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AR Fellow Abby Hoffman at work at the Texas Department of State Health Services

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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 Fellowship Program
• Bioinformatics Fellowship Program
• Newborn Screening Bioinformatics Fellowship Program
  (which did not place any fellows in 2018, and so is not included in this compilation)
• Ronald H. Laessig Memorial Newborn Screening Fellowship Program
• Infectious Diseases Laboratory Fellowship Program and
• Environmental Public Health Laboratory Fellowship Program
  (which did not place any fellows in 2018, 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

The 2018-2019 Bioinformatics Fellows at their orientation.
Fellowship Programs Include 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.

LEARN MORE ABOUT CORE COMPETENCIES: aphl.org/Competencies
Antimicrobial Resistance (AR) Fellowship Program

AR testing in public health laboratories (PHLs) 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 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

2017–2019 Fellows

Marisabel Etter

PhD (Molecular, Cell and Developmental Biology), University of California—Los Angeles

WORKING WITH: Edward Desmond, PhD and Grace Lin, MS, Microbial Diseases Laboratory, California Department of Public Health (CDPH) Laboratory

PROJECT: Conduct data analysis of the validation of testing bronchoalveolar lavage samples with the Xpert MTB/RIF assay. Assist with the initial stages of a study to validate the use of PSQ for detecting mutations in codon 306 of the gene embB, which is associated with resistance to ethambutol.

FUTURE PLANS: I have been hired as a public health microbiologist in CDPH’s Vaccine Preventable Diseases and Herpes Viruses section. My plan is to get more experience with testing and other aspects of the functions of a public health lab. In the future I would like to pursue a leadership position in public health.

Kelsey Florek

PhD (Microbiology), University of Wisconsin—Madison

WORKING WITH: David Warshauer, PhD, D(ABMM), Wisconsin State Laboratory of Hygiene

PROJECT: Develop new next-generation sequencing pipelines and workflows that increase AR surveillance and outbreak investigations. Increase data analysis capacity by expanding computational infrastructure. Design and validate new molecular assays that aid the detection of resistance mechanisms.

FUTURE PLANS: My past work has relied on the application of cross-disciplinary approaches to science and public health. In the future I hope to pull from these experiences in teaching and running a laboratory devoted to public health research.
Lisa M. Leung  
PhD (Microbiology), University of Maryland—Baltimore  
WORKING WITH: Robert Myers, PhD, Maryland Public Health Laboratory  
PROJECT: Use MALDI-TOF to validate Neisseria gonorrhoeae and non-Neisseria species, elucidate drug resistance phenotypes, and analyze proteins and other molecular biomarkers in Candida auris to improve detection and determine underlying resistance mechanisms versus other Candida species.  
FUTURE PLANS: At the completion of my AR fellowship, I would like to continue to build upon my expertise in public health. Ideally, I would undertake a second postdoc, in an academic setting this time, and these combined experiences would prepare me to be a lead researcher/scientist at an institution studying the environmental and public health impacts of antibiotic-resistant bacteria.

Mimi Rey Precit  
PhD (Microbiology) University of Washington  
WORKING WITH: William A. Glover II, PhD, D(ABMM), MT(ASCP), Washington State Department of Health Public Health Laboratory  
PROJECT: Develop and improve molecular assays to improve detection of antibiotic resistance mechanisms in carbapenem-resistant Gram-negative bacteria. Develop more complete reference databases that combine microbiological, clinical, epidemiological, and genomic or metagenomic data to create actionable data to inform proper control practices and stop transmission of antibiotic transmission.  
FUTURE PLANS: In July 2019, I will begin a CPEP-accredited fellowship in clinical/medical microbiology at the Children’s Hospital of Los Angeles. Following CPEP, I plan to take the American Board of Medical Microbiology (ABMM) certification exam, with the ultimate career goal of directing a clinical or public health microbiology laboratory.

Eric Ransom  
PhD (Microbiology), University of Iowa  
WORKING WITH: Jean Patel, PhD, D(ABMM), Antimicrobial Resistance Coordination and Strategy Unit, Division of Healthcare Quality Promotion, CDC  
PROJECT: Develop and validate antibiotic resistance diagnostic methods; implement public health data to determine antibiotic susceptibility breakpoints; and utilize whole-genome sequencing to identify and combat antibiotic resistance threats. Collectively, this research will improve patient care by ensuring a strong ARLN that can provide accurate results and timely outbreak responses.  
FUTURE PLANS: After my fellowship, I plan to work in a clinical or public health laboratory.
Emily Snavely  
**PhD (Molecular Genetics and Microbiology), Duke University**  
**WORKING WITH:** Kimberlee Musser, PhD, Wadsworth Center, New York State Department of Health  
**PROJECT:** Develop and validate a WGS analysis pipeline to identify AR genes and use WGS to provide ongoing support for epidemiologic investigations.  
**FUTURE PLANS:** I’m pursuing further training in clinical microbiology through a medical microbiology fellowship at the University of Utah, ARUP Laboratories. My goal is to direct a diagnostic or public health microbiology laboratory that fosters a collaborative environment between the laboratory, health care professionals and basic scientists.

