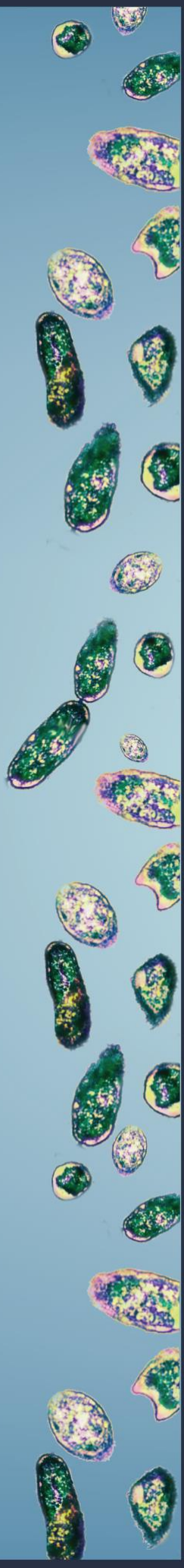
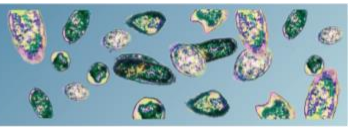
Threat Reduction Network *on*
Rickettsial Pathogens

Focus Area Working Group Meeting • Vientiane, Lao (PDR)



Final Report
August 2018



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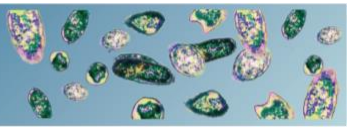

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Executive Summary

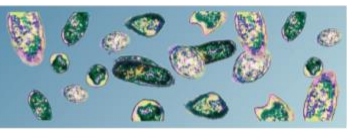
On August 8-9, 2018, the Defense Threat Reduction Agency, Cooperative Biological Engagement Program sponsored a “Focus Area Working Group Meeting” for its Threat Reduction Network on Rickettsial Pathogens (TRN-RP) in Vientiane, Lao (PDR). The Working Group participants, objectives, and agenda for the TRN-RP meeting were established at the conclusion of a broader TRN strategic session in March at the Orchid Hotel in Singapore.

Working group participants were TRN volunteers with expertise in infectious disease and entomological research from the Mahidol-Oxford Medical Research Unit (MORU), University of Malaysia, U.S. Naval Medical Research Unit-2 detachment in Cambodia (NAMRU-2), the Armed Forces Research Institute of Medical Sciences (AFRIMS), the Uniformed Services University of Health Services (USU), the U.S. Centers for Disease Control and Prevention (CDC), Mahidol University in Thailand, the Lao-Oxford-Mahosot Hospital Wellcome Trust Research Unit (LOMWRU), and the Navy Medical Research Center (NMRC). Funding and sponsorship representatives from DTRA Joint Science and Technology Office (JSTO), CBEP, and Porton Down were present to prioritize and align group conclusions with their research and development portfolios.

Figure 1 Volunteer Members of the TRN-RP Working Group Meeting

Activity organizers facilitated small working group discussions to develop workplans and initiate biosurveillance projects that (1) establish field sampling protocols; (2) organize a website / communications platform; (3) determine foci for baseline literature reviews; and (4) survey existing diagnostics and protocols. The working groups were able to develop projects with short and long-term, multi-month timelines and measurable action items; their progress will be reported at the next official TRN.

Overall the meeting was a success and the meeting organizers felt its objectives were achieved. The consistent request throughout the meeting was for a platform for file sharing, case reporting, and other necessary communication. The website Working Group (Group 2) secured a web address, “rickettsia.net” and will begin taking steps to populate it with resources for intra- and inter-network coordination.



At the conclusion of the meeting, the participants drafted a list of additional representatives (geographical and organizational experts) whom they wish to be included in the next TRN meeting. Additionally, the group tentatively agreed on a date for the next meeting and drafted its agenda. A more in-depth read-out of the meeting discussions and outcomes may be found in the Meeting Outcomes section of this final report. Other members of the TRN-RP who did not volunteer to participate in its Working Groups may expect an invitation to officially participate in its next meeting, which is tentatively scheduled for late-fall 2018 or early 2019 (note: a poll will be sent to all active TRN members to vote on the exact location and date).

Meeting Outcomes

On August 8-9, 2018 volunteer experts of the Threat Reduction Network for Rickettsial Pathogens (TRN-RP) gathered in Vientiane, Laos gathered for a working group meeting and achieved the following objectives:

- Established workplans and initiated working group activities for:
    - *Developing protocols for field sampling and platforms for communicating protocols*
    - *Transitioning melioidosis website backbone data collection and integrating other website data*
    - *Setting literature review foci and bounds*
    - *Surveying existing molecular and serological tests and available reagents and SOPs*
- Developed upcoming TRN-RP meeting objectives and agenda
- Discussed planning other outreach / focus area activities

Working Group Coordinating Instructions

The working group topics were identified as priority research needs for the Rickettsial Pathogen research community during a TRN-RP Strategy Mapping session in March 2018. Volunteers then self-nominated themselves into working groups at the conclusion of that meeting. Event organizers created a workplan template (Figure 2) in addition to journal references, prompt questions, and other source material [Annex 2] to help initiate discussions and keep all the working groups moving towards their objectives. All materials were emailed to participants in advance of the meeting and provided in hard-copy during the meeting.

