THE MHIRT NEWSLETTER - STAYING CONNECTED
Monday, 26 June through Sunday, July 2, 2017
Newsletter #6

SIGNIFICANCE OF MHIRT PROJECTS
RESEARCH EXPERIENCE ABROAD IS MORE THAN HALF-WAY OVER

Wow! MHIRT students have been away for ~ 5 weeks already, with only ~3 weeks to go. Previous newsletters have reported on their daily experiences in the laboratory. But, what are they really trying to do? What new information do they hope to acquire? What is the benefit of their research to society if successful? In the next 3 Newsletters, we will try to answer these questions. This week, we look at 4 projects with similar goals.

In biomedical research, rapid and accurate diagnosis of a infection is critical for providing timely successful treatment. This year, 4 projects seek to improve diagnosis of diseases caused by viruses, bacteria, and a parasite.

One new, emerging viral disease is caused by Zika virus (ZIKV). The disease is relatively mild, except in pregnant women where the virus can cross the placenta and infect the fetus, causing microcephaly (small brains) in newborns. Several cases of imported ZIKV have been diagnosed in Hawaii and ZIKV is becoming prevalent worldwide. ZIKV a mosquito-borne virus is similar to many other viruses, e.g., viruses that cause dengue fever and West Nile fever, so diagnosis must be virus-specific. Thus, Cindy is working with Dr. Pornsawan to develop a diagnostic assay. The first step is to use a molecular cloning technique to produce a protein that is specific for the ZIKV. Thus, Cindy is transfecting bacteria with a pREST plasmid that contains the ZIKV domain 3 in hopes of producing ZIKV-specific protein for use in the diagnostic assay. They think they have been successful and are sending the plasmid for sequencing to confirm they are working with the right protein. The ultimate goal is to develop an assay for diagnosis of ZIKV infection.

Melioidosis is a severe infectious disease caused by a soil bacterium, called *Burkholderia pseudomallei*. Although the bacteria have been isolated on the Hawaii Island, they are not a health problem in Hawaii. However, in Thailand the microbe is abundant in rice paddies, with ~13 people per 100,000 becoming infected with a 43% mortality rate. Rapid diagnosis and treatment of melioidosis is critical in Thailand. Sasha and Dr. Narisara are working on developing a rapid diagnostic assay that can be used in local clinics or even at the bed-side. Dr. Narisara's group has produced a monoclonal antibody that is specific for the bacterium. This summer, Sasha is using different techniques to try to purify the monoclonal antibody (protein A looks best so far) and she is using the purified antibody in ELISA assays to make sure it works. They are currently coupling the antibody to Latex to see if they can detect the microbe in people who are infected. Clearly, having a rapid diagnostic assay could save lives. (Photo: Sasha with her lab supervisor, P'Tom)

Malaria, caused by the parasite *Plasmodium falciparum* is one of the 3 most important infectious diseases worldwide. The highest burden is found in young children and pregnant women in sub-Saharan Africa. Today, there is hope that malaria can be eradicated; however, a very sensitive molecular diagnostic test is needed to detect the presence of the parasite. So, Jovikka and her mentor Livo Esemu, and Brad along with his mentors Yukie Lloyd and Prof. Rose Leke are comparing different molecular tests. L. Esemu and colleagues found that parasite DNA can be found in saliva of infected individuals, with about 75% of infected individuals testing positive. The

goal of their study is to try different molecular assays to see if they can detect 100% of malaria cases. If so, then saliva (that is easy to obtain) can be used instead of venous blood. Brad is trying to determine if pregnant women who are receiving chemoprophylaxis for malaria are completely protected from infection or if they may still have very low level of infection. Recent studies have shown that babies exposed to low levels of malaria in utero are at a higher risk of infection after birth. Thus, he is using different molecular approaches to screen blood samples from women who have received prophylaxis and those who have not.

Here are a few snippets of things our students did this week outside of the laboratory:

Dwayne and Cindy visit Wat Paknam Phasi Chareon temple. *Cindy reflects,"As I examined the art of the dome more closely, I was reminded of a quote which Professor Leke shared with us, "Reach for the moon and if you can't reach it, at least you'll be among the stars."*

Lean hosted an international dinner. *"It was last week when I met new Thai friends and they said they wanted to have a dinner and try Filipino food. So we planned to have dinner at my place on Sunday (yesterday), they bring Thai food and dessert and I cook them Filipino food since none of them have tried before. I admit I was a bit nervous and stressed because I was preparing three main dishes and two desserts for six people and it was a success!*

Jessica volunteers as a photographer *"I stumbled upon the National swimming pool where the Belau Games and their National Swimming Team competition, which only happen once every two years." "I watched the first day and asked if I could volunteer, they said yes! So I volunteered with timing the national swimmers and the last day, I volunteered with GoPro filming for their national swim team open water swim. It was great volunteering and being part of the experience."*

Mark throws a birthday party. "*Earlier this week I found out one of my grad student's birthday passed (P'Klong) So I tried to set up a little surprise party for him during lab, which ended up not being a surprise*, *"The cake I bought was surprisingly delicious (I'm not a big fan of cakes), probably because I wasn't aware it was an ice cream cake."*

Michael grabed lunch at Hauz Khas village and checked out the India gate. *"It began to rain a bit and [I] took an auto-rickshaw back to my guest house before it started to pour.*

Brianna meets a giant clam. *"The captain said next week we can try to swim with manta rays, which is one of my favorite animals, and a Palauan spirit animal. I love Palau's wildlife. It is amazing seeing a thriving reef. Being in the water really makes you feel more connected to nature."*