

Delaware LabOrator

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LPAC SPRING 2018 UPDATE

by Margaret J. Zimmerman, Lab Manager, Delaware Public Health Laboratory

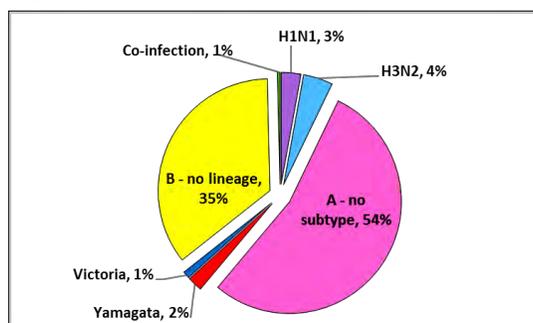
THE SPRING MEETING of the Delaware Laboratory Preparedness Advisory Committee (LPAC) was held at the Delaware Public Health Laboratory (DPHL) on Tuesday May 22, 2018. A wide range of topics were presented. These ranged from a presentation by a representative from the Delaware Department of Natural Resources and Environmental Control's Emergency Response Branch (DNREC-ERB) to an update about how the State of Delaware fared in the most recent Influenza season.

The meeting began with an informative presentation by Krista Murray from the University of Delaware (UD). Ms. Murray presented an overview of the UD Biosafety program and the organization, The International Association for Biosafety and Biosecurity (ABSA). ABSA offers a wide variety of resources and services intended to serve Biosafety-Biosecurity professionals in industry, including professional certifications.

The second presentation involved an update about the DPHL Bioterrorism Program. Marion Fowler, the DPHL Biosafety Official, shared that all hospitals in the State of Delaware allowed her to perform Risk Assessments. Ms. Fowler received a warm reception and will conduct additional visits in the future. Ms. Fowler updated the group regarding the LXP shipping exercise that took place during the first quarter of this year and announced the dates for the upcoming WET Workshop that will take place on October 4 and 5, 2018 in order to allow participants the option to select one of these two days to attend.

Ms. Emily Hanlin, Laboratory Manger of the DPHL Virology section briefed the audience about the 2017-2018 Influenza, which started October 1, 2017. To date, 9,025 laboratory confirmed cases have been identified. Forty-one (41) outbreaks have occurred in long term care facilities. There has been thirty-five (35) deaths. The confirmed cases alone, exceeded last year's confirmed cases by fifty percent. A break-down of sub-type and lineage is shown by the graphic that follows:

Figure 1. Delaware Influenza cases 2017-2018.



Source: Delaware Public Health Laboratory

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Fall 2018

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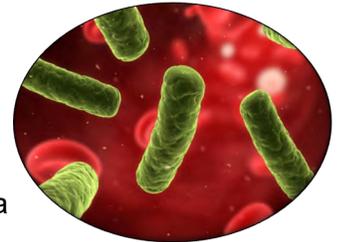
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The meeting continued with a presentation by Dr. Cynthia Flynn, Pathologist at Christiana Care Health Center. Dr. Flynn shared some fascinating infectious disease case-studies involving Mycobacteriology. Erich Schuller, Environmental Scientist from the DNREC, Emergency Response Branch, followed Dr. Flynn. Mr. Schuller's presentation provided an overview of the Branch's mission - "Public safety and the protection of environmental resources through emergency response, planning, and educational outreach activities" - and how this group achieves that mission. During calendar year 2017, the DNREC-ERB responded to 398 incidences, 280 of these were petroleum product related. In addition to these responses, there were fifteen (15) additional responses involving clandestine drug laboratories within Delaware and Maryland.

Gregory Hovan, DPHL Microbiology Manager, shared statistics about organisms that have the capability to resist antibiotics – i.e., Carbapenem Resistance. From April 1, 2017 to May 21, 2018, DPHL received, analyzed by quantitative Polymerase Chain Reaction (qPCR), and reported 392 isolates from 34 patients; 57 of these isolates were

found to have carbapenemase mechanisms. Most of the isolates (98%) harbored the *Klebsiella pneumoniae* carbapenemase (KPC) gene. The remaining isolates presented *Pseudomonas aeruginosa*. Mr. Hovan also described the DPHL testing algorithm that is used for processing these types of specimens. Within this protocol, DPHL confirms the organism ID and performs susceptibility testing using a Vitek 2 Comact system.