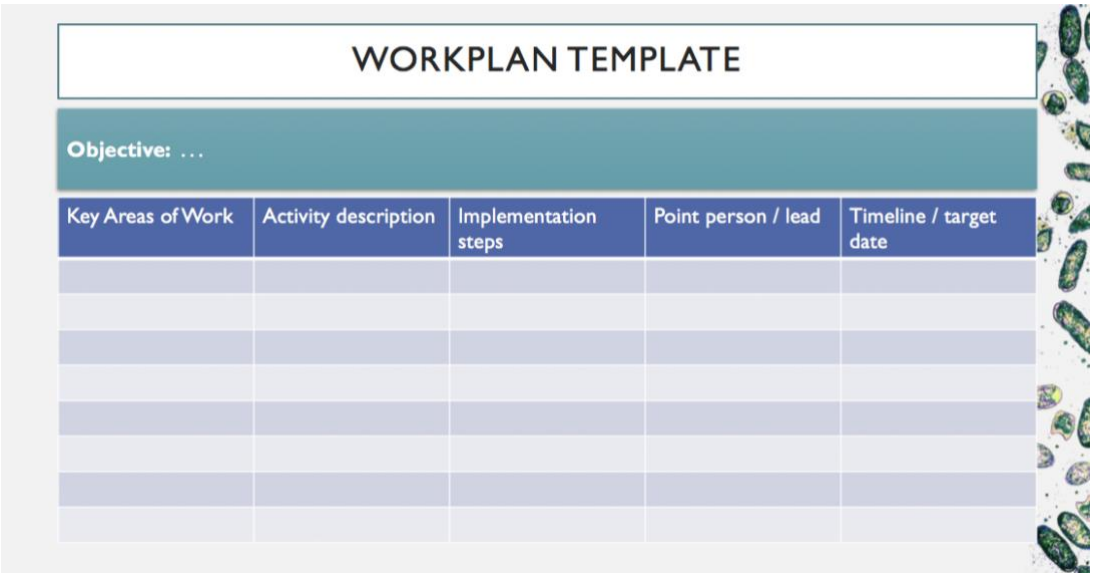
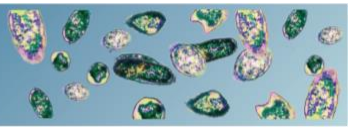


Figure 2 - Template provided to all working groups



Working Group Summaries

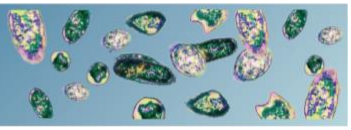
All working groups presented their workplans in the slide template (figure 1); however, BTRP reformatted the output for this report, removing acronyms and providing full names and references where applicable. The full slides that were presented at the end of the conference are provided in Annex 3 of this report for reference.

WORKING GROUP 1
Objective: Establish protocols for field sampling and develop platform for communicating protocols

WORKING GROUP 1 KEY AREAS OF WORK

ACTIVITY 1: Establish data collection and management processes for vectors
Description: Use existing materials (e.g., CERo-Path) for vector collection and sampling; establish: (1) data collection sheet; (2) field guide; (3) protocols for field and lab studies; (4) database – "R" biostats program / processes
Implementation steps: 1. Begin a library of resources on a yet to be established share site – all members commit to upload their protocols 2. Set CERo-Path materials as a framework for improvement with other materials 3. Use CERo-Path materials as framework / data collection fields for ticks, fleas, and chiggers
Activity point person / lead: Everyone in Group 1 will be asked to upload their current protocols for field and lab studies; anyone who uploads a protocol, also outline challenges that dictate their methodology
Timeline / target date: By next TRN-RP meeting (note – working group had anticipated ASTMH as next meeting date) and TBD for follow-on dates

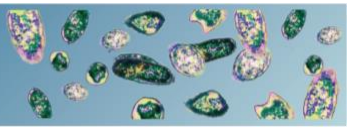
ACTIVITY 2: Collect and share keys and species distribution lists
Description: Establish a list of confirmed species and map around SEA
Implementation steps: 1. Collect data from experts a. Arthropods / chiggers – Alexander Stekolnikov b. Ticks – Rich Robbins c. Fleas – Boris Krasnov; Ken Aplin 2. Group established that confirmed species = voucher specimen with GPS location
Activity point person / lead: Serge Morand, Silas Davidson, and Jeffrey Hertz
Timeline / target date: By next TRN-RP meeting (note – working group had anticipated ASTMH as next meeting date) and TBD for follow-on dates



