BIOZOOINOSEA:

A regional Biotechnology platform for research & training on Parasitic Zoonoses in Southeast Asia

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Zoonoses
Diseases affecting animals and humans

Out of 1415 human pathogens
868 (61%) are zoonotic
75% of emerging diseases are zoonotic
A Hotspot for potential (re)-emergences

High variability in human-dominated ecosystems
Drastic land use changes &
High human & livestock densities

A hotspot of biodiversity …at threat
Biodiversity erosion

A Hotspot for potential (re)-emergences
Zoonoses in SEA

Zoonoses (often neglected) circulating in SEA are a major burden on public health.

Strong ecological modifications induce spreading of diseases which are becoming emerging diseases.

Prevalence highly variable from a place to another, transboundary diseases in SEA: a Regional concern.

Complex diseases with most often vector - intermediary hosts - reservoir: Multidisciplinary studies.
Parasitic zoonoses under study

1. Helminthiases

Nematodes:
Trichinellosis (pig), Ancylostomiasis (dog), Capillariasis, Gnathosotomiasis, Anisakiasis (fish)

Trematodes:
Opisthorchiasis, Clonorchiasis (fish & carnivores), Fasciolosis, Schistosomiasis

Cestodes:
Taeniasis / Cysticercosis
2. Protozooses

Zoomastigophora:

Giardiasis

Trypanosomiasis

(T. evansi, T. lewisi)

& Leishmanioses,

are now considered

as potential newly

emerging zoonotic
diseases in SEA

Apicomplexa:

Plasmodium (P. knowlesi) monkeys;

Sarcocystosis, Babesia divergens

rodent borne Toxoplasma

Cryptosporidium

Babesia microti
Why this platform?

☞ Strong demand from Regional Partners in SEA for collaboration on parasitic zoonoses

☞ Multidisciplinary approach is of paramount importance

☞ Optimizing Human & material resources

☞ Share regional expertise

☞ Develop research projects
Background

SEA: Hotspot for zoonoses emergence

Asean 2015 agreement

A central role for THAILAND
“Core Partners”

5 Resource persons
3 Master students
Grease Network in SEA

1 Resource person
Partnership in SEA,

2 Resource persons
PPR SELTAR Network

6 Resource persons
6 master and PhD students
Kasetsart University
Faculty of Veterinary Medicine

4 Resource persons
Mahidol University
Faculty of Tropical Medicine
Main regional partners

- Lao PDR:
- Cambodia:
- Vietnam:
- Malaysia:
- Indonesia:
- Philippines:
- China:
Objectives

Gathering regional human & material resources

1. Provide technical and academic trainings and expertise

2. Organise Workshops on zoonoses of Regional interest

3. Develop joint research projects (MSc & PhD supervising)

4. Generate and share regional Biological banks and Data resources (computer & web resources)
High impact of **Trichinellosis** in Vietnam & Northern Thailand

Traditional raw meat ingestion
Impact of leptospirosis (not parasitic, but close epidemiology) is high in Thailand, Vietnam, Indonesia & Southern China. Prevalence is highly fluctuating in time and space.
Mammalian Trypanosomoses in South-East Asia

1) The main trypanosome is *T. evansi*

- Buffalo and cattle are sensitive to infection (abortion), horses very sensitive;
- Holstein dairy cattle (milk production) are highly sensitive
- *T. evansi* induces immunosuppressive effects which impact is unknown (FMV vaccination ?)

Transboundary diseases: importation of cattle from India and China to Thailand can bring foreign stocks of parasite chemo-resistant to trypanocides

2) Potential zoonosis: *T. evansi & T. lewisi*

first human cases observed in:
- India (*T. evansi*)
- Thailand and India (*T. lewisi; a rat parasite*)
Trypanosoma evansi life cycle

Mechanical vectors

Stomoxys calcitrans
Tabanus atorius

Per Os
Geographical distribution

- *T. evansi* in all tropical areas; outbreaks in Europe.
- *T. lewisi*, rat parasite, cosmopolite.
Zoonotic trypanosomes: a case report in India

Blood smear of an Indian patient

Clinical and biological investigations

Classical biological and biochemistry dosages with a special attention to lipid dosages because of the suspicion of Tangier’ disease?

- Normal: no Tangier disease

CATT/ *T. evansi*, mAECT (blood, serum)

- Strongly positives

Examination of CSF: search of lymphocytes and trypanosomes

- Negative, normal CSF
Molecular and genetic investigations

392 bp Trypanozoon

372 bp T. evansi

Truc et al., Inf. Gen. Evol. 2007

Microsatellites (M6C8-CA, MT3033-AC/TC, TRBPA) compared with 9 reference stocks

→ “Typical” T. evansi

The patient: mutations on the ApoL1 gene

Description of the Trypanosome Lytic Factor (TLF)

Zoonotic trypanosomoses: a case report in Thailand

Diagnosis of a *Trypanosoma lewisi* like (*Herpetosoma*) infection in a sick infant (45 days) from Thailand

Morphology

![Morphology Image]

Sarataphan *et al.*, Journal of Medical Microbiology 2007

Molecular techniques

![Molecular Techniques Image]
Interactions between humans, domestic animals and wildlife gives the opportunities for new disease emergence.

Rats escaping the flood in Bangkok. Flooding can facilitate the spread of pathogenic organism, because of the amount and proximity of rodents to humans on shared higher ground.

Elephants & cattle in Surin
Technical trainings & expertise

The platform provide technical training for:
- Laboratory technicians,
- Master students
- PhD students
- Researchers ...

Laboratory training:
- Parasitology
- Serology (ELISA, Agglutination)
- Molecular biology
Laboratory Facilities

- Laboratory for molecular and cellular biology/parasitology located on the Bangken campus of KU, Faculty of Veterinary Medicine.
- Approximately 500 m² of laboratory space, with scientific supplies and equipment.
- All basic molecular and cellular biology equipment.
- Small animal room.
Training Facilities

Conference & meeting room

Teaching laboratory (up to 80 students)
Field trainings:

- Sampling animals & environment
- Screening & penside diagnosis tests
- Vector trapping / studies
- Access to Kampangsaen campus/KU
Biological banks & Data resources

Biological banks:

Serum Bank >9000 samples
Cattle, buffalo, horse, pig, goat, elephant, sheep...

Cryopreserved isolates
Trypanosoma evansi, Trypanosoma lewisi, Leptospira, Bartonella

Rodent samples
2500 rodents from 15 species for investigations in viruses, bacteria, protozoans, arthropods and helminths

Data Bases and Web resources:
protocols, maps, barcoding tools, sofwares...
Workshops on Zoonoses

Organize regular workshops & training courses devoted to

- Laboratory techniques
- Statistics and modelling
- GIS

Parasitic, but also bacterial and viral, including their vectors could be considered.
Pilot training/Workshop
« Rodent survey: from trapping to pathogen screening »
15-18 May 2012
FVM/KU

80 participants from 4 continents, 15 international speakers
Workshop/Training on “Diagnosis and control of human and animal trypanosomes and their vectors in Asia: from field to laboratory”
15-21 May 2013
FVM/KU

35 participants from 9 countries
Workshop/Training on “Biting insects as mechanical vectors of trypanosomes in South East Asia”
18-22 November 2013
Veterinary Research Institute, Ipoh, Malaysia

Next Workshop Yogyakarta, Indonesia, 19-24 May 2014
Thank you for your attention