

# Challenges & Opportunities for Standardized Reference Databases – FDA ARGOS



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**Global Good – NGS & Dx meeting  
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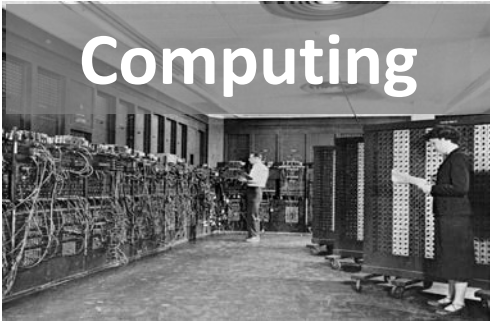


# Disclaimer

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**Opinions are my own**





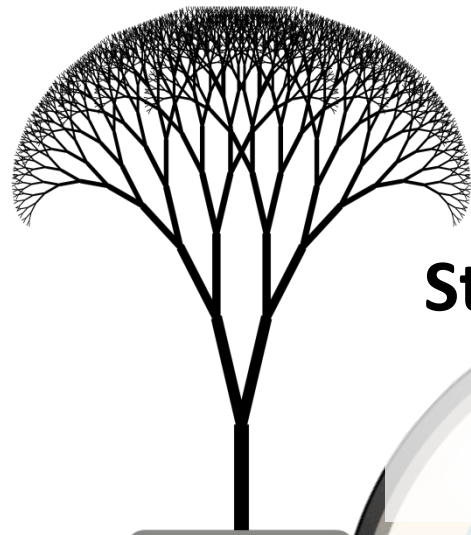
Computing

0111011100110  
0101011101010



Next Generation Sequencing (NGS)

cgg aca cac  
aaa aag aaa



Standardized  
Reference  
Database



NGS Dx



NIST

Progress

# Reference Genome Gap: Ebola

## Endemic African Diseases

Chikungunya virus  
Crimean-Congo  
Hemorrhagic Fever virus  
Dengue virus serotype 1  
Dengue virus serotype 2  
Dengue virus serotype 3  
Dengue virus serotype 4

## Ebola virus

Lassa virus  
Marburg virus (Angola)  
Marburg virus (Ci67)

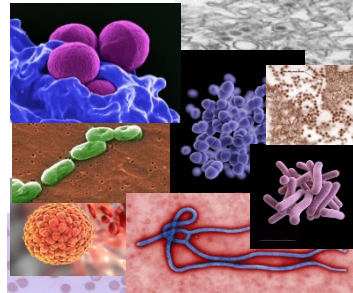
## Plasmodium falciparum

Rift Valley fever virus  
West Nile virus

## Yellow fever virus

## Zika virus

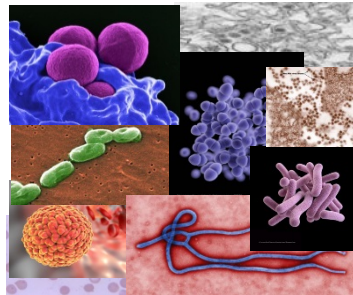
## Non-Curated Database



## Misdiagnosis:

- ☐ False Positives
- ☐ False Negatives

## Standardized Reference Database



## Correct Diagnosis:

- ☒ True Positives
- ☒ True Negatives

✓ *Minimize Misdiagnosis*

✓ *Evolutionary Change*

✓ *Rapid Diagnostics*

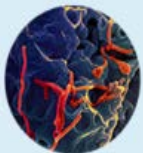




**FDA**-----  
 ---d**A**tabase for  
 -----**R**eference-  
 ----**G**rade-----  
 micr**O**bial-----  
 -----**S**equences



✓ Coverage of circulating strain in reference database first step to catch the bug



Decoding Ebola: Next-Generation Sequencing of the Ebola Genome for the FDA ARGOS Database

When you need a test to confirm disease in an outbreak, you need it fast. Global

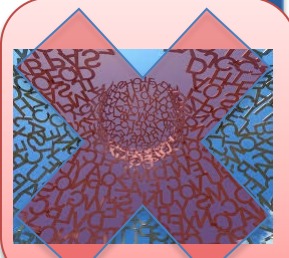
THE FUTURE

Platform?