ACTIVITY 3: Collect subject matter surveillance points of contact from each country
Description: Establish a list of subject matter experts from each country in the region (e.g., Laos – Khamsing Vongphayloth, Malaysia – Sazaly Abu Bakar, others . . .); solicit this information from experts within the network and BTRP
Implementation steps: 1. Poll group for representation from all BTRP countries (to start) 2. Ensure full participation at next strategy development meeting 3. Allow them to brief on their interests
Activity point person / lead: Katie Leahy will collect from the group
Timeline / target date: By next TRN-RP meeting (note – working group had anticipated ASTMH as next meeting date) and TBD for follow-on dates

ACTIVITY 4: Establish a repository for correct identification of ectoparasites and rodents
Description: Establish a list of instructions for and begin to collect high-resolution pictures / images of ectoparasites and rodents at every stage of life and pictures of the collection sites with geo reference tags
Implementation steps: 1. Curate tick information from the National Tick Collection in Georgia Southern University 2. Curate rodent information from CIRAD (Kasetsart University) 3. Identify place to send voucher specimen for fleas, mites, other ectoparasites 4. Establish barcoding guidelines (molecular, MALDI-TOF, etc.) 5. Establish geo-reference guidelines
Activity point person / lead: Silas Davidson and Jeff Hertz will contact point person Georgia Southern University; invite as an observer to side-meeting Priority: Rodents, Ticks
Timeline / target date: By next TRN-RP meeting (note – we will invite the GSU representative to the next TRN-RP meeting)

ACTIVITY 5: Conduct a training event
Description: Exercise ethical, efficient and safe field and lab collecting and sampling protocols; exercise University of Malaya Biosafety / Biosecurity standards for field work
Implementation steps: 1. Planning – look at early 2019
Activity point person / lead: collaboration between Serge Morand and Sazaly abu Bakar
Timeline / target date: Spring 2019



WORKING GROUP 1 Gaps / Needs

- Need funding for a knowledge manager / web curator that can do the "R" database collection and curation
- Need interim share-site

WORKING GROUP 2

Objective: Transition melioidosis website and integrate other website data; work with other groups to create webpage content plan

WORKING GROUP 2 KEY AREAS OF WORK

ACTIVITY 1: Develop website

Description: Build on existing melioidosis website and link to other websites; establish and purchase URL

Implementation steps:

1. Establish contract with MORU
2. Study existing databases
3. Appoint project manager from MORU
4. Procure rickettsia.net (done!)

Activity point person / lead: Nick Day; TBD (other working group POCs)

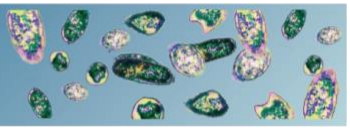
Timeline / target date: By next TRN-RP meeting (note – working group had anticipated ASTMH as next meeting date) and TBD for follow-on dates

ACTIVITY 2: Define content

Description: Begin to organize web content

Implementation steps:

1. Develop maps based on vectors, hosts, seroprevalence in humans and hosts, confirmed cases, diagnostic facilities, experts
2. Collect data
    a. Publications: organize and load peer reviewed articles and meeting proceedings onto website (get inputs from WG 3)
    b. Government reports: gather reports and strategic plans from various regional governments
    c. Links to other relevant websites and resources
    d. Reporting confirmed cases by TRN members and third parties; construct framework on website (based on melioidosis data collection process) for submission / verification of this information; **determine case definition criteria**
    e. Information for researchers, implementers, and stakeholders
    f. Information for public awareness
    g. Other awareness / resources (e.g., isolates and samples, clinical trial lists, clinical trial data, type culture collections, entomology collections, taxonomy and other resources)



h. Historical documents (IMR bulletins)
Activity point person / lead: Nick Day; TBD (other working group POCs)
Timeline / target date: By next TRN-RP meeting (note – working group had anticipated ASTMH as next meeting date) and TBD for follow-on dates

ACTIVITY 3: Determine website governance and maintenance
Description: Build a web governance plan
Implementation steps: 1. Establish user friendly CMS 2. Establish governance working group 3. Define CMS user network with defined user roles
Activity point person / lead: Nick Day; TBD (other working group POCs)
Timeline / target date: By next TRN-RP meeting (note – working group had anticipated ASTMH as next meeting date) and TBD for follow-on dates

