

  
**APHL** ASSOCIATION OF  
PUBLIC HEALTH LABORATORIES

# APHL: LEADING THE LABS THAT PROTECT THE NATION'S HEALTH

The Association of Public Health Laboratories (APHL) is the national nonprofit representing governmental laboratories that monitor and detect public health threats, ranging from lead contamination in drinking water to metabolic and genetic conditions in newborns.

As the primary advocate for public health laboratories, APHL is active on many fronts:

## EMERGENCY RESPONSE

During the outbreak of novel influenza A (H1N1) in 2009, APHL was at the hub of national response efforts, working around the clock with the Centers for Disease Control and Prevention (CDC) to coordinate the nation's laboratory response to the crisis.

## LABORATORY SCIENCE

APHL is coordinating with member laboratories to adapt a powerful molecular technique—multi-locus variable number tandem repeat analysis—to subtype foodborne bacteria.

## EDUCATION AND TRAINING

When scattered outbreaks of the “superbug” MRSA (methicillin-resistant *Staphylococcus aureus*) erupted in 2007, the APHL/CDC National Laboratory Training Network fast-tracked the development of a course on methicillin resistance testing for public health scientists.

## LABORATORY WORKFORCE

After an APHL survey revealed an alarmingly small pool of potential, future laboratory directors, the association established the National Center for Public Health Laboratory Leadership. Its mission is to attract a new cadre of lab leaders and to develop the leadership skills of those in the field.

## MEMBER PERSPECTIVE

“When I pick up the phone, I never know what to expect. It's always unique and often challenging as well.”

SALLY LISKA, DrPH, director,  
San Francisco Public Health Laboratory

## HEALTH POLICY

APHL championed the inclusion of \$7 million in direct funding for the CDC Newborn Screening Quality Assurance Program—the first ever direct funding for the program—in the 2008 Consolidated Appropriations Act, subsequently enacted into law.

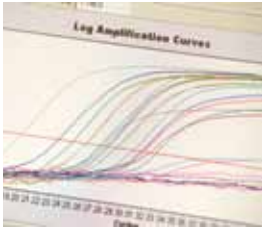
## GLOBAL LABORATORY CAPACITY

APHL implemented a pilot laboratory information system in Mozambique to support treatment of HIV/AIDS patients. The system links instruments for CD4, hematology and biochemistry testing to the laboratory database.

## LABORATORY SYSTEMS

APHL not only supports systems of laboratories—such as the emergency-focused Laboratory Response Network—but devotes considerable attention to labs' internal business systems, promoting performance standards and continuous quality improvement.

## LEAD



Clockwise from top right: Bulletin board in newborn screening laboratory with letters from families of children who have been tested at the lab, Virginia Division of Consolidated Laboratory Services (VDCLS). Scientist at biosafety cabinet, Environmental laboratory, VDCLS. Screen view of amplification curves showing results of real-time polymerase chain reaction assay, VDCLS. Scientist examining culture, VDCLS. Center: Team from the Colorado Public Health Laboratory responsible for isolating the outbreak strain of *Salmonella* Saintpaul in a jalapeño pepper using polymerase chain reaction, pulsed field gel electrophoresis and multi-locus VNTR analysis; from left: Dave Heitzel, Mary Kate Cichon, Justin Nucci and Melissa Jett Nucci (Not pictured: Skip Gossack).

## APHL MEMBERS: A CRITICAL PUBLIC HEALTH RESOURCE

Laboratories in public health operate at all levels of government to detect, identify and monitor:

- Outbreaks of infectious diseases.
- Chemical contaminants in people and the environment.
- Clusters of foodborne illness.

They also:

- Screen newborns for genetic and metabolic conditions.
- Respond to natural disasters, industrial accidents and suspected biological, chemical or radiological terrorism.
- Conduct testing to support enforcement of water, food, dairy and environmental safety laws.
- Carry out research to investigate disease trends and develop new laboratory technologies.
- Contribute to the formulation of state and national health policies.

