GALAXY TRAKR FOR STATE PUBLIC HEALTH BIOINFORMATICS

INTRODUCTORY TRAININGS, DATA ANALYTICS, & BIOINFORMATICS COLLABORATIONS

Kevin G. Libuit, M.S.
Senior Informatics Scientist
Division of Consolidated Laboratory Services
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
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
- Course-based Undergraduate Research Experience

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
<table>
<thead>
<tr>
<th>Isolate</th>
<th>Source</th>
<th>Serotype</th>
<th>Resistance genes</th>
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Collaborative Projects

Continued investigation of standout isolates
- MinION sequencing
- Hybrid assembly (Unicycler)
- Investigation of plasmid genomes
Environmental plasmid harboring alarming array of heavy metal- and antibiotic resistance genes
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
Kevin G. Libuit, M.S.
Senior Informatics Scientist
Division of Consolidated Laboratory Services
Email: kevin.libuit@dgs.virginia.gov