WORKING GROUP 2 Gaps / Needs

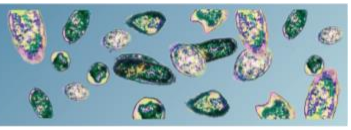
- Contract mechanism with BTRP

WORKING GROUP 3

Objective: Set literature review foci and bounds

WORKING GROUP 3 KEY AREAS OF WORK

ACTIVITY 1: Tabulation and mapping of global distribution of human typhus group graded by diagnostic evidence
Description: (1) Literature review; (2) PROSPERO Statements; (3) PRISMA; (4) Estimate global burden
Implementation steps: 1. IP1: Continuing; including links to pdfs and genomic repository 2. IP2: Start the activity 3. IP3: Identifying key personnel
Activity point person / lead: 1. IP1: Paul Newton 2. IP2: Coordinate with Al Richards 3. IP3: Steve Dumler
Timeline / target date: 1. IP1:12 months 2. IP2: TBD 3. IP3: Stage 1 (identifying key personnel, PROSPERO draft by November 2018)

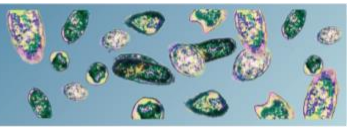


ACTIVITY 2: Tabulation and mapping treatment and outcomes (clinical trial, case series data): (1) typhus group; (2) scrub typhus; (3) SFG
Description: (1) Literature review; (2) PROSPERO Statements; (3) PRISMA; (4) Develop consensus for clinical trial protocol; (5) Future research priorities; (6) Future individual patient database (IPD) and meta-analysis
Implementation steps: 1. Identifying key personnel 2. Methods development a. Data dictionary b. Database
Activity point person / lead: 1. TG: Paul Newton 2. SG: Kartika Saraswati
Timeline / target date: Stage I (identifying key personnel and methods development) 6 months

ACTIVITY 3: Vaccine – scrub typhus
Description: Situational analysis; what has been done, gaps and challenges; catalogue groups currently working on scrub typhus vaccine; future research priorities
Implementation steps: 1. Identify key personnel 2. Facilitate future vaccine working groups
Activity point person / lead: TBD
Timeline / target date: TBD

WORKING GROUP 3 Gaps / Needs

- Need Translators for Dutch, French, Russian, Spanish, Chinese, Korean, Japanese
- Engagement with South Korean, Japanese, Taiwanese, Indian, Nepalese, Bhutanese, Chileans, Bangladeshi, Burmese research network
- Absence of consensus of reporting guidelines for rickettsial epidemiology
- Absence of consensus for inclusion criteria and endpoints for rickettsial clinical trials
- Difficulties in identifying experts in morphological identification of vectors
- Challenges in dealing with multiple SFG species (lump or split)
- Sustainability of databases (how much human capacity would be needed to create and sustain?)
- Engagement plan with policy makers and general public (discussion of dashboard ideas)
- Engagement with WHO
- Request invitations to next TRN-RP meeting for:
    - Infectious Diseases Data Observatory (IDDO) director (Philippe Guerin) and data manager



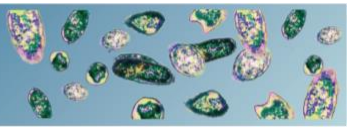
  - Scrub typhus vaccine investigators
  - WHO (Geneva) representative for neglected tropical diseases (Eric Bertherat) – POC: Paul Newton
  - Wellcome Trust
- Need to hold future discussions with larger group on larger research community gaps (future agenda topics for next TRN-RP meeting
  - Vector and non-human hosts epidemiology, niche mapping, predictive modelling
  - Standardized antimicrobial susceptibility testing methods and database
  - Pathogenesis:
    - Adjunctive host directed therapy
    - Transcriptional profiling of acute rickettsial illnesses
    - Early innate immune responses in the skin after vector bite

WORKING GROUP 4
Objective: Survey existing molecular and serological tests and survey available reagents and SOPs

WORKING GROUP 4 KEY AREAS OF WORK

ACTIVITY 1: Multi-pathogen platforms / Luminex platform
Description: Fever serology (use any isotype to find certain antibodies (Uniformed Services Univ)
Implementation steps: 1. Purchase equipment 2. Collaboration with U.S. Uniformed Services University 3. Identify diagnostic infectious disease targets 4. Identify samples for diagnostic development 5. Staff recruitment
Activity point person / lead: Stuart Blacksell
Timeline / target date: 24 months

ACTIVITY 2: Singapore Regional Bank / Network
Description: Biobank for sample sharing in the region and exchange between labs
Implementation steps: 1. Inventory management 2. Use of PACs (Pathogen Asset Control System) 3. Use of LIMs 4. Legislation (depending on involved countries) 5. Criterial for sample submission / timeframe 6. Shipping, logistics / restrictions 7. Register with the TRN - RP
Activity point person / lead: Yazid Abdad and John Stenos



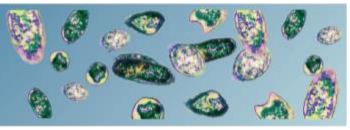
Timeline / target date: November 2018 – draft; August 2019; 5-year storage plan

