# SURVEY FOR THE ARTHROPODS-BORNE PATHOGENS: *RICKETTSIA*, *EHRLICHIA*, *ANAPLASMA*, *COXIELLA*, *BORRELIA* IN THAILAND AND DEVELOPMENT OF A GIS MODEL TO PREDICT ENDEMIC AREAS

**Jariyanart Gaywee[1], Wuttikon Rodkvamtook[2], Walatrat Pornwiroon[3], Darunee Utainnam[2], Narongrid Sirisopana[2], Penny Masuoka[4], Lanlalit Kumtim[2], Chaleaw Phompiniti[2], Wimutara Sornsamrang[2], Chatrat Rujikerepong[2], Kamonwan Siriwatthanakul[2], Yuttapong Sudsavart[2], Surasawadee Poompanit[5], Anon Sanitwong Na Ayuthaya[5] and Allen L Richards[6]**

1Operating Officer attached to Royal Thai Army Headquarter active duty at Armed Forces Research Institute of Medical Sciences, Bangkok, Thailand 2Armed Forces Research Institute of Medical Sciences, Bangkok, Thailand 3Faculty of Science and Technology, Prince of Songkla Nakarin University, Pattani Campus, Pattani, Thailand 4Uniformed Service University of the Health Science, Maryland, USA 5Geo-Informatics and Space Technology Development Agency (Public Organization), Thailand 6Naval Medical Research Center, Maryland, USA

## Progress Report

**Introduction:** Arthropod-borne diseases become major health problem throughout the world including military areas of operation along Thai borders. Effective disease protection and control strategies require specific epidemiological information regarding and pathogens and their transmission cycle. In response to this concern, RTA-AFRIMS has conducted a surveillance program to gain essential data of rickettsial diseases in Thailand since 2002. However, there are other arthropod-borne diseases need to fill the knowledge gaps in Thailand. Thus, with the AFHSC-GEIS funding, the surveillance program is expanded to capacity building in implementing the rapid molecular detecting tools of 5 genus of arthropod-borne bacteria; *Rickettsia*, *Ehrlichia*, *Anaplasma*, *Coxiella*, and *Borrelia* to survey for their vectors, and implementing GIS technology to create risk area map display as well as to develop an advance GIS predictive model for endemic areas.

**Methods:**

1. To enhance capability of pathogen detection and GIS techniques at RTA-AFRIMS, training and technical transfer in those fields were initiated in collaboration with Rickettsial Disease Research Program, Naval Medical Research Center, USA, Geo-Informatics and Space Technology Development Agency, Thailand and Uniformed Services University, USA.
2. To gain essential information regarding other arthropod-borne bacteria in Thailand, a collection of arthropod DNAs collected from AOs along Thai borders were tested for the presence of 5 bacterial genus using implementing realtime PCR techniques.
3. Data analysis using GIS technique to generate risk area map and develop a GIS Niche Model.
4. Filing report, abstracts and manuscript to publish information and release.

**Progress report:**

Capacity building of molecular laboratory and GIS technology at RTA-AFRIMS was success as planned. Five RTA-AFRIMS personnel were trained to capable of set-up and running realtime PCR to detect 5 arthropod borne bacterial pathogens and techniques were successfully implemented at RTA-AFRIMS molecular laboratory. Seven personnel were trained to recognize GIS technology and be able to generate GIS maps. A collection of 780 arthropod DNA samples were tested by realtime PCR. *Rickettsia* and *Ehrlichia* were detected 66.9% (522/780) and 51.9% (405/780), respectively. *Borrelia* was detected in 1 tick samples, while *Anaplasma* and *Coxiella* were not found. Risk maps were generated as shown in Figure 1. GIS predictive model is undergone developing.

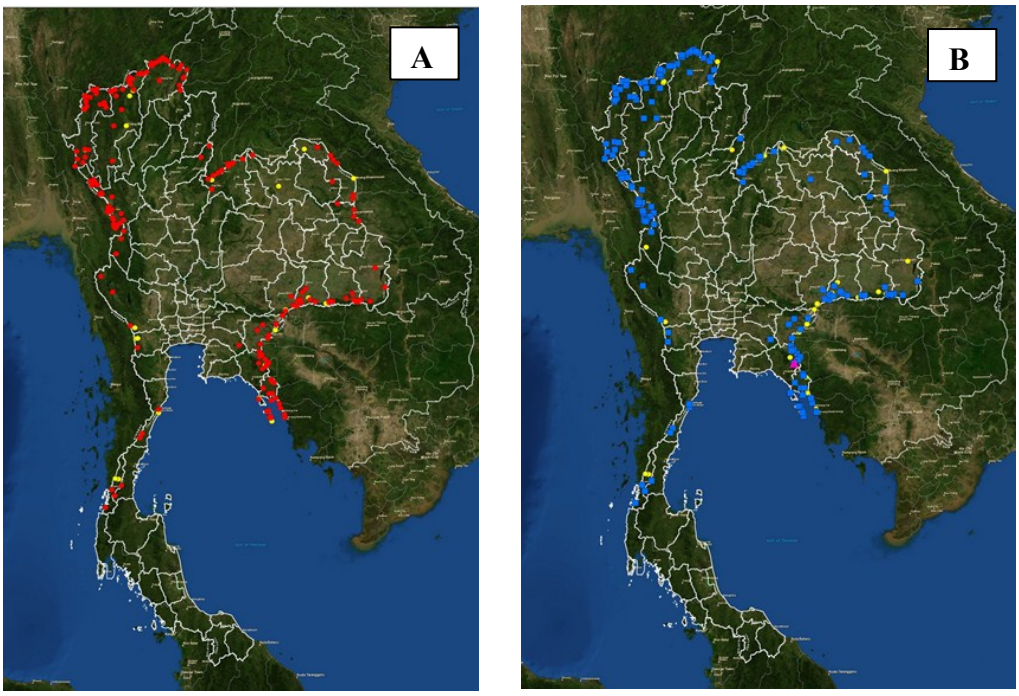


**Figure 1. A.** GIS mapping of survey areas where blood sucking arthropods and rodents were collected (yellow dot), rickettsiae agent of rickettsial fever detected (red dot), **B.** *Erhlichia* agent of Erhlichiosis (Blue dot) and *Borrelia* agent of Lyme disease (Pink dot).