

GALAXY TRAKR FOR STATE PUBLIC HEALTH BIOINFORMATICS

**INTRODUCTORY TRAININGS, DATA ANALYTICS, &
BIOINFORMATICS COLLABORATIONS**

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DCLS Bioinformatics

Surveillance of emerging foodborne illness outbreaks across the state

- Performing WGS since 2013
- Bioinformatics capabilities since 2016
- CDC OAMD Lead Training Laboratory and Regional Bioinformatics Support Laboratory for Mid-Atlantic Region



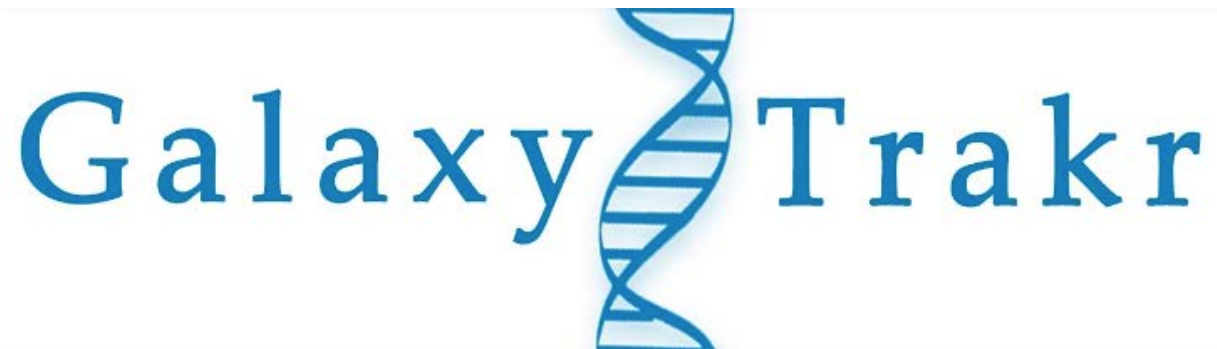
DCLS & Galaxy Trakr

Pilot Laboratory since program onset

- Active user; regular communication with developers

DCLS use of Galaxy and Galaxy Trakr:

- Bioinformatics trainings
- WGS analysis
- Collaborations with external partners



Bioinformatics Trainings

Educating public health scientists

- Conceptual background
- Perform analysis
- Interpret results

DCLS Bioinformatics Trainings:

- Introductory course in 2017 and 2018
- Utilized Galaxy Platform in 2018



Bioinformatics Trainings

Training on Galaxy Platform:

- Conceptual background
- Perform analysis
- Interpret results

Web-based platform

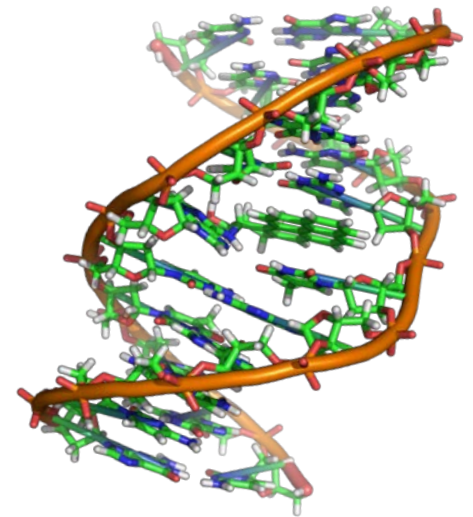
- Post-training accessibility for continued learning



Bioinformatics Trainings

Galaxy Plugins:

- NGS data quality control and assessment
 - FastQC, Trimmomatic
- Genome assembly
 - SPAdes, QUAST
- Variant calling
 - Galaxy Workflows



Bioinformatics Trainings

Galaxy

- Public Galaxy server available to everyone
 - Tools for general genome analysis
 - Long turn-around time

Galaxy Trakr

- Dedicated AWS resources
- Specific to plugins/workflows for public health scientists (e.g. CFSAN-SNP)
- Training webinars and active FDA support