Susceptibility testing for Colistin is done using Etest kits. Beyond this, DPHL performs phenotypic carbapenemase testing using the modified carbapenemase inactivation method (mCIM). Any positive or indeterminate mCIM results receive additional PCR testing for KPC, NDM-1, OXA-48, and VIM.

The meeting concluded with a "Roundtable" at which all attendees had an opportunity to share "what's new" with all of the partners that were present.

The next LPAC meeting will take place in the fall of 2018. We hope to see you all then.



ASSOCIATION OF PUBLIC HEALTH LABORATORY (APHL)

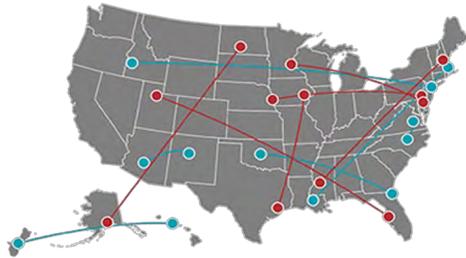
BIO SAFETY PEER NETWORK

by *Marion Fowler, BS MT (ASCP), Biosafety/Biosecurity Official*

Delaware Public Health Laboratory

THE BIOSAFETY (BSO's) PEER NETWORK, previously known as the Visiting Biosafety Official Program, was established, by APHL, in 2016. The program's purpose is to strengthen biosafety and biosecurity through information sharing and mentoring between paired State Biosafety Officials and Officers (BSOs). Each State and territory BSO was to reside in the State Public Health Laboratory (PHL).

Figure 2. Biosafety Peer Network Pairing



Source: Association of Public Health Laboratories, aphl.org

Using funds provided by the Centers for Disease Control and Prevention (CDC), in 2015, interstate BSO exchanges were planned and training was provided to BSOs. In the second year of the program, the interstate BSO exchanges began. Delaware and Minnesota were paired for three day exchanges. To this end, Eric Lundquist, MLS (ASCP), Biosafety Outreach Coordinator, Emergency Preparedness and Response, Minnesota Department of Health, traveled to Smyrna, Delaware, during the week of October 16, 2017. In return, Marion Fowler, BS MT (ASCP), Biosafety and Biosecurity Officer for the Delaware Public Health Laboratory (DPHL), traveled afterwards to St. Paul, Minnesota, during the week of February 26, 2018.

Each exchange laboratory BSO and laboratory staff was asked to review and identify procedural strengths and training needs involving biosafety and biosecurity. From this review, specific topics of interest resulted. These included: BSL-2 Safe Practices, Biological Risk Assessments, Personal Protective Equipment (PPE), Spill Prevention, Control and Countermeasure, Regulated Waste Management,

BSL-3 Safe Practices, Biosafety Program, Select Agent Regulations, and others.

From the review, three day BSO exchanges were planned. These were driven by the topics of interest identified by the reviews. In Delaware, the exchange took place over the week of October 16, 2017. Eric Lundquist, from Minnesota, spent time doing an in depth review of DPHL Laboratory Sections and ancillary areas. He dedicated time to engage laboratory staff as they described the work being performed in each laboratory area. Marion Fowler provided a legally allowable review of DPHL Plans concerning Biosafety and Security. Among the main topics were biosafety training topics and the methods used for this training – i.e., PowerPoint, classroom, hands-on, etc. – to achieve a greater level of practicality and applicability.

Discussions occurred regarding new ideas and techniques to increase employee classroom interest, active participation, and willingness to engage in further (yearly) biosafety training. A review of the various PHL program components in both states provided ideas for achieving this goal in both States.

Other discussions involved Sentinel Laboratory Outreach Programs, Biosafety Risk Assessment of Sentinel Laboratories Programs and Training, the DPHL Biosafety Management Program, and the Select Agent Program. To this end, questions had been submitted, by the Minnesota personnel, prior to holding the exchange event in Delaware. These were all addressed.