Alesha Stewart  
**PhD (Pharmaceutical Sciences), University of Texas—Austin**  
**WORKING WITH:** Susan Tanksley, PhD, Texas Department of State Health Services Laboratory  
**PROJECT:** Focus on improving laboratory functionality and efficiency; perform validation studies, create an ARLN website and recruit new submitters for ARLN testing.  
**FUTURE PLANS:** I would like to continue a career in public health after my fellowship concludes. My time here has really made me realize how important the work of the ARLN is to help protect from infectious disease.

2018-2019 FELLOWS

Bradley Craft  
**MS (Public Health Microbiology and Emerging Infectious Disease), George Washington University**  
**WORKING WITH:** Paula Snippes Vagone, MT(ASCP), Minnesota Department of Health Public Health Laboratory  
**PROJECT:** Assess the resistance trends of antibiotics against well-characterized clinical isolates by using meropenem, meropenem-vaborbactam, ceftazidime and ceftazidime-avibactam gradient diffusion antibiotic test strips on a subset of carbapenemase-producing Carbapenem-resistant Enterobacteriaceae (CRE) isolates from 2012-2018. Lead the laboratory’s implementation and validation of the ARLN Antibiotic Digital Dispenser pilot program, which will enable MIC testing on very resistant gram-negative bacilli for new antibiotics with no available commercial tests.  
**FUTURE PLANS:** My goal is to participate in investigative research for antibiotic resistance and emerging infectious diseases of public health importance. I hope to be able to make a difference in the treatment of those diseases by performing surveillance and monitoring activities, and contributing to knowledge learned about those diseases.
**Abby Hoffman**  
*MS (Biohazardous Threat Agents and Emerging Infectious Diseases), Georgetown University*

**WORKING WITH:** Susan Tanksley, PhD, Texas Department of State Health Services

**PROJECT:** Serve as core member of the first ARLN multi-site Epi-Aid, led by CDC, which aims to implement a regional containment strategy to limit the spread of VIM CRPA in the panhandle region of Texas. Perform lab lookbacks, aid in the collection of colonization swabs for point prevalence survey and serve as a liaison between the lab and the Epi-Aid Team. Collect data and write progress reports in coordination with the region’s HAI Epidemiologist.

**FUTURE PLANS:** After the completion of my fellowship I plan to continue working in public health with a focus on infectious disease. The fellowship exposed to me to the epidemiology side of infectious disease response. I really enjoy helping with outbreak investigations and hope to continue that in my next position.

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**Nadine Peinovich**  
*MPH (Infectious Diseases and Vaccinology), University of California—Berkeley*

**WORKING WITH:** Kimberlee Musser, PhD, Wadsworth Center, New York State Department of Health

**PROJECT:** Sequence previously characterized clinical isolates using the IonChef/IonS5 platform to compare its AR gene detection to the current testing algorithm at Wadsworth, which involves WGS and AmpliSeq targeted sequencing. Conduct validation testing of new, CDC-sponsored HP technology that “prints” antibiotics, which will allow antimicrobial susceptibility testing with novel drugs on exceptionally-resistant organisms before these new antibiotics are available in commercial assays.

**FUTURE PLANS:** Ideally, I would like to continue learning about AR testing at another public health laboratory, perhaps on the west coast, to observe differences in clinical isolates on the opposite side of the US. Working in AR within the private sector is also of interest, as I would like to learn more about the commercially created diagnostics and assays available or under development for public health use.

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**Jessica Plemmons**  
*MPH (Hospital and Molecular Epidemiology), University of Michigan—Ann Arbor*

**WORKING WITH:** Robert Myers, PhD, Maryland Public Health Laboratory

**PROJECT:** Contribute to the Mid-Atlantic ARLN activities to understand the rising threat of AR. Develop and validate a method to isolate and identify CRE among a vast majority of normal flora from rectal swabs by using a culture-based method, MALDI-TOF and PCR. This culture-based method will help guide patient treatment and improve CRE surveillance within the Mid-Atlantic region.

