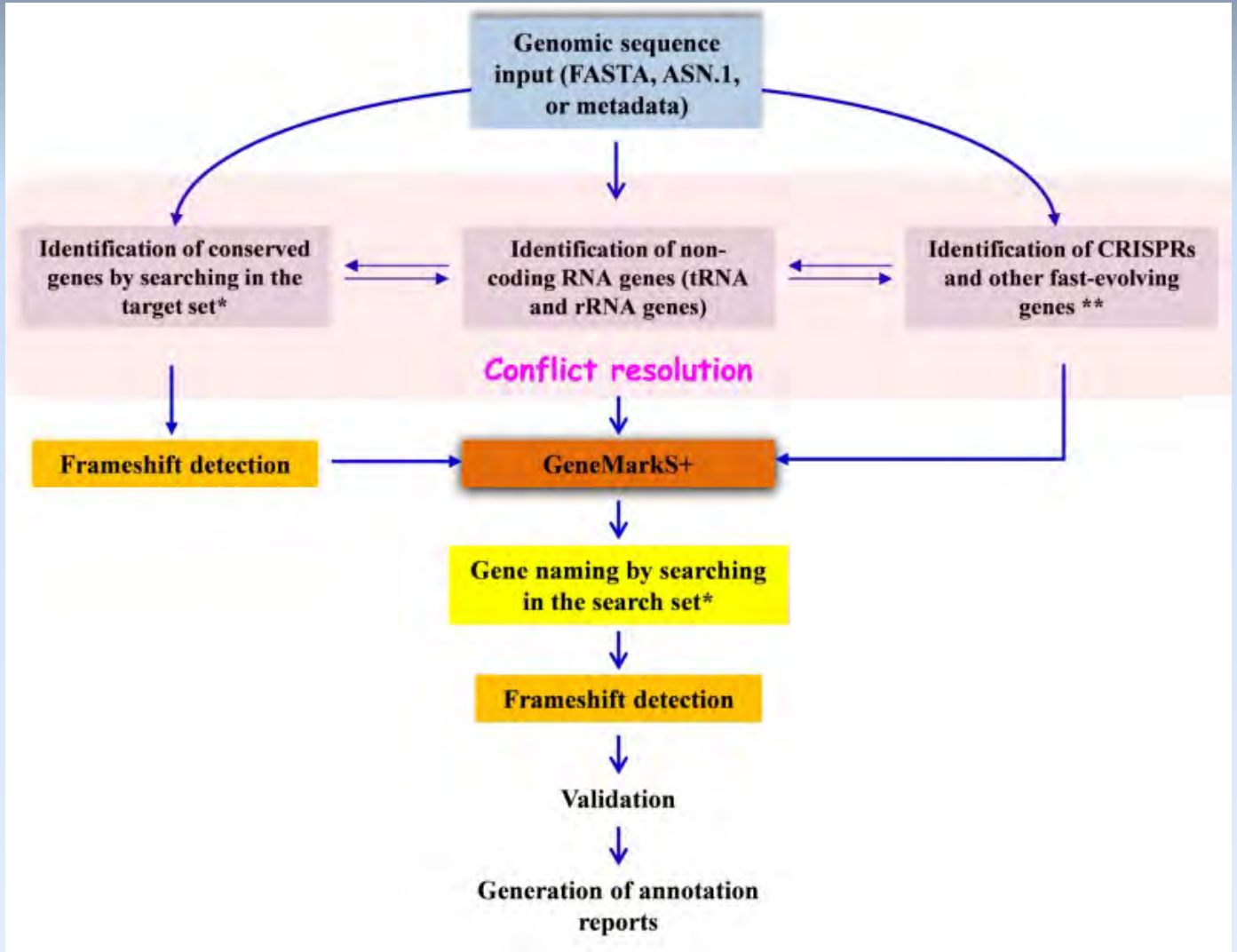


http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2736203/figure/F1/

MOLE-BLAST: BLAST for Metagenomics



How Prokaryotic Genomes are Annotated at NCBI



Foodborne Pathogens

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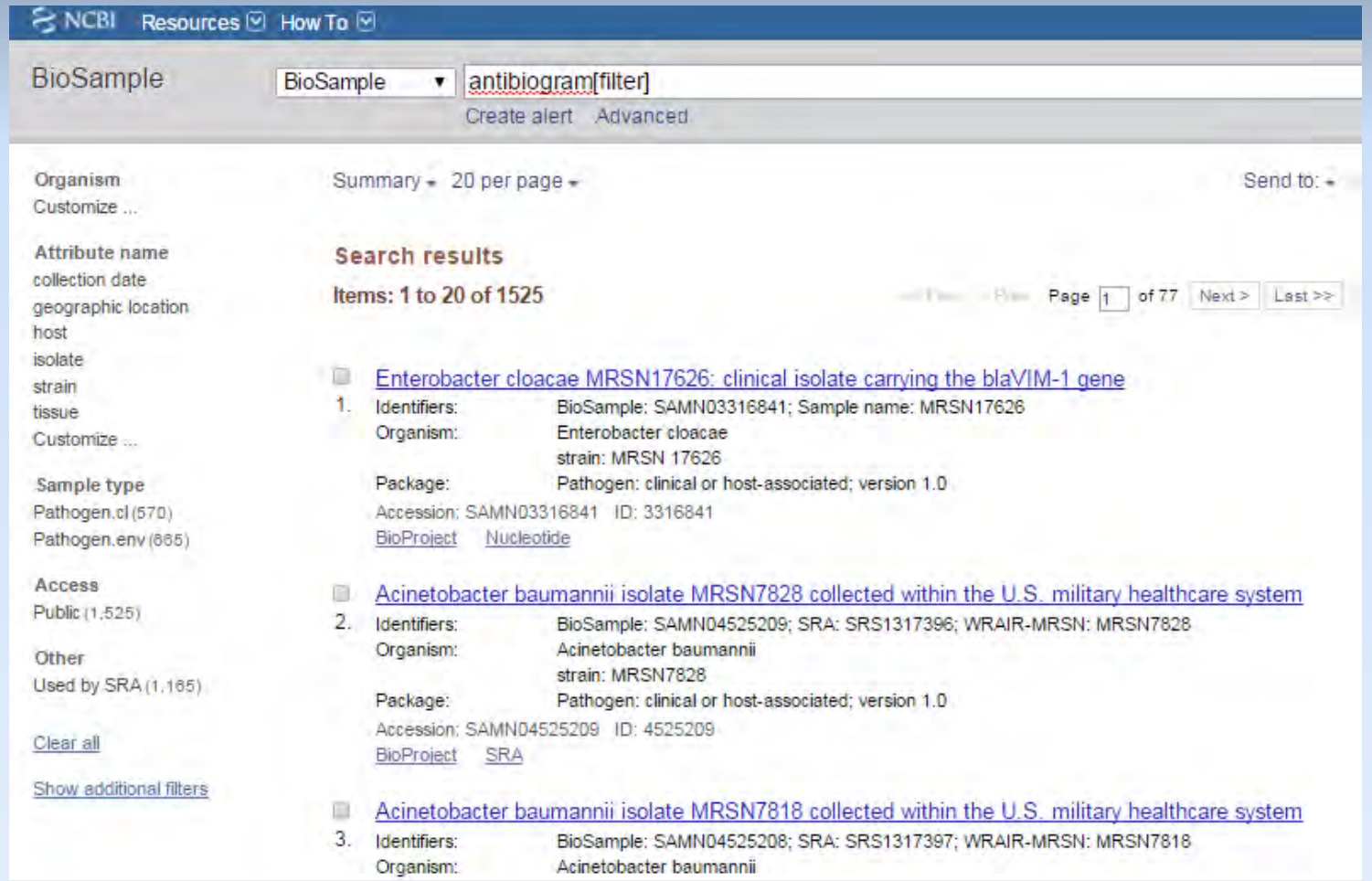
Foodborne Pathogens



Foodborne Pathogens

List of Pathogens

Currently the collaborative project is focusing on sequencing and analyzing the four bacterial groups that are the major causes of foodborne illness in the US:

- Campylobacter
- Escherichia coli and Shigella
- Listeria
- Salmonella

Several other clinically relevant pathogens have been added with more expected to follow:

- Acinetobacter
- Klebsiella pneumonae