Day three of the each exchange involved special activities. As Minnesota is a very large state, it is a challenge to visit all of its sentinel laboratories in order to provide the required training, risk assessments and develop the close relationships needed between public health and the hospitals. Delaware has the clear advantage since it has smaller geographic footprint that can be covered within two hours or less (without beach traffic!). Thus, Eric was interested in a visit to one of Delaware's sentinel laboratories.

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ASSOCIATION OF PUBLIC HEALTH LABORATORY (APHL)

BIOSAFETY PEER NETWORK continued from page 3

Linda Hudson, Microbiology Manager for Bayhealth Medical Center, invited Marion and Eric to the Milford Campus. Conversations were held with Linda Hudson about the Biosafety Risk Assessments completed by the BSO and sentinel laboratories and the mutual benefits for both agencies. Arrangements were also made for Eric to meet with Bayhealth staff from all sections of the laboratory to discuss their biosafety practices, analytical test methods used, equipment and test kits used, and any technical issue of concerns.

In February, 2019, Marion traveled to Minnesota. While prepared to dress in heavy cold weather clothing, a heat wave was occurring in Minnesota where temperatures were warmer than in Delaware!

The first two days in Minnesota were spent in a manner similar to what was planned in Delaware. However, conversations begun during the Delaware visit were further developed by sharing of more detailed and specific information.

Marion had the opportunity to meet with specific sections of the Minnesota Laboratory to gain greater knowledge about preparedness sample submission and testing protocols. Also, the Minnesota Laboratory Quality Assurance Program Manager held conversations with Marion regarding Biosafety Audits and Competencies.

On day three Eric and Marion then attended a full-size Preparedness exercise being held at the University of Minnesota Medical Center. For this exercise, one of the National Ebola Training and Education Center (NETEC) Teams was on site to provide free site assessments (available through on-line requests) for Ebola events and for other Emerging Infectious Disease Treatment and Assessment Centers. Participants included hospital administrators, hospital laboratory staff, infectious control coordinators, nurses, security personnel, transportation personnel, state and hospital preparedness teams, public health laboratory representatives along with other partners.

Once the site assessment was completed, Marion talked with the Emory and Nebraska NETEC specialists about DPHL laboratory protocols and preparedness procedures and policies. This conversation yielded valuable information.

Through this process, key lessons were learned.

Among them is the fact that, by comparing and sharing information with another state, there are significant opportunities and great value for learning new and more efficient and effective methods and protocols.



For Marion, this became one of the most productive learning experiences in a career that spans more than 40 years. The act of sharing experiences, procedures, testing methods, etc., served to help both Delaware and Minnesota gain benefits for improving the Biosafety and Biosecurity Programs.

Beyond this, there was also an unexpected benefit. Soon after these exchanges were completed, Delaware participated in a statewide Ebola exercise. Taking from the knowledge gained by Marion's interaction, in Minnesota, with NETEC team, she was able to provide timely and pertinent feedback that helped to increase the effectiveness of the exercise. She provided updates about laboratory set-ups, information about Personal Protective Equipment (PPE), Testing Procedures and Equipment, necessary changes in paperwork to expedite specimen transport, etc. This resulted in a process that decreases the time to transport a specimen from patients in a hospital room (with minimum disruption in the hospital) to the DPH Laboratory.

“Take Aways”: It is important to always look for program improvement opportunities by “Being observant, constantly; Staying open minded; and by being eager to learn and improve.” – John Wooden

ENVIRONMENTAL CONTROL TECHNICIANS MOVE TO THE DPHL

by Fred Franze, QA Laboratory Manager

IN MAY, 2018, four Delaware Division of Public Health, Office of Drinking Water, Environmental Control Technicians, were reassigned to the Delaware Public Health Laboratory (DPHL).

Environmental Control Technicians (ECT) serve in various roles. These include obtaining samples from public drinking water sources throughout the state and transporting these to the DPHL (Environmental lab) for chemical and bacteriological analyses focused on identifying possible contaminants that could affect human health and safety.