**FUTURE PLANS:** I aspire to become a lead public health scientist in an academic or governmental laboratory, where I will conduct research in the field of infectious disease microbiology. I am using this fellowship to help guide my path to determining whether I return to school for a PhD in microbiology, continue to work in a public health laboratory, or work in a hospital as an infection prevention epidemiologist.
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

Since the program’s inception in 2013, there have been 29 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

2017-2019 Fellows

Su Bin Park

MS (Bioinformatics) Georgia Institute of Technology; MS (Medicine), Seoul National University, South Korea

WORKING WITH: Brian Raphael, PhD, Pneumonia Response and Surveillance Laboratory, CDC

PROJECT: Develop a tool for subtyping Legionella pneumophila with 50 core genes, as part of an international collaboration. Analysis of resulting data—statistics summaries, phylogenetic trees, heat maps and distance matrices—aims provide sufficient performance data on the scheme to support a joint manuscript and for adoption of the scheme by international public health laboratories.

FUTURE PLANS: I want to grow more in public health. I plan to pursue a doctoral degree in health science and want to be a respectful leader, being able to contribute on wellness and safety of career for young bioinformaticians as well as microbiologists.
Sarah Schmedes  
*PhD (Biomedical Sciences—Molecular Genetics), University of North Texas Health Science Center*  
**WORKING WITH:** Venkatachalam (Kumar) Udhayakumar, PhD, Malaria Genomics Laboratory, CDC  
**PROJECT:** Create high-quality reference *Plasmodium falciparum* genomes by developing a standardized bioinformatics pipeline for assembly and annotation using PacBio long-read sequencing. Implement machine learning to infer AR, infection level and geographical origin of *Plasmodium* isolates.  
**FUTURE PLANS:** The APHL Bioinformatics Fellowship has given me the opportunity to expand my bioinformatics skills, specifically in a public health setting, providing many opportunities for advanced training, collaboration and leadership. After the fellowship, I hope to pursue opportunities at a state or federal public health lab to continue bioinformatics research and applications in public health, focusing on molecular surveillance of antibiotic resistance and using molecular epidemiology to assist with outbreak investigations.

### 2018-2019 Fellows

**Vincent Caruso**  
*MS (Biomedical Informatics), Oregon Health & Science University*  
**WORKING WITH:** James Lara, PhD, Division of Viral Hepatitis Laboratory Branch, CDC  
**PROJECT:** Conduct research that aims to advance the understanding and characterization of hepatitis C virus (HCV) infections. Develop machine learning models to detect clinical phenotype information from a patient’s HCV sequence data.  
**FUTURE PLANS:** My career goal is to work as a member of a bioinformatics research team, applying machine learning and sequence analysis techniques for the advancement of human health. I also want to develop new software-based analytical tools to assist in that research. The APHL Fellowship has given me invaluable experience as the main investigator on a novel public health research project, while simultaneously allowing me to advance my machine learning and programming expertise.

**Peter W. Cook**  
*PhD (Animal Science), Texas Tech University*  
**WORKING WITH:** Todd Davis, PhD, Zoonotic Virus Team, CDC, Texas Tech University, Lubbock, Texas  
**PROJECT:** Use bioinformatic techniques to characterize novel influenza variant viruses and identify potential molecular markers that differentiate host specific influenza viruses. Develop programs that assist in surveillance by improving the efficiency of data analysis.  
**FUTURE PLANS:** I intend to continue improving public health through the use of bioinformatics either at the CDC or in a similar research and surveillance organization.
Working directly with the biologists that produce the data, analyze results and will eventually use the tools has provided the best feedback loops for the development and design of the programs and models I have been working on. It would not have been possible for me to work directly with these individuals without the help of this fellowship.

Curtis Kapsak  
MS (Biology), James Madison University  
WORKING WITH: Joel Sevinsky, PhD, Colorado Department of Public Health and Environment  
PROJECT: Develop and implement Docker containers for bioinformatics software used for the characterization, serotyping, antibiotic resistance prediction and phylogenetic analysis of pathogenic bacteria.  
FUTURE PLANS: I aim to continue a career in public health due to the exciting work and opportunities I’ve had during the fellowship. It is amazing to be surrounded by people who all work towards one common goal—improving the health of others.

