FOCUS ON FELLOWS

APHL–CDC LABORATORY FELLOWSHIP PROGRAMS
2019-2020
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Antimicrobial Resistance Laboratory Fellows at their orientation at the US Centers for Disease Control and Protection (CDC).
About the APHL-CDC Laboratory Fellowship Programs

The Association of Public Health Laboratories (APHL) and the US Centers for Disease Control and Prevention (CDC) partner to offer a variety of laboratory fellowship programs to train and prepare scientists for careers in public health laboratories and support public health initiatives.

There are currently six APHL-CDC fellowship programs:

- Antimicrobial Resistance Laboratory Fellowship Program
- Bioinformatics Fellowship Program
- Newborn Screening Bioinformatics and Data Analytics Fellowship Program
- Ronald H. Laessig Memorial Newborn Screening Fellowship Program (which did not place any fellows in 2019, and so is not included in this compilation)
- Infectious Diseases Laboratory Fellowship Program and
- Environmental Public Health Laboratory Fellowship Program (which did not place any fellows in 2019, and so is not included in this compilation)

Fellowships range from one to two years, depending on the fellowship and funding availability. While each has a specific focus, these experiential programs also offer a competency-based core curriculum.

LEARN MORE ABOUT APHL’S LABORATORY FELLOWSHIP PROGRAMS:
visit aphl.org/fellowships or email fellowships@aphl.org

Newborn Screening Bioinformatics and Data Analytics Fellow, Samantha Marcellus, presents at the 2019 APHL Newborn Screening and Genetic Testing Symposium.
Core Competency Training

In addition to laboratory-specific work, all APHL fellows participate in distance-based training and learning activities to achieve proficiency in select public health laboratory core competencies.

The competencies covered in the APHL-CDC fellowship program curriculum include:

- Management and Leadership
- Communications
- General Laboratory Practice
- Research
- Surveillance
- Ethics
- Safety
- Emergency Management and Response
- Quality Management Systems

This curriculum provides a well-rounded introduction to public health laboratory science to all fellows, and provides them with the knowledge, skills and abilities to enter and advance in the public health laboratory workforce.

The Public Health Laboratory Competencies outline the knowledge, skills and abilities necessary for public health laboratory professionals to deliver core services efficiently and effectively. As part of a two-year project co-sponsored by CDC and APHL, competencies were developed for 15 domain areas by a diverse group of over 170 experts, representing state and local public health laboratories, clinical laboratories, academic institutions, laboratory professional organizations, CDC and APHL.

View the complete document, Competencies Guidelines for Public Health Laboratory Professionals, to learn more.

LEARN MORE ABOUT CORE COMPETENCIES: aphl.org/Competencies

[Diagram showing the hierarchy of competencies]
Antimicrobial Resistance (AR) Laboratory Fellowship Program

AR testing in public health laboratories for nationwide capacity is an emerging field and, therefore, a new class of well-equipped and dedicated scientists is required to address this growing threat. The AR Laboratory Fellowship provides training in AR laboratory activities—such as advanced molecular methodologies, surveillance and research—as well as communication and outreach.

This program is open to master’s- and doctoral-degree level scientists.

Learn more at aphl.org/AR-fellows

Host laboratory locations for the 2019-2020 AR Laboratory Fellows

Sara Belknap

MS (Infectious Disease and Global Health), 2017, Tufts University

HOST LABORATORY: Tennessee Department of Health Division of Laboratory Services

PRIMARY MENTOR: Victoria Stone, PhD

FELLOWSHIP PROJECT:

- Conduct whole genome sequencing (WGS) to provide molecular confirmation of genetic connections between previously characterized carbapenem-resistant Enterobacteriaceae (CRE) isolates found to be spatially and temporally grouped via epidemiological cluster detection methods, in an effort to assist epidemiologists improve current cluster detection programs and, subsequently, surveillance of CRE for the state of Tennessee.