Some municipalities that have a dedicated water system for the community also have trained water collectors in their staff. These collectors submit samples to the DPHL for analyses. Our ECT's are responsible for all public sites that are not monitored and collected by the municipalities.

When collecting water samples, it is essential to follow defined collection protocols for the various types of water samples to ensure that samples are representative of real conditions and results are accurate and precise. The types of samples collected is dependent on the type analyses to be done. Each ECT's is certified as an "Approved Sampler/ Tester" by the State and are well trained in various types of sample collection. These include sampling for bacteria, volatile organic compounds, pesticides, toxic metals, and other possible contaminants.

The test results are conveyed to the Division of Public Health Office of Drinking Water where they are assessed to determine the safety of drinking water.

The Environmental Control Technician crew consists of three full time merit employees and one casual/seasonal employee. The full time employees have an assigned geographic area of the State – a "territory".

Tommy Stepnay is responsible for the Northern territory, which consists of all sample sites north of Felton.

Hamish Lord MacBeth is responsible for the Southwestern territory, which consists of all sample sites south of Felton and west of route 113.

John DeAngelis was recently hired for the Southeastern territory, which consists of all sites south of Felton and east of route 113.

Matthew "Matt" Pinson is our casual/seasonal employee and is responsible for the Southeastern territory.

Once John DeAngelis is fully trained, Matt will be primarily responsible for test result data management and to serve as back-up sampling support for the crew.

Tommy and Hamish each have more than 10 years of experience collecting water samples and both are a source of knowledge and experience for John and Matt.

The DPHL is excited to have the opportunity to work with Tommy, Hamish, John, and Matt as an integral part of our Environmental Laboratory group and look forward to working together, as a team, to ensure that drinking water in Delaware is safe for everyone.

TUBERCULOSIS EXPOSURE AT DELAWARE LONG TERM CARE FACILITY 2017-2018

by Gregory Hovan BS, MBA, Laboratory Manager

TUBERCULOSIS CONTINUES to be a worldwide, modern day, plague and a leading infectious disease cause of death. It ranks next to HIV/AIDS in that, worldwide, it kills about five thousand people each day¹. Beyond this, the etiologic agent is in the process of developing antibiotic drug resistance and is a major socioeconomic burden. It primarily affects the economically deprived segments that ostracizes people from society.

Although considered to be a worldwide epidemic by the World Health Organization, the United States has had historically low case rates. In 2016, the case rate was 2.9 cases per 100,000, this is the lowest case count on record². In calendar year 2017, it was even lower³.

Tuberculosis is caused by bacteria classified as *M. tuberculosis* complex. The complex includes:

1. *Mycobacterium tuberculosis*
2. *Mycobacterium africanum*
3. *Mycobacterium orygis*
4. *Mycobacterium bovis* and the Bacillus Calmette–Guérin strain
5. *Mycobacterium microti*
6. *Mycobacterium canetti*
7. *Mycobacterium caprae*
8. *Mycobacterium pinnipedii*
9. *Mycobacterium suricattae*
10. *Mycobacterium mungi*

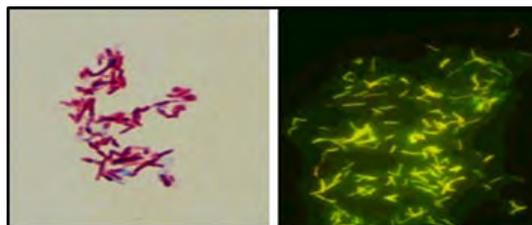
These are organisms that have distinct behaviors as compared to other types of infectious bacteria, such as *E. coli* and *Staphylococcus*. They grow at a much slower rate. They are not easily identified by routine laboratory test methods. They are highly infectious and have to be tested in a specialized, isolated, laboratory – Biologic Safety Level III - that has negative air pressure, and special work benches - biosafety cabinets- that pass air through HEPA filters.