APHL's 800 members include state, territorial and local public health laboratories; state environmental testing laboratories; state agricultural and food safety laboratories; and individual scientists, public health officials and academicians.

## LINKING PARTNERS TO SAFEGUARD HEALTH

APHL is the nexus for the country's extensive network of laboratories with public health mandates: a hub for information exchange among members and between the APHL membership and external partners.

APHL has a longstanding relationship with the Centers for Disease Control and Prevention (CDC). In 1999, APHL, CDC and the Federal Bureau of Investigation founded the Laboratory Response Network—a group of public and private sector laboratories that serve as laboratory first responders to terrorism, emerging infectious disease and other public health crises.

APHL also co-sponsors with CDC the:

- Newborn Screening Quality Assurance Program, which provides technical assistance to laboratories worldwide to assure timely and accurate newborn test results.
- National Laboratory Training Network, a respected source of continuing education for laboratory scientists who perform testing of public health significance.

The association:

- Links member laboratories with the clinical laboratory community—the principal source of patient specimens in the US.
- Acts as liaison between member laboratories and the companies that supply them with testing reagents, instrumentation, facility

designs and other goods and services.

- Links member laboratories and subject matter experts with federal agencies, including the CDC, Environmental Protection Agency (EPA), Food and Drug Administration, Department of Homeland Security and the Department of Agriculture.

In 2005, APHL formalized its relationship with the EPA. The association is now a chief supporter of the EPA's Water Laboratory Alliance, a network of public health and environmental testing laboratories that perform testing for drinking water contaminants, including potential agents of terrorism.

### MEMBER PERSPECTIVE

“We're emergency responders from the lab perspective.”

PETER SHULT, PhD, director,  
Communicable Disease Division and  
Emergency Laboratory Response,  
Wisconsin State Laboratory of Hygiene

### AFTER THE STORM: APHL COORDINATES RELIEF ACTIVITIES

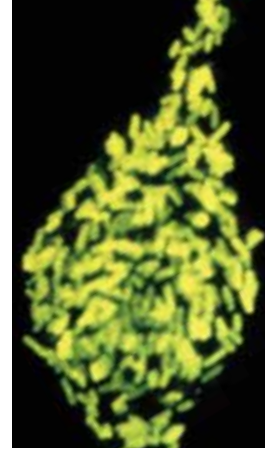
After Hurricane Katrina disabled the New Orleans branch of the Louisiana State Public Health Laboratory in 2005, APHL quickly stepped in to assure vital lab services would continue.

APHL secured single points of contact for the laboratory director at federal agencies, intervened with the Centers for Medicare & Medicaid Services to authorize clinical testing in ad hoc locations, contacted national US Postal Service officials to redirect New Orleans-bound laboratory specimens to the laboratory's Shreveport facility, explained the workings of the little-known Emergency Management Assistance Compact and coordinated offers of assistance from association members.

For its efforts, APHL was cited in the official presidential report on the hurricane response. And when hurricanes Ike and Gustav were forecast in 2008, APHL was ready to respond again.



CONNECT



Clockwise from top right: *Salmonella*, sp. bacteria cultured in a tetrathionate-enrichment broth and stained using the direct fluorescent-antibody technique, source: Public Health Image Library. David Warshauer, PhD, assistant director, Communicable Diseases, entering BSL-3 suite, Wisconsin State Laboratory of Hygiene. Scientist uploading confirmed patterns of foodborne pathogens to national PulseNet database, Virginia Division of Consolidated Laboratory Services (VDCLS). Aerial view of eye of Hurricane Katrina. Attaching labels to specimens in newborn screening laboratory, VDCLS. Loading robotic sampler, VDCLS. Center: Scientist from University of Iowa Hygienic Laboratory sampling water after floods of 2008.