- Perform PCR validation studies to simultaneously expand the range of detectable target genes and increase molecular testing efficiency, improving surveillance of resistance genes throughout the Southeast Region.

FUTURE PLANS: I would like to pursue another degree to continue incorporating public service and science in my career, ideally working to improve science communication and science literacy.
June Chan  
PhD (Molecular Microbiology and Immunology), 2017, Johns Hopkins University  
HOST LABORATORY: Wadsworth Center of the New York State Department of Health  
PRIMARY MENTOR: Kimberlee Musser, PhD  
FELLOWSHIP PROJECT:  
• Lead the AR Lab Network surveillance analysis of specimens submitted from six different academic healthcare facilities to better understand carbapenem resistance in recipients of solid organ transplants, a population at very high risk for acquiring carbapenem-resistant organisms.  
• Track the carriage and movement of plasmids carrying antibiotic resistance genes among organisms of interest using the latest short- and long-read sequencing technologies (MiSeq and MinION, respectively).  
FUTURE PLANS: I hope to become a leader in clinical and public health microbiology, and I am driven by the excitement of being at the intersection of microbiology, research and public health. I plan to pursue further training in clinical and medical microbiology, with the career goal of directing a clinical or public health laboratory and conducting research to improve patient diagnostic testing.

Anna Hasche-Kluender  
MHS, 2018, Johns Hopkins Bloomberg School of Public Health  
HOST LABORATORY: Indiana State Department of Health Laboratory  
PRIMARY MENTOR: Sara Blosser, PhD, D(ABMM)  
FELLOWSHIP PROJECT:  
• Perform WGS on a subset of carbapenem-resistant KPC isolates and create a library of KPC variants in Indiana that represents prevalence per county. Validate the library using epidemiology cluster data so it can be used to detect variant emergence in communities and track transmission within and between facilities.  
• Validate the use of carbapenem-carbapenemase inhibitor Etests to determine the susceptibility of clinical isolates to combination drugs and detect emerging resistance.  
FUTURE PLANS: I plan to pursue an MD/PhD and aim to continue research on antimicrobial resistance as a PhD. As an MD/PhD I would like to specialize in infectious disease and work in an academic medical center so that I can provide patient care and research the prevention, treatment and control of antimicrobial resistance and infectious disease.
Mondraya Howard  
**PhD (Molecular Genetics and Microbiology), 2019, University of Pittsburgh**  

**HOST LABORATORY:** Maryland Department of Health Laboratories Administration  

**PRIMARY MENTORS:** Robert Meyers, PhD and Pongpan Laksanalamai, PhD  

**FELLOWSHIP PROJECT:**  
- Develop and validate a method to isolate carbapenem-resistant *Acinetobacter baumannii* (CRAB) from colonization swabs.  
- Conduct WGS analysis to identify AR genes and support ongoing epidemiologic investigations.  
- Isolate and characterize plasmids harboring resistance genes from carbapenemase-producing organisms; generate a plasmid database as a tool to supplement WGS projects and aid in understanding transmission events during outbreak investigations.  

**FUTURE PLANS:** I have enjoyed applying cross-disciplinary approaches to public health research by participating in laboratory testing and outbreak investigations during my fellowship. I hope to leverage these experiences and further develop my expertise to gain a leadership role in a clinical or public health laboratory.

Michael Mamerow  
**MS (Clinical Microbiology), 2018, University of Wisconsin – La Crosse; Technologist in Microbiology, American Society for Clinical Pathology**  

**HOST LABORATORY:** Wisconsin State Laboratory of Hygiene  

**PRIMARY MENTOR:** Ann Valley  

**FELLOWSHIP PROJECT:**  
- Implement and optimize a colonization screening test for CRAB, using both culture- and molecular-based methods.  
- Optimize the recovery of carbapenemase-producing organisms from positive specimens, troubleshoot and improve MiniION sequencing runs.  
- Analyze statewide *Salmonella* susceptibility data to detect trends across serotypes, such as regional differences in AST profiles and changes in susceptibility over time.  