ACTIVITY 3: EQA molecular and serology diagnostics
Description: Use of stored samples from the regional bank network to develop the QAP program
Implementation steps: 1. EQA protocol (RCPA) determining participants 2. Obtaining positive and negative samples
Activity point person / lead: Yazid Abdad, John Stenos, and Stuart Blacksell
Timeline / target date: November 2019 (after activity 2)

ACTIVITY 4: Protein sample
Description: Identify diagnostic targets for serology
Implementation steps: 1. Access to strains and samples 2. Staff
Activity point person / lead: Jackie Dugan
Timeline / target date: 24 months

ACTIVITY 5: RNA assay
Description: Testing and characterizing samples
Implementation steps: 1. Portable platform 2. Sample preparation 3. Legislation and licensing 4. Application development
Activity point person / lead: Cecilia Kato
Timeline / target date: 24 months for validation of platform (POC depending on funding)

ACTIVITY 6: Chembio (DPP)
Description: Dual Path Protocol multiplex serology and antigen detection for tropical fevers
Implementation steps: 1. Prototype 2. In-house validation publication 3. Field trial the assay



Activity point person / lead: Stuart Blacksell and Matt Robinson
Timeline / target date: 6-12 months (depending on commercial partners)

ACTIVITY 7: Literature Review
Description: Identify gaps for diagnostic antigens
Implementation steps: 1. Define search criteria
Activity point person / lead: Stuart Blacksell and student
Timeline / target date: 6 months

ACTIVITY 7: Diagnostic biomarkers
Description: Identify rickettsial biomarkers in non-invasive samples
Implementation steps: 1. Mass spec of target 2. Develop a rapid diagnostic test
Activity point person / lead: Marcus Winterberg
Timeline / target date: 1st phase dependent on funding

ACTIVITY 8: Assessment of disinfectants and disinfection protocol
Description: Validation of disinfectants and related protocols; viability studies
Implementation steps: 1. Develop disinfection and viability detection protocols 2. Develop candidate organisms and surfaces
Activity point person / lead: PHE and MORU
Timeline / target date: 3-year (depending on funding

ACTIVITY 9: Sample preservation and pre-analytical processing
Description: Suitability of blood preservation and clinical assessment of anticoagulants and stabilizers
Implementation steps: 1. Establishment of protocol 2. Identification of samples 3. Testing analysis
Activity point person / lead: Cecelia Kato and Matt Robinson
Timeline / target date: Potential start of testing August 2019

Working Group Conclusions

The working groups concluded that they had achieved their objectives. The meeting concluded with a recap of the working group work, tied to the overarching TRN focus areas: (1) Regional Risk and Burden; (2) Detection and Diagnosis; and (3) Pathogenicity and Immune Response, Treatment, and Prevention. The participants agreed that they needed to discuss clinical recognition at the next TRN-RP meeting, as it had come up in many of the Working Group discussions; and establishing a case definition was a long-term goal of the Network.

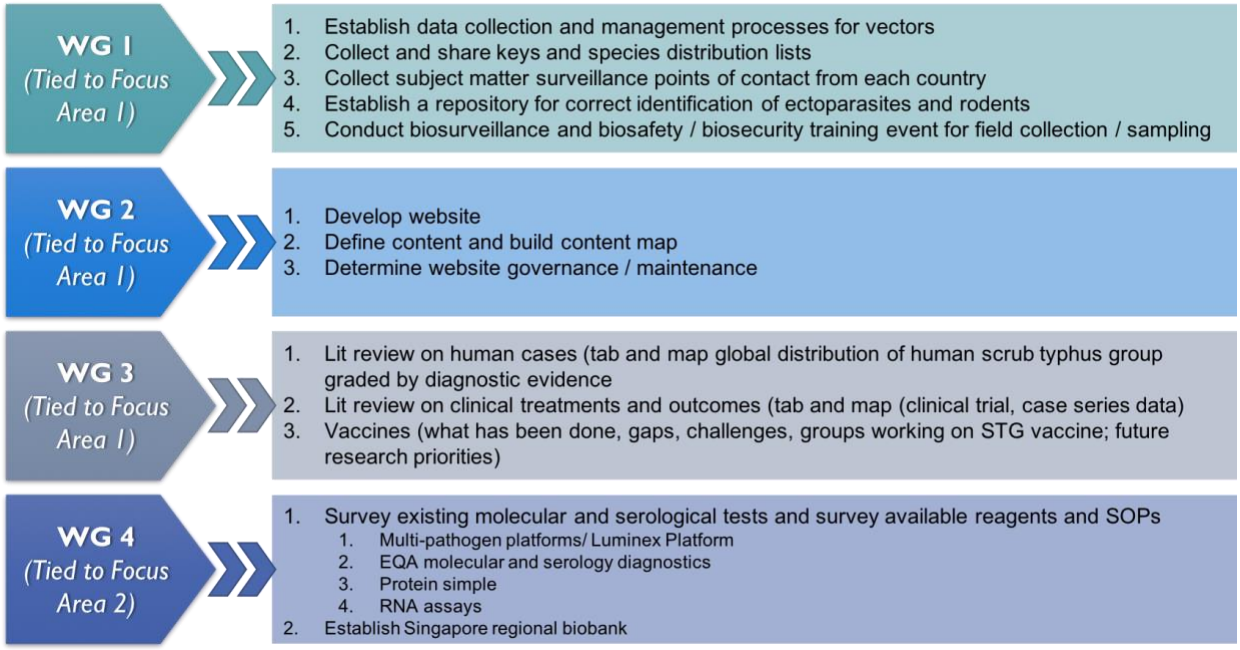
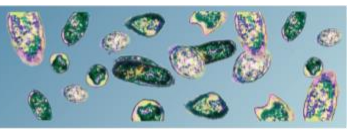


