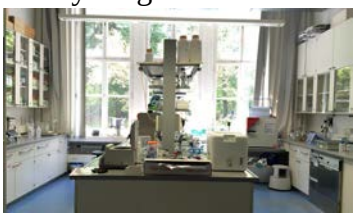
# THE MHIRT NEWSLETTER - STAYING CONNECTED

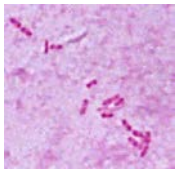
A weekly newsletter for students, family, faculty, mentors, and friends
June 11 through June 17, 2015
Newsletter 3

## WORKING IN THE LABORATORY, BEGINNING TO ACQUIRE A DEEPER UNDERSTANDING OF THEIR PROJECTS, AND ENJOYING BEING ABROAD

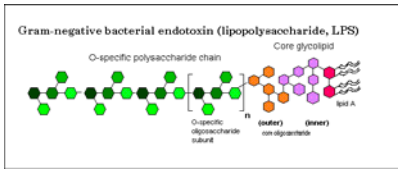
MHIRT 2015 students are becoming comfortable with working in overseas laboratories and living abroad. Maya's weekly update revealed that "Every MHIRT student has been absorbed in their work and has little time in the week for anything but sleep and further study for tomorrow's work. We hardly see one another, which emphasizes the importance of journal club as a means to reconnect with each other." Chris mirrored this idea, "Throughout the week I have been extremely busy, that I haven't had much time to go out and enjoy the sites, … . Monday through Friday I go to work until late in the evening and usually I want to get home to wind down." "This week is the first full week of work and I already feel very well adjusted to life here." Sai also reports: "I had to go out alone to get some information on specific things needed for the project, which was difficult because most people did not speak English! It was a challenge, but it was also an opportunity to experience the difficulties of international research and language barriers. At the end, I got everything I needed with the help of Google translate." (Sai is a communications major. Way to go!). Samantha was the first to report that not all experiments work, "This week in lab, Dr. Som had me test out my primers using my DNA. For some reason, we are having trouble with them, but we will assess the problem on Monday." Robinson noted that "This week we got started with reviewing the whole scope of our project and protein purification." Here is a picture of his lab (Wow! So clean!).

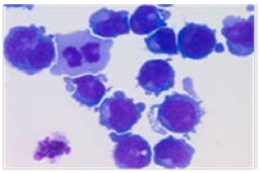


**Research:** This summer, we will highlight 3 projects in each Newsletter, to illustrate the breadth of the research the students are undertaking. Of course, we will also include a section of "Cool Results" as they are reported to us. Toward the end of summer, we will provide progress reports for the projects. On August 13th, everyone is invited to come to *E Ho'oulu Haumana* (growing students) to hear the exciting presentation of this summer's work. The 3 projects highlighted in this week share common elements: 1) They are on important diseases in Thailand; 2) A cell type in blood, called *macrophages*, plays a significant role in the studies, as these cells kill microbes and modulate the immune response; 3) Although the 3 diseases are caused by bacteria, fungi, and viruses, macrophages help determine if the immune response results in a good outcome (protection) or bad outcome (pathology). The trick is to figure out how to make sure macrophages produce the "good" response.



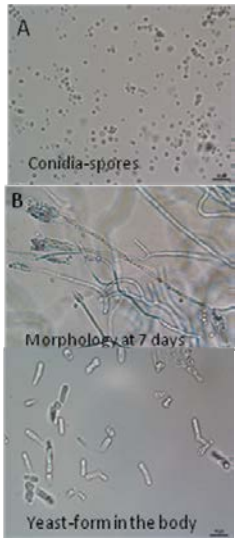
***Melioidosis*: Can a method be identified to predict if the prognosis of patients with melioidosis will be good or bad outcome?** This summer, Sairel Labsan is trying to help answer this question. She is working in Dr. Narisara Chantratita's lab with pêe June and pêe Phon as her daily mentors. Sairel explains that *Burkholderia pseudomallei*, a gram negative bacterium, (top photo on the right) is the causative agent of melioidosis. In the northeast of Thailand, melioidosis accounts for 20% of all community acquired septicemias in addition to having a mortality rate of about 50%. For our study, we will determine whether variations in *B. pseudomallei's* lipid A ( middle photo on the right) composition affects the kind of pro-inflammatory cytokines released by immune cells. We will be using mass spectrometry to determine the lipid A compositions of samples from two groups (Group 1: 70 isolates from one patient and Group 2: samples from 70 different patients). ELISA will then be used to determine and quantitate the release of IL-1 and IL-6 by THP-1 cell line. On a clinical level, this study aims to establish a way of



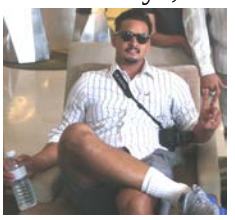
THP1 cells - Macrophages

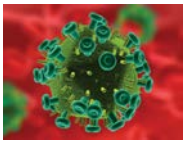
determining patient prognosis by identifying the lipid A composition of that patient's bacterial strain." Her UH mentor is Dr. Willie Gosnell.




***Penicillium marneffei:*** ***How long does it take P. marneffei to transform from the mold (soil) phase to the yeast phase (human body) in vivo (using a ThP-1 model) and in vitro (tissue culture)?*** McMillian Ching, at Chiang Mai University, is working with Dr. Sirida Youngchim on this interesting fungus. He writes: "The *Penicillium marneffei* is thermally dimorphic fungus [i.e., has different shapes at different temperatures] that causes a fatal systemic mycosis in immunocompromised patients especially in HIV patients in Southeast Asia." "In nature and at room temperature in the lab, it grows as a mold that develops into conidiophores, plialides and globoseconidia as similarly seen in the Penicillium species." (see Fig. A and B). But in the human body, it grows as yeast-like colonies." This summer, they hope to learn how long it takes the fungus to replicate under both conditions. His UH mentor is Dr. Axel Lehrer.

***HIV/AIDS:*** ***Do activated macrophages enhance susceptibility to non-AIDS related conditions like cardiovascular diseases, diabetes, neuro-cognitive disorders, and other infectious pathogens*****?** Christian Dye, a PhD student, is hoping to provide information toward answering this question. He is working at the Armed Forces Research Institute of Medical Sciences (AFRIMS) with Dr. Alexandra Schuetz, where he is learning techniques and producing data that will be used in his dissertation. Human Immunodeficiency Virus (HIV) affects 34 million people worldwide. Today, individuals with HIV take a combination of anti-retroviral drugs and are able to live a very long time. However, they are at risk for the conditions listed above. One theory is that their macrophages are activated and produce inflammatory mediators leading to susceptibility to non-AIDS conditions. Christian says, he and his colleagues will "use a flow cytometry panel that measures protein levels of various cytokines in monocytes and gut macrophages [from HIV patients] at a resting state and upon stimulation." They "hypothesize that acute HIV infection is characterized by an increased immune response in monocytes and macrophages [during the early stages] and even greater activation after beginning retroviral drug treatment." If so, these cytokines maybe a reason for enhanced susceptibility to non-AIDS conditions and other pathogens. His UH mentor is Dr. Lishomwa Ndhlovu.





**Cultural Experiences:** Since a photo is worth a thousand words, I'll let the photos do the reporting. [Sorry, Maya, Sairel, Sai and Christian are either working very hard in the lab or photo-shy, which explains why you don't see them here. But they describe wonderful experiences in their written reports]. Until next week: Work hard. Keep healthy. Have fun.