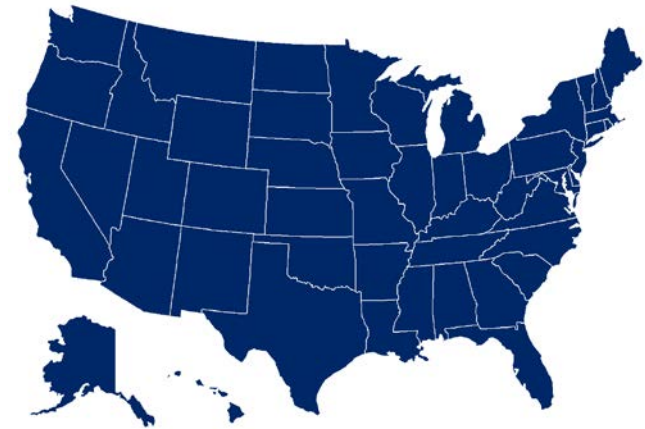


Bioinformatics Analysis

Galaxy Trakr for non-GT laboratories

- Mid-Atlantic PHLs
- StaPH-B Community
 - ~60 members from >25 PHLs
 - Introductory webinar from Justin Payne
 - Opened access for registration

StaPH-B
State Public Health Bioinformatics



Bioinformatics Analysis

Mid-Atlantic laboratories continuing to use the Galaxy Platform

- Public Galaxy portal
- FDA's Galaxy Trakr portal
- Local Galaxy install



Collaborative Projects

Supporting University C.U.R.E. programs

- **C**ourse-based **U**ndergraduate **R**esearch **E**xperience

CURE :

- Projects that engages whole classes of students in addressing a research question or problem that is of interest to the scientific community



Collaborative Projects

Sequencing support for C.U.R.E. projects at Virginia Universities:

- Students collect and characterize environmental isolates
- Isolates sent to DCLS for WGS sequencing

Data transfer and bioinformatics analysis

- WGS data distributed through Shared Libraries
- Students analyze data on the Galaxy Trakr Platform



Collaborative Projects

Supporting University C.U.R.E. programs

- Valuable experience for young scientists
 - Ownership of projects
 - Introduction to public health perspective
 - Exposure to bioinformatics
- WGS data from unique environmental isolates



Isolate	Source	Serotype	Resistance genes
FHS2	Stream sediment	Infantis	<i>aac6-ly, aac-IVa, aadA1-pm, aph3"la, aph4-la, sull, tetA, tetR</i>
HJ13, HJ14, HJ15	Stream sediment	Hadar	<i>aac3-Ib, aac3-IIb, aac6-ly, aadA1-pm, blaTEM-105, strA, strB, tetA, tetR</i>

Collaborative Projects

Continued investigation of standout isolates

- MinION sequencing
- Hybrid assembly (Unicycler)
- Investigation of plasmid genomes



Collaborative Projects

Supporting University C.U.R.E. programs

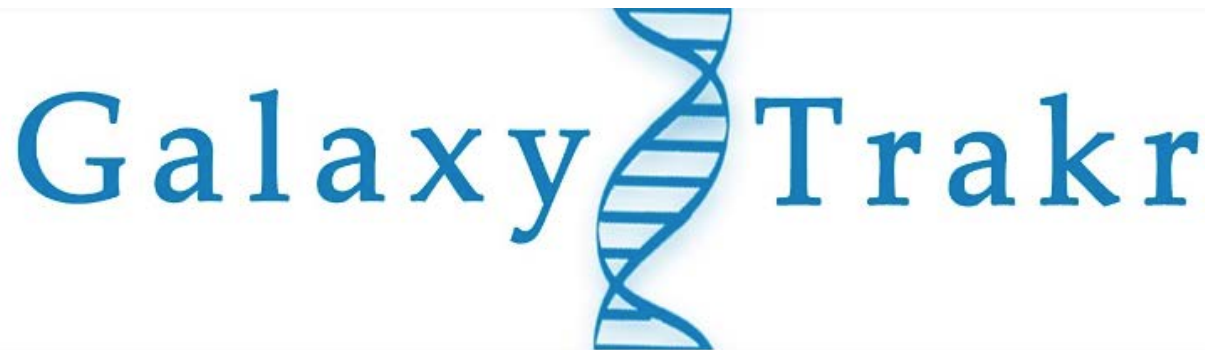
- Second semester of collaboration (~40 students)
- Will become requirement for JMU's microbiology concentration
- Adoption by other Virginia universities
 - Under validation at Longwood University



Galaxy Trakr for State Public Health Bioinformatics

Facilitating bioinformatics analysis of public health data

- Introductory trainings
- Bioinformatics analysis
- Collaborative projects with external partners





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