Figure 3 TRN-RP Working Group summary; each group is tied to the focus area of the TRN

TRN – RP Meeting - Objectives

The group used this the recap discussion as an opportunity to begin drafting the objectives and agenda for its upcoming larger strategy development meeting. There was significant debate on the time and location with BTRP taking the lead for coordinating schedules. Based on discussions, the following objectives were set for the upcoming TRN-RP meeting:

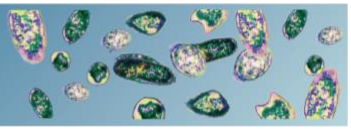
(1) Discuss working group progress on priority research enablers tied to Focus Areas 1 and 2
(2) Establish pathogenesis and immune response working group to identify case definition and work with the goal of development of a human model
(3) Conduct discussions with other experts from related fields of study to operationalize research data into One Health intervention and control policies
    1. GIS environmental experts
    2. International aid organizations / international displaced persons
    3. Sample transfer sharing, agreements, international protocol experts



4. Q-Fever
5. Genomics – bioinformatics
6. Ecology of scrub typhus

(4) Engage with other USG funders

BTRP will refine these objectives and develop an agenda that meets its intent.



Network Overview

Defense Threat Reduction Agency, Cooperative Biological Engagement Program (DTRA CBEP) is sponsoring a disease surveillance Threat Reduction Network (TRN) to mitigate the threat of rickettsial pathogens of security concern in Southeast Asia. This threat reduction network aims to identify and connect interdisciplinary expertise, convening an agile group to adapt to a wide spectrum of arising challenges and threats.

Background

Rickettsial pathogens are under-recognized with wide distribution across Southeast Asia and are considered some of the most understudied emerging and re-emerging diseases. While not on the World Health Organization's list of neglected tropical diseases, they account for the second most frequently reported infections for non-malarial febrile illnesses among residents in the region (dengue ranks as the first). Rickettsial infections are difficult to treat and if left untreated can have fatality rates as high as 30-45 percent. Thus, rickettsial pathogens pose a significant global threat; CBEP employs the TRN to dramatically minimize this threat nationally, regionally, and globally.

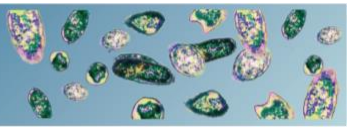
CBEP plans to facilitate a series of discussions and workshops to identify current research, discuss critical needs, and prioritize gaps and needs for the rickettsial research and at-risk communities (which include U.S. and Collation forces). CBEP will assist the TRN-RP with developing short and long-term work plans to meet identified requirements. Other U.S. Government agencies and non-governmental entities with an invested interest in the output of the network are invited to observe and advise on the TRN-RP sustainment goals.

The CBEP mission limits its funding to research for pathogens of security concern that are listed on the U.S. Select Agent List; however, in the case of rickettsial agents, national and international policy makers require better characterization and understanding of the full scope of geographical distribution, for the entire genus of Rickettsia, to produce better diagnostics and standards of practice. To this end, TRN-RP focuses on all rickettsial and related rickettsial pathogens with a heavy emphasis on *Rickettsia typhi* (typhus group), *Rickettsia prowazekii** (typhus group), *Rickettsia rickettsii* (spotted fever group), *Orientia tsutsugamushi*, and *Coxiella burnetii**. (* Indicates a US Department of Health and Human Services and Department of Agriculture Select Agent. https://www.selectagents.gov/selectagentsandtoxinslist.html)

TRN-RP Network Objectives

The network established and refined the following network objectives to guide the development of short and long-term projects and activities.