**FUTURE PLANS:** I am thrilled that I’ll get to continue to work at the Wisconsin state lab, because I really love the public health aspect of microbiology that I get to be a part of at the WSLH. Longer term, I would like to go back to school for a PhD or MD to open up more opportunities in the future.
Kimberly McCullor  
PhD (Pharmaceutical Sciences), 2019, University of Oklahoma Health Sciences Center  
HOST LABORATORY: Michigan Department of Health and Human Services, Bureau of Laboratories  
PRIMARY MENTOR: Marty Soehnlen, PhD  
FELLOWSHIP PROJECT:  
• Conduct TB culture and susceptibility testing to learn best practices within the public health laboratory setting.  
• Validate WGS for predicting drug susceptibility patterns of *Mycobacterium tuberculosis*.  
• Assess the use of Fourier-Transform-Infrared Spectroscopy (IR Biotyper) technology for epidemiological studies of nontuberculous mycobacteria.  
FUTURE PLANS: My career goal is to become a public health laboratory director. I am most interested in collaborating with others to improve best practices within the laboratory. I also aspire to be involved with the research and development of cost-effective diagnostics that can provide timely, actionable data to help treat and prevent the spread of communicable diseases.

Julie Miranda  
MPH, 2018, University of Texas Health Science Center at Houston  
HOST LABORATORY: Texas Department of State Health Services Laboratory  
PRIMARY MENTOR: Rachel Lee, PhD  
FELLOWSHIP PROJECT:  
• Conduct a quality improvement of the ARLN isolate and swab testing process, as well as data management to establish metrics and implement efficiencies.  
• Evaluate new multiplex real-time PCR kits for the detection of gene variants for the presence of β-lactamases, OXA, MCR and TEM/SHV/GES and compare them to Cepheid and CDC PCR.  
FUTURE PLANS: I would like to continue to build upon my expertise in public health, to gain more experience with testing and other aspects of the functions of a public health lab. My plan is to continue working in public health and participate in an antibiotic resistance and emerging infectious diseases research group.
Sarah Namugenyi  
*PhD (Microbiology), 2019, University of Minnesota – Minneapolis*

**HOST LABORATORY:** Minnesota Department of Health Public Health Laboratory  
**PRIMARY MENTOR:** Paula Snippets Vagone, MT(ASCP)  

**FELLOWSHIP PROJECT:** Assist with implementation of Min-ION, a real-time DNA sequencing device, for the analysis of carbapenemase resistance genes in gram-negative bacteria. Long-read sequences generated by the Min-ION sequencer will enable *de novo* assembly of plasmids that may potentially harbor the antibiotic resistance genes. This data can be used for plasmid tracking to identify transmission routes during outbreaks and to identify horizontal transfer of plasmids between and across bacterial species.  

**FUTURE PLANS:** I am interested in investigating and being involved in controlling emerging infectious diseases. Therefore, I would like to continue to work in public health microbiology and obtain further training that would prepare me to direct a public health microbiology laboratory.

Megan Nelson  
*MS (Clinical Microbiology), 2019, University of Wisconsin – La Crosse*

**HOST LABORATORY:** State Hygienic Laboratory at the University of Iowa  
**PRIMARY MENTOR:** Michael Pentella, PhD, MS(ASCP), CIC, D(ABMM)  

**FELLOWSHIP PROJECT:**  
- Coordinate with clinical laboratories across Iowa to perform surveillance testing of stool cultures for CRE using agar dilution media.  
- Collaborate with state epidemiologists to investigate sources of novel carbapenemase genes.  
- Develop an automated Antibiotic Resistance Report that tracks patients with CRE’s throughout the state, communicates results with state epidemiologists and allows Iowa’s AR trends to be visualized.  