Of particular concern is the fact that these bacteria can develop resistance to powerful antibiotics. Antibiotic therapy protocols require that patients be directly observed taking the antibiotics, which are prescribed for extended periods of time ranging from 6 months to 12 months.

Even though Tuberculosis (TB) is decreasing in the United States, newer physicians who have less opportunities to encounter patients with TB, find it a challenge to think about the possibility and thereby diagnose the disease. This extends the time between disease onset and an accurate diagnosis that initiated treatment. Add to this, TB cases present with generic signs and symptoms, such as cough, chest pain, blood tinged sputum, weight loss, fatigue, chills, fever, and night sweats. These may be confused with signs and symptom that are caused by other, more common, diseases⁶.

In 2013, Sheboygan, Wisconsin, experienced an exposure involving 11 active TB cases and 38 latent TB cases. Among these patients, one was a multi-drug resistant (MDR) case. Even though the patient had been actively seeking medical help for at least eight months prior to final diagnosis, the perception held by physicians of low TB incidence in the area where the patient resided and the delay in time to diagnosis allowed this patient to be in contact and potentially infect others during those eight months.

In the end, the cost to treat this case summed to over \$6 million dollars in state and federal funds⁴.



Mycobacteria are stained with carbol fuchsin-based Kinyoun stain (left) and fluorescent auramine-rhodamine stain (right)⁵

Delaware experienced a similar situation.

On April 23, 2018, the Delaware Public Health Laboratory (DPHL) received a grown organism labeled as *M. tuberculosis* complex from a hospital laboratory. The organism had been isolated from the respiratory tract of a 36 year old female, on April 14, 2018. The patient was a licensed practical nurse working in a long-term care

facility, in Wilmington, DE. The history revealed that between January, 2017, and September, 2017, she had active Tuberculosis disease and, because she was infectious, had potentially exposed as many as 513 people.

On May 25, 2018, the Division of Public Health sent out a Health Alert Notification (HAN) and hosted a call center to advise the contacts to get follow-up medical screening.

Drug susceptibility testing, done at the Delaware Public Health Laboratory (DPHL), found that the organism was resistant to three out of four treatment antibiotics. As this occurred, the hospital laboratory that had submitted the sputum specimen, informed DPHL that the TB culture was a mixed culture with other bacteria in the family of *M. tuberculosis* complex. This information was shared with the TB nurses helping the patient so that they could take appropriate safety measures. It also meant that the drug susceptibility test results could be inaccurate. Having more than one organism in a culture creates significant technical challenges because there are no automated separation methods and manual separation process takes a long time and is difficult.

On May 14, 2018, the Delaware Public Health Laboratory coordinated with partners at the California State Microbial Disease Laboratory to perform a very complex and specific drug susceptibility method that studies the DNA of the organisms. Although complex, this is a faster and more sensitive analytical method than the manual growth-based methods.

Further genotyping of organisms from the index patient revealed that, there were only two other TB organisms in Delaware that match the genotype. One was isolated in 2015. The other was isolated from a Delaware patient tested by the Pennsylvania Department of Health Laboratory, in 2005. Though the organisms show

similarity by genotyping, they may still be epidemiologically different. Delaware is pending further study results of the organisms, from the Pennsylvania Laboratory, regarding the 2005 patient.

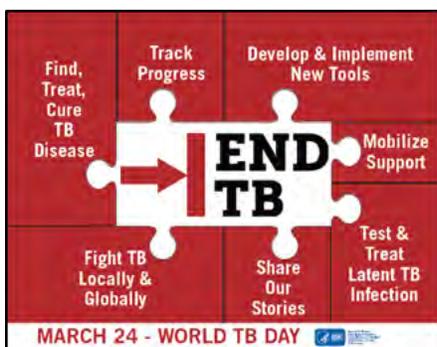
On May 17th, 2018, test results from the California State Laboratory revealed that the TB organisms were susceptible to the antibiotic Rifampin, Ethambutol, and Pyrazinamide. Resistance was shown to Isoniazid. On May 29th, 2018, the CDC also reported consistent results. This information allowed for a treatment regimen to be initiated. Many months of treatment and follow-up will have to go by before the effectiveness of therapy is determined.