## ADVANCING LABORATORY SCIENCE

Science is the heart of the laboratory and an important focus for APHL. The association and its members routinely collaborate in the development of new assays and testing algorithms to capitalize on scientific advances and to find alternatives to conventional methods when needed.

### ALTERNATE METHODS TO CURB MUMPS OUTBREAK

In 2006, while the Midwest was experiencing a massive mumps outbreak involving thousands of people, the conventional mumps antibody test failed to perform as expected, throwing its diagnostic value into question. APHL hosted a national conference call with leading virology experts to discuss the utility of alternate methods, such as virus isolation and reverse transcription polymerase chain reaction, to assist them in responding to the demand for testing.

### NEW ASSAY FOR RAPID DETECTION OF INFLUENZA

APHL recently collaborated with the CDC in the development of a new influenza test, which received 510(k) clearance by the Food and Drug Administration in time for the 2009 flu season. The Human Influenza Virus Real-Time RT-PCR Detection and Characterization Panel can accurately detect and identify all commonly circulating human influenza viruses as well as avian influenza A (H5N1) viruses.

### ADVANCES IN HIV DIAGNOSTICS

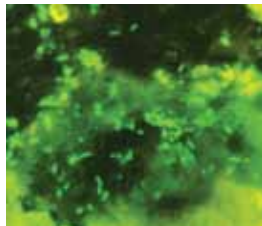
A current priority is updating US HIV diagnostic algorithms. Existing algorithms have been unchanged for 20 years, despite the availability of more rapid and more sensitive tests. And while the World Health Organization has been updating international HIV diagnostic protocols, the issue has received scant attention in the US.

APHL established expert committees to identify the best combination of rapid tests to screen patients at the point-of-care and to confirm positive results in the laboratory. The new algorithms will offer faster results, fewer false-negative results and the ability to identify HIV-2, a West African strain of the virus showing up more frequently in North America.

### MEMBER PERSPECTIVE

“You don’t know a disease is emerging or re-emerging if you don’t test for it.”

RON LIMBERGER, PhD, director  
Infectious Disease Division,  
Wadsworth Center, New York State  
Public Health Laboratory



## ANALYZE

Clockwise from top right: Scientist Frank Barley, PhD, conducting analyses using liquid chromatography-tandem mass spectrometry, California Public Health Laboratory. Susan Waters, laboratory technician, performing a wet mount examination in the STAT laboratory at Tarrant County Public Health Laboratory, Fort Worth, TX. *Escherichia coli* stained using the direct fluorescent-antibody technique, source: Public Health Image Library. Scientist in BSL-3 laboratory, Virginia Division of Consolidated Laboratory Services.

## PROTECTING NEWBORNS WITH ADVANCED METHODOLOGY

State public health laboratories are incorporating molecular testing into their newborn screening programs, with cystic fibrosis as one of the model conditions. Of the 45 states that screen for cystic fibrosis, more than half use molecular testing to detect the condition.

To develop technical proficiency with this method, APHL co-sponsors four-day, intensive workshops for laboratorians and follow-up managers and nurses from states that screen for cystic fibrosis. The workshops combine lectures from national experts with hands-on training in specimen preparation, gene detection and determination of results. APHL develops and conducts the training in collaboration with the Centers for Disease Control and Prevention, the National Newborn Screening and Genetics Resource Center, the Health Resources and Services Administration and the National Laboratory Training Network as well as member laboratories that provide the facilities.

# STRENGTHENING NATIONAL LABORATORY SYSTEMS WORLDWIDE

APHL works with national health systems in more than a dozen resource-constrained nations in Asia, Africa, South America and the Caribbean to extend the reach of laboratory-based disease surveillance, advance in-country health objectives and reduce the burden of endemic diseases such as HIV/AIDS and TB.

## PLAN, DESIGN, TRAIN, BUILD

APHL's Global Health Program is the association's largest initiative. Under its auspices, APHL develops and supports training,

## MEMBER PERSPECTIVE

“One of the things anybody who has gone overseas very quickly realizes is that unless you have good systems and good management in place, you can teach people how to do a test and when you go back six months later, it's like you've never been there.”