Global ARGOS

Prevent Outbreak



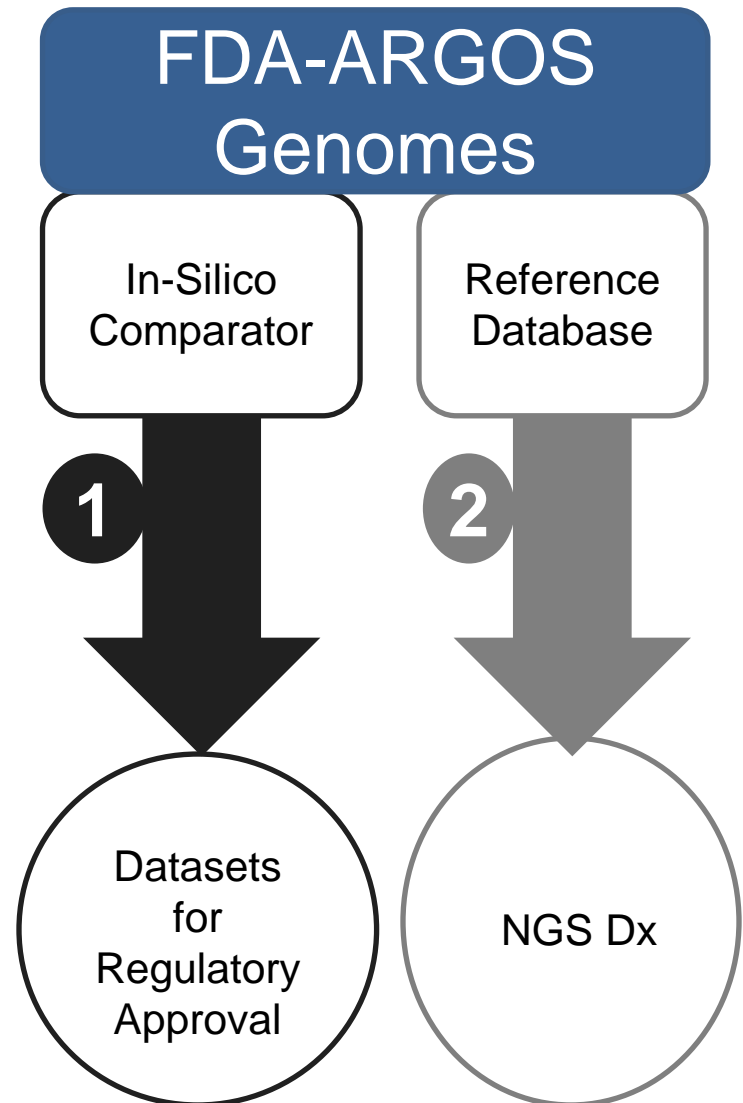
Viral Immunol 28(1): 19-31

# FDA-ARGOS: Goal and Use

- Public Resource
- Regulatory-Grade Genomes
- US-Initiated
- Medical Countermeasures
- Common clinical
- Near neighbors

- Coverage for US Interest
- Does NOT reflect *Needs for Developing World* and associated *Global Standards*

NCBI Project [PRJNA231221](#)