**FUTURE PLANS:** I hope to continue working within the AR Lab Network, educating the public on appropriate antibiotic use and the threat of antibiotic resistance to public health. Eventually, I would like to move into a supervisory role, hopefully somewhere with snow-capped mountains.
Lindsay Alexandra Parnell
PhD, (Biology and Biomedical Sciences, Molecular Genetics and Genomics Program), 2019, Washington University in St. Louis

HOST LABORATORY: CDC Antimicrobial Resistance Coordination and Strategy Unit
PRIMARY MENTOR: Dawn Sievert, PhD, MS

FELLOWSHIP PROJECT:
• Develop a reporting system for 19 non-regional jurisdictions performing Candida spp. identification testing.
• Contribute to implementation of WGS and bioinformatics analysis of AR/HAI pathogens across the AR Lab Network. Use WGS and epidemiological AR/HAI data to identify new AR signals or potential threats.

FUTURE PLANS: I want to incorporate my background in molecular genetics and genomics into an advanced career in public health.

Jennifer Rivers
ScM (Molecular Microbiology and Immunology), 2016, Johns Hopkins Bloomberg School of Public Health; Medical Laboratory Scientist (MLS, ASCP®CM)

HOST LABORATORY: Washington State Department of Health, Public Health Laboratories
PRIMARY MENTOR: Philip Dykema, PhD

FELLOWSHIP PROJECT:
• Investigate and test a culture-independent DNA extraction method for carbapenemase gene variant screening to be used with existing PCR protocols, which will increase laboratory efficiency and decrease turnaround time. Optimize protocol to streamline the testing process, use fewer consumables and reduce hands-on time.
• Cross-train in WGS and the full spectrum of AR Lab Network testing offered in the West Region.

FUTURE PLANS: I will continue to gain research experience while also taking my expertise and laboratory background into the field of public health policy and bioethics. I will likely seek additional education in health and humanitarian law and pursue work with the WHO, the UN or major global health research institutions.

Kayla Audenia Simanek
MS (Biological Sciences), 2019, University of Wisconsin – Milwaukee

HOST LABORATORY: Virginia Division of Consolidated Laboratory Services
PRIMARY MENTOR: LaToya Griffin-Thomas, PhD

FELLOWSHIP PROJECT:
• Conduct molecular characterization of CRE and Pseudomonas aeruginosa clinical isolates using WGS, specifically looking for genes that may explain variations in phenotypic antibiotic resistance between isolates.
• Conduct a phylogenetic analysis to determine strain relatedness.

FUTURE PLANS: I plan to pursue a PhD and eventually manage an infectious disease research lab.
Bioinformatics Fellowship Program
Bioinformatics is revolutionizing the way the world tracks and detects infectious disease. In public health, the use of Next Generation Sequencing (NGS) technology has reshaped outbreak investigations and pathogen surveillance. Bioinformaticians are crucial for this transition to the use of NGS in public health. They develop pipelines and help interpret the data, identifying and characterizing pathogens; playing a vital role in the public health engine that keeps us all healthy. The program is a year-long, full-time working fellowship for master’s- and doctoral-level bioinformaticians; some fellowships may be extended for an additional year, as funding allows. Fellows are placed in state, local, and federal public health laboratories throughout the US.

Learn more at aphl.org/bioinformatics-fellows

I AM A BIOINFORMATICIAN
I am a programmer, a teacher, an investigator and a translator. In addition to my programming skills, I must be able to communicate my work to a variety of different audiences.

MY BACKGROUND
Bioinformatics is the cross-section between computer science, biology and information technology. This multidisciplinary field calls upon knowledge of:

- Programming languages & data analytics
- Machine learning
- Cluster algorithms
- NGS analysis & pipeline developments
- Molecular Biology
- Genomic Microbiology
- Metagenomics
- Cloud Computing

Bioinformatics Fellows attend AMD 2-day at CDC in September 2019. Front (L-R): Alyssa Kent, Jenna Hamlin, Rachael St. Jacques, Lacey Walker, Back (L-R): Kate Prussing, Jonathan Gearhart, Wesley Hottel, Andrew Lang, and Abigail Shockey.
Andrew Lang
PhD (Genetics), 2019, University of New Hampshire; SECRET Security Clearance (Medical Operations Officer with Army National Guard)