ERIC BLANK, DrPH  
laboratory consultant and former director,  
Missouri State Public Health Laboratory

strategic planning, collaborative partnerships and other services to build the capacity and capability of national laboratory systems to provide accessible, quality testing services and support timely disease surveillance and response.

APHL assists ministries of health and laboratories in resource-constrained nations to:

- Craft a strategic plan to guide the national laboratory system.
- Provide technical and leadership training.
- Procure laboratory equipment and supplies.
- Develop and implement laboratory information systems.
- Design quality assurance systems.
- Plan and manage laboratory renovation projects.
- Build effective national laboratory networks.

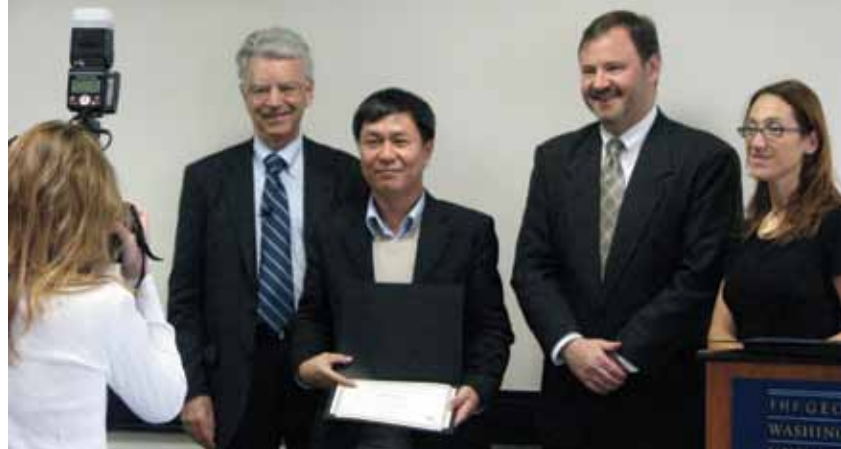
APHL supports these efforts through the contributions of experienced member laboratory professionals who serve as on-site technical advisors and provide training opportunities in US laboratories.

## NATIONAL AND INTERNATIONAL PARTNERSHIPS

The association collaborates with leading national and international health agencies, including the CDC Global AIDS Program, the US President's Emergency Plan for AIDS Relief, the International Union Against Tuberculosis and Lung Disease and the World Health Organization (WHO). In one of several WHO collaborations, APHL matches laboratories in resource-constrained countries with “expert” institutions in the US to improve quality laboratory practice and international infectious disease surveillance and response.

In addition to partnering with health agencies, APHL has joined with the George Washington University School of Public Health and Health Services to establish the International Institute for Public Health Laboratory Management—a unique educational program serving senior laboratory professionals with minimal access to advanced public health laboratory management training in their home countries.

## DEVELOP



Clockwise from top right: Laboratorian working with a laboratory information system (LIS), newly installed in collaboration with APHL, at the National Reference Laboratory at Maputo Central Hospital, Maputo, Mozambique. Laboratory Quality Control Workshop in Maputo, Mozambique, 2009, sponsored by APHL in conjunction with CDC and the Mozambique Ministry of Health. Loading centrifuge at Coast General Provincial Hospital in Mombasa, Kenya. Mozambican students training at Miami Dade College in Miami, FL, as part of an APHL program to develop laboratory managers from their country. David Mills, PhD, director, New Mexico Scientific Laboratory Division, at World Health Organization headquarters in Geneva, Switzerland. Tran Huu Bich, MD, PhD, epidemiologist and vice dean for research, Hanoi School of Public Health (center), accepting graduation certificate from the International Institute of Public Health Laboratory Management from Ralph Timperi, MPH, senior advisor, Laboratory Management and Practice, and director of Global Health, APHL (left); Alan Greenberg, MD, MPH, chairman, Department of Epidemiology and Biostatistics, the George Washington University (right); and Maria Elena Botazzi, PhD, associate research professor, vice chair for Administration-Microbiology, Immunology and Tropical Medicine, the George Washington University (far right).