FDA-ARGOS



COMPREHENSIVE

ACCURACY

EMERGING THREATS

Precision

Inclusivity

VERACITY

Robustness

Specificity Geography

Sustainability

Spatial

Rigorous

Temporal

Timeliness

Coverage

Global-ARGOS





# Accuracy



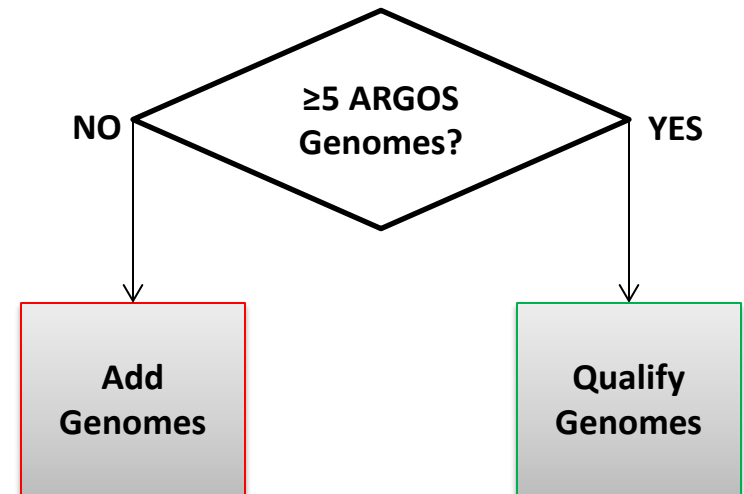


# Why a Regulatory Grade Genome?

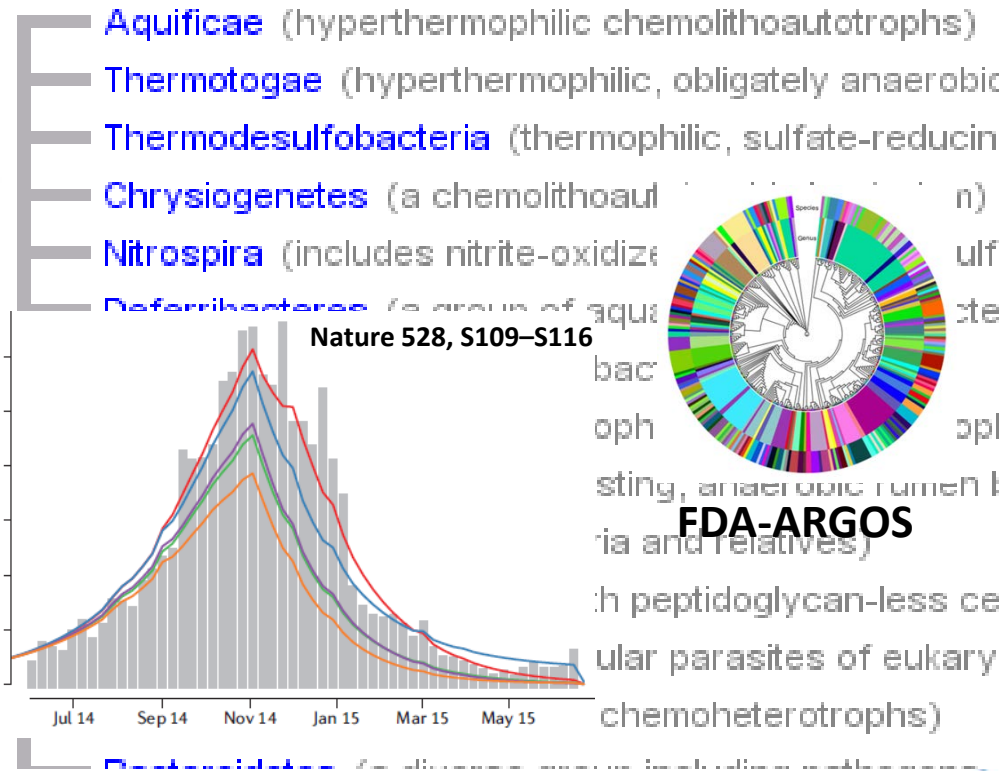
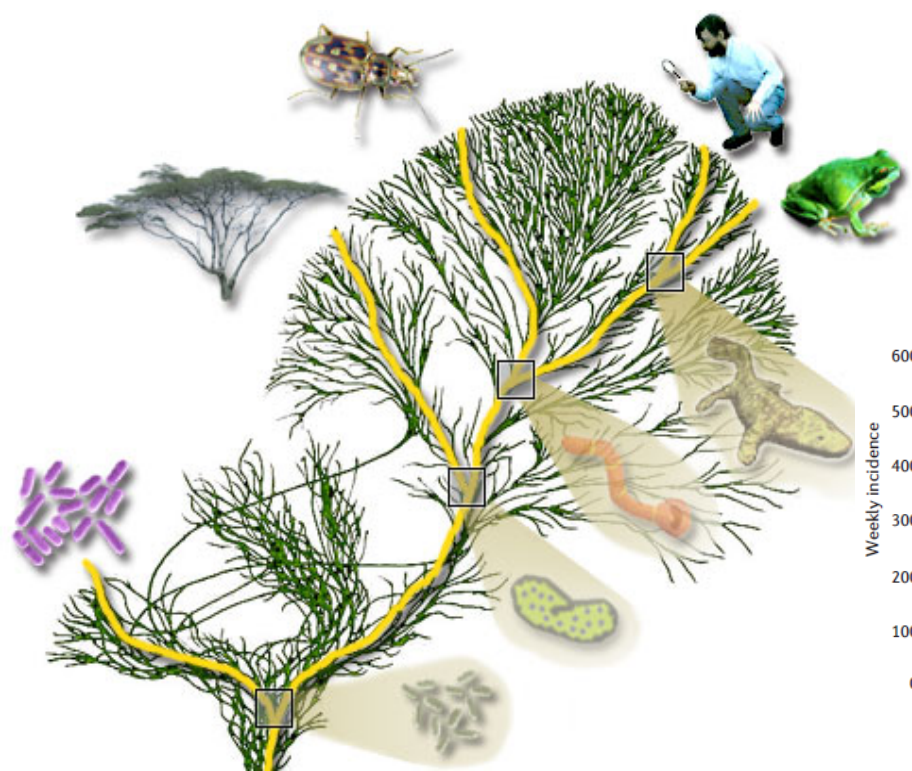
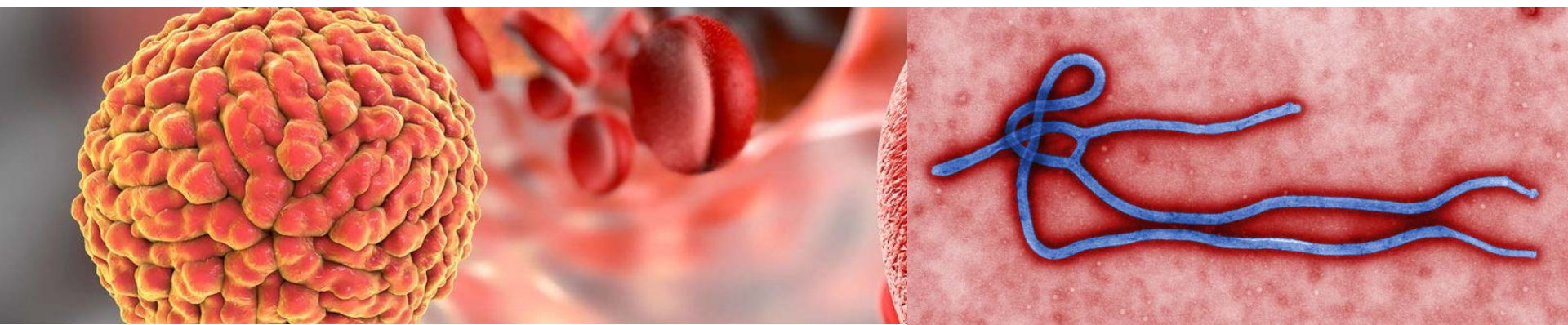


## Species-specific Quality Metrics

- Vetted by FDA
- Genome similarity measure and range
  - Based on at least 5 representatives
  - Nucleotide similarity (ANI)
  - Species core genome
    - Minimum 20X over 95%
- Sample-specific Metadata
- Raw reads, assemblies, annotations
- Pipeline
  - Sample Prep, Library , Platform, Assembler



# Coverage: Spatial/Temporal





# Sustainable Solution