HOST LABORATORY NAME: Massachusetts State Public Health Laboratory (MA-PHL)

PRIMARY MENTOR: Glen Gallagher, PhD

FELLOWSHIP PROJECT:
• Onboard several established pipelines for tuberculosis and CRE/HAI.
• Conduct cost/benefit analyses of targeted vs. whole genome sequencing for Hepatitis A, to determine “best methods” depending upon scientific question and available funding.
• Update bioinformatics tools for use by MA-PHL and other laboratories in the Northeast, as MA-PHL is the Bioinformatics Regional Resource.

FUTURE PLANS: I am thoroughly enjoying the public health sector – something I had not seriously considered prior to this fellowship – and I hope to continue with bioinformatics support of public health efforts. I like the service element of public health work, as it allows me to apply my bioinformatics skillset to issues currently facing the local and American populace.

Abigail Shockey
PhD (Microbiology), 2019, University of Wisconsin – Madison

HOST LABORATORY NAME: Wisconsin State Laboratory of Hygiene

PRIMARY MENTOR: Kelsey Florek, PhD

FELLOWSHIP PROJECT:
• Develop bioinformatics workflows for the analysis of next generation sequencing data, facilitating antibiotic resistance surveillance and informing outbreak investigations.
• Develop applications to visualize the results of bioinformatics analyses in standardized reports that effectively communicate the results to public health scientists and epidemiologists.
• Characterize the dynamics of acquired antimicrobial resistance from a historical collection of CRE from Wisconsin.

FUTURE PLANS: I aim to continue working in public health. I hope to work as a bioinformatician in a state or federal public health lab, developing new tools to improve the use of bioinformatics in public health settings and assisting in AR surveillance and outbreak investigations.
Jenna Hamlin  
*PhD (Genetics), 2015, University of Georgia*

**HOST LABORATORY:** CDC NCEZID Enteric Diseases Laboratory Branch (EDLB), Culture Independent and Metagenomic Subtyping Group  

**PRIMARY MENTOR:** A. Jo Williams-Newkirk, PhD  

**FELLOWSHIP PROJECT:** Improve, deploy and maintain an updated Tinsel application, a phylogenetic visualization tool built using the R programming language that employs an R package called Shiny. This tool will be used in outbreak meetings within EDLB, as either a stand-alone product or as a browser-based service offered by CDC, to communicate laboratory findings to epidemiologists and state public health labs.  

**FUTURE PLANS:** I aspire to continue working as a public health scientist either at the CDC or at a state public health laboratory. Working with and understanding the genomic difference for organisms, which cause harm to humans, is extremely important for public health. This combination of public health and bioinformatics is where I want to continue and contribute in my future.

Alyssa Kent  
*PhD (Biological Sciences), 2019, University of California – Irvine*

**HOST LABORATORY:** CDC NCEZID Division of Healthcare Quality Promotion, Clinical and Environmental Microbiology Branch  

**PRIMARY MENTOR:** Alison Laufer Halpin, PhD  

**FELLOWSHIP PROJECT:**
- Leverage bioinformatics, machine learning and molecular epidemiology to improve our understanding of antimicrobial resistance, horizontal gene transfer and virulence in healthcare-associated infection pathogens.  
- Analyze sequence data and other laboratory data generated from sentinel surveillance of carbapenem-resistant and carbapenem-sensitive Enterobacteriaceae.  
- Develop and validate a computational pipeline for antimicrobial surveillance of human microbiomes using highly multiplexed PCR assays.