From the group that had been exposed to the active case, the Delaware Public Health Laboratory received 49 blood samples for TB exposure testing. From this group, one was positive. People in this group were treated with either Isoniazid or Rifampin.

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Figure 3. World TB Day



Source: Centers for Disease Control and Prevention



EMPLOYEE NEWS

Welcome, Wes!



Wes Holleger. Join us in welcoming Wes Holleger to DPHL. Wes recently started as DPHL's Administrative Accountant and is now supervising the Finance section of DPHL. His knowledge of the FSF accounting system paired with his experience with financial data analysis, database creation and administration, and inventory management makes him well-suited for the position. Wes joins us from previous positions at DeDOT and Department of Corrections. Wes is excited to take on the responsibilities and challenges of his new position and his mission is to create efficiencies in the Finance section and, in turn, the Laboratory as a whole.

Welcome, Carly!



Carly Aquino. DPHL welcomes Carly Aquino as our new Microbiologist II in the Virology department. Carly graduated from the College of William and Mary with a B.S in Biology and soon after graduation worked at the University of Delaware as a Research Specialist working on gene editing of single base pair mutation diseases. After the University of Delaware, Carly worked at Charles River Labs as the MALDI Laboratory Manager, where she performed microbial identification on bacteria and yeast using the MALDI-TOF technology. In her free time Carly enjoys hiking, being outdoors, going to the beach and spending time with her family.



Congratulations, Lori!



Lori Bellotti. We would like to congratulate Lori Bellotti in her new position of Microbiologist II at DPHL. Lori is a native Delaware resident and the youngest of 4 children. She graduated from the University of DE with a BS from the Medical Technology program. She gained valuable experience while working in the laboratory at Bayhealth Medical center for 15 years and completed the Business Administration and Healthcare Management Master's program. Before starting in the state contract position, she worked at the Blood Bank of Delmarva and owns her own home-based business. The temporary state position led to a full time permanent Lab Tech position at the Williams State Service Center, and to her new position in Microbiology. Lori and her husband Mark have been married for 16 years and have two dogs, Raven, a 10-year-old black lab and Forest, a 4-year-old pit bull. In her spare time, Lori enjoys spending time with family, working with her home-based business, playing with the dogs, fishing, traveling, and riding motorcycles.

Welcome, Emma!

Say hello to **Emma Fare**, our new contractual Molecular Biologist. Emma is working on her Master's Degree in Biological Sciences at the University of Delaware and received her Bachelor's degree in Biological Sciences at Salisbury University. Emma enjoys spending her free time with her cat and dog, riding horses, and hunting.



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EMPLOYEE NEWS



(continued)

Welcome, Matt!



Matt Pinson. Matt joined the DPHL as an Environmental Control Technician II in late April 2018. He received a Bachelor of Science degree in Environmental Science from the University of Delaware. His previous experience focused on water quality and ecology of freshwater streams, serving as a technician with the Delaware Geological Survey, Delaware Nature Society, and National Park Service. For the DPHL, Matt currently supports the collection of water samples from public drinking water systems for microbial and chemical monitoring. Outside of the lab, Matt enjoys hiking and nature photography.

Welcome, Hamish!

Hamish Lord-Macbeth. DPHL welcomes Hamish Lord-Macbeth as an Environmental Control Technician II. Hamish began working with the state of Delaware in 2006 and is a licensed Water Operator and a Level 4 Waste Water Operator.



Welcome, Tommy!



Tommy Stepnay. Join us in welcoming Tommy Stepnay to DPHL. Tommy, an Environmental Control Technician II, started with the Office of Drinking water as a Casual Seasonal employee in 2006 and became a merit employee in 2008.

Welcome, John!

John DeAngelis. We welcome John as our new Environmental Control Technician II. John has an extensive background in customer service and online merchandising. John enjoys watching Cage fighting, WWE and local wrestling, collecting professional horror masks, up keeping his exotic fish and aquariums and most of all caring for his pet cats and any homeless cats lucky enough to wander to his patio door.