APHL's Global Health Program is active in the following 14 countries. Additional projects are under development in Cameroon, Mexico, Paraguay, Zambia and Zimbabwe.

- Angola
- Barbados
- Botswana
- Ethiopia
- Côte d'Ivoire
- Guyana
- Haiti
- Kenya
- Lesotho
- Mozambique
- Namibia
- Nigeria
- Tanzania
- Vietnam

Other global initiatives include collaborations with China to support development of national disease detection capability and with Canada to strengthen cross-border influenza surveillance.

## DELIVERING HIGH QUALITY LABORATORY TRAINING

The cutting-edge science practiced in public health, environmental-testing and agricultural laboratories requires a highly trained and adaptable workforce. Not only are technological advances making older laboratory techniques obsolete, health threats themselves are evolving at a rapid rate.

APHL has a 20-year history as a provider of high quality, timely education to keep scientists current in a rapidly changing field. While there are other continuing education providers, APHL fills a crucial niche by focusing on topics of fundamental public health importance. Some—like rabies testing—are addressed nowhere else.

### NATIONAL LABORATORY TRAINING NETWORK

Each year, the National Laboratory Training Network (NLTN)—co-sponsored by APHL and CDC—delivers hundreds of courses to tens of thousands of scientists on topics ranging from parasitic diseases to chemical terrorism. The NLTN has even developed a seminar examining the threat potential and laboratory identification of pathogens that have yet to establish a real presence in the US, such as dengue and chikungunya virus.

### FELLOWSHIP PROGRAMS

APHL and CDC also co-sponsor two fellowship programs. The Emerging Infectious Diseases Fellowship Program is designed to recruit and prepare laboratory scientists for public health careers. The program offers a track for bachelor's or master's level scientists and

another for doctoral-level scientists interested in infectious disease research. The Environmental Health Traineeship Program offers specialized training in environmental health to practicing public health laboratory scientists.

### DISTANCE LEARNING, CONFERENCES, HANDS-ON TRAINING

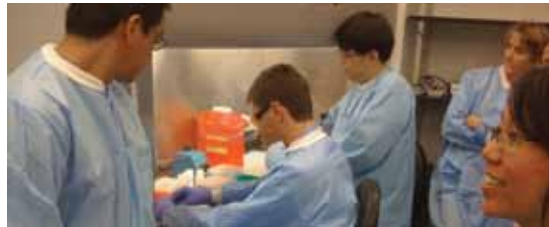
In addition to CDC, APHL partners with other federal agencies, member laboratories, nonprofit organizations, and academic and corporate partners to create distance learning opportunities and hands-on training courses addressing specific needs.

Emerging infectious diseases, biosafety, MRSA, foodborne pathogens: APHL offers more than 200 training programs each year on diverse topics in laboratory science and management.

Finally, the association sponsors a number of prominent technical workshops and national meetings with training components:

- An annual membership meeting.
- An annual update meeting for members of PulseNet, the nation's foodborne disease surveillance network.
- A periodic newborn screening and genetics testing symposium.
- A periodic conference on laboratory aspects of tuberculosis.

# TRAIN



Clockwise from top center: Emerging Infectious Diseases (EID) Fellow Nicole Podnecky in BSL-3 Suite. Screen shot of set up of 96-well plate with newborn screening specimens. EID Fellow Sankar Sridaran assisting with malaria surveillance in Jabalpur, India. Diagnostic Molecular Parasitology course sponsored by APHL at the CDC training laboratory. International EID fellow Modupe Osinubi participating in a baiting project to prevent the spread of raccoon rabies in Alabama. EID Fellow Hillary Shane (right) and colleague at the Kenya Medical Research Institute in Kisumu, Kenya. Center: 2008 Class of EID Laboratory Fellows.