**FUTURE PLANS:** This fellowship has provided both a broad introduction to public health policy and research and has expanded my skills in scientific innovation and inquiry. I plan to continue in a public health career focused on antimicrobial resistance detection and prevention. I specifically hope to leverage my training to bring efficient and effective bioinformatics strategies to the healthcare setting.
Lacey Walker
MS (Biochemistry and Molecular Biology-Bioinformatics), 2019, Georgetown University

HOST LABORATORY: California Department of Public Health
PRIMARY MENTOR: Rituparna Mukhopadhyay, PhD

FELLOWSHIP PROJECT:
• Improve and develop standardized pipelines for the analysis of bacterial and viral whole genome sequences as well as viral metagenomic samples and amplicons.
• Develop data visualization and analysis tools to better incorporate sequencing data with in vitro lab testing results, epidemiological data and disease outcomes, with the aim of easing the translation of genetic data to epidemiologists and nonscientists.

FUTURE PLANS: I have enjoyed the interdisciplinary encounters that I have had as a part of the fellowship and plan to enter a PhD program with a combined focus on epidemiology and bioinformatics. My ultimate career goal is to become part of a bioinformatics research team that develops and applies advanced computational techniques to large datasets in an effort to better understand and improve human health on a global scale.

Jonathan Gerhart
MS (Biology), 2017, Portland State University

HOST LABORATORY: CDC NCIRD Division of Bacterial Diseases, Streptococcus Laboratory
PRIMARY MENTOR: Yuan Li, PhD

FELLOWSHIP PROJECT:
• Improve automated Streptococcus serotyping and an analysis pipeline to reduce dependence on high quality sequencing and the workload needed to support the pipeline
• Make pipeline directly available to state health departments to improve response times.

FUTURE PLANS: I would like to continue to work with CDC to improve analysis tools and to help streamline the process of routine surveillance so our experts have more time to respond to emerging issues.
Newborn Screening Bioinformatics and Data Analytics Fellowship Program

The Newborn Screening Bioinformatics and Data Analytics Fellowship places graduates of bioinformatics or biostatistics programs in newborn screening (NBS) public health laboratories, where they conduct specialized next-generation sequencing (NGS) and data analytics projects for certain recommended uniform screening panel (RUSP) disorders.

Projects range from utilizing bioinformatics skills for mining complex genetic data for biomarkers, developing and validating pipelines and tools for NGS and sanger analysis, to comparing NBS results from unsatisfactory specimens to their matched satisfactory repeat specimens.

Learn more at aphl.org/NBS-BIF

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**Bryce Asay**  
*PhD (Microbiology), 2020, Colorado State University*

**HOST LABORATORY:** Utah Public Health Laboratory  
**PRIMARY MENTOR:** Andy Rohrwasser, PhD  
**FELLOWSHIP PROJECT:** Develop a universal next-generation sequencing (NGS) analysis pipeline to address the second-tier testing requirements for clinical disorders in newborns via:  
- Expansion of current diagnosis methodology to all clinical newborn disorders reported in the literature,  
- Variant curation,  
- Variant database development and  
- Creation of an automated pipeline to update the developed database with novel newborn screening findings for variants of interest.

**FUTURE PLANS:** I hope to continue my research at my host laboratory. I also hope to continue my side software and machine learning projects, which are essentially the gamification of basic microbiology. The first is a self-learning pathology software that will aid in veterinary diagnostics. The second is an android game that teaches microbiology and epidemiology to teenagers by mimicking a zombie apocalypse, where players have to determine what organism is causing the disease, how it spreads and what possible real-world treatments could be used as a cure.
Samantha Marcellus
MPH (Epidemiology), 2018, University of Iowa College of Public Health

HOST LABORATORY: Texas Department of Health
PRIMARY MENTOR: Rachel Lee, PhD

FELLOWSHIP PROJECT:
• Develop, standardize and refine tools and infrastructure to efficiently and accurately analyze Severe combined immunodeficiency disorder (SCID) NGS data, including sequencing alignment, variant calling and interpretation.
• Establish and pilot the use of NGS analysis pipelines for SCID screening.

FUTURE PLANS: I plan to continue working with newborn screening data at a state health department. I’m particularly interested in working with data from recently implemented conditions.