- Convene multi-disciplinary researchers, health implementers, policy makers, and funding authorities to identify and prioritize *Rickettsia* research needs and gaps
- Characterize the distribution and prevalence of rickettsial pathogens and their vectors in Southeast Asia to better understand and address the human and animal health burden



using statistical analysis and other best practices for assessing the global burden of other neglected infectious diseases
- Employ, monitor, and evaluate the consistent use of "gold standard" diagnostics and community accepted case definitions to determine if better standards are needed for detection in lab and clinical settings
- Increase awareness for *Rickettsia* amongst at-risk populations, clinicians, laboratory staff, national decision makers for better prevention, detection and response

TRN-RP Network Output

The TRN-RP organizers have set the following metrics as indicators of success for its efforts. These "end-states" in addition to the Network Objectives should guide all activities and projects for the TRN-RP.

- Characterization of geographical distribution of rickettsial pathogens and their vectors, to include vectors and reservoir hosts in Southeast Asia (and beyond)
- Understand pathogen diversity and the full spectrum of rickettsial disease epidemiology in Southeast Asia (and beyond)
- Improved or enhanced technology for diagnostics
- Improved access to accurate and affordable diagnostics and countermeasures
- Improved or enhanced standard operating procedures for diagnostics and clinical recognition
- Increased interest in *Rickettsia* research
- Improved global surveillance

TRN-RP Focus Areas

Focus Area 1: Regional Risk and Burden

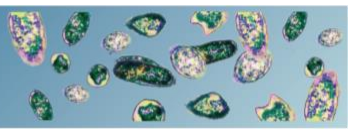
Epidemiological studies of the disease have not fully captured the prevalence and variance of rickettsioses throughout Southeast Asia. This focus area may:

- Conduct consolidated studies across the region
- Define at risk locations and populations
- Research regional burdens and economic impact of infections

Focus Area 2: Detection and Diagnosis

The most commonly used tests to diagnose *Rickettsia* infections lack sensitivity and specificity and are not particularly useful for acute diagnosis in an endemic setting; however, they are commonly employed because they are the cheapest and quickest option for low-resourced settings. This focus area may:

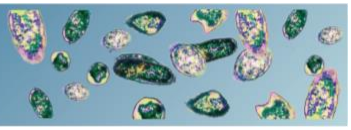
- Survey available diagnostics
- Test and evaluate current diagnostics
- Survey national case definitions for rickettsial pathogens



Focus Area 3: Pathogenicity and Immune Response, Treatment, and Prevention

Clinical recognition is a challenge due to vast variability and non-specific presentation of symptoms for rickettsial infections. This focus area may:

- Research human susceptibility
- Research current and new treatments
- Research host-pathogen interaction
- Research pathogen diversity for vaccine development



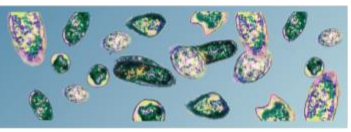
Annex 1: Agenda

Day 1 (August 8, 2018)

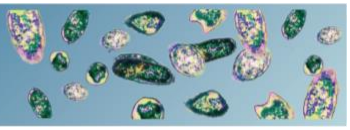
Time	Agenda Item	Session Objectives
0900 – 0930	Welcome	*Dr. Martha Stokes thanks everyone for attending; reviews objectives for the meeting* *Take a group photo*
0930 – 0940	Housekeeping	*Review agenda and support instructions*
0940 – 1000	Scene Setter, Instructions, and Agenda Review	*Review output from the Singapore meeting* *Discuss objectives for the Vientiane meeting* *Run through agenda; answer questions*
1000 – 1200	Focus Area Group Work	*Conduct small group work on Working Group projects*
1200 – 1300	Lunch	
1300 – 1500	Focus Area Group Work	*Continue group work on Working Group projects*
1530 – 1600	Group Report-out	*Working Groups report-out progress and answer questions from the entire group; request assistance / support as needed*

Day 2 (August 9, 2018)

Time	Agenda Item	Session Objectives
0900 – 0915	Quick Day 1 Review	*Review previous day's events* *Review agenda for Day 2*
0915 – 1030	Focus Area Group Work	*Continue small group work on Working Group projects*
1100 – 1200	Group Report-out	*Working Groups report-out final progress and answer questions from the entire group; request assistance / support as needed* *Brief work plan and project goals for November*
1200 – 1300	Lunch	



1300 – 1400	November Objectives / Agenda Development	*Develop objectives and agenda topics for the November ASTMH side meeting* *Identify session leads and other participants / observers as necessary*
1400 – 1430	Action Items and Conclusion	*Review meeting Action Items; assign responsible authorities* *Conclude meeting*



Annex 2: TRN-RP Source Material for Focus Area Working Groups

The following information, which includes questions, resources, and output from previous meetings, was provided to help each group start discussions for projects they identified at a previous Strategy Development meeting in Singapore (March 2018).

Working Group 1

Objective: Establish protocols for field sampling and develop a platform for communicating protocols

Members: Hertz, Davidson, Bakar, Robinson, Moran

Proper field sampling is required for documentation and preservation. Therefore, protocol for field sampling and communication of these protocols is necessary. The end result of this Working Group meeting should be a brief-out of a workplan (including: milestones, responsibilities, etc.) for which the group will be responsible for reporting the progress on at our November meeting.