# BOLSTERING LABORATORY SYSTEMS

Quality laboratory practice is APHL’s overarching goal as articulated in its mission statement. The proven route to quality is through a systems approach to laboratory practice that treats discrete functions and entities as part of a larger, integrated system.

APHL bolsters laboratory systems in three ways:

- **BEST PRACTICES:** Identifying and promoting best practices, performance standards and standardized methods for analytical testing, information management and other important tasks. As one example, APHL released a seminal report laying out benchmarks and a new organizational paradigm to revamp the nation’s TB testing infrastructure amid signs that multidrug-resistant TB strains were emerging.
- **RESEARCH:** Conducting research to document member laboratories’ capabilities, testing capacity and resource needs so deficits can be addressed. The association also offers a toolkit and technical assistance to help laboratories perform their own assessments and plan and implement system improvements.
- **NETWORK SUPPORT:** Organizing and supporting networks that provide surge capacity and standardized protocols for disease surveillance and emergency response. For example, APHL collaborates with CDC to support PulseNet, the nation’s network for detection and response to foodborne disease outbreaks.

Although systems improvement is seldom glamorous, it is a prerequisite for quality and therefore critical to the high caliber performance of US laboratories in public health.

## MEMBER PERSPECTIVE

“The PHLIP system allows decision makers to have what we call ‘actionable information.’ Highly accurate, highly reliable, timely.”

STEVEN HINRICHS, MD, director,  
Nebraska Public Health Laboratory

## FASTER REPORTING OF RESULTS

When the novel Influenza A (H1N1) virus emerged in April of 2009, only four state public health laboratories could report influenza test results electronically to CDC using standards-based reporting. The remainder had to rely upon antiquated and inefficient data exchange methods. In many cases, critical test results had to be communicated via phone or fax.

Fortunately, another 12 state labs will soon have real-time reporting capability for influenza, and more are slated to follow thanks to the Public Health Laboratory Interoperability Project (PHLIP). APHL and CDC lead this initiative, which aims to establish the messaging standards and technical architecture to support secure, multi-directional electronic exchange of laboratory data.

# SHAPING NATIONAL HEALTH POLICY

APHL is known in Washington, DC, as an authoritative voice on laboratory-related health issues, including emerging infectious diseases, human exposure to environmental toxicants, genetic testing, foodborne disease outbreaks, terrorism preparedness and others.

APHL's education and advocacy program includes:

- An annual "Hill Day," when association members engage legislators and their staff in discussions pertaining to critical public health issues.
- Issue statements on pending legislation and federal regulations.
- Congressional testimony and briefings.
- Participation on national advisory bodies, such as the American Health Information Community, a federal advisory committee that makes recommendations on health IT standards and policies, and several of CDC's Boards of Scientific Counselors, which advise the CDC director and secretary of the Department of Health and Human Services.

Among its recent successes, APHL was asked to submit draft language for the "Improving Foodborne Illness Surveillance and Response Act of 2008," introduced by then-Senator Barack Obama. APHL was also instrumental in changing federal regulations so tests for SARS and other novel pathogens can be performed even when

there is a shortage of test control materials, provided laboratories use alternate quality control measures that were identified with APHL input.

With detailed knowledge of the laboratory and Capitol Hill, APHL bridges the gap between science and public health policy.



Clockwise from top right: US Capitol. APHL members meeting with congressional staff. Peter Shuit, PhD, director, Communicable Disease Division and Emergency Laboratory Response, Wisconsin State Laboratory of Hygiene (WSLH), testifying before the House Subcommittee on Emerging Threats, Cybersecurity, and Science and Technology of the Homeland Security Committee. Charles Brokopp, DrPH, director, WSLH, discussing public health laboratory capacity with congressional staff.



## DEVELOPING THE NEXT GENERATION OF LABORATORY LEADERS

The United States is in the midst of a severe shortage of laboratory scientists, threatening emergency response capability. Alarming, the shortage is most acute for senior technical and managerial positions. An entire cohort of highly trained government scientists is retiring, while fewer students are entering the profession. The result is a serious leadership gap.

In 2003 APHL launched the National Center for Public Health Laboratory Leadership. Its mission is to attract new laboratorians into public health and to prepare current and emerging laboratory leaders with the skills needed to succeed in the rapidly evolving public health arena.

The Center:

- Documents worker shortages, required job competencies and innovative recruitment practices.
- Sponsors mentoring and peer-exchange programs for emerging leaders, with opportunities for training in risk communication, strategic visioning and other leadership skills.
- Develops and disseminates succession planning seminars and tools.
- Hosts a three-day orientation program for new public health laboratory directors.
- Is currently developing a laboratory management curriculum targeted to future state public health laboratory leaders.

Without qualified laboratory scientists, the United States has no frontline to detect and respond to emerging health threats.



Clockwise from right: Mark Pandori, PhD, assistant director, San Francisco Public Health Laboratory. Scientist working in newborn screening laboratory, Virginia Division of Consolidated Laboratory Services. David Warshauer, PhD, assistant director, communicable disease, Wisconsin State Laboratory of Hygiene and Emerging Infectious Diseases Fellows.





## FOSTER

### NARRATING SUCCESSES

As part of its effort to promote laboratory careers in public health, APHL is collecting stories documenting the contributions of its members. This excerpt describes the work of the New Mexico Scientific Laboratory Division during the 2006 nationwide *E. coli* O157:H7 outbreak, as told by Director David Mills.

“[Health authorities] suspected bagged spinach but they hadn’t been able to link it with product. Our laboratory was the one that actually made the link . . . between the *E. coli* in the case patients and a bag of spinach that was pulled out of the fridge of one of the patients. . . Within 24 hours we had the results. We knew we had the link. We had the bag of spinach with the brand, the lot number. CDC was abuzz. . . And within a day [health authorities] had narrowed it from just having an idea that we think it’s linked to spinach—but we have no more than that—to spinach fields in three California counties...”

Clockwise from top center: Lou F. Turner, DrPH, MPH, HCLD, deputy section chief, Epidemiology, North Carolina Division of Public Health, at recording booth for APHL Storytelling Project. Paul Kimsey, PhD, assistant deputy director, laboratory services, and California state public health laboratory director, California Department of Public Health, at recording booth. APHL annual meeting attendees at listening station for storytelling project. Natalie Mills, student and disease detective, University of Texas-Austin, and participant, storytelling project. Emerging Infectious Diseases Fellow Narry Tiao works at the Peruvian University of Cayetano Heredia as part of her fellowship field experience. Scientist preparing report, Virginia Division of Consolidated Laboratories.

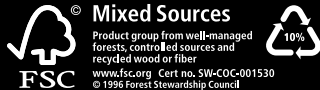


#### **VISION**

A healthier world through quality laboratory practice.

#### **MISSION**

To promote the role of public health laboratories in support of national and global health objectives, and to promote policies and programs which assure continuous improvement in the quality of laboratory practice.



#### **FUNDERS**

APHL Member Dues

Centers for Disease Control and Prevention:

Coordinating Center for Health Information and Services

National Center for Health Marketing

National Center for Public Health Informatics

Coordinating Center for Infectious Diseases

National Center for Immunization and Respiratory Diseases

National Center for HIV, Viral Hepatitis, STD and TB Prevention

National Center for Preparedness, Detection and Control of Infectious Diseases

National Center for Zoonotic, Vector-borne and Enteric Diseases

Coordinating Center for Environmental Health and Injury Prevention

National Center for Environmental Health

Coordinating Office for Terrorism Preparedness and Emergency Response

Office of Workforce and Career Development

Environmental Protection Agency

President's Emergency Plan for AIDS Relief

World Health Organization