Jessica C. Respress
MS (Biology), 2019, Georgia State University

HOST LABORATORY: Wadsworth Center of the New York State Department of Health
PRIMARY MENTOR: Denise Kay, PhD

FELLOWSHIP PROJECT:
• Assist with transition from sanger sequencing to NGS.
• Conduct a comparative study of sanger and NGS data output, use previous sanger sequencing data sets as a baseline to validate results. As a result, use bioinformatic techniques in programs such as R to do a comparative study.

FUTURE PLANS: I hope to progress my career by continuing my education and pursue a dual PhD/MD degree in bioinformatics. With this I plan to work in a clinical setting doing medical and bioinformatics research.

Charles Roberts
MS (Bioinformatics), 2019, Johns Hopkins University

HOST LABORATORY: Wisconsin State Laboratory of Hygiene
PRIMARY MENTOR: Mei Baker, MD

FELLOWSHIP PROJECT: After completing rotations at each of the lab benches to learn the flow of specimens and data within the lab, I will begin working on several projects including, working on short turn follow up data collection and creating a reliable electronic method for collection and analysis and NGS pipeline development for NBS panels and projects.

FUTURE PLANS: My future plans are to continue to work in the field as a bioinformatician and to continue to grow and expand my experience and knowledge. I am also considering the possibility of pursuing a doctoral degree for bioinformatics in the future.
Infectious Diseases Laboratory Fellowship Program

The Infectious Diseases Laboratory Fellowship program is a year-long, full-time working fellowship for master’s-degree level scientists. Fellows are placed in local and state public health laboratories where they receive training in bench-level laboratory skills and methods, and assist with high-priority infectious disease testing, surveillance and control measures.

Learn more at aphl.org/ID-fellows

Valerie Patritti

MS (Biochemistry and Molecular Biology), 2019, Pace University

HOST LABORATORY: New York City Public Health Laboratory

PRIMARY MENTOR: Scott Hughes, PhD

FELLOWSHIP PROJECT:

- Expand next generation sequencing capacity at the public health laboratory for identification and characterization of *M. tuberculosis* complex from specimens.
- Implement gDNA extraction procedures from isolates that generate gDNA for WGS and implement sequencing protocols.
- Expand metagenomics capacity for detection and characterization of *Legionella* ssp. from specimens, using bioinformatic tools for sequencing analysis.
- Complete training for sequencing West Nile Virus hosted by the Massachusetts Department of Health and the Broad Institute at MIT.

FUTURE PLANS: I would like to work in a clinical or public health laboratory as a research investigator with a focus on infectious disease.
About APHL
APHL works to strengthen laboratory systems serving the public’s health in the United States and globally. APHL represents state and local governmental health laboratories in the United States. Its members, known as “public health laboratories,” monitor, detect and respond to health threats.

APHL works closely with federal agencies to develop and execute national health initiatives. During public health emergencies, it operates as a coordinating center for laboratory response. APHL also works internationally to build effective national laboratory systems and expand access to quality diagnostic testing services. With over 20 years’ experience in 31 countries on five continents, APHL is recognized internationally as a leader in laboratory science and practice.

APHL’s core membership is comprised of state, local and territorial laboratories and includes environmental, agricultural science and food safety laboratories. Representatives from federal agencies, nonprofit organizations, corporations and interested individuals also participate in the association. International participation is expanding in response to the globalization of disease and APHL’s active global health program. Total APHL membership numbers over 800.

About CDC
CDC is one of the major operating components of the US Department of Health and Human Services. CDC works 24/7 to protect America from health, safety and security threats, both foreign and domestic. Whether diseases start at home or abroad, are chronic or acute, curable or preventable, human error or deliberate attack, CDC fights disease and supports communities and citizens to do the same.

CDC increases the health security of our nation. As the nation’s health protection agency, CDC saves lives and protects people from health threats. To accomplish our mission, CDC conducts critical science and provides health information that protects our nation against expensive and dangerous health threats, and responds when these arise.