What information is needed to form a detailed sampling protocol?

What are the preferred methods of collecting and sampling?

Are there risk of contamination that should be considered?

What safety procedures should be considered?

How can the protocol be communicated effectively? What delivery method should be used?

- Tick-, mosquito-, and rodent-borne parasite sampling designs for the National Ecological Observatory Network: https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.1271
- Field Sampling Guide: https://www.aabb.org/tm/eid/Documents/184s.pdf

Working Group 2

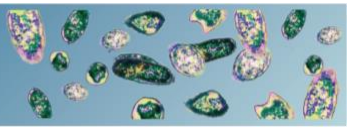
Objective: Transition melioidosis website and integrate other website data

Members: Stokes, Day, Richards

Transition of information and the development of a website database is key for communication of the TRN's objectives. Therefore, the transition of the *melioidosis* website and development of a similar rickettsial database is necessary. The end result of this Working Group meeting should be a brief-out of a workplan (including: milestones, responsibilities, etc.) for which the group will be responsible for reporting the progress on at our November meeting.

What information needs to be transitioned from the melioidosis website?

What kind of information database and what information needs to be collected for the Rickettsial Pathogen group?



Who will be responsible for gathering and collecting the information? Who will long term be responsible for updating the information?

What platform would be beneficial for this information (database, discussion boards, etc.)?

- Melioidosis Website: http://www.melioidosis.info/infobox.aspx?pageID=101
- Developing a Sitemap: https://onlinestrategy.gwu.edu/developing-sitemap
- Examples of Sitemaps: https://realtimeboard.com/examples/sitemap/

Working Group 3

Objective: Set literature foci and bounds
Members: Saraswati, Dumler, Newton, Tuttle

A literature review will help the TRN establish what needs and gaps there are in the Rickettsial Pathogen field. Setting literature foci and bounds is therefore key for to establishing the goals of TRN and identifying what next steps are needed to sustain the group. The end result of this Working Group meeting should be a brief-out of a workplan (including: milestones, responsibilities, etc.) for which the group will be responsible for reporting the progress on at our November meeting.

What is the purpose of goal of reviewing Rickettsia literature for this TRN?

What has been established and accepted in the Rickettsial Pathogen field?

What areas of controversy or conflict are there?

What gaps/needs are we aware of and/or should focus on?

What are new approaches or emerging trends?

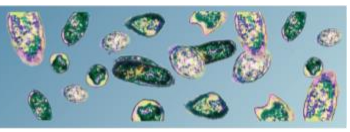
What types of literature will we focus on (empirical studies, journals, government reports, etc.)?

- Literature Review Steps: https://www.monash.edu/rlo/graduate-research-writing/write-the-thesis/introduction-literature-reviews
- Organizing a Literature Review: https://www.dcu.ie/sites/default/files/students_learning/scientific_lit_review_workshop_ug.pdf

Working Group 4

Objective: Survey existing molecular and serological test and survey available reagents and SOPs
Members: Kato, Richards, Duggan, Robinson, Blacksell, Stenos, Abdad, Dutt

Surveying existing molecular and serological test and surveying available reagents and SOPs will be necessary to establish what gaps there are. By establishing a working database of molecular and serological test, reagents, and SOPs the TRN can work to address gaps and maintain a continuous database of new research. The end result of this Working Group meeting



should be a brief-out of a workplan (including: milestones, responsibilities, etc.) for which the group will be responsible for reporting the progress on at our November meeting.

What molecular and serological test, reagents, and SOPs are currently available?

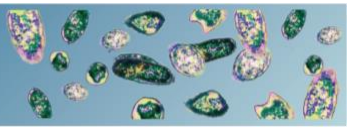
What gaps or needs are there for these tests, reagents and/or SOPs?

Is there current research into tests, reagents, or development of SOPs that should be considered?

What type of database or collection would be necessary to survey the available tests, reagents, and SOPs?

Who is responsible for collecting and maintaining the information?

- State of the art of diagnosis of rickettsial diseases: the use of blood specimens for diagnosis of scrub typhus, spotted fever group rickettsiosis, and murine typhus: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5029442/
- Assessment of Real-Time PCR Assay for Detection of Rickettsia spp. and Rickettsia rickettsii in Banked Clinical Samples: http://jcm.asm.org/content/51/1/314.full
- Molecular detection of Rickettsia bellii and Rickettsia sp. strain Colombianensi in ticks from Cordoba, Colombia: https://www.ncbi.nlm.nih.gov/pubmed/24378078
- Evaluation of a new serological test for the detection of anti-Coxiella and anti-Rickettsia antibodies: https://www.ncbi.nlm.nih.gov/pubmed/26432518



Annex 3: Working Group Reference Slides

[Full meeting slides removed due to publication size constraints]