Yvette Ochuwa Unoarumhi  
MSc (Biomedical Sciences), University of Toledo  
WORKING WITH: Mili Sheth, PhD, Biotechnology Core Facility Branch, CDC  
PROJECT: Utilize the latest methodology for de-novo assembly of clinically isolated strains of *Leishmania*, curate clinical samples of *Leishmania* genomic assembly, prepare genomic assemblies and carry the raw data for upload to NCBI. Carry out gene annotations on assembly of *Leishmania* samples.  
FUTURE PLANS: I hope to continue a career in public health and use bioinformatics to contribute to public health. The fellowship helped me by presenting an opportunity into the field of public health. One of the most valuable aspects is the wealth of experience I received as a scientist and the willingness by my team to take on tasks to improve public health.

Erin Young  
PhD (Molecular Biology), University of Utah  
WORKING WITH: Kelly Oakeson, PhD, Utah Public Health Laboratory  
PROJECT: Refine, automate and expand the scope of the existing Utah Public Health Laboratory pipelines. Enhance the ease and capacity of information transfer through data visualization and report creation.  
FUTURE PLANS: My career ambition after the fellowship is to remain in public health. I would like to be the head of bioinformatics at a state or regional public health laboratory. The APHL-CDC Bioinformatics Fellowship allowed me to explore this career option and meet people in the field.
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 (PHLs) 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

Moinuddin Chowdhury
MS (Biology), MPH (Public Health Epidemiology), New York University
WORKING WITH: Scott Hughes, PhD, New York City Public Health Laboratory
PROJECT: Develop, implement and validate protocols for efficient characterization of pathogens, including *M. tuberculosis* and *Legionella*, using next-generation sequencing (NGS) methods (such as DNA extraction directly from clinical specimens, preparation of libraries and sequencing on NGS platforms). After quality assessment, analyze data with bioinformatic tools for pathogen identification and characterization, including drug resistance profiling and subtyping.

FUTURE PLANS: I plan to pursue a career in epidemiology, focused on antimicrobial resistance with infectious disease agents. I hope to apply the knowledge I learn from this fellowship towards the development and validation of new diagnostic tools that are effective and sustainable for low-resource settings.

Jonathan Plitnick
MA (Biological Sciences), Binghamton University
WORKING WITH: Lisa Mingle, PhD, Joseph Wade, PhD, Wadsworth Center New York State Department of Health Laboratory
PROJECT: Determine the gene regulatory network associated with motility in *S. Typhimurium* (Previous studies indicate a connection between motility and virulence in *S. Typhimurium* and that genes involved in motility are coordinately-regulated with genes involved in attachment to host gut epithelial cells). Rotate in the clinical service laboratories to learn diagnostic tests in relation to basic research.

FUTURE PLANS: I plan to use this fellowship to get an overview of the role of state public health laboratories in public health. In the future I will either pursue a higher degree or a career at a public health laboratory focusing on the prevention and detection of infectious diseases.
**Ronald H. Laessig Memorial Newborn Screening Fellowship Program**

The Ronald H. Laessig Memorial Newborn Screening Fellowship Program prepares laboratory scientists for careers in newborn screening and/or genetic research while also strengthening local, state and federal public health infrastructures to support surveillance and implement prevention and control programs. The program is a two-year, full-time post-doctoral fellowship that accepts one applicant per fellowship cycle.

Learn more at [aphl.org/NBS-fellows](http://aphl.org/NBS-fellows)

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**Ellen Stevens**

*PhD (Pharmacology), University of North Carolina—Chapel Hill*

**Working with:** Dee Pettit, PhD and Scott Zimmerman, PhD, North Carolina State Laboratory of Public Health

**Project:** Validate and implement the Illumina MiSeqDx Cystic Fibrosis (CF) 139-Variant screening methodology, which allows for the rapid detection of CF disease-causing mutations. Collaborate with partner agencies (CDC and RTI) to develop, optimize and implement novel molecular assays to detect mutations associated with lysosomal storage disorders in newborns. Conduct a data analysis project for the SCID TREC assay.

**Future Plans:** The most valuable aspect of my fellowship has been gaining experience in a clinical laboratory screening environment. I have learned how to validate a new technology (next generation sequencing) for CF variant screening in newborns, which will be implemented in the future. I have formed multiple collaborations with other NBS screening programs and CDC throughout my fellowship that will guide my future career. [I plan] to continue to perform research that will ultimately improve the overall well-being of babies being born with life-threatening disorders by guiding earlier diagnosis and treatment options.

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Thanks to Ellen’s work, the North Carolina newborn screening program is poised to integrate a sequencing assay for detection of variants in the CF transmembrane conductance regulator gene (CFTR) used to screen newborns